THE STATE OF SOUTH CAROLINA
In The Court of Appeals

APPEAL FROM CLARENDON COUNTY
COURT OF COMMON PLEAS

W. Jeffrey Young, Circuit Court Judge
And
George C. James, Circuit Court Judge

Case No. 2008 CP 14-0461

Andreal Holland by his Guardian Ad Litem Peggy Knox,

Plaintiff/Appellant,

vs.

Morbark, Inc, Precision Husky Corporation, A & K Mulch, LLC, Watford Industry, Inc., Defendants, of whom Morbark, Inc. is the Respondent.

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Q: So you've got a cut --
A: You've got to cut the board.
Q: Right.
A: And then the board goes through the edger and be edged and. The waste falls off the board and that goes to the chipper.
Q: All right. Even for non-saw mill folks I think I understand your answer. At some point do I understand that this chipper operates without an operator attending it? I mean, it's just there doing its job and there is no one actually assigned to operate this machine?
A: That's correct.
Q: All right. So if we were to look during a normal shift when Mr. Holland was working there we wouldn't find him near the chipper. We would find him back at the cut off saw. And that would be inside the mill?
A: Yes, sir.
Q: All right. Now if something goes wrong out here, who attends to the machine?
A: If something goes wrong out there, that's when they notify me and I goes out there.
Q: Okay. Who would do that? I mean, how would anybody know something's gone wrong if no one's in attendance?
A: It would be the resaw man, Levain, he operates the

resaw. And we have a resaw tailer. He's in the mill also in the back of the mill. And if something, if the chipper goes down or they hear it dies down or something like that then they notify me. We got an air whistle in the mill. They blow the whistle four times and I'll respond.

Q: All right.

A: If it ain't nobody back there.

Q: You mentioned Mr. Brown, Levain Brown. How close to this machine is he, was he working to Andreal Holland -- well, let's strike that question. How close does Levain Brown work on a normal basis to this location that's pictured in photograph Plaintiff's One?

A: Well, when he was working Levain, he got a little box that he's in. It's in the back of the mill. And you have to leave out of that box. It's probably about 20 or 25 feet from the chipper. But you've got to go through the back door in order to get there. So you've got a wall up on the back and you've got a back door back there.

Q: So Levain wouldn't be in the position to actually see what was going on in the chipper. Although he's nearby it that wall is in the way?

A: The wall is in the way. He could not see.

Q: Has there been any changes to that at this point? Has

that wall been removed?
A: No, sir. That wall is there all the time.
Q: So this, this conveyor that goes to the vibrator, there's some sort of opening I assume in that wall that takes this through the, through the end of the mill and out to this area?
A: There's an opening there. Yes, sir.
Q: How big is that on there?
A: It's almost like a door I would say.
Q: Is it big enough you can see through it or around it?
A: It's big enough you can see through it.
Q: Is there anybody that works nearby that they can see the chipper machine looking through that opening?
A: No, sir.
Q: All right. You mentioned Mr. Frierson who apparently has had some experience running that or changing blades in that chipper. How long has Mr. Frierson -- I guess he's not working there now?
A: No, sir.
Q: All right. But had worked there a good while?
A: He had worked there a good while. He had worked at Georgia Pacific a good while.
Q: All right. Let me go into that with you a little bit. Your experience at Georgia Pacific, you say you went in there as a laborer?

took over.
Q: Okay. Well, I'm just trying to get an idea.
A: Yes, sir.
Q: So when you got there you had, what were your responsibilities?
A: To keep the mill running and do whatever I had to do. If I had to saw I would saw. If I had to run the edger I would run the edger, do the maintenance work if something broke down.
Q: How involved would you get with scheduling production?
A: I was very involved with it along with, well, safety always come first to me.
Q: Yes, sir.
A: That was my number one priority. And production was very, you know, I mean, it comes after safety. But I used to push for it.
Q: All right. I was just trying to get an idea about, you apparently are a working foreman when you were hired. You supervised and filled in to do extra work, whatever it took --
A: Yes, sir.
Q: -- would be your job?
A: Yes, sir.
Q: But in terms of actually scheduling people to work, taking responsibility for supervising or disciplinary

issues, was that also your job?
A: Yes, sir.
Q: All right. So you would have some information or training by someone to get prepared to take over the procedures of A&K Mulch?
A: Yes, sir.
Q: How did you go about that, to make yourself familiar with those procedures, whatever they were? Let's say the disciplinary procedures to start with.
A: Oh, like if someone late or tardy and all that?
Q: Yes, sir.
A: Well, I had that position, I had the position. When I was at Georgia Pacific I had to do the same thing.
Q: All right. Did you work with the people in the office to carry out this --
A: Yes, sir.
Q: -- this job?
A: Yes, sir.
Q: So if somebody needed to be written up would they hand you the form or would you go to the office to complete the form?
A: When somebody need to be written up, I mean, I had procedures to go by.
Q: That's what I'm asking. Where did those come from?
A: Those come from the office. I had to go to the office

what sub-standard work means? That's under the violation section. I mean, you judge that yourself I guess?

A: Well, I know what tardiness mean but when it comes down to reading the book on that, I didn't have that.

Q: All right. Did anybody else have to approve these warnings? I mean, was this just your job and no one else's?

A: Well, it was my, well, it was my job to if someone is late and didn't call in, if I'm the supervisor or either if I'm the mill foreman, and you got a job to do if you're supposed to be here at seven o'clock and you don't show up, then I feel that I should be the one that you notify.

Q: Yes, sir. So what I'm getting to is that, you know, there's another category here that's called carelessness. And I can't find where Mr. Holland's ever been written up with a written warning for carelessness. Do you recall ever making such a written warning to him for carelessness?

A: No, sir. I haven't.

Q: All right. Does Mr. Witherspoon review these?

A: I feel that he does.

Q: All right.

A: Yes, sir.

Q: Now, you actually work for Mr. Witherspoon, don't you?
A: Yes, sir.
Q: And I understand that he's in charge of both J.C. Witherspoon Jr. Inc. and A&K Mulch?
A: Yes, sir.
Q: And maybe some others. But do you know about Witherspoon, J.C. Witherspoon Jr., Inc., that that's a separate business from A&K Mulch?
A: I know of it. Yes, sir.
Q: All right. Well, you've never worked for them?
A: No, sir.
Q: All right. Now, at some point the, I think counsel asked you about this OSHA report and he had referred you to the OSHA exhibit. I'm just going to get mine separately marked, if you would.

(Plaintiff's Exhibit Number Five was marked for identification purposes.)

Q: All right. This report which is fairly lengthy, it has front and back pages on most of these things. I think you were asked about a statement that's handwritten. It says time 4:30 on June the 1st. And you were asked whether this is your handwriting. And I think you said it was not.
A: Uh-huh (affirmative response).
Q: Is that right?

A: That's right. Yes, sir.
Q: Okay. Now, in terms of the information that's here, I would like to make sure I understand. Does that time, it looks like that 4:30 on June the 1st is actually when the accident happened. That's not when this statement was made. Is that your understanding?
A: That's the time it happened.
Q: All right. So the information that's on here is it's it's got Andreal Holland two years in the saw mill. And then the second line says Richland Memorial Hospital. So I guess we would take from that whoever wrote this knew a little bit about the background of the case, that Andreal was at Richland anyway?
A: Yes, sir.
Q: And somebody had told them he had worked there for two years?
A: Right.
Q: Now, the information here and I want to make sure this is what you understood, because I think they're making the connection back to something you said to them. You didn't see the accident. I understood that.
A: No, sir.
Q: But in terms of the mill had shut down, that, was that true?
A: Yes, sir. The mill had, was getting ready to shut

A: Changing the chipper knives.
Q: Why does it take two people to change the chipper knives?
A: You have to have one to run the air gun. That's to loosen your bolts. One be on one side with the air gun. The other be on the other side with the knives. And when they loosen that blade you push it out to the one that got the blade and put the knives on it. That's why it takes two people.
Q: All right. So let's look at another picture. You've got, at this point where you've got the entire machine with that hood open -- let me get this marked.
(Plaintiff's Exhibit Number Six was marked for identification purposes.)
Q: All right. That's another photograph that's marked as Plaintiff's Six. Can you tell me what that is?
A: That's the chipper with the hood open.
Q: All right. And you talked about using an air gun. And the knives.
A: Right.
Q: Let's get the same terminology now. Where are the knives?
A: The knives is on the other side.
Q: All right.
A: These are the bolts that you loosen with the air gun to

back the knives, you know, to take the tension off the knives.
Q: All right. What do we call this device here that seems to be part of the disk?
A: That's a fan. We call that a fan.
Q: All right. Let's put some labels on this one so we know.
A: (Witness complies).
Q: Okay. And the bolts that are going to get loosened, which ones are they?
A: These right here. You've got four of them.
Q: All right. Well, circle them.
A: (Witness complies).
Q: Okay. So what do you call those? The knife bolts?
A: Those are the clamps.
Q: All right. Let's put clamps on there then.
A: (Witness complies).
Q: Now, how many knives does this machine have on it?
A: Six.
Q: All right. So if we've got four bolts for each knife; is that what I'm saying?
A: Yes, sir.
Q: You've got a total of 24 bolts to unloosen?
A: Yes, sir.
Q: Now, who, in this process of using two people, you've

A: And we're still on the same side of the chipper.
Q: All right. In this particular photograph there seems to be some debris hanging on the wheel there or on the disk or the fan portion of it. Do you see where I'm referring to?
A: Yes, sir.
Q: Is that typical of what you usually find when you open the machine?
A: When it stops. Yes, sir. When it stops. Right. That's where your knives up in there. You have like some chips that, you just clean all that out to change the knife.
Q: All right.
A: You don't have to bother with this right there but right here where this knife is you've got to clean that out.
Q: All right.
A: Right in there.
Q: Would you circle those things that you're calling knives?
A: I don't know if you've got any other pictures of the other side of the disk or not. But I could show you you better. But this is the knife right up through there. That's on the other side of the wheel.
Q: Yes, sir.

A: And right there.
Q: All right. So the knives actually go through the disk, some portion of them?
A: No, sir.
Q: All right.
A: The knives fit up flush against the disks on the other side.
Q: All right. But with some sort of an indent that positions them?
A: Right. That positions them in there. Yes, sir.
Q: And you want to recess them so they don't, so that they are secure in that disk?
A: Right. Yes, sir.
Q: All right. So this is, where you've drawn these arrows is the reverse side of the knives?
A: Right.
Q: I don't know how you say that but let's put something on there to indicate it's the back side of the knife.
A: (Witness complies).
Q: All right. This is one more photograph.
(Plaintiff's Exhibit Number Eight was marked for identification purposes.)
Q: All right. Looking at Plaintiff's Eight how do you identify this one?
A: This is the in-feed. That's your vibrator.

Q: Okay.
A: Vibrator. This is the mouth where your in-feeder or your waste going in there.
Q: Uh-huh (affirmative response).
A: This is the hood again. Your fans take it around to your out-feed. Out-feed through the pipe and goes over to your --
Q: It's some kind of a separator in this that gets the two large chips to come back through the machine?
A: Yes. It's a screen inside of the shaker.
Q: All right. Now, and this is the position the machine was in the day when you found Andreal unconscious?
A: Yes, sir.
Q: All right. Where was Andrea's body when you saw it?
A: Right in front of the, a little bit further out right along in here.
Q: All right. Let's put an X with an arrow indicating about where it was at but further out.
A: I would say approximately three or, about four foot out that way. Yeah.
Q: Okay.
A: I'll put an X here.
Q: Right.
A: And I'll put a little arrow out that way.
Q: Okay.

A: And I would say approximately five foot.
Q: All right. And so he was more or less parallel with the machine but lying on his face?
A: He was, he was, this is the hood.
Q: Yes, sir.
A: And that hood was opened back.
Q: Yes, sir.
A: His foots were here and his head was out here.
Q: All right.
A: But he was face down.
Q: Right.
A: He was lined up straight with the hood of that machine.
Q: So his feet were closest to the machine and his head was furthest from it?
A: His head was furthest from it. Yes, sir.
Q: You had if I understand how you had worked your preparation to take over your job, you had all essentially 25 years with Georgia Pacific and then these other supervisor jobs. You had been a supervisor for how many years at Georgia Pacific?
A: Approximately, supervising approximately about 15 or 20 years.
Q: All right. And if you add the time that apparently you had some supervisory position at these jobs before you got to Witherspoon, total time you've been a foreman or

had been powered off and locked out, tagged out, locked out and tagged out, did you ever talk to anybody that had an estimate of the time that had gone by between the time that machine had been powered off?

A: No, sir.

Q: And when the accident happened?

A: No, sir. I haven't.

Q: When you say the chipper wheel turns ten to 15 minutes, I assume you've got experience on this job enough to make that estimate?

A: Yes, sir.

Q: All right. And is that typical of the other machines that you've operated?

A: Yes, sir.

Q: Other chipper machines?

A: Yes, sir.

Q: All right. Now, what would be the difference between ten and 15 minutes? I mean, how, does this machine sometimes take ten minutes and sometimes take 15 minutes?

A: Yes, sir. And the reason why is when you're in operation and everything, just take for instance everything is running at the time.

Q: Yes, sir.

A: All right. And you've got waste in this vibrator right

here.
Q: Yes, sir.
A: And when you go over there and hit the button, stop button, you've still got feed going in. When you cut everything off and you cut this vibrator off but you've still got a little bit of waste going in there. A little built of waste will help slow that, your disk down. Just take for instance you ain't got no waste in there and you cut it off and there ain't nothing in there to slow it down, it will free wheel. I call it free wheel. It will free wheel right on for maybe 15 minutes at that time because you ain't, there's no waste in there when you cut it off.
Q: Does sometimes operators or people changing the blades intentionally pack material in there to slow it down?
A: You don't supposed to do that but I have stopped them from doing that. But you don't suppose to do that.
Q: Well --
A: What I'm saying you don't suppose to -- it's a no-no.
Q: Well, is it in your 20 or 35 years of experience working around chippers have you known other operators of other chipper machines to do exactly that to get this thing to slow down faster?
A: Not pack nothing in it.
Q: I'm not talking about pack. Feed.

A: You can, after you lock this out and if you turn the vibrator on, the vibrator will feed it in there. But you can't do that because if you do that it will choke the chipper up and stop it. And then you can't even turn it. So you have to cut that off in order to lock it out for it, you know, to stop. If it's got chips in it and it choke its own self down, when time to change the knives you won't be able to rotate the disks because you've got chips in it. That's the reason why you lock it out and wait until the wheel stops turning so you can have a free wheel to turn when you want to change the knives. If you feed stuff in it you won't be able to do it.

Q: Well, within some range then if the material's being fed into the machine when it's powered off and the vibrator is still on, it's going to slow down quicker than if it isn't?

A: It's going to slow down quicker. But I always taught my fellows, I mean, that's a no-no.

Q: One of the things about the equipment that feeds this, this vibrator, where are the controls for this?

A: The controls for this one is sitting right back, if you've got a control panel.

Q: Uh-huh (affirmative response).

A: Out on the back side of the mill back there.

Q: Is the vibrator then on a separate control --
A: Yeah.
Q: -- button --
A: Yes, sir.
Q: -- than the machine?
A: Yes, sir.
Q: Now, are there any emergency stop switches on the machine?
A: On the chipper?
Q: Yes.
A: Not no emergency stop. No, sir.
Q: Okay. And is there any window that you can look through the hood and see if the machine is still turning?
A: On this, on that one right there you can look at the, in the wheel right there, you know, where it --
Q: You mentioned that, and I think you were very specific, you said even at a very slow speed that this machine could still have enough momentum or power in the disk to cause damage, either cut you badly or maybe dismember you.
A: Right.
Q: I mean, do you know what the speed of this machine is?
A: The rotation RPM, I don't. But it's a very high RPM.
Q: And do you know, have you looked at the safety manual

A: Right.
Q: I'm just trying to get an approximation. There's a pulley about in that same area, the machine that you worked on, the Nicholson where you've drawn this circle. The pulley pulled up what part of the hood?
A: That half part where that opened up.
Q: How was that hood secured? Did it use pins or bolts?
A: They used pins. The same pins that we --
Q: How did you get up there and get the pins out? I mean, that's pretty big, isn't it?
A: Yes, sir. We had like a two foot stepladder that we had built.
Q: Okay. And you used the hammer over there too?
A: Yes, sir. The majority of the time the pins that you put them in there, you had to drive them in and out of there.
Q: Have you worked on or seen chippers where the hood's bolted, the half hood, these two-piece hood sets where they bolted the sections together?
A: Not where I've been. Every one that I've been at was had the pins in it. The reason why is on account of time. If you've got the bolts in there, you spend more time taking the bolts. I mean, it may be more of a safety. But I know the pins is majority of the time what that's, you know, would be in.

A: There ain't no bushings or bearings in it. No, sir.
Q: So as it was designed I mean I guess it worked the way it was supposed to be. But when you looked at the damage to the hood, and I'm looking at Plaintiff's Eight from the Witherspoon deposition, we've got what looks like some damage along this flange on the right side of the hood?
A: Yes, sir.
Q: All right. Is that where you found the problem with the fans?
A: There wasn't no problem, it was a problem after the, that, you know, when the fan hit the thing. What I'm saying, if the hood wasn't lining up with the fans and when we cut the machine on, it would have been hitting in the inside of there, you know, to start with if it wasn't lining up. When it's in operation and if the hood wasn't lined up with the fans, you couldn't run it.
Q: All right. Well, I'm not arguing with you. I'm just trying to understand. So Plaintiff's Eight which is marked at the bottom PH 004 would be one of those areas of damage to the hood that you can pretty easily see?
A: Yes, sir. I mean after the accident.
Q: Yes, sir.
A: Right.

noise?
A: No, sir.
Q: Okay.
A: No, sir.
Q: You mentioned that after the 58-inch chipper was installed that you put some additional decals on it?
A: Yes, sir.
Q: And that you had ordered those through the office?
A: Yes, sir.
Q: Okay. And you're certain that those decals you ordered were the ones that were on the machine at the time this accident happened?
A: Yes, sir.
Q: Who put them on?
A: Me and Mr. Jimmy.
Q: Okay. And they were the decals with this illustration of this, that we've looked at before but a man getting knocked in the head with something?
A: Yes, sir. The position of the hood, you know, coming back.
Q: Okay. But the three stickers, the one on the back side of the movable section of the hood and on each side, those are the ones that you and Mr. Jimmy put on there?
A: Yes, sir.
Q: And do you recall how long that machine was there and

A: As an employee he was a good worker. Knowing his job, he knew his job.
Q: Were you aware that the first saw mill job he had was apparently started in early 2004?
A: No, sir.
Q: Okay. Now, your own experience when you got there and after 35 years you talked about all the information that you accumulated that apparently has convinced you about your emphasis of safety.
A: Yes, sir.
Q: Okay. And it looks like your own experience included significant training by a variety of people over a course of time when you were at Georgia Pacific.
A: Right.
Q: And that safety was emphasized in operating those machines at Georgia Pacific?
A: Yes, sir.
Q: And your I'll call it industrial experience that's accumulated over decades now, it's something you rely on to be safe yourself?
A: Yes, sir.
Q: And you know that David Wright has got a similar amount of experience?
A: Yes, sir.
Q: And you know that Leroy Frierson has got a similar

Q: Well, he's documented it for us. But as far as the area that's most dangerous while the machine's operating, I assume it's the feed chute. I mean, if someone were to try to get their, force a jam or something into the feed chute, that would be an area where you would be exposed?

MR. OTT: Objection to the form.

A: It feeds itself.

Q: Well, if it works right.

A: Right. You don't need nobody to feed it.

Q: Yes, sir.

A: It feeds itself.

Q: Does it ever not work right? Do you ever have to --

A: Well, I mean, that's man-made material. Sometimes it don't work right. But you've got to fix the cause of it. If it don't feed, something's wrong somewhere or another. You don't have to have a man there to stand there to feed it in there.

Q: I understand that.

A: That's unsafe and it's a no-no.

Q: Well, what warnings are posted on the machine about not feeding the machine? I mean, we've talked about warnings about being, reading the safety manual apparently.

A: Right.

Q: All right. Well, I'm not asking you about the pin so we'll let that go for another day. Or maybe counsel will ask you some more. But my question about the information that we've been talking about here is what's in this safety manual. And it instructs the operator to look at the chipper sheave to verify the machine is stopped.

A: Sure. Whatever you, wherever you look all I said is make sure the machine is stopped. Lock out tag out and make sure the machine is stopped. If you look at the sheave or if you look at the opening or whatever. I never tell you to listen to it. I always say make sure the machine is stopped.

Q: When you were looking at the old 48-inch machine or the 58-inch machine, did you see some warning on the machine where to look? I mean, arrows pointing to look here first?

MR. OTT: Objection to the form.

A: No, sir. I haven't.

Q: That's basically, I mean your information about looking and where you would look is based on your experience?

A: Where they, what the manual say.

Q: I think we just read that.

A: Right.

Q: Look at the sheave.

A: Right. Look at the sheave.
Q: This is the manual that you kept in the office that Mr. Holland never saw. Is that what we're talking about here?
A: That's the safety manual.
Q: Yes, sir.
A: I mean, that's the manual.
Q: All right. Let's go back to the question about the warnings that you were asked about. Okay? So we've got a decal that you've put on this machine that shortly after it arrived with this illustration of somebody being struck in the hood with some portion of the half hood, struck in the head by some portion of the half hood, that's the three stickers or labels that you referred to, you and Mr. Witherspoon put on the machine; is that right?
A: Safety stickers. Yes, sir.
Q: But we already identified them. And but the specifics of those labels, I mean, you didn't design those labels?
A: I didn't.
Q: Had you ever seen those labels on any other machine?
A: No, sir.
Q: Now, in your range of experience have you ever known anybody to get hit in the hood, or head with that half

anybody that's made the change, lock out tag out and wait until the wheel stops turning.

Q: Yes, sir.

A: I mean, if you follow the proper procedure that --

Q: Yeah. And we're almost done. I know Curtis has some questions for you. But the specifics of this bad accident, you know, Mr. Holland didn't get his arm cut off. He got hit in the head. Okay? And whether he understood that risk or not, I don't know. But what I understand from you is you generally trained everybody or warned everybody follow the procedure, lock out tag out and wait until the disk stops?

A: Yes, sir.

Q: But you didn't specifically train everybody that one of the specific risks of doing all that was you're going to get hit in the head?

MR. OTT: Objection to the form.

A: I wouldn't think you would have to go that far if you follow the proper procedure which is safety precautions.

Q: I understand.

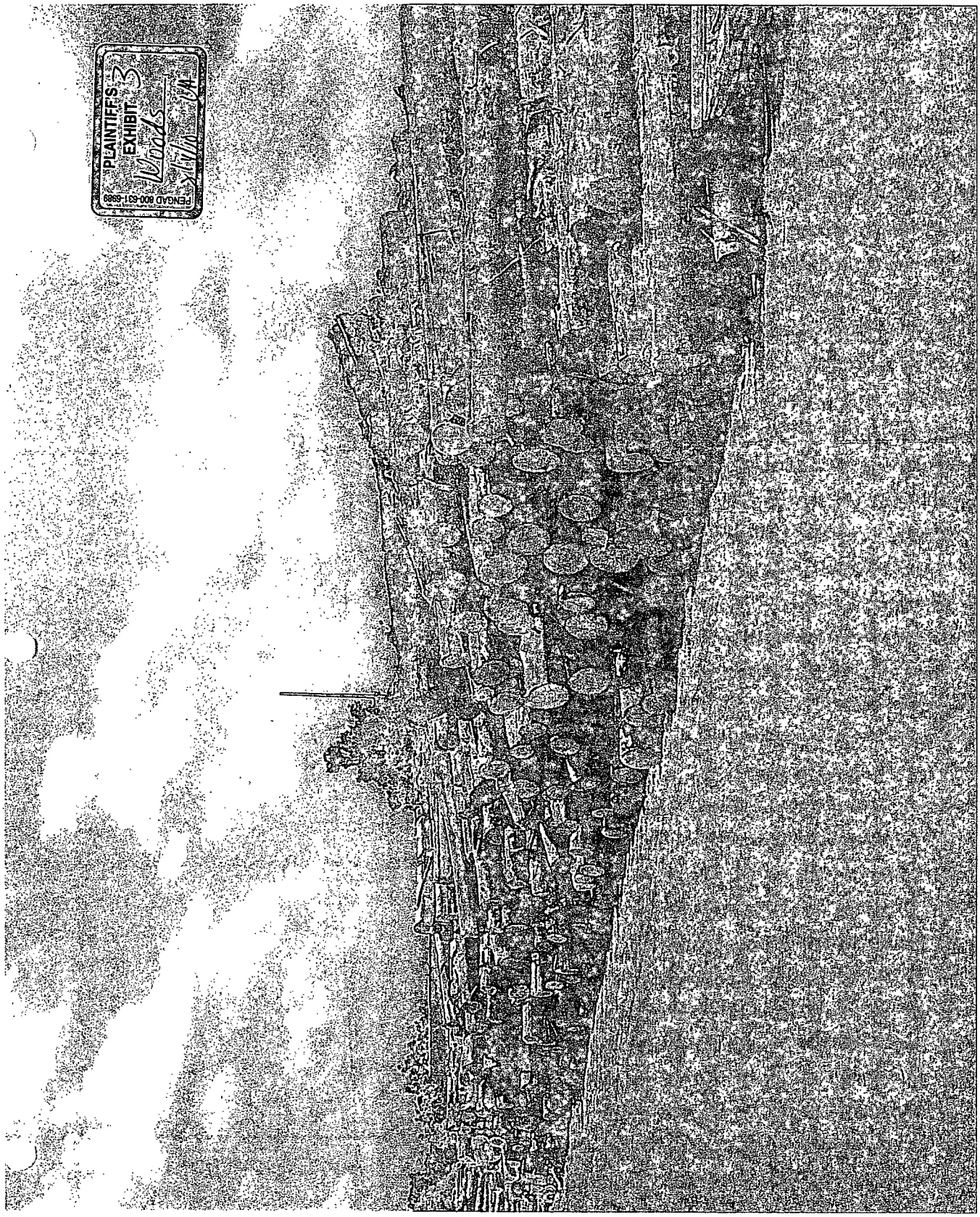
A: Yes, sir. I mean, if you're not going to follow the proper, then you would tell them, say look, that wheel is going to, you're going to get hurt if you open it when it's open. I just --

PLAINTIFF'S EXHIBIT
Woods
8/3/10 CA

00519


Small ferring mill
PLAINTIFF'S EXHIBIT 2
DANGER
Do Not Open When Chipper is Turning
DO NOT REMOVE THE DECALS FROM THIS MACHINE
CAUTION
MOVING PARTS
MANUFACTURED WITH PRIDE IN THE USA!
MORBARK
WINN, MICHIGAN
SAFETY FIRST!

00520


PLAINTIFF'S
EXHIBIT
3
PENGAD 800-631-6989

PLAINTIFF'S
EXHIBIT
PENGAD 800-631-6989
Front
Clamp
Disc

PLAINTIFF'S
EXHIBIT
PENGAD 800-631-6989
DANGER
LOCK OUT FOR
SAFETY

PLAINTIFF'S
EXHIBIT
PENGAD 800-631-6989

COPY

STATE OF SOUTH CAROLINA	IN THE COURT OF COMMON PLEAS
COUNTY OF CLARENDON	
Andreal Holland by his Guardian Ad Litem Peggy Knox,	
Plaintiff,	C/A NO. 2008-CP-14-00461
vs.	
Morbark, Inc., Precision Husky Corporation, A & K Mulch, LLC, and Watford Industry, Inc.,	
Defendants.	

DEPOSITION OF

ROBERT ROSEBOOM

****

Wednesday, August 4, 2010
3:20 p.m.-5:18 p.m.

The deposition of ROBERT ROSEBOOM, taken on behalf of the Defendant at the offices of Land, Parker & Welch, 29 South Mill Street, Manning, South Carolina, on the 4th day of August, 2010, before Lyn Allen, Court Reporter and Notary Public in and for the State of South Carolina, pursuant to Notice of Deposition and/or agreement of counsel.

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ROBERT ROSEBOOM, being duly sworn, deposes and testifies as follows:

MR. ROSEBOOM - EXAMINATION BY MR. OTT:

Q: Tell us your full name please.

A: Robert Alan Roseboom.

Q: Mr. Roseboom, we just met. My name again is Curtis Ott. I'm an attorney. And I represent a company called Morbark who makes wood chippers.

A: Uh-huh (affirmative response).

Q: Do you know who Morbark is?

A: Yes, I do.

Q: All right. We're here today to take your deposition because you've been identified as someone who might know something about this lawsuit which involves a June 1, 2006 accident that a Mr. Holland had at A&K's facility. Do you remember that incident?

A: I do.

Q: Were you working that day?

A: I was.

Q: All right. I'm just going to ask you a number of questions about what you remember from that day and your experience with the wood chipper involved in the accident. And your role for lack of a better word is simply to answer my questions and any that Mr. Jonas might have --

A: Okay.
Q: -- on behalf of Mr. Holland. The most important thing we're going to do today is communicate. So if I ever ask you a question that you do not understand, would you please let me know that and I'll be happy to rephrase it?
A: All right. Will do.
Q: Okay. What is your position at A&K?
A: I am a supervisor of the smaller mill out there.
Q: And tell me what you mean by the smaller mill.
A: I's a scrag mill where we just cut dog ear fencing.
Q: Mr. Woods referred to that as the fencing mill earlier?
A: That's correct.
Q: The same thing?
A: That's right.
Q: In fact, is there a 48-inch chipper machine now located in the area --
A: That's correct.
Q: -- of your fence mill?
A: Yeah.
Q: And do you understand that that 48-inch machine used to be in the area where Mr. Holland's accident was?
A: I do.
Q: Okay. How long have you worked at A&K?
A: Since July 2004.

Q: Were you hired to be supervisor of the fence mill?
A: No. I was actually hired to make sure all, that his equipment gets maintenanced and keep up inventory and everything like that.
Q: And so were you the maintenance man?
A: Down at the shop. Yeah.
Q: How long did you work at the shop?
A: About two weeks.
Q: And why did you stop there?
A: He asked me if I could go down to the mill. And then my job then was receiving, shipping and receiving, weighing in trucks at that point.
Q: And when you say go down to the mill do you mean the fence mill or the saw mill?
A: Oh, A&K. Because I first got hired to work for J.C. Witherspoon.
Q: I see. So originally you worked for J.C. Witherspoon, Jr., Inc. I think was the company?
A: Inc. That's correct.
Q: Only stayed there two weeks and then moved over to A&K side?
A: That's correct.
Q: When you started at A&K you were originally with shipping and receiving?
A: Yeah. A gentleman named David Hewitt is sales. And he

needed help weighing trucks in, writing orders and loading trucks and that sort.

Q: How long did you stay in that job position or title?

A: I would say roughly a year.

Q: And then what did you do?

A: Then Jimmy asked, promoted me to supervisor of the fencing mill.

Q: So did you ever work in the saw mill portion?

A: The one with Wood, Mr. Woodrow Woods?

Q: Right.

A: No, I haven't.

Q: Have you done anything to prepare for your deposition today? Talked with anyone? Looked at any photographs?

A: No. I didn't know I was going to be here until yesterday.

Q: Who let you know that you got to do this?

A: Ms. Martha Odom.

Q: And do you have an understanding of what this lawsuit is about?

A: I have a rough idea.

Q: And what is that?

A: That workman's comp is, or Andreal is trying to get some more compensation as far as I know.

Q: Okay.

A: Other than that I don't have a clue as to what it's

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Q: -- this violation led to his injury?
A: Yes, sir.
Q: And is that what you've talked about with Mr. Witherspoon?
A: Yeah. He would open the lid or the drum or the --
Q: The hood?
A: Whatever it is still spinning. And was warned a couple of times. I was there one time when Jimmy warned him. I know Woodrow said he warned him. I wasn't in the presence when he warned him. But that was one thing that he would open the door and blow, he would take an air hose and blow the backwards, you know, to try to help slow it down quicker is why he would do that.
Q: Had you ever seen him do that personally?
A: Yes, sir.
Q: How many times?
A: Probably two or three. I don't go over there all the time when he changed the knives.
Q: What is your experience with the wood chipper machines that A&K has had over the years?
A: Well, I got the one at my mill, that 48-inch Morbark is on my mill. And change knives on it. Not all the time. I've got guys that do them but if they need help I'll change them or help them change them. You know, it takes two or three people to do it. I have been at

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the big mill, Mr. Woodrow Woods' mill when they're changing those knives. And I have worked, I have worked on other chipping mills or chippers that Jimmy has in the woods, the big ones.

Q: When did the 48-inch machine get moved down to the fence mill?

A: I can't put a date on it.

Q: Was it before or after Mr. Holland's --

A: It was after that.

Q: Based on a lot of other folks coming in and giving their depositions we understand that the first chipper that A&K had was that 48-inch. Do you understand that?

A: Yeah.

Q: Do you understand who made that chipper? Who the manufacturer is?

A: You mean Morbark?

Q: Right.

A: Yes, sir.

Q: And at some point that chipper was moved out and in its place was installed a 58-inch machine?

A: That's correct.

Q: Do you know when that happened?

A: That was the same time the 48 came down to my mill, the big mill got a bigger chipper.

Q: Okay.

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A: I mean I can't put a date on it.
Q: Do you know who manufactured the 50-inch chipper?
A: I think it was Precision.
Q: Do you have an idea who, which machine was present at the time of Mr. Holland's accident?
A: I don't believe it was the 48-inch because I had to take the hood, I took the hood that was hit when the door flew open. I had to take that and see if it could be fixed. And it was a, it wasn't green. I want to say it was like a dark red. But the 48-inch I do believe was at my mill when that happened.
Q: So if it was a 58-inch in place at the time of the accident, do you know which company manufactured that machine?
A: Not offhand I don't.
Q: When that 48-inch machine was up at the saw mill as opposed to your fence mill, did you ever participate in changing its blades?
A: No, I didn't.
Q: During that time before it came down to your mill were you aware of the procedure that was in place to follow that A&K had established for changing the blades?
A: No. Because I never changed them out before.
Q: Did you understand that the blades were changed twice a day?

A: Yes, sir.
Q: Once around or before lunch and once at the end of the shift?
A: In the afternoon. That's correct.
Q: When that machine came down to your fence mill, did you at that point learn the procedure for changing the blades?
A: Yes, sir.
Q: Who taught you?
A: I think it was Woodrow that went over the procedures with me. Yeah. I'm going to say Woodrow.
Q: And are those procedures the same today as when the 48-inch first came down to the fence mill?
A: That's correct.
Q: Tell me the procedure to follow for changing the blades on that 48-inch.
A: First you find the power source and shut it off and lock it out and tag it out. And you open the door. And start, you know, with the knives, loosen them up, clean the pocket out, put the new knife back in, tighten it up. And I go backwards with it to the next knife. And so on until you get all six done. And then close the hood. Put the pins back in it. And then, well, actually when you're done you spin it backward and make sure it's not hitting the anvil. And then put

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the pins back in the door and turn the power back on and that's it.

Q: When you say the door do you mean the hood?

A: The hood. Yeah. The door.

Q: Do you understand that from the time that the power's shut off to the 48-inch that there is a period of additional time that it takes for that machine to actually stop turning?

A: Well, when I meant turn the power off, I mean, it's done, it's already stopped by then. You know, we shut it off with the button, start stop button. But then wait until it stops and then you shut it down and then lock it out. That's what I meant by that.

Q: So you're saying --

A: It probably takes roughly three or four minutes for it to stop turning.

Q: I want to make sure I understand this. So you actually switch off. Is there a button or is there a switch?

A: There's a button on a wall, you know, a start stop button.

Q: Okay.

A: I'll hit the stop button. It will stop turning and then go over and hit the main breaker and then lock the main breaker out.

Q: So the step of making sure that the wheel has stopped

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A: I sure don't.
Q: Did they speak with you?
A: Huh-uh (negative response). No. They didn't.
Q: Do you know what the result of their investigation was?
A: No, I don't.
Q: I assume that because Mr. Holland did not work directly under you that you never provided him any training; is that fair?
A: That's correct.
Q: Are you aware of who did train him about his job duties?
A: No, I'm not.
Q: Was he working at A&K when you started at A&K?
A: I believe he was.
Q: Do you remember what his job duties were when you started?
A: Not offhand I can't remember where else. I'm trying to place where I've seen him in the mill but I can't, I don't know what his job description was.
Q: Do you know when he first started changing blades on the chipper machines?
A: It was before, before that happened. And like I said, I only go over there every now and then. I don't go over there all the time.
Q: You mentioned that you were the one who took the hood

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to see if it could be fixed?
A: That's correct.
Q: Who disassembled it from the actual chipper?
A: That I don't know. When I went over around the back it was, you know, it was off. Might have been Mr. Jimmy because I know he came. Mr. Jimmy came after the ambulance left.
Q: When you say you went around the back are you talking after the ambulance left?
A: That's correct.
Q: When you went over there to Mr. Holland did you look at the condition of the chipper or the hood or anything like that?
A: No, I didn't.
Q: Because you were concerned simply --
A: That's right.
Q: -- about how he was doing?
A: That's correct.
Q: And then at some point after the ambulance left you went back over to where it had happened?
A: After the ambulance left I want to say I went to the office either to weigh a truck in or do something. And then came back over because I seen Mr. Jimmy's truck over there and went back over across there.
Q: And what do you remember talking with Mr. Witherspoon

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side. So pretty much everything was moved around.
Q: All right.
A: Because the chips coming out of the chipper now go off to this side over here, to the left.
Q: I see. So what we've got there now isn't going to be very much help in understanding how it was set up at the time?
A: No.
Q: Let me show you Plaintiff's Two from the Woods deposition that's been marked up as the small 48-inch near the fencing mill. I guess this is what you've been talking about?
A: That's correct.
Q: And I represent to you this picture was taken shortly after Mr. Holland's injury. There's a lot of information on the, that's shown here on the side of the machine when this photo was taken. Is this machine basically in the same condition today? I mean, could I go out there today and look and see the same decals on the machine?
A: I believe so.
Q: Has there been anything added to this machine as far as decals or information?
A: Not that I'm aware of.
Q: All right. I think you said that you surmised that

there must have been some damage to the 58-inch machine when this, when the hood came in contact with, apparently came in contact with some portion of the disk or the fans or some portion of it?

A: That's correct.

Q: You didn't actually see any of that?

A: No, I didn't.

Q: But you did see the damage to the hood?

A: I did.

Q: And let's get this second one marked here. This is Defendant's Two in the Witherspoon deposition. It's Precision Husky 004. And I think we labeled these in succession. So it's the Defendant's Two from Witherspoon and Defendant's Three from Witherspoon which includes A, B and C. Let's mark them here as one exhibit.

(Plaintiff's Exhibit Number Three was marked for identification purposes.)

Q: This exhibit, just flip through it quickly, but there is a photograph of the hood, the damaged hood. And I'm not sure where this was taken. There's a lot of, looks like a differential or something there in the foreground. But do you know where this hood's at now?

A: No. I sure don't.

Q: All right. Well, the most important part of this is,

is that the damage in these, I guess there's four photographs that you, does that represent what you saw?

A: It didn't look like the hood that I seen. The hood I seen was worse than that.

Q: All right. The decals that are on the various portions of this hood, I mean, there's decals on the side and the back and the left and right sides, these decals, do you know anything about those?

A: What do you mean know about them?

Q: Well, my question is whether you were around when presumably or allegedly Mr. Witherspoon and Mr. Wood put those decals on the machine apparently after it was installed?

A: No. I wasn't around then.

Q: Are those the decals you saw on the hood that was damaged that you took over to Watford's?

A: Actually I thought I remember more decals on the sides. The ones on the back look about the same.

Q: Yeah.

A: I mean, I can't read them from here but I thought there was a few more decals on them.

Q: All right. So the damage you recall to the hood was not as it's represented in that photograph. It was more serious?

A: I thought so. You know, it's been a while but I

working up to.

A: All right.

Q: Almost working up to. This pin that we've been talking about, the hinge that essentially allows the movable part of the hood to rotate against, we have a picture of it on this 58-inch. Do you know if that's the same arrangement on the 48-inch?

A: That's correct.

Q: All right. Various people describe this hood against that pin as allowing a certain amount of wobble in the hood back and forth. Is that your experience with the hood?

A: You mean side to side?

Q: Yes, sir.

A: It might get a little wore every now and then. But other than that, it shouldn't have any wear because once you put that door down, these pins hold it tight there to which it won't have any wear and tear. If it gets any wear, it will just open the door, open and closing it.

Q: It's not a precision fit. It's not got bushings or any of these, any other way to control the clearances on it. It's just a rough fit?

A: Well, I mean it's got to be kind of tight but it's got to be loose enough to pivot.

Q: And I'm not trying to make a point. I'm just saying that would you agree, or asking would you agree that the hood setting on that pin without it being secured with the pins that lock it to the machine has a certain amount of wobble? If you get it up in the air it's going to move left to right some amount?

A: It might move just a tad. But you're talking that pin is about eight to ten inches long. I mean, you're not going to have too much play.

Q: You wouldn't expect so?

A: No.

Q: Okay. Now your surmise about the accident is that this hood, some portion of it came in touch with some portion of the disk or possibly the fan blade that we're looking at there in Plaintiff's Six in the Woods deposition?

A: That's correct.

Q: All right.

A: Either that fan blade or the knife on the other side. They would have to grab one of those.

Q: All right. And if we look at these photographs that we've now marked as Plaintiff's Two, if this is accurate and represents the damage, it looks like at some point the damage was mostly to the lower section of the hood. I mean, it seems to be near the joining

we'll call that.
A: Not the pin. Your pin's back here.
Q: Yes, sir.
A: But that from this angle here your damage is on the pocket side.
Q: All right. So as far as an accident goes, we don't know what Mr. Holland was doing other than it's pretty obvious the pins weren't in the hood, otherwise it wouldn't have been thrown backwards?
A: That's correct.
Q: So he might have just pulled out a pin. The machine might have been barely moving or it might have been moving very fast and he might have pulled it back? Any of those possibilities?
A: That's possible.
Q: All right. So if the hood just by way of your experience with the 48-inch machine, once those pins are pulled out of there, if no one attempted to move the hood back, but it moved just enough on the hinge to come in contact with the blade without him pulling back on the hood itself, I mean, that would be one way this accident could have happened?
A: Yeah. If you took them pins out.
Q: Yes, sir.
A: Because your clearance on your pocket and this side, I

mean, I don't know how much clearance is, but it --
Q: It's pretty tight?
A: Once those pins are out. Yeah.
Q: This thing works on kind of a plenum basis. I mean, it exhausts because it's got those fans in fairly close tolerance, isn't it?
A: That's correct.
Q: It throws this stuff, I mean, it creates this upward draft.
A: (Nods head affirmatively.)
Q: It doesn't work if it doesn't create the upward draft?
A: That's right. Yeah. It's throwing it up.
Q: All right. One other question about the operation. There's no emergency stop or safety stop on this machine. I mean, it, once you power it off that isn't going to change the momentum of that wheel.
A: No.
Q: There's no brake on it?
A: No.
Q: And as far as indicators on the machine you have the opportunity to look at that drive shaft that leads to that pulley system. That would be one place you could look to see if it's moving?
A: That's correct.
Q: All right. And we don't know I guess, well, I mean, in

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your experience let me ask you about the 48 inches. I mean, at some point this thing slows progressively. It's very fast when you cut off the power but it slows by momentum, the momentum being dissipated so that it finally stops.

A: That's correct.

Q: So the last minute it might be turning very, very slowly. The first minute you power it off might be turning very fast?

A: It is.

Q: And you didn't have or do you know how fast the machine turns the 48-inch, I mean, what the RPMs are?

A: I don't know the RPMs but I know it's really fast.

Q: More than a thousand?

A: Oh, yeah.

Q: Substantially more?

A: If I had to guess I would say somewhere around 15, maybe two thousand.

Q: Okay.

A: If not more. I mean, I'm not good on guessing RPMs.

Q: And I asked you for your estimate. So that's all we can make it.

A: Right.

Q: You've never actually read this operator's manual?

A: Myself, no.

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Q: Okay. We're looking at Plaintiff's Eleven here. And one, let me see if I can get to the question quickly. The troubleshooting section of this, and it's been marked Morbark 060 refers to some problems with chip size which seems to indicate something about the speed of the machine. It says varying engine RPM might be one of the causes. It says the operating RPMs are about 2150. So you've got a pretty good guess there.

A: Okay.

Q: So two thousand more or less RPMs. Is that, in that period of time you think it takes to turn, to run down the 48-inch machine to the point of powering off until it completely stops your estimate is what?

A: Excuse me. I was thinking somewhere around five or ten minutes if it's free-flowing, you know, doesn't have any obstacles in it.

Q: Which I guess is the question. We don't really know how it's being fed or what it's being fed when the power is turned off? I mean, if it's got --

A: You should be able to see material in it. I mean, it's got the big throat.

Q: So if there's material in it, it's going to slow down a little more quickly than if it doesn't?

A: That's correct.

Q: How do you operate the machine at the fence mill? Does

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it have a vibrator leading to the --

A: That's correct. It does.

Q: And what's the procedure for powering off? What do you do about the vibrator issue powering off the machine?

A: First you've got to turn it off because if you don't it's going to steady keep feeding the machine. Turn it off with the button off, off on button right there. And then you turn the machine off. And then you go, shut the main breaker off and lock it out and tag it out. And then wait until it stops and start changing your knives.

Q: So if somebody forgot to turn off the vibrator and you powered off the machine, it could jam the machine up?

A: It will stop it. Yeah.

Q: Yeah. And it could have problems, I'll call this digesting, I don't think that's a very good word but as the machine cuts the material I understand from one of our witnesses that, in the big mill that some of the pieces being fed could be up to 16 feet long.

MR. OTT: Objection to the form.

A: That's correct.

Q: Is that typical of what your machine has to handle?

A: No. My machine has everything at six foot.

Q: Well, as the material is being fed then of course, and if it's continuing to try to chip up some piece of

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material that's being fed, I mean, it could either stop it or it could run erratically. I mean, it could --

A: Well, if it's going to steady feed it it's going to slow down to where it will plug it up because it won't have the momentum to push the chips out.

Q: Have you ever any problems with the bearings on your machine?

A: No.

Q: Never been replaced that you know about?

A: I replaced one bearing on a chipper at my mill.

Q: Did you do the work?

A: Yeah. It was me, Mr. Jimmy and I want to say Jessie was bearing back then.

Q: All right. Looking at the Plaintiff's Ten from the Woods deposition, the parts manual for the 48 and 58-inch machine that starts at Morbark 012, this parts manual, just looking at the 48-inch, what bearings did you replace?

A: The one I replaced was the inside one by the belts.

Q: Yeah. So number nine on page Morbark 015?

A: That's correct.

Q: What do you have to do to replace that bearing?

A: You've got to take the pulley off or you've got to take the guard for the belts, take all the belts off, take the big pulley off. You've got to lift the wheel up a

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will have to go up and shut the vibrating conveyor off and try to put the other pieces of wood back and then try to clean that piece out.

Q: So the vibrating conveyor has got a separate set of controls the way yours is set up in the fence mill. I mean, it doesn't stop simply because the machine stops?

A: That's correct.

Q: You've got to turn them both off?

A: That's correct.

Q: And if you don't I think we already asked that but you could end up in a situation where you've clogged up the machine?

A: That's correct.

Q: Have you had that happen?

A: Plenty of times.

Q: What was the problem?

A: Well, sometimes if our chip screen which is this green piece right here, if they forget to turn that on because that's another separate piece of on and off equipment, the chips will, the chips will back up into this -- what do you call that? I can't remember. Cyclone is what I call it.

Q: Okay.

A: And if it backs up in that cyclone and then that will take away from the pressure of your chips. And it just

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backs up into the chipper.

Q: I see.

A: And sometimes it will throw the breaker off. And I've had one time where it burned the motor up.

Q: So it would just keep continuing to try to turn through this mass of material?

A: That's correct.

Q: Until something broke or stopped?

A: Or stopped.

Q: I think I'm done. That's all the questions I have. Thank you.

Further deponent sayeth not.

(There being no further questions, the deposition concluded at 5:18 p.m.)

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09:12:05

STATE OF SOUTH CAROLINA)
) IN THE COURT OF COMMON PLEAS
COUNTY OF CLARENDON) THIRD JUDICIAL CIRCUIT

2008 CP 14-0461

ANDREAL HOLLAND by his Guardian Ad Litem PEGGY KNOX,

Plaintiff,

- vs -

MORBARK, INC., PRECISION HUSKY CORPORATION, A&K MULCH, LLC, WATFORD INDUSTRY, INC.,

Defendants.

VIDEOTAPE DEPOSITION OF JAMES STRONG

Taken by the Plaintiff on Tuesday, the 24th day of August, 2010, at 1985 Ashland Drive, Suite C, Mt. Pleasant, Michigan at 1:36 p.m.

APPEARANCES:

For the Plaintiff: MR. DONALD E. JONAS, Esq.
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13:26:34 VIDEOTAPE TECHNICIAN: Today's date is August 24th, 2010, and we are on the record at 1:26 p.m. This is the video deposition of Jim Strong. We are at 1985 Ashland Drive, Mt. Pleasant, Michigan. This matter is pending in State of South Carolina, Court of Common Pleas, County of Clarendon, case number 08-CP-14-0461, Holland versus Morbark, Incorporated, et al. This deposition is being taken pursuant to the Rules of South Carolina Civil Procedure.

Would counsel, please, put your appearance on the record.

MR. JONAS: Yes. I'm Don Jonas. I represent the plaintiff Andreal Holland.

MR. OTT: Curtis Ott represent Morbark; and just for clarification, this is a continuation of the 30(b)(6) deposition that was started with Mr. Noch.

MR. CARTER: And this is Darrell Carter. I'm attending by telephone from Columbia, South Carolina, and I represent Axis Insurance Company.

JAMES STRONG

HAVING BEEN CALLED BY PLAINTIFF AND SWORN:

EXAMINATION

BY MR. JONAS:

Q. All right. Mr. Strong, would you, please, introduce yourself.

A. My name is James Strong.

Q. All right. And, Mr. Strong, where do you reside?

13:32:16 Q. What was the name of that?

13:32:18 A. Strong Manufacturing Company.

13:32:20 Q. What type of equipment?

13:32:22 A. Whole tree chippers.

13:32:24 Q. Is that company still in operation?

13:32:33 A. Not under that name.

13:32:34 Q. What is the name now?

13:32:35 A. Trelan Manufacturing.

13:32:37 Q. And it's in Remus?

13:32:43 A. Yes.

13:32:44 Q. Okay. Lot of activity in Remus. When you worked in the chipper business for Strong Manufacturing, now Trelan, did you ever work for Bandit at any time?

13:32:56

13:33:02 A. No, sir.

13:33:02 Q. All right. They're nearby in Remus?

13:33:06 A. They're in the neighborhood, yes.

13:33:08 Q. All right. I call it Remus. I don't know the difference. So within a few miles distance, you've got Morbark, Strong or Trelan I think as it's known as now, and Bandit?

13:33:11

13:33:18

13:33:22 A. Yes.

13:33:23 Q. And you're all in the business of manufacturing chippers of some sort?

13:33:28

13:33:30 A. Yes, of some sort.

13:33:31 Q. All right. What type of chippers did Strong, now Trelan manufacture?

13:33:37

13:44:31 trying to set it up, they would work with you to get it --
13:44:33 A. Salespeople would bring it to me with their request and I'd
13:44:37 lay it out for them, told them what they were looking for.
13:44:39 Q. Okay. This particular change, this number 1999 incorporating
13:44:49 this Michigan OSHA standard, what caused you to initiate that?
13:44:56 A. Well, I don't remember exactly, but I -- we had safety
13:45:00 meetings with MIOSHA people, we had a local employee with the
13:45:05 MIOSHA department, and he would come in and give us training
13:45:10 for various aspects of guarding, stairways, it could be any
13:45:16 topic, and this one came up in one of them, and we thought
13:45:19 that it would be good to let this be known to our customer
13:45:23 that were purchasing equipment.
13:45:24 Q. Right. So as a result of some sort of internal training, you
13:45:30 recognized that this is something might need to go on the
13:45:34 purchase invoices?
13:45:35 A. Yeah. I don't know if it was actually myself that done it or
13:45:44 my supervisor.
13:45:44 Q. All right. Was there anybody within the department in the
13:45:45 period of time you were in the drafting department in early
13:45:48 '90s up until 1996 that was responsible for trying to -- well,
13:45:54 for basically documenting any design standards other than the
13:46:05 one that is referred to there? I mean, is there a designer
13:46:12 someplace that says this equipment is or is not required to
13:46:20 meet ANSI standards or some other standards?
13:46:22 MR. OTT: Objection to form. You still need to

13:46:25 answer, Mr. Strong.

13:46:27 THE WITNESS: There's been searches made -- in fact, 13:46:30 I've done it myself -- looking for various standards that may 13:46:32 apply to it. It seems to be a type of equipment -- it's not a 13:46:36 type of equipment that's common to a normal consumer that you 13:46:39 could go to Wal-Mart and buy this type of equipment.

13:46:41 BY MR. JONAS:

13:46:41 Q. Right.

13:46:41 A. It's got kind of its own world, I guess you could say. As far 13:46:45 as to say it needs certain this, certain that, there is no 13:46:47 standards.

13:46:48 Q. All right. But who makes the call?

13:46:51 A. Who makes the call as far as --

13:46:53 Q. That it does or does not meet -- require these standards? I 13:46:57 mean, is that a job you have?

13:46:58 A. No.

13:46:58 MR. OTT: Objection to form.

13:46:58 BY MR. JONAS:

13:47:01 Q. Okay. Who would it be?

13:47:02 A. Well, it would be farther up the ladder than I am.

13:47:05 Q. I mean, you researched it, so I mean, who did you report it 13:47:09 to?

13:47:10 A. Who did I report it to? It's just been more recently.

13:47:18 Q. All right. So my understanding from Larry's testimony was 13:47:21 that this machine, at least Norval Morey had something to do

13:47:27 with its design in the early '60s. Is that your
13:47:31 understanding?
13:47:31 MR. OTT: Objection to form.
13:47:32 THE WITNESS: Could you say that again?
13:47:33 BY MR. JONAS:
13:47:34 Q. That Norval Morey had something to do with the design of this
13:47:38 Morbark chipper machine or the style of machine that we
13:47:45 referred to as a horizontal feed, top discharge stationary
13:47:52 chipper, that Norval had something to do with that design in
13:47:57 the early '60s?
13:47:58 A. It's my understanding that he did, yes.
13:48:03 Q. All right. How did you get that understanding?
13:48:05 A. Just up until Norval's death was my understanding that he
13:48:13 looked over all the equipment that was produced by Morbark.
13:48:16 Q. I see. Well, we got this stationary chipper specification
13:48:27 sheet here. It's Morbark Number 4. And that's got some basic
13:48:34 information, but that style of chipper, if it came from this
13:48:45 origin of the early '60s and it moved along -- and it's still
13:48:49 being sold, I guess, is that your understanding?
13:48:52 MR. OTT: Objection to form.
13:48:53 THE WITNESS: This particular model here?
13:48:53 BY MR. JONAS:
13:48:54 Q. Yes.
13:48:55 A. Or these models, there's all -- there's several models stated.
13:48:58 Q. Yes. That's the style, I think.

13:49:01 A. Okay. So your question again is?
13:49:03 Q. That style of machine is still being sold by Morbark?
13:49:08 A. Yes. Yes.
13:49:08 Q. Okay. And the basic design, other than these changes that
13:49:14 were shown us in these engineering change notes or notices,
13:49:22 Exhibit 20, it's the same machine that Norval worked on and
13:49:26 apparently designed in the early '60s?
13:49:29 A. Yeah. I would say that the machine parts that's on these, if
13:49:33 you took them from the early '60s, early '70s, it would still
13:49:37 fit on this unit.
13:49:38 Q. Yes.
13:49:38 A. As far as compatibility, it would still fit that way.
13:49:41 Q. Right. So in terms of these changes, we had a little
13:49:46 discussion about how this machine might have been changed over
13:49:49 the years, it hasn't changed much apparently?
13:49:53 MR. OTT: Objection to form.
13:49:54 THE WITNESS: Well, the ECNs would determine changes
13:49:57 that were in these booklets here, everything in this pile
13:50:01 here --
13:50:01 BY MR. JONAS:
13:50:01 Q. Right.
13:50:02 A. -- would point out, I think, when they pulled these -- Larry
13:50:05 pulled these, these were all for a -- specific 48 or 58-inch.
13:50:09 Q. Right. But other than the changes that are now Exhibit 20 in
13:50:13 this deposition, there are no other changes that you're aware

13:50:16 of?
13:50:16 A. Which one is 20?
13:50:18 Q. This whole stack.
13:50:19 A. Okay. So your question is, are you asking me if this is
13:50:29 inclusive of everything that there would be a change in?
13:50:31 Q. As far as you know.
13:50:38 A. These are ones that are reported in the ECNs. I don't know if
13:50:41 that's all inclusive. I don't -- like I said, the machine is
13:50:45 pretty much the same so --
13:50:47 Q. All right.
13:50:47 A. -- I don't recognize where there would be changes, put it that
13:50:50 way.
13:50:50 Q. All right. Let's look at some of the things that seem to be
13:51:00 characteristic of the machine. As far as its operational
13:51:10 characteristics, do you know anything about that? I mean, how
13:51:14 fast it turns, what the feed rate is, that sort of thing.
13:51:18 A. I have knowledge of that. It may not be exact, but generally.
13:51:23 Q. Well, in a general way then, let's start with what you think
13:51:27 the approximate operating speed of the machine is.
13:51:33 A. Which machine are we referring to?
13:51:35 Q. Well, the 58-inch.
13:51:37 A. The 58-inch.
13:51:39 Q. I'm sorry, yes.
13:51:39 A. So you want to know how fast the disc rotates?
13:51:41 Q. Yes.

13:51:41 A. That machine is typically around 700 RPMs.
13:51:48 Q. Okay. And that's powered by what, typically what type of
13:51:51 motor?
13:51:52 A. That varies by the application.
13:51:58 Q. When you say it turns 700 RPMs, that would be based on what?
13:52:03 A machine, I assume, in good condition?
13:52:05 A. That's the only way the machine should be run.
13:52:08 Q. I understand your point. But if the bearings were failing or
13:52:11 something, you could have some -- some issues?
13:52:13 A. If the bearing was failing, you shouldn't run it.
13:52:15 Q. Certainly. That's not a trick question. I assume that you're
13:52:21 giving me these numbers as a machine in good condition. So
13:52:26 700 RPMs. And how far, and I've read about the rate of feed
13:52:39 of the actual cutter mechanism, how that affects the operation
13:52:48 of the machine. This is a six-knife machine, right --
13:52:54 A. Yes.
13:52:55 Q. -- I take it?
13:52:56 MR. OTT: Objection to form.
13:52:56 BY MR. JONAS:
13:52:57 Q. So as a six-knife machine, at 700 RPMs, what is the
13:53:03 approximate feet of cutting of -- per minute or per whatever
13:53:14 time you're familiar with?
13:53:15 A. Do you have a calculator? I don't know off the top of my
13:53:20 head. I mean, it's a formula to determine that.
13:53:22 Q. It has a formula to determine that?

13:53:25 A. Yes.
13:53:25 Q. And it's a critical formula?
13:53:27 MR. OTT: Objection. Form.
13:53:29 THE WITNESS: I don't know about critical. I guess
13:53:32 I don't know what -- I don't know what you mean by "critical."
13:53:34 BY MR. JONAS:
13:53:34 Q. Well, one of the things I was -- wanted to ask about, somebody
13:53:39 that could answer, was this is a disc-style chipper as opposed
13:53:48 to a drum-style chipper?
13:53:49 A. Yes.
13:53:50 Q. All right. And the difference for people that don't know the
13:53:54 difference is what? I mean, why would you ever use a
13:53:57 disc-style chipper?
13:53:59 A. Versus a drum-style, is that the question?
13:54:02 Q. Yes.
13:54:02 A. The quality of the chips are better out of a disc-style
13:54:05 chipper.
13:54:06 Q. More uniform?
13:54:07 A. Yes.
13:54:07 Q. All right. And, of course, if you were producing pulp chips
13:54:13 or chips for the pulp industry, you'd want uniformity?
13:54:18 A. Yes.
13:54:18 Q. All right. And if you were putting together mulch, I guess,
13:54:22 or some other material that didn't have to be so uniform, you
13:54:29 might use something like the drum-style?

13:54:32 A. Well --
13:54:34 Q. I'm not -- let me strike the question. It's -- I can see that
13:54:39 it's a technical one that I may have misstated.
13:54:43 All right. So in terms of the operation of the
13:54:48 disc-style and the idea that you're going to produce uniform
13:54:53 size chips and using the knives and an RPM rate of
13:55:05 approximately 700 RPM, what material and what type of feed
13:55:12 mechanism do you need to produce a uniform size chip for a
13:55:17 58-inch disc-style chipper?
13:55:21 A. That's kind of long. Could you do that one more time.
13:55:26 Q. Sorry. Let me, since you were here, I asked the question
13:55:30 about whether this is a machine that is fed from a vibrating
13:55:38 feed platform or conveyor I think Larry called it. And it's
13:55:47 not hand fed, is that right?
13:55:48 A. That's correct.
13:55:48 Q. All right. So Morbark produces a vibrating conveyor system to
13:55:54 feed this, don't they?
13:55:56 MR. OTT: Objection to form.
13:55:57 THE WITNESS: They could.
13:55:57 BY MR. JONAS:
13:55:59 Q. Well, they've got such products?
13:56:00 A. Yes.
13:56:00 Q. All right. Can you actually identify such a thing, a Morbark
13:56:07 product, by its color or design? I mean, you're that familiar
13:56:12 with the equipment?

14:01:07 A. Yes.
14:01:07 Q. All right. I was looking at the original equipment list, and
14:01:14 I think that's Deposition Exhibit 3. I believe it's in here.
14:01:40 All right. It says the options that went out the
14:01:44 door, this Serial Number 914 machine included 58" Chipper,
14:01:52 six-knife, horizontal feed, top discharge, three-quarter-inch
14:01:58 chips, four-inch fronts, five-eighths-inch clamps, and six
14:02:03 each heavy-duty fan blades with T-1 inserts and T-1 hood
14:02:08 liner, T-1 belly bands, and a five-inch chipper disc and knife
14:02:14 gauge kit.
14:02:15 Do you know what those heavy-duty fan blades with
14:02:19 T-1 inserts and T -- with T-1 inserts are -- look like?
14:02:23 A. Yes, I do.
14:02:24 Q. All right. Did you look at the parts manual of this thing?
14:02:30 A. Yes, I did.
14:02:31 Q. All right. Looking back at Deposition Exhibit 7, when we look
14:02:42 at these blades here, these fan blades, are these T-1 inserts?
14:02:59 A. No, sir.
14:03:02 Q. What do T-1 inserts look like?
14:03:04 A. They look like in that pile there.
14:03:09 Q. Okay. Is this what you're looking for?
14:03:12 A. Yes.
14:03:12 Q. It's Deposition Exhibit 2?
14:03:14 A. Yes. This part.
14:03:23 Q. All right. So looking at two, there's a sheet, assembly

14:03:26 number at the bottom here, 40293-580?
14:03:31 A. Yes.
14:03:32 Q. All right. How are these different than the fan blades in the
14:03:38 parts manual that are illustrated in the Deposition Exhibit
14:03:45 Number 7?
14:03:45 A. How are they different?
14:03:46 Q. Yes.
14:04:07 A. The fan blade that's listed in the parts catalog?
14:04:11 Q. Yes.
14:04:11 A. It's listed as 30160-580. Fan blade box type.
14:04:11 Q. Yes.
14:04:16 A. Which is a drawing attached to the back of this sheet. This
14:04:20 one here, which is not a part of the parts catalog.
14:04:24 Q. All right.
14:04:25 A. That is the part that's listed in the parts catalog.
14:04:27 Q. All right. So what we've got is a blade that is this T-1
14:04:33 blade does something different than the parts -- the fan blade
14:04:39 that's pictured in the parts manual, is that --
14:04:42 A. Could you say that again, sir?
14:04:43 Q. This T-1 heavy-duty fan blades with T-1 inserts --
14:04:51 A. Yes.
14:04:51 Q. -- is an alteration of what essentially is shown in the parts
14:04:56 manual?
14:04:57 A. It's a variation of what's shown in there.
14:05:00 Q. All right. Better word. How is it different in performance

14:05:06 or function?
14:05:08 A. Well, on the sales order, when you're reading the options
14:05:14 section, it says -- I just noticed or experienced that a
14:05:17 five-inch chipper disc, but this fan blade will not fit on
14:05:21 that unit. This is designed for a four-inch thick disc.
14:05:24 Q. All right. So when you say five-inch chipper disc, you know,
14:05:32 we're talking about the --
14:05:39 MR. JONAS: Let's get this one marked.
14:05:40 (Deposition Exhibit Number 23 marked.)
14:05:50 BY MR. JONAS:
14:05:53 Q. Let me show you Defendant's 23, which I purport to you is a
14:06:01 photograph of this Morbark Serial Number 914. It was taken
14:06:09 some time a few weeks after the accident we're involved with.
14:06:14 The four-inch and five-inch dimension you mentioned, would you
14:06:18 indicate where on that --
14:06:21 A. Five-inch references the thickness of the disc.
14:06:24 Q. All right.
14:06:27 A. You want me to write on this?
14:06:29 Q. That would be fine if you just illustrate your testimony.
14:06:32 A. And this five inches is a raw sheet. It's not the finish
14:06:39 size.
14:06:39 Q. All right. So the Morbark chipper as it is shown in the parts
14:06:42 manual has a four-inch disc. This one is bigger?
14:06:46 A. Yes. For clarification -- we've got too many things here.
14:06:56 Q. Yes. Always do.

14:06:58 A. In the shipping documents --
14:07:00 Q. Yes.
14:07:01 A. -- you should have a sheet called a chipper checksheet.
14:07:04 Q. Okay. I think I've seen -- this thing here.
14:07:24 A. This page. During the era that this unit was built, we used to make what they called a chipper checksheet. This was specific to this build of this piece of equipment. The parts catalog is general to the product.
14:07:39 Q. I see.
14:07:39 A. So when you look at this catalog, the parts catalog that went with it, that's only kind of a generic build. It probably fit most of the units, but it may not fit all of them, but this machine had so many options, all the features that are different or the primary ones are stated on this list.
14:07:55 Q. Yes.
14:07:56 A. It tells the size of the chipper, it tells the feed types, it tells the parts that were actually assembled on the machine.
14:08:03 Q. All right. Now, looking back at Deposition Exhibit Number 23, the type of fan blade that's installed there, do you know anything about it?
14:08:15 A. Do I know anything about that particular one? It's not a Morbark manufacture. Morbark does not make one that style for a 48 or a 58 machine.
14:08:25 Q. All right. So that fan blade in terms of design, I mean, it does essentially the same thing, I take it?

14:08:31 MR. OTT: Objection to form.
14:08:34 THE WITNESS: I would say not.
14:08:35 BY MR. JONAS:
14:08:35 Q. Okay. Well, what is your -- the basis of your answer?
14:08:39 A. Based on experience and Bark Bulletins that we published and
14:08:44 we provided.
14:08:45 Q. So in terms of a fan blade that has some function,
14:08:54 particularly this five-inch disc, the T-1 insert that you're
14:09:00 talking about was designed with how much clearance to the hood
14:09:04 with a five-inch disc?
14:09:07 A. You're asking how much clearance there would be on the
14:09:10 originally installed fan blade to the back of the base or the
14:09:14 back of the hood?
14:09:15 Q. Yes.
14:09:15 A. Yes. It would be approximately seven-eighths to five-eighths.
14:09:19 Depending on manufacturing tolerances, there's a little bit of
14:09:23 variance in the disc finish.
14:09:24 Q. Okay. Seven-eighths to five-eighths?
14:09:26 A. Yes. I mean, without putting a layout together, I would
14:09:29 estimate in that area.
14:09:30 Q. So with the T-1 inserts, which have to go apparently with this
14:09:40 five-inch disc -- let me ask another question. Strike that.
14:09:45 And just --
14:09:45 With the five-inch disc, is there anything but T-1
14:09:51 inserts that are typically installed by Morbark on a

14:09:55 disc-style chipper, 58-inch disc-style chipper?
14:10:00 A. Yes. We make a paddle blade, but it's not of this nature.
14:10:04 It's similar, but not of that nature.
14:10:06 Q. And what is the functional difference with the paddle blade?
14:10:11 A. The Bark Bulletin explains the reasoning behind it, but in
14:10:16 these top discharge type machines, they're normally conveying
14:10:21 those chips a greater distance than just up to a cyclone
14:10:24 that's attached to the machine like on a Chip-Pac.
14:10:24 Q. Yes.
14:10:27 A. So the box type blades offer more throwing capacity. It
14:10:30 doesn't work so much by air. It works more by discharging
14:10:33 them in this encased box that's attached to the back of the
14:10:36 discharge where the chips are.
14:10:39 Q. If you had -- do the dimensions on the paddle blades change
14:10:44 the clearance between -- to the disc -- or to the hood?
14:10:51 A. They're nearly identical. We make adjustments when we install
14:10:56 them. We make adjustments to where we position the disc when
14:10:59 we install them so we end up with a similar clearance at all
14:11:02 times.
14:11:03 Q. Okay. All right. The paddle blades are purchased from
14:11:08 Morbark?
14:11:08 A. Pardon?
14:11:09 Q. Are the paddle blades purchased by Morbark or from Morbark or
14:11:14 do they manufacture them here in Winn?
14:11:16 MR. OTT: Objection to form.

14:11:17 THE WITNESS: Which fan blades are you referring to?
14:11:19 BY MR. JONAS:
14:11:19 Q. The paddle blades.
14:11:20 A. The paddle blades I just stated?
14:11:22 Q. Yes.
14:11:22 A. Just recently? We manufacture paddle fan blades, yes.
14:11:27 Q. Okay. Here in Michigan?
14:11:28 A. Yes. At Winn.
14:11:29 Q. Okay. So it's not a subcontractor, it's a Morbark item?
14:11:33 A. Not that I'm aware of.
14:11:34 Q. Okay. And the T-1 blades, those are also manufactured in
14:11:39 Winn, Michigan?
14:11:40 A. Yes.
14:11:40 Q. And the standard blade that is featured in the parts manual,
14:11:47 that's also manufactured here in Winn?
14:11:49 A. You're talking about this item?
14:11:51 Q. Yes.
14:11:51 A. Yes.
14:11:52 Q. So in terms of the standard blade that would typically go with
14:12:00 the four-inch disc, is it larger in dimension than the T-1
14:12:07 blade?
14:12:07 A. Could you state that again, sir.
14:12:09 Q. Let's be specific. The blade, the fan blade that is featured
14:12:18 in the Morbark catalog.
14:12:24 A. Which is this one, 30160.

14:13:54 to a quarter of an inch.
14:13:56 Q. Where did you get that?
14:13:57 A. From materials that I got from Larry Noch to review.
14:14:00 Q. Okay. What were those?
14:14:06 A. I don't know as I remember the exact. They were supplied from
14:14:12 your office, I assume.
14:14:13 Q. Do you recall -- I mean how --
14:14:15 A. It was --
14:14:16 Q. Probably have them.
14:14:17 A. I seen them also in you have an expert witness --
14:14:23 Q. Roger Davis?
14:14:24 A. Yes. He had some photos attached in there, and that had the
14:14:27 pictures with the clearance.
14:14:28 Q. Okay. So that would have been in the report that Mr. Davis
14:14:33 did?
14:14:33 A. Pardon?
14:14:34 Q. The report by Roger Davis?
14:14:36 A. Yes. He was a member of a group. I don't remember the name.
14:14:40 Q. Warren Group. So you're taking his number, whatever it was,
14:14:57 to make that conclusion?
14:14:59 A. I'm taking his photograph that he took --
14:15:03 Q. Right.
14:15:03 A. -- with a tape measure between that clearance.
14:15:05 Q. Okay. Good.
14:15:08 A. I'm basing it on that.

14:15:08 Q. All right. Well, we've got lots of ground to cover, so let me
14:15:13 move on.
14:15:14 We've got a number of labels on this machine that
14:15:26 have -- that Larry has talked about, the Morbark labels. Do
14:15:30 you have anything to do with placing labels on the machine?
14:15:33 A. No, sir.
14:15:33 Q. Do you know anything about the design of those labels?
14:15:37 A. Of those particular labels?
14:15:38 Q. Yes.
14:15:41 A. Can you be more specific?
14:15:42 Q. Well, I mean, what is the origin of those? Do you have
14:15:45 somebody that is a safety engineer at Morbark that has
14:15:49 designed those labels?
14:15:51 A. We have people that make labels or design them.
14:15:54 Q. All right. And who would those people be?
14:15:56 A. Well, I'm not sure of the exact. It's a function of our
14:15:59 drafting department with other groups. I'm not sure what the
14:16:04 exact process is.
14:16:04 Q. All right. And do you know if that's remained constant? You
14:16:10 know, have the labels on this machine changed?
14:16:13 A. Have they changed?
14:16:14 Q. Yes.
14:16:14 MR. OTT: Objection to form.
14:16:14 BY MR. JONAS:
14:16:22 Q. Over time. We've done --

14:16:24 A. I would say probably over time. But I don't know that for an
14:16:26 exact fact, no.
14:16:27 Q. All right. Well, we looked at earlier now a photograph of the
14:16:35 machine, apparently two machines that were produced in 1996,
14:16:42 including this Serial Number 914. And from one view you can
14:16:49 see a number of labels on it, and they seem to be similar to
14:16:53 the labels that Larry reviewed with me. Also look at Morbark
14:17:06 88. Now, do you know whether those two photographs, he's
14:17:16 calling these exit photographs, accurately represent where the
14:17:20 labels are placed on this machine at least from those -- those
14:17:24 perspective?
14:17:25 MR. OTT: Objection. Form.
14:17:26 THE WITNESS: What are you asking me now?
14:17:26 BY MR. JONAS:
14:17:28 Q. I'm asking you, have you ever participated in putting labels
14:17:32 on the machine or identifying where the labels are at on this
14:17:36 machine, this 58" Chipper?
14:17:41 A. No. I've never directed anyone in how to put labels on nor
14:17:45 done it myself.
14:17:46 Q. All right. Do you know what labels are supposed to be placed
14:17:49 on the machine?
14:17:50 A. All I know is what is produced on them, and those are supplied
14:17:53 in our -- for 913 and 914, there's a listing of the labels
14:17:58 that was installed on each unit.
14:17:59 Q. All right. So as far as these photographs, you haven't seen

these before?

A. I have seen them before.

Q. All right. Fair. The -- so someone at Morbark actually is a safety engineer?

A. I don't know if that's the proper term or not.

Q. All right. And just to be clear about your own role in this, in terms of complying with any kind of engineering standards or industry standards or safety standards, do you have any role in determining whether this machine complies with these various standards?

MR. OTT: Objection to form.

THE WITNESS: On this particular machine?

BY MR. JONAS:

Q. On this style machine, yes.

A. On this style machine. And your question one more time?

Q. Do you have any role or responsibility for determining whether this 58" Stationary Horizontal Feed, Top Discharge Morbark Machine complies with industry or safety standards, whatever they might be? You authored this one memo or at least your originated it?

A. I authored this memo, yes.

MR. OTT: Objection to form.

THE WITNESS: Yes. In this case here, like I said, I was -- it was after a meeting. I was instructed to write this up, and that's what I did.

14:21:59 Q. Nova Scotia?
14:22:00 A. No.
14:22:00 Q. Or Labrador?
14:22:03 A. No, sir.
14:22:03 Q. You stayed in Maine?
14:22:05 A. New England.
14:22:06 Q. All right. Were there dealers, Morbark dealers in Canada near
14:22:15 the Maine border? If you know.
14:22:19 A. Not that I'm aware of.
14:22:20 Q. All right. All right. Let's see. We've got -- do you know
14:22:30 anything about the original design of the machine, what
14:22:35 considerations were taken into account?
14:22:38 A. On the original machine?
14:22:40 Q. Yes.
14:22:41 A. No, sir.
14:22:41 Q. On the design of the machine.
14:22:43 A. No, sir.
14:22:43 Q. Any assessment of the type of people or circumstances the
14:22:51 machine would be operating under?
14:22:54 A. Could you say that again?
14:22:56 Q. Well, do you know of any studies or design considerations that
14:23:03 were given to the preparation of workers or operators of this
14:23:09 machine as far as special instructions or special training --
14:23:14 MR. OTT: Objection to form.
14:23:14 BY MR. JONAS:

14:23:16 Q. -- that was required?
14:23:16 A. The only thing I could see, I don't know of any special
14:23:19 assessments as far as training goes. Working safely around
14:23:25 the machine, abiding by the decals, and reading the operator's
14:23:29 manual and training provided by the employer.
14:23:31 Q. What training --
14:23:33 MR. OTT: Don, let me -- he asked you to repeat a
14:23:35 lot of things. I should have told you this in the beginning.
14:23:38 He has hearing problems.
14:23:39 MR. JONAS: Okay.
14:23:40 MR. OTT: So if you trail off, he's not going to be
14:23:42 able to hear you. Sorry.
14:23:45 MR. JONAS: I appreciate that. I've got a little
14:23:46 myself.
14:23:47 MR. OTT: I don't know why I didn't say something
14:23:48 earlier. I apologize.
14:23:51 MR. JONAS: I'll try to be considerate. I've been
14:23:54 working around jet engines a long time. I can hear you. But
14:23:58 if you can't hear me, just say I just can't hear you. I'll --
14:24:02 I've never been accused of being -- of not able to speak up.
14:24:02 BY MR. JONAS:
14:24:09 Q. All right. So my question specifically has to do with your
14:24:15 knowledge of any design information or materials that would
14:24:21 indicate that anyone reviewed the design of this machine
14:24:25 originally or subsequently for operator safety concerns?

14:24:30 A. Not that I'm aware of.
14:24:32 Q. All right. Now, did you have any role in trying to discover
14:24:38 where the original design information was for this machine?
14:24:41 A. I looked in our drawing files, yes.
14:24:43 Q. What did you find there?
14:24:45 A. I looked for -- I took the checksheet here -- are you talking
14:24:49 about the original or for the subject machine?
14:24:51 Q. For the subject machine.
14:24:53 A. For the subject machine. I got the information from Larry
14:24:57 Noch and reviewed what had been exchanged and he told me this
14:25:05 was the machine that -- actually this machine is not the one
14:25:05 that's -- this is 913.
14:25:06 Q. Right. But --
14:25:12 A. But I reviewed the information that was on this, and I looked
14:25:13 at the drawings and that's these drawings that you have in --
14:25:17 that we gave to you this morning.
14:25:18 Q. Yes.
14:25:19 A. Wherever they are. Those are drawings that I pulled that seem
14:25:23 to pertain to the area where the injury occurred.
14:25:26 Q. Now, basically I'm asking the same question with regard to the
14:25:29 original design. Did you have any role in trying to track
14:25:32 down any information as to what considerations were made by
14:25:37 Mr. Morey or anyone else that was involved in that design?
14:25:41 A. No, sir.
14:25:48 VIDEOTAPE TECHNICIAN: Excuse me. Could you raise

14:27:30 Q. Yes. Did you have any responsibility at all for design changes for the original design of the Morbark 58" Horizontal Feed, Vertical Discharge Chipper series?

14:27:48 A. Well, as I stated when we first started here, during that period that I entered into the scene on these units in here, we were in the process of taking drawings from a hand form that were drawn on the drafting board and putting them into a computer system, and there were probably subtle changes that made it fit better than, you know, what they got from a hand-fed -- or from a hand drawing.

14:28:12 Q. What about the base --

14:28:14 A. The base --

14:28:15 Q. -- was five-eighths inch off or something in the original drawing --

14:28:17 A. Pardon?

14:28:18 Q. It looks like the base was five-eighths of an inch off?

14:28:23 A. I'm not following you.

14:28:24 Q. In these engineering changes, there's several remarks about increasing the drawing dimensions.

14:28:34 A. I would want to -- I wouldn't want to state without looking at each one individually.

14:28:38 Q. All right. Well, I may ask you to do that.

14:28:40 A. Okay.

14:28:40 Q. But, you know, my real question is about your responsibility for design changes. Other than the drafting aspect of it and

14:28:49 conforming the drawings, you didn't design any of this
14:28:54 equipment, did you?
14:28:54 A. No, sir.
14:28:55 Q. All right. Do you know anything about used chipper equipment
14:29:04 sold by Morbark?
14:29:05 A. It's used.
14:29:06 Q. That's probably a good start. Where is it kept?
14:29:17 A. If it was taken in, I would assume, I don't know for a fact
14:29:20 where every piece may be, but it could end up at a dealer's
14:29:24 location.
14:29:24 Q. All right.
14:29:25 A. It could be transported to another site or to our facility in
14:29:28 Winn.
14:29:28 Q. Do you ever go over there and assist or assess this equipment?
14:29:35 A. Excuse me?
14:29:36 Q. Assist in repairs or assess it?
14:29:38 A. No, sir.
14:29:39 Q. All right. Just -- who would have that job?
14:29:41 A. On assessing the equipment?
14:29:44 Q. I mean, bringing it in, making sure that the equipment is
14:29:48 properly functioning if it's to be resold. I mean, is there a
14:29:54 person that has that responsibility?
14:29:58 A. I don't know. I would assume it was probably driven by sales
14:30:02 on -- if they're going to resell a piece of equipment or do
14:30:05 something with it.

14:30:06 Q. All right.
14:30:09 A. As part of an agreement between Morbark and the new customer.
14:30:11 Q. As we were looking at the Exhibit 3 before, you had picked up
14:30:51 the sheet for the machine Serial Number 913, but right behind
14:30:57 it is 914, and is there any difference between the -- how
14:31:03 those two pieces were equipped? Did you have a chance to look
14:33:20 at those?
14:33:21 A. Yes. They appear to be the same.
14:33:22 Q. All right. So when we looked at specifically the -- as we
14:33:36 were talking about the fan blades, they both refer back to
14:33:41 this number 40239-580.
14:33:50 A. Per the checksheet, yes.
14:33:52 Q. Yes. And that is your version of the T-1 inserts?
14:33:56 A. Yes. Although there is a typographical error on this.
14:34:01 Q. All right.
14:34:02 A. It's 293, not 239.
14:34:04 Q. All right. So at the time then, however these things were
14:34:13 handled, they were handled the same?
14:34:20 A. Pardon?
14:34:20 Q. They were equipped the same?
14:34:20 A. Yes.
14:34:20 Q. Both these machines?
14:34:20 A. I think the sales order states the same.
14:34:22 Q. All right. And at the -- looking at the hood infeed number,
14:34:34 it says four -- 40045-580. Is that another one of these

14:34:44 generic numbers or is it special to this machine?
14:34:49 A. No. That's a pretty common hood. It may or may not be the
14:34:54 ones that's depicted in here. Like I said, this is just kind
14:35:00 of a generalization of the machine.
14:35:02 Q. You're talking about the parts manual?
14:35:04 A. Yes. So you want to know if the hoods showing in the parts
14:35:09 manual are the same as these here?
14:35:11 Q. That's right.
14:35:39 A. That would fall under the numbers that are shown here, yes.
14:35:42 Q. All right. Next question is as to the hood pins?
14:35:45 A. Yes.
14:35:45 Q. Okay. Now, those hood pins have a part number?
14:35:54 A. Yes.
14:35:55 Q. All right. In the drawings or the additional information you
14:36:01 gave us this morning, Deposition Exhibit 2, there's a
14:36:07 photograph or a drawing, rather, of hood pins and one with a
14:36:14 drilled hole.
14:36:16 Was this machine, if you can tell me, equipped with
14:36:19 a pin with a drilled hole? That is Machine 914.
14:36:28 A. That would be the only pin for 48 or 58" Chipper.
14:36:35 Q. All right. So all machines had the drilled hole, all pins for
14:36:39 both the 48 and 58-inch had the same pin?
14:36:42 A. Yes.
14:36:42 Q. With a drilled hole?
14:36:44 A. Yes.

14:38:21 Q. So this would be 26812-191?
14:38:25 A. Yes.
14:38:25 Q. All right. Now, that pin, do you know anything about the
14:38:31 design of the pin, how it is -- what the tolerances are for
14:38:38 it?
14:38:39 A. I've never measured one, no.
14:38:42 Q. Well, the dimensions of the pin are what?
14:38:45 A. The hood pin itself?
14:38:47 Q. Yes.
14:38:53 A. The physical size is three-quarter diameter hot rolled by
14:38:58 11 inches.
14:38:59 Q. Now, what is the size of the opening it fits to?
14:39:01 A. I can't verify that from this drawing.
14:39:08 Q. All right. On a personal basis, have you pulled those pins in
14:39:15 and out?
14:39:15 A. Yes, I have.
14:39:16 Q. All right. What is your assessment of the fit? Is it a close
14:39:21 fit or a loose fit?
14:39:22 A. It's -- I mean, you don't -- normally when they're fit
14:39:26 together, when they're fresh and new, they drop in fairly easy
14:39:30 and you put the clip on the bottom of them.
14:39:32 Q. All right. And when they're not so fresh and new, what
14:39:35 happens?
14:39:35 A. They usually -- if the hoods are maintained properly, they
14:39:41 usually pretty much retain that fit. There's no strain or

anything on these pins.
Q. All right. So in terms of binding in those pins, have you had to force those pins out? Force meaning use some kind of come-a-long or hammer even?
A. These -- this particular hood style is usually pretty much pull the clip out, lift it out.
Q. So --
A. It's not pounded in or out.
Q. So your experience has been that you can -- the pins are somewhat loose fitting?
MR. OTT: Objection to form.
THE WITNESS: They're not -- they're not hammer tight.
BY MR. JONAS:
Q. Well, the question is since we don't have the dimensions, what are they tight?
A. I'm sorry. I can't answer that.
Q. Well, they've got an L shape handle on them. I mean, can you easily pull them out with your --
A. Yes. If they're fit properly, you can lift them out by your hand.
Q. The other thing I wanted to ask you about was the pin that secures the hood, the hinge to the back of the machine, on the rotating -- or the -- that section of the hood that is pulled back.

14:40:49 Looking at your drawing, it seems to be clearly
14:40:52 indicated back in this area here. There seems to almost be a
14:40:57 part number to it. Is there a part number to that?
14:41:01 A. Yes. It's stated right here. 30359-700.
14:41:05 Q. All right. So in terms of forming this, is that part number
14:41:14 then welded to the back of the hood?
14:41:16 A. Yes, it's welded.
14:41:16 Q. All right.
14:41:19 A. Excuse me. I mean, could you restate your question? Make
14:41:21 sure I understood right.
14:41:22 Q. How is that part number, which is part of the hinge of the
14:41:27 hood, attached to the hood?
14:41:28 A. It is welded to the back of the hood.
14:41:31 Q. All right. What goes through it?
14:41:35 A. Hinge pin.
14:41:35 Q. What is the size of that hinge pin?
14:41:41 A. One inch diameter hot rolled by 18 inches.
14:41:45 Q. Now, is that secured in place?
14:41:52 A. Yes.
14:41:53 Q. How is it secured?
14:42:08 A. There's two collars welded affixed to the base on each end of
14:42:13 the tube, but the pin installs through and there's a set screw
14:42:17 in each collar.
14:42:18 Q. All right. So the collars have the set screw, but they're
14:42:23 also welded?

14:42:25 A. The collar is welded to the base on each side of the tube
14:42:29 that's attached to the hood by weld.
14:42:31 Q. Okay. So the set screw is what holds it in place?
14:42:34 A. Yes.
14:42:35 Q. All right. And this pin is the only way to secure, means of
14:42:42 securing the hood to the machine when the machine hood is
14:42:50 open? I mean, it supports the hood as it's pulled back?
14:42:54 A. Yes. It's supported here and rests on this brace.
14:42:57 Q. All right. And has it been your experience that there
14:43:02 develops some wobble in the hood side to side as -- over that
14:43:08 shaft?
14:43:11 A. I don't recall any -- you're talking about if it gets really
14:43:17 sloppy or something.
14:43:17 Q. Well, what I'm saying is -- I'm asking, not saying anything.
14:43:21 You've got a part which looks like 30359-700, and a pin goes
14:43:33 through it, and a hood that has some substantial weight to it,
14:43:37 that rotates on it, and if that's the only wear that it
14:43:45 receives, it's pulling straight back and forth, it looks like
14:43:48 it would remain fairly tight, but if it would wobble side to
14:43:52 side, it looks like you might develop some excessive clearance
14:43:56 in that. Do you agree or not?
14:44:00 MR. OTT: Objection to form.
14:44:00 BY MR. JONAS:
14:44:01 Q. Do you know?
14:44:02 A. Well, there shouldn't be much wear on it. It's only used to

BY MR. JONAS:

Q. You did. I'm sorry.

A. Yes.

Q. What is that?

A. It's a hood style that would be used like on a Chip-Pac machine.

Q. All right. And is that something that Morbark has designed? Or do you know what the source of the design is?

A. It was in existence when I hired at Morbark, so I don't know.

Q. Okay. Good. All right. Are you familiar with Morbark equipment, chipper equipment that has any sort of tachometer device that measures the speed of the disc?

A. What was your term again?

Q. A tachometer.

A. Tachometer?

Q. Yes.

A. Could you state the question?

Q. Do you know of any Morbark chipper equipment, whether it's brush chippers or stationary chippers, that employs a tachometer device that reveals or counts the revolutions of the disc?

A. None that I'm aware of.

Q. Are you aware of any Morbark equipment that has indicator lights indicating whether or not the disc is continuing to turn?

14:53:36 A. Is there an indicator light on it?
14:53:39 Q. Yes.
14:53:39 A. No, sir.
14:53:40 Q. All right. Did you ever review any of the patents that were
14:53:54 obtained by Morbark?
14:53:58 A. I am casually aware of them. I don't -- haven't sat down and
14:54:03 studied them.
14:54:04 Q. All right. Do you know if Morbark has a patent for a device,
14:54:16 a large chipping apparatus device that was patented in 1970
14:54:23 that has a speed-sensing device such as a tachometer mounted
14:54:29 on the driveshaft?
14:54:35 MR. OTT: Objection to form.
14:54:38 THE WITNESS: And you're asking if I'm aware of
14:54:40 that?
14:54:40 BY MR. JONAS:
14:54:41 Q. Yes.
14:54:41 A. No, I'm not.
14:54:42 Q. All right. One of the things about disc chippers and chippers
14:54:48 in general that I wanted to ask you about is this business
14:54:56 about feeding them, and we've already talked about this
14:54:59 vibrating feeder. What is the typical time in your experience
14:55:06 that it takes to stop a disc on a 58-inch -- I guess we'd have
14:55:11 to make it a five-inch disc, on a 58" Horizontal Feed,
14:55:24 Vertical Discharge Stationary Chipper machine after the power
14:55:25 is turned off?

14:55:27 A. I'd only be guessing. I don't know as I've ever been on a
14:55:32 five-inch disc machine when it was running -- running down.
14:55:35 Most of these five-inch disc machines are generally produced
14:55:39 for one customer, Johnson-Sherman. And I don't -- I don't
14:55:44 have that much experience in that particular region. Mine was
14:55:49 New England.
14:55:49 Q. Do you have experience with the four-inch disc?
14:55:51 A. Yes.
14:55:51 Q. What is your estimate of the time of that?
14:55:54 A. On a 58-inch?
14:55:56 Q. Yes.
14:55:56 A. It would depend on how it's equipped, but an average number,
14:55:59 you're probably five to ten minutes for it to run down.
14:56:03 Q. Okay. And if the material that was being fed to the machine,
14:56:09 the vibrating feeder wasn't turned off but continued to feed
14:56:13 material, would that affect the run-down time?
14:56:17 A. You're assuming wood is being entered into the chipper knives?
14:56:23 Q. That's right.
14:56:23 A. Depends on the size of the material.
14:56:25 Q. Well, I mean, whether it was small or large, if it continued
14:56:33 to feed, wouldn't it slow the disc quicker?
14:56:36 A. Well, a small piece would have very little bearing on it and a
14:56:40 larger piece would have a larger bearing on it.
14:56:43 Q. Has there been, to your knowledge, any improvement in chipper
14:56:56 hood designs preventing mistaken opening of the hoods before

14:57:07 1 the disc is stopped?
14:57:09 2 MR. OTT: Objection to form.
14:57:10 3 THE WITNESS: Could you say that again, sir.
14:57:10 4 BY MR. JONAS:
14:57:13 5 Q. Do you know of any machines or industry information that
14:57:23 6 essentially proclaims that there are a variety of devices to
14:57:32 7 prevent a chipper hood from being opened before the disc is
14:57:37 8 stopped?
14:57:40 9 A. I'm still not sure as I got your whole gist of your question.
14:57:44 10 Could -- I'm --
14:57:45 11 Q. I think one of the issues in this case is the allegation that
14:57:52 12 Mr. Holland attempted to open this hood before the disc had
14:57:58 13 stopped.
14:57:59 14 A. Uh-huh.
14:57:59 15 Q. Okay. And the question that I had is are you aware of any
14:58:05 16 industry information or designs that prevent a chipper hood
14:58:15 17 from being opened before the disc is stopped?
14:58:18 18 A. No, sir.
14:58:19 19 Q. Okay. Do you know Michael Boyd Morey?
14:58:24 20 A. I know of him.
14:58:26 21 Q. All right. He's from Remus?
14:58:28 22 A. Yes.
14:58:29 23 Q. All right. And he's, I guess, the owner of a patent number
14:58:41 24 6,016,855 which employs some sort of mechanical device to
14:58:48 25 prevent that hood from being opened, but you're not aware of

14:58:52 that?
14:58:52 A. No, I'm not.
14:58:53 MR. OTT: Objection to form.
14:58:53 BY MR. JONAS:
14:58:55 Q. Do you know of any chippers that were manufactured by Morbark
14:58:58 that include a brake assembly preventing a hood from being
14:59:07 opened or essentially braking the machine if the hood is
14:59:16 opened?
14:59:17 A. Could you say that again?
14:59:20 Q. Do you know of any product, brush chipper or stationary
14:59:24 chipper, that Morbark manufactures that employs a brake
14:59:29 assembly that stops the machine in the event that the chipper
14:59:33 hood is opened before the disc stops turning?
14:59:37 MR. OTT: Objection to form.
14:59:39 THE WITNESS: When you're talking about a brake,
14:59:42 you're talking about actually stopping the disc itself?
14:59:42 BY MR. JONAS:
14:59:45 Q. Yes.
14:59:45 A. No. Not that I'm aware of.
14:59:47 Q. All right. Do you know of any equipment manufactured by
14:59:59 Woodchuck that employs a device to prevent the hood from being
15:00:07 opened before the disc is stopped turning?
15:00:10 MR. OTT: Objection. Form.
15:00:12 THE WITNESS: No, sir.
15:00:12 BY MR. JONAS:

15:00:15 Q. Do you know of any device manufactured by Bandit that prevents
15:00:23 the hood of a chipper from being opened while the disc is
15:00:28 turning?
15:00:29 MR. OTT: Same objection.
15:00:30 THE WITNESS: No, sir.
15:00:30 BY MR. JONAS:
15:00:33 Q. Do you know of a device incorporating a brake -- or strike
15:00:47 that.
15:00:49 MR. JONAS: Let me take a little break and hopefully
15:00:52 we can finish up.
15:00:53 THE WITNESS: Okay.
15:00:53 VIDEOTAPE TECHNICIAN: We're going off the record at
15:00:55 3:00 p.m.
15:00:58 (Recess.)
15:09:08 VIDEOTAPE TECHNICIAN: We are going back on the
15:09:10 record at 3:09 p.m.
15:09:10 BY MR. JONAS:
15:09:17 Q. Mr. Strong, just a few final matters. You had been called to
15:09:26 talk about number 15, "The consideration given by Morbark
15:09:36 machine designers to the so-called hierarchy of safety machine
15:09:39 design, in the planning and design of the Morbark 58" Chipper
15:09:42 Machine, Serial Number 914."
15:09:45 Do you know anything about the hierarchy of safety
15:09:48 of machines?
15:09:49 A. Yes, sir.

15:09:49 Q. What do you know about it?
15:09:51 A. That during the designing of machinery, that you design out any hazards that may be present or perceive to be, you'll warn it out, you'll educate people in its -- in its potential for injury. That's kind of my summary, I guess.
15:10:20 Q. Well, where did you get your training?
15:10:20 A. As far as that part of it?
15:10:21 Q. Yes.
15:10:21 A. From Morbark.
15:10:22 Q. All right. You've identified some criteria that talks about design. Within your knowledge of the hierarchy of safety, do you understand that the design anticipates operator errors?
15:10:49 A. Could you say that again, sir?
15:10:51 Q. In your knowledge of the concept of the hierarchy of safety or safety through design, do you understand that design considerations include that a likely aspect of operator error?
15:11:11 MR. OTT: Objection to form.
15:11:13 THE WITNESS: Well, I think one would look for things that might be foreseeable.
15:11:17
15:11:19 BY MR. JONAS:
15:11:19 Q. Yes. And do you think it's foreseeable that someone would mistakenly open this hood while the disc wheel was turning on this horizontal feed, top discharge 58" Morbark Chipper?
15:11:25
15:11:28
15:11:34 A. Not if they was trained properly and following instructions.
15:11:38 Q. Well, those instructions that you're referring to, where would

15:11:41 an operator get those?
15:11:42 A. Where would you get them? From the decals on the machine,
15:11:46 from the operating manual, and from the employer.
15:11:49 Q. All right. Which part of Exhibit 9, I think, of the decals
15:11:56 that were provided that were on this machine would address the
15:12:05 possibility of an operator recognizing a risk of being hit in
15:12:09 the head?
15:12:09 A. Being hit in -- specifically for that?
15:12:14 Q. Yes.
15:12:14 A. I don't know there's any one that says that specifically.
15:12:17 It's the design of the decal that warns them.
15:12:20 Q. So there's nothing in the Morbark manual or the decals that
15:12:26 address the risk of being hit in the head?
15:12:29 MR. OTT: Objection. Form.
15:12:31 THE WITNESS: Well, these decals contain a single --
15:12:37 one single word on here, and through ANSI 35 and 535 -- or Z35
15:12:45 and five -- and ANSI Z535. That symbol alone tells them that
15:12:50 there's a danger that you could get killed or seriously
15:12:53 injured from doing the opposite of what it tells you to do.
15:12:59 BY MR. JONAS:
15:12:59 Q. Well, what is the typical injury that you are aware of that
15:13:04 results from chipper accidents?
15:13:07 MR. OTT: Objection. Form.
15:13:09 THE WITNESS: Well, I'm not aware of a great deal of
15:13:11 chipper accidents. You're referring to the Model 58?

15:13:11 BY MR. JONAS:
15:13:19 Q. We're referring to chipper accidents.
15:13:19 A. Okay.
15:13:22 Q. And at the time that you then received your training, were you
15:13:28 ever advised that labelling a danger is not sufficient to
15:13:35 comply with the hierarchy of safety design considerations;
15:13:40 that labelling was what one does after a design is completed?
15:13:48 MR. OTT: Objection to form.
15:13:50 THE WITNESS: Could you state that again?
15:13:50 BY MR. JONAS:
15:13:53 Q. My question is whether or not these labels on a machine that
15:13:57 has an open hazard, a rotating disc that runs for at least ten
15:14:02 minutes after the power is cut off is sufficient to comply
15:14:06 with the hierarchy of safety?
15:14:09 MR. OTT: Objection. Form.
15:14:11 THE WITNESS: Well, the decals typically are
15:14:20 secondary to designing it out.
15:14:20 BY MR. JONAS:
15:14:27 Q. Is there not an obvious and open danger to this machine where
15:14:32 the disc continues to turn after the power is turned off?
15:14:37 MR. OTT: Objection to form.
15:14:39 THE WITNESS: Not if you follow the instructions.
15:14:39 BY MR. JONAS:
15:14:42 Q. Well, obvious in this case that, and other cases, that this
15:14:47 rotating disc, whether it's in a brush chipper or whether it's

15:14:51 in a stationary chipper, is an obvious hazard that causes
15:14:56 injury?
15:14:57 MR. OTT: Objection to form.
15:15:00 THE WITNESS: Can you restate your question?
15:15:00 BY MR. JONAS:
15:15:04 Q. At the time that this machine was created, designed in
15:15:13 someplace in the 1960s, was there any consideration that
15:15:19 you're aware of to prevent an operator from opening that hood
15:15:23 while the disc was still turning?
15:15:25 A. I'm not aware of those activities in 1969.
15:15:28 Q. On any occasion after that, were there any design changes made
15:15:34 to this machine to keep the operator from opening that hood
15:15:38 after the power was turned off and the disc continued to turn?
15:15:42 A. None that I'm aware of.
15:15:43 Q. All right. At the point that a disc is continuing to turn
15:15:49 after the power is shut off, does it progressively slow?
15:15:57 A. Progressively. Meaning --
15:16:00 Q. It means it goes 700 RPMs and then it goes 699 RPMs, 698, and
15:16:06 at the end of ten minutes it may be turning one RPM?
15:16:10 A. It's likely not to increase.
15:16:12 Q. That would seem to be the case. But at the end of the ten
15:16:15 minutes, is there a different aspect of the hazard than at the
15:16:20 beginning of the ten-minute cycle?
15:16:23 MR. OTT: Objection to form.
15:16:27 THE WITNESS: Can you repeat that again, sir?

15:16:27 BY MR. JONAS:
15:16:30 Q. At the end of the run-down time --
15:16:30 A. Yes.
15:16:33 Q. -- before the disc is completely stopped but slowly turning, is there a hazard to the disc that is different than the hazard when the disc is initially turned off or the power is turned off to the machine?
15:16:48 MR. OTT: Same objection.
15:16:49 THE WITNESS: I'm not really sure how to answer your question. I don't know as I fully understand what you're saying. You're asking if it's turning fast, is there any difference in as it's turning slow?
15:17:06 BY MR. JONAS:
15:17:06 Q. We're talking about the risk to the operator.
15:17:09 A. Okay.
15:17:09 Q. As I understand, this machine has no device to keep that -- the operator from opening the hood while the disc is turning even after the power is shut off?
15:17:19 MR. OTT: Objection to form.
15:17:21 THE WITNESS: Okay.
15:17:21 BY MR. JONAS:
15:17:22 Q. All right. And at some point in time, as I understand the Morbark manual, it is advised that the operator should look at the sheave of the machine to determine whether the disc is still turning?

15:17:38 A. He should look at some portion of the disc. You can visibly
15:17:42 see that it rotates.
15:17:43 Q. You agree that the Morbark manual says look at the sheave?
15:17:48 A. Without referring to the manual, I wouldn't want to say.
15:17:52 Q. Let me have the manual. All right. In the section entitled
15:18:17 safety maintenance of Morbark 040, there's a section on
15:18:22 changing chipper knives.
15:18:24 A. Yes.
15:18:24 Q. Okay. And just referring to the manual, is there a section
15:18:31 that indicates where to look to turn off or to determine
15:18:36 whether the machine is running? Or the disc is turning?
15:18:57 A. Yes. In the first paragraph one.
15:19:02 Q. Yes. It says where -- where should you look, what does it
15:19:06 say?
15:19:06 A. It says, "After power is disengaged the chipper will coast --
15:19:10 rotate for several minutes until it -- until it completely
15:19:13 stops. Check the chipper sheave to verify it has stopped
15:19:17 before opening the hood."
15:19:18 Q. All right. So there are no directions on where to look that
15:19:22 are attached to the machine that you know of, are there?
15:19:24 MR. OTT: Objection to form.
15:20:36 THE WITNESS: Can I have the opportunity to review
15:20:39 the manual?
15:20:39 BY MR. JONAS:
15:20:41 Q. Sure.

15:22:56 VIDEOTAPE TECHNICIAN: We have about ten minutes on this disc. Do you want to change now?

15:23:03 MR. OTT: We don't have ten minutes. I don't have ten minutes. I've got to get going.

15:23:08 VIDEOTAPE TECHNICIAN: Okay.

15:26:43 THE WITNESS: It says to check the chipper sheave to verify that it has stopped before opening the hood.

15:27:11 BY MR. JONAS:

15:27:11 Q. All right. Other than that sentence that you just read, you've been through the warning decals and the handbook, you don't see any reference to any other instructions about where to look, either on the machine or in the manual?

15:27:28 MR. OTT: Objection. Form.

15:27:28 BY MR. JONAS:

15:27:30 Q. Do you agree to that?

15:27:31 A. I do not see anything else.

15:27:33 Q. All right. And as to any specific warnings as to risk of being hit in the head, you don't see anything about that specifically, do you?

15:27:40 A. No, sir.

15:27:43 MR. JONAS: All right. Curtis has got to go. What do you want to do, Curtis?

15:27:48 MR. OTT: Well, I thought we were done.

15:27:50 MR. JONAS: I think we are.

15:27:51 MR. OTT: Okay.

48" & 58"

STATIONARY

R.H. CHIPPER

PARTS MANUAL

S/N_____

SOLD AND SERVICED BY:

_____

MOBARK PARTS MANUAL 012 THROUGH 023

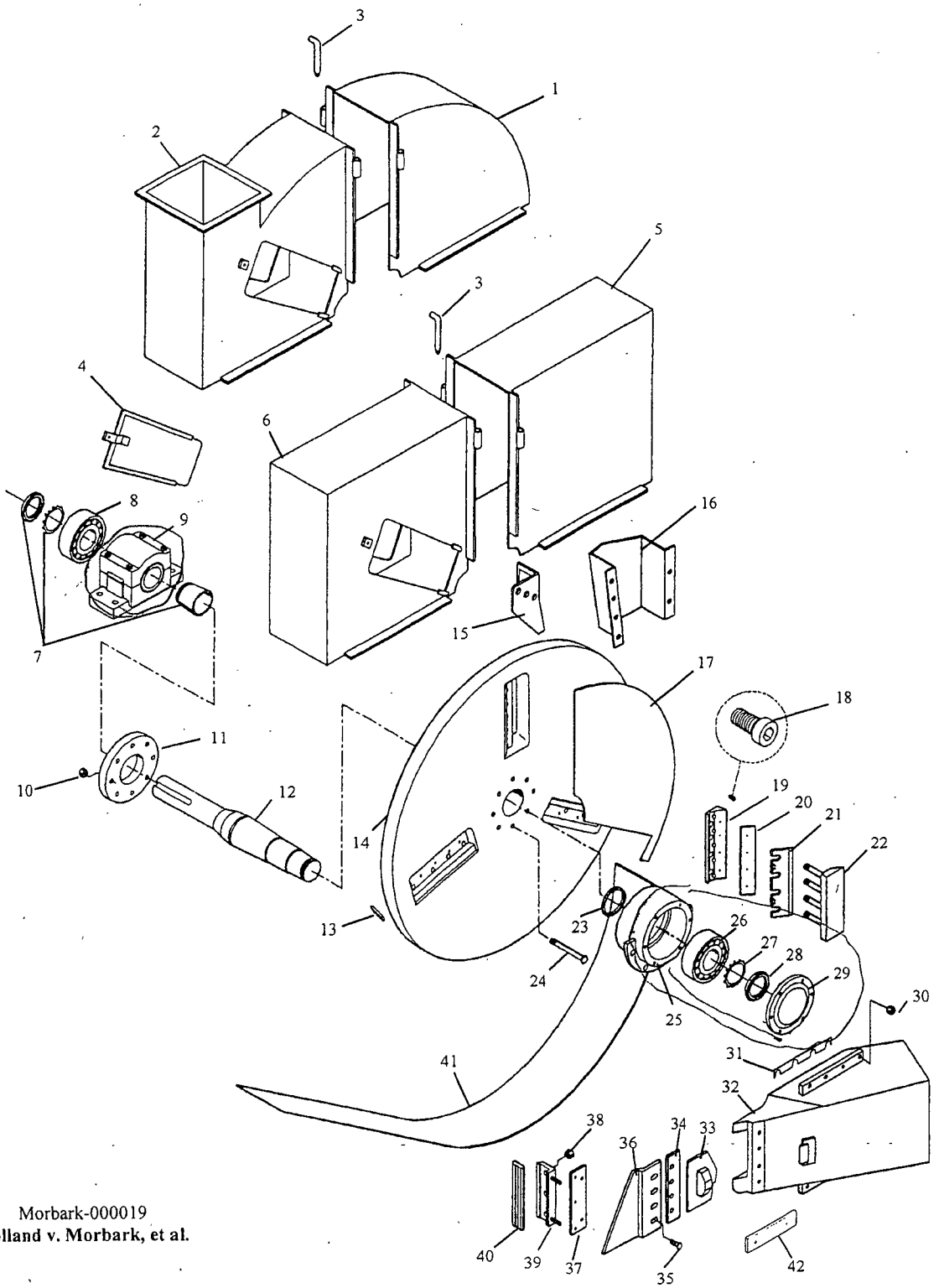
Manufactured By:
Chiparvestors, Inc.

Morbark-000012
Holland v. Morbark, et al.

76345-109
5/93

00596

58" CHIPPER COMPONENTS



Morbark-000019
Holland v. Morbark, et al.

- 06597

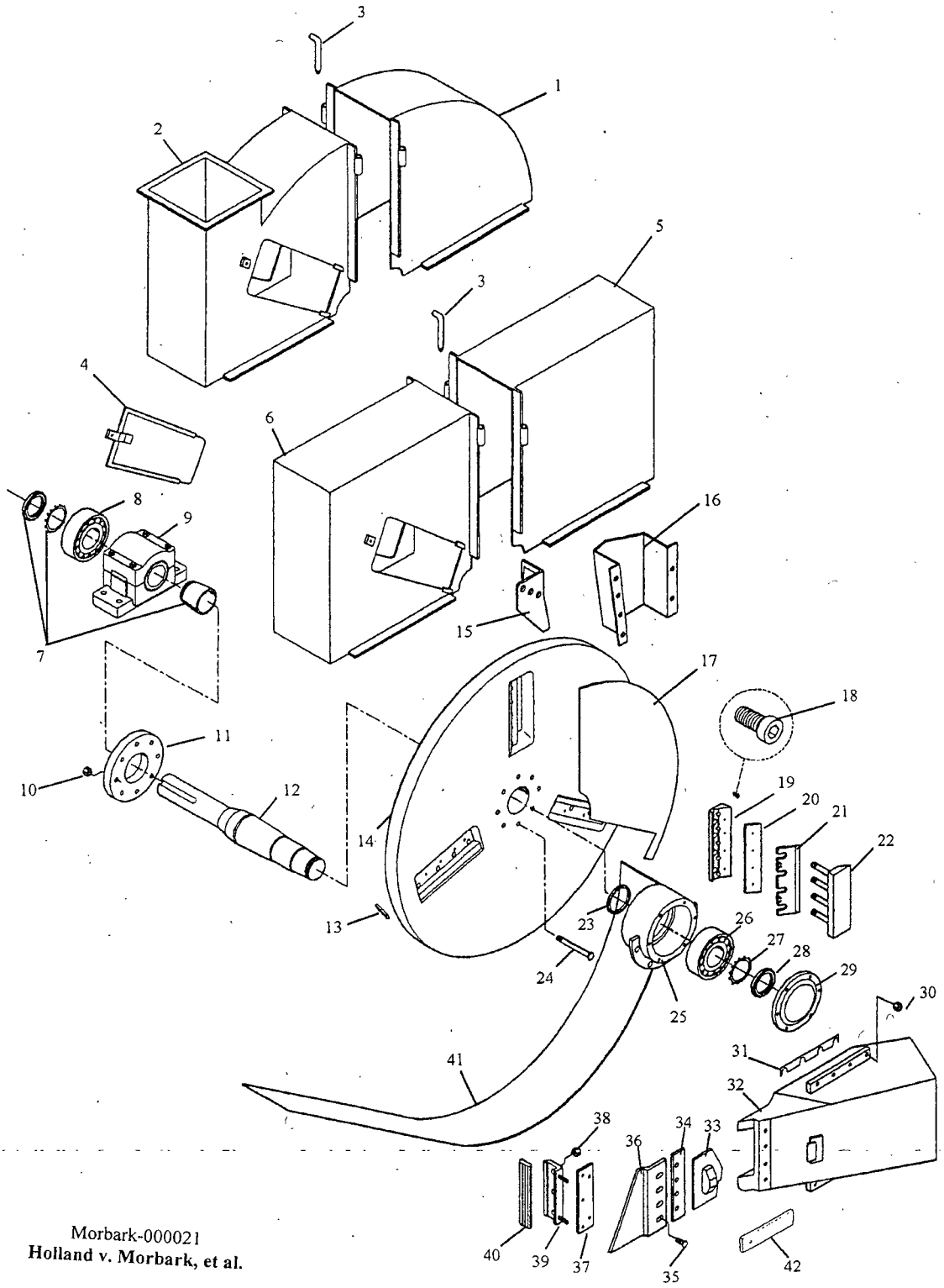
58" CHIPPER COMPONENTS

ITEM	QTY.	PART NO.	DESCRIPTION
1	1	40045-580	Hood (Infeed Half) Horiz. Feed
1a	1	40049-580	Hood (Infeed Half) Drop Feed
2	1	40046-580	Hood (Discharge Half) Horiz. Feed
2a	1	40050-580	Hood (Discharge Half) Drop Feed
3	2	30107-480	Hood Pin
4	2	40218-480	Pocket Access Door
5	1	40283-580	Hood (Infeed Half)
5a	1	40047-580	Hood (Infeed Half) Drop Feed
6	1	40036-580	Hood (Discharge Half)
6a	1	40048-580	Hood (Discharge Half) Drop Feed
7	1	23962-226	Adapter Kit
8	1	23661-118	Bearing
9	1	23973-113	Bearing Housing
10	8	22531-211	Nut
11	1	30090-580	Draw Ring
12	1	30120-580	Chipper Shaft
13	1*	30193-750	Rim Blade
14	1	40217-580	Disc 3 Knife (Conventional)
14a	1	40218-580	Disc 6 Knife (Conventional)
14b	1	40235-580	Disc 3 Knife (Mor-Clamp)
14c	1	40254-580	Disc 4 Knife (Mor-Clamp)
14d	1	40236-580	Disc 6 Knife (Mor-Clamp)
15	1*	40157-480	Fan Blade (Paddle)
16	1*	30160-580	Fan Blade (Box)
			(We Use Box Fan Blades on 6 Knife with Top Discharge)
17	1	40239-580	Wear Plate (3 Knife)
17a	1	40256-580	Wear Plate (4 Knife)
17b	1	40240-580	Wear Plate (6 Knife)
18	2*	30529-901	Cap Screw (w/Shoulder)
18a	3*	21452-118	Cap Screw
19	1*	30133-580	Knife Holder
20	1*	39233-116	Counter Knife
20a	4*		Cap Screw (for Item#20)
21	1*	39233-159	Knife

*** NOTE: Quantity shown is for one pocket only.**

00598

58" CHIPPER COMPONENTS cont...



Morbark-000021
Holland v. Morbark, et al.

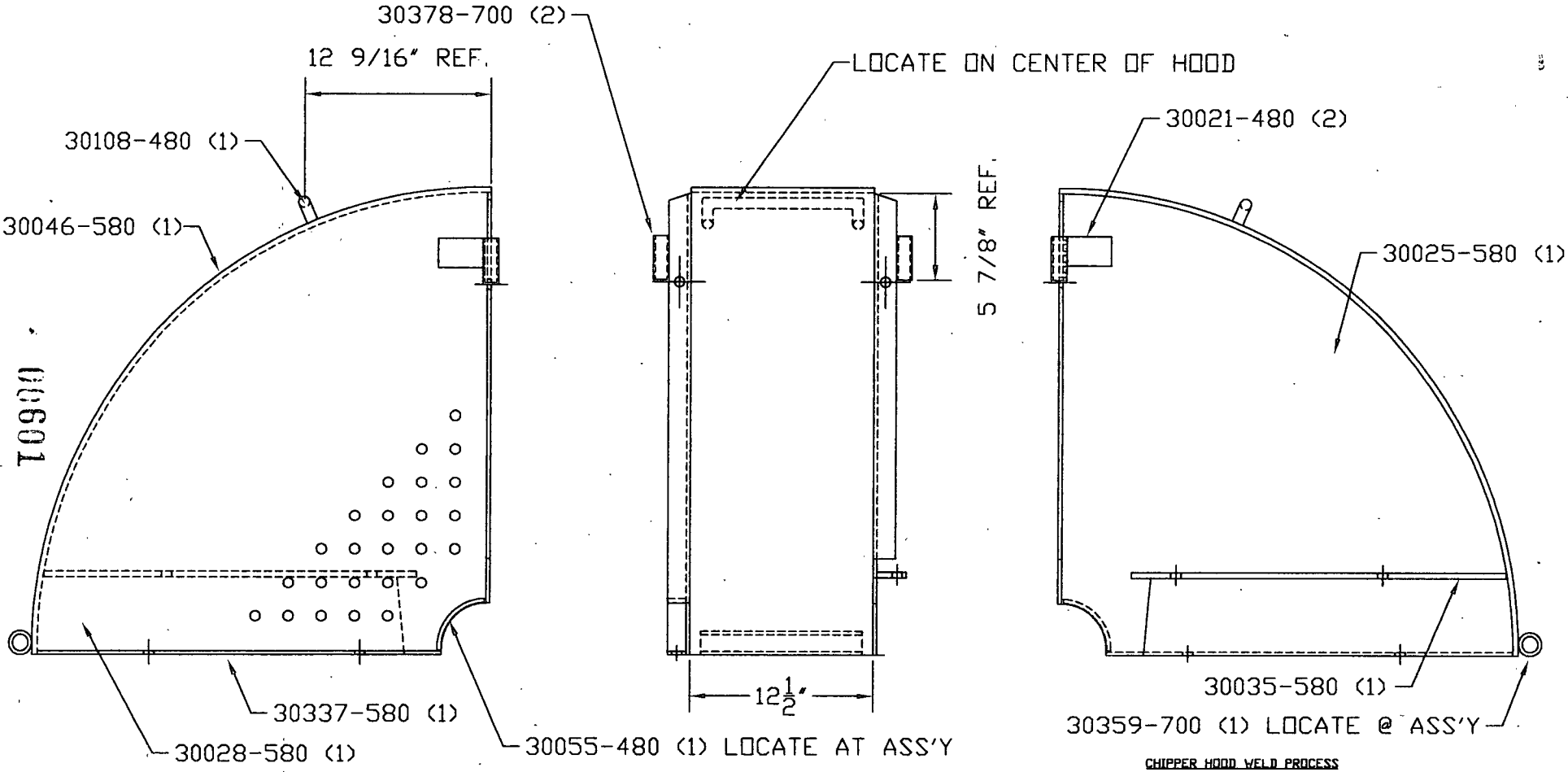
00599

58" CHIPPER COMPONENTS cont...

ITEM	QTY.	PART NO.	DESCRIPTION
22	1*	40001-580	Knife Clamp 5/8 Chip (Conventional)
22a	1*	40002-580	Knife Clamp 3/4 Chip (Conventional)
22b	1*	40003-580	Knife Clamp 7/8 Chip (Conventional)
22c	1*	40232-580	Knife Clamp 5/8, 3/4, 7/8, 1" Chip (Mor-Clamp)
23	1	25173-047	Seal
24	8	22424-423	Draw Ring Bolt
25	1	30134-580	Bearing Housing
26	1	23661-216	Bearing
27	1	23962-122	Lock Ring
28	1	23962-022	Nut
29	1	30131-580	End Cap
30	8	21731-080	Infeed Spout Nut
30a	8	21731-112	Jam Nut
30b	8	21161-048	Washer
31		30006-580	Spout Shim (Top) (.062" Thick)
31a		30008-580	Spout Shim (Top) (.100" Thick)
31b		30010-580	Spout Shim (Top) (.125" Thick)
31c		30134-480	Spout Shim (Bottom) (.062" Thick)
31d		30009-480	Spout Shim (Bottom) (.100" Thick)
31e		30133-480	Spout Shim (Bottom) (.125" Thick)
32	1	40029-580	Infeed Spout
33	1	40174-580	Pusher Block
34	1	30019-580	Guide
35	4	21624-405	Bolt
36	1	30132-580	Feed Plate
37	1	30067-580	Keeper Plate
38	3	22531-075	Nut
39	1	40021-580	Anvil Clamp
40	1	39233-243	Vertical Anvil
41	1	30039-580	Belly Band (End Discharge)
41a	1	30040-580	Belly Band (Top Discharge)
42	1	39233-252	Horizontal Anvil
-	1	40179-580	Knife Gauge, 5/8" Chip
-	1	40180-580	Knife Gauge, 3/4" Chip
-	1	40181-580	Knife Gauge, 7/8" Chip

*** NOTE: Quantity shown is for one pocket only.**

C 40045-580



CHIPPER HOOD WELD PROCESS

1. SET HOOD PARTS INTO WELD FIXTURE AND TACK PARTS TOGETHER.
2. MOVE HOOD TO ROLLING FIXTURE AND INSTALL HOOD LINERS (OPTIONAL).
3. WELD UP HOOD AS FOLLOWS: (1) INSIDE WELDS INCLUDING HOOD LINERS WHEN REQUIRED (2) OUTSIDE WELDS. TACK HOOD RAILS, DO NOT WELD. (FOR SHIPOUT HOODS, TACK HOOD RAILS TO THE INSIDE OF HOOD FOR SHIPMENT.)
4. REMOVE HOOD FROM THE ROLLING FIXTURE AND ALLOW TO COOL AND NORMALIZE FOR A MINIMUM OF TWO DAYS.
5. AFTER NORMALIZING, FIT HOODS TO THE CHIPPER BASE.
6. TRANSFER HOOD RAIL HOLES TO THE CHIPPER BASE.
7. SEND BASE TO MACHINE SHOP FOR DRILLING.
8. FINISH WELD HOOD RAILS TO THE HOOD.
9. AFTER CHIPPER BASE HAS BEEN DRILLED, REFIT HOODS AND CHECK HOLES FOR PROPER ALIGNMENT.
10. REAM HOOD RAIL HOLES AS NEEDED. DO NOT PRY ON HOOD SIDES TO ALIGN BOLTS!

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SYM	REVISION	DATE	BY
E	ADDED WELD PROCESS PER ECN 7993	12/08/04	GB
D	REVISED #30028-580	7/10/00	RT.
C	CHANGED #30046-580 TO T-1	6/29/99	RT.
B	ADDED PART #30337-580	3/10/99	RT.
A	REVISED ILLUSTRATION	9/12/97	RT.

MORBARK, INC. — Hobride

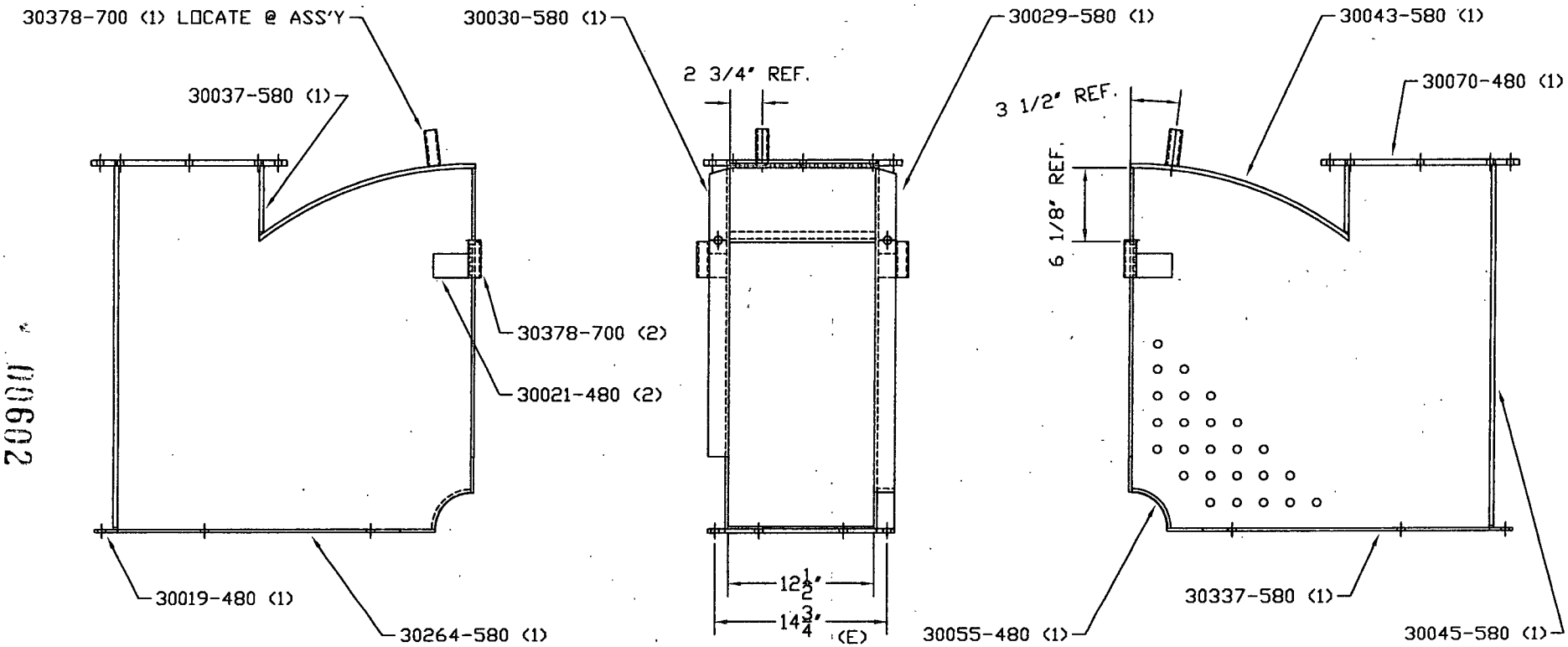
8507 SOUTH WINN RD. WINN, MI 48896 — PHONE: (517) 866-2381 FAX: (517) 866-2280

TITLE: INFEED HOOD-R.H.-TOP DISCHARGE

DRAWN BY: Jason — SCALE: NS

DATE: 10/10/94 — ASSEMBLY NO. C 40045-580

NEXT ASS'Y:



20900

CHIPPER HOOD WELD PROCESS

1. SET HOOD PARTS INTO WELD FIXTURE AND TACK PARTS TOGETHER.
2. MOVE HOOD TO ROLLING FIXTURE AND INSTALL HOOD LINERS (OPTIONAL).
3. WELD UP HOOD AS FOLLOWS: (1) INSIDE WELDS INCLUDING HOOD LINERS WHEN REQUIRED; (2) OUTSIDE WELDS. TACK HOOD RAILS, DO NOT WELD. (FOR SHIPOUT HOODS, TACK HOOD RAILS TO THE INSIDE OF HOOD FOR SHIPMENT.)
4. REMOVE HOOD FROM THE ROLLING FIXTURE AND ALLOW TO COOL AND NORMALIZE FOR A MINIMUN OF TWO DAYS.
5. AFTER NORMALIZING, FIT HOODS TO THE CHIPPER BASE.
6. TRANSFER HOOD RAIL HOLES TO THE CHIPPER BASE.
7. SEND BASE TO MACHINE SHOP FOR DRILLING.
8. FINISH WELD HOOD RAILS TO THE HOOD.
9. AFTER CHIPPER BASE HAS BEEN DRILLED, REFIT HOODS AND CHECK HOLES FOR PROPER ALIGNMENT.
10. REAM HOOD RAIL HOLES AS NEEDED. DO NOT PRY ON HOOD SIDES TO ALIGN BOLTS!

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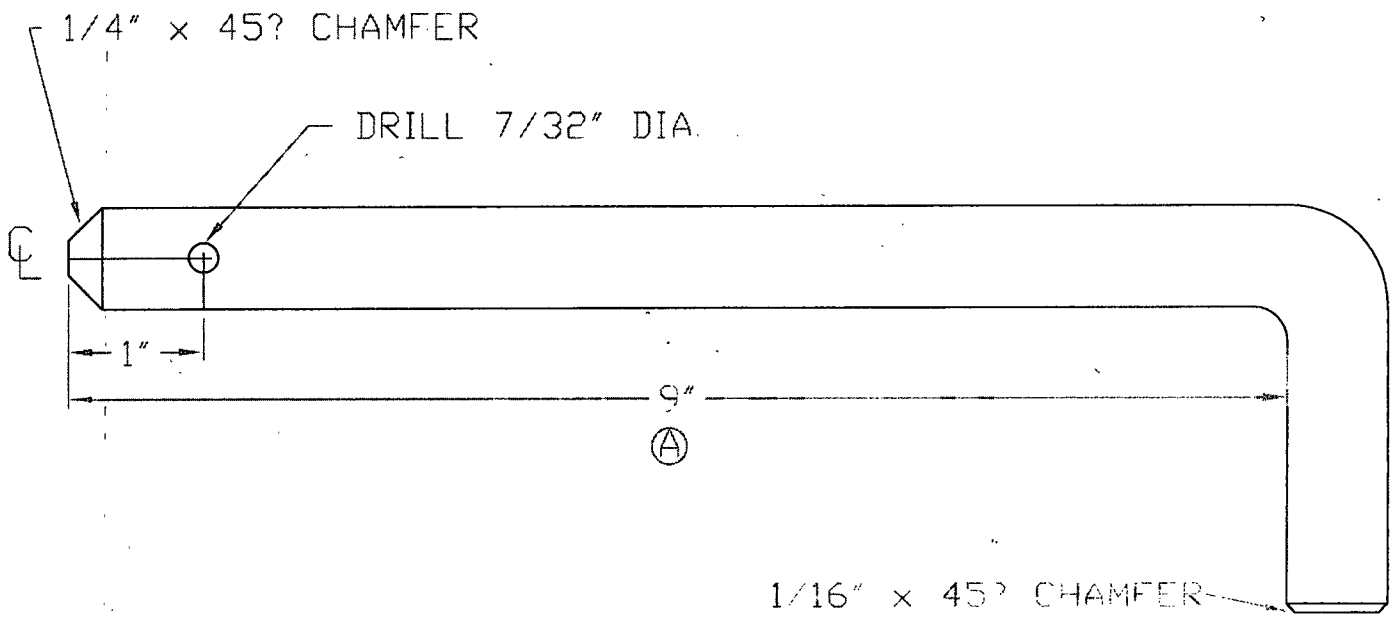
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SYM	REVISION	DATE	BY
F	ADDED WELD PROCESS PER PCF 7993	12/8/04	GB
E	30337-580 WAS 30288-580	12/11/01	RV
E	WAS 14 1/2"	8/30/01	DG
D	REVISED 030029-580	7/10/00	RT.
C	CHANGED 030045-580 TO T-1	6/29/99	RT.
B	CHANGED 030043-580 TO T-1	6/29/99	RT.
A	CHANGED 030037-580 TO T-1	6/29/99	RT.

MORBARK, INC. — CHIPARVESTORS
8507 SOUTH WINN RD. WINN, MI 48896
PHONE: (517) 866-2381
FAX: (517) 866-2280

TITLE: DISCHARGE SIDE- TOP DIS. (RH.)
DRAWN BY: Ron Tennant — SCALE: NS
DATE: 9/12/97
NEXT ASS'Y:
C ASSEMBLY NO. 40046-580

30107-480
PART NO.

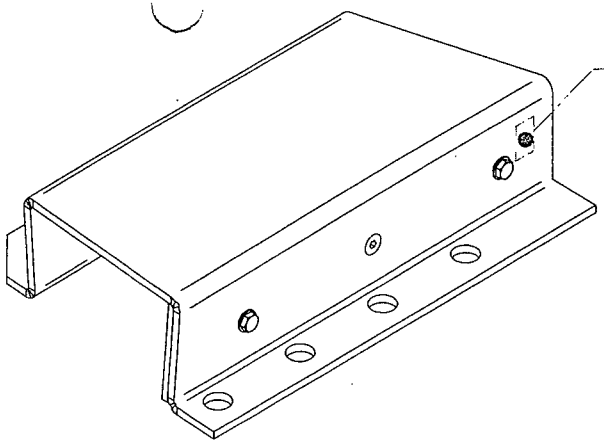


A WAS 8 11/8/89 D.C.

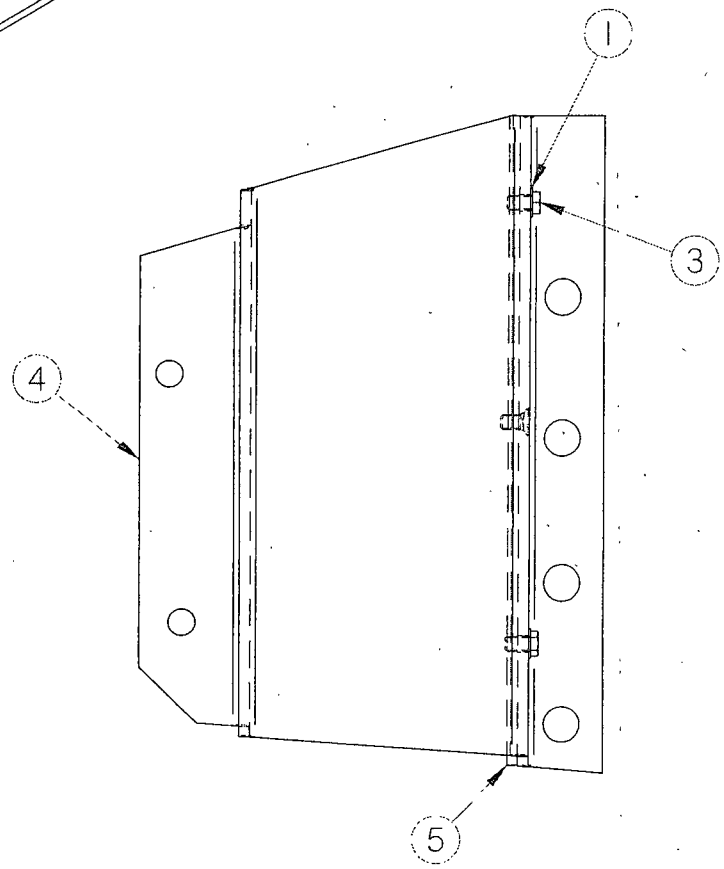
DATE ORD_____ DATE REQ'D_____ QTY ORD._____ QTY REC'D_____ ORDERED BY_____ SHELF LOC. S 02

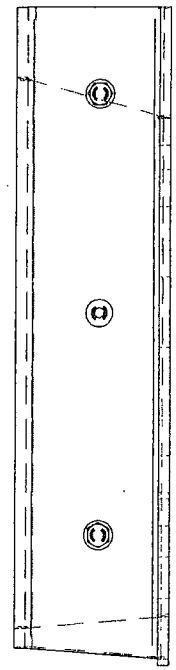
QTY. 2	BY- DPC	DATE 11/8/89	DESCRIPTION 3/4 DIA HR X 11	CHIPARVESTORS INC.
ASSEMBLY NO.			TITLE HOOD PIN	PART NO. 30107-480

A | SEMBLY NO. 0293-580



30900





LOCKTITE INSERT BOLTS
GRIND INSERT BOLTS FLUSH INSIDE
PROPERLY TORQUE BOLTS
STAMP WEIGHT ON BLADE-63.0 LBS APPROX.
INSTALL IN MATCHED SETS ONLY

Item #	Qty	Part #	Desc.
5	1	30302-580	3/8 100XF x 4 11/16 x 22 1/4
4	1	30301-580	3/8 HR x 22 1/2 x 24 7/8
3	2	21624-252	Bolt - 1/2-13 x 7/8
2	1	21451-350	Bolt - 1/2-13 x 1 FHSCS
1	2	21161-044	WASHER, FLAT, 1/2

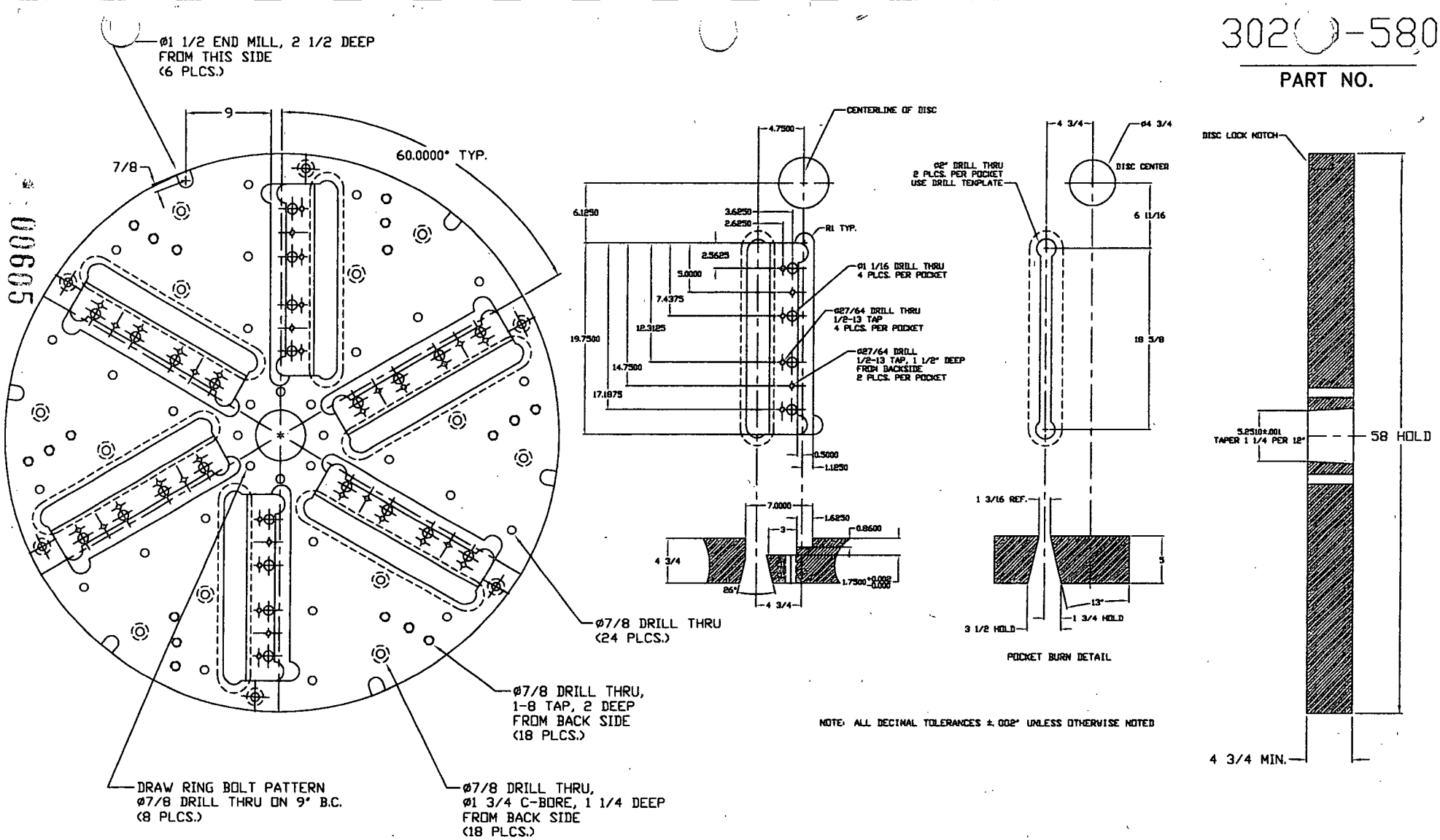
ACED [illegible]-252 & [illegible]044 W/ [illegible]2145[illegible]350, [illegible]		4/15/08	PP
SION		DATE	

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SE DESIGN BY: JStrong	DATE: 10/20/2006	ASSM. WEIGHT 63.602 lbm	MORBARK, INC. 8507 S. Winn Rd. Winn, MI #48896 Phone: 1-989-866-2381 Fax: 1-989-866-2280
SE DRAFT BY: JStrong	DATE: 10/20/2006	TITLE FAN BLADE	
ACAD DESIGN BY: N	DATE: Nc	NEXT ASSEMBLY NO.	A / SHEET 1 c / ASSEMBLY NO. 40[illegible]580

30299-580

PART NO.



NOTE: ALL DECIMAL TOLERANCES ± .002" UNLESS OTHERWISE NOTED

USE DRILL TEMPLATE #30489-999

A) REDRAWN FOR PRE-DRILLED WEAR PLATES-REV. 11/2/00 RT.

DATE ORD.:_____ DATE REQ'D:_____ QTY ORD.:_____ QTY REC'D:_____ ORDERED BY:_____ GAS SHELF LOC.:_____

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± 1/16" DECIMAL ± 0.005" BRAKE ANGLES ± 3/4° STRAIGHTNESS 1/32" PER FOOT	*MORBARK, INC.*	*CHIPARVESTORS*	ASSEMBLY NO.			
	DESC. 5 HR X 59 X 59		PER MACH. 1	PER ASSY 1	BY *Brandon Smith*	DATE: 1/27/93
	TITLE 6 KNIFE-R.H.-NON SEP.-MOR CLAMP-5" THICK		SCALE: NS	PART NO. 30299-580		

United States Patent Office 3,524,485
Patented Aug. 18, 1970

PENGAD 800-631-6989
Noch
DEPOSITION
EXHIBIT
#14
JC 9-27-10

3,524,485

LOG CHIPPING APPARATUS

Leward N. Smith, Remus, Mich., assignor to Morbark Industries, Inc., Winn, Mich., a corporation of Michigan

Filed Aug. 5, 1968, Ser. No. 750,199
Int. Cl. B27c 1/12; B02c 18/24
U.S. Cl. 144—176 15 Claims

ABSTRACT OF THE DISCLOSURE

Log chipping apparatus comprising a rotatable chipping disk and a feed conveyor for feeding a log lengthwise into engagement with the chipper and including a speed sensing device operable to sense changes in the speed of rotation of the chipper. The speed sensing device is coupled to the feeding conveyor and includes means to enable and disable operation of the latter in accordance with changes in the speed of movement of the chipper. A stop member is coupled to the sensing device for movement into and out of holding engagement with a log in response to changes in speed of the chipper.

This invention relates to log chipping apparatus and more particularly to a portable chipping mechanism having means to control the feeding of a log to a chipping wheel so as to enable the chipping wheel to operate at speeds most desirable for the formation of chips.

In the manufacture of paper from wood pulp, trees growing in a forest are cut, debarked, and cut into chips for further processing into pulp from which paper is made. To expedite operations, it is preferable that the logs be converted into chips in the forest, thereby dispensing with the necessity of handling and shipping unwieldy logs. In the formation of the chips it is conventional to feed a log to a chipping station at which a movable, toothed member engages the log and converts the latter into chips. In the formation of the chips, however, the rate at which the chipping knives travel has a direct bearing on the quality of chips produced. That is, if the log being fed slows down the chipping apparatus beyond a predetermined speed, a change in the size of chips and the rapidity at which they are produced occurs. It is preferable that the chips to be produced for paper making be substantially of uniform size, thereby facilitating the reduction of the chips to pulp.

An object of this invention is to provide log chipping apparatus wherein the feed of the log to the chipping apparatus is automatically interrupted when necessary so as to enable the chipping apparatus to regain speed and produce chips of substantially uniform size.

Another object of the invention is to provide apparatus of the character referred to and wherein the log feed is controlled automatically in response to changes in the rate of movement of the chipping apparatus.

A further object of the invention is to provide chipping apparatus of the character described which is self contained so as to be capable of utilization at remote and isolated forest sites.

Still a further object of the invention is to design a wood harvesting system employing a chipper which in view of the provision for stopping feeding of the log into the chipper may be driven by a smaller motor of considerably decreased horsepower.

Other objects and advantages of the invention will be pointed out specifically or will become apparent from the following description when it is considered in conjunction with the appended claims and the accompanying drawings in which:

FIG. 1 is a fragmentary view, partly in top plan and partly in section, of chipping apparatus constructed in accordance with the invention;

FIG. 2 is a sectional view taken on the line 2—2 of FIG. 1; and

FIG. 3 is a simplified schematic diagram of electrical and pressure fluid apparatus forming part of the invention.

Apparatus constructed in accordance with the invention includes conventional chipping mechanism 1 comprising a cylindrical housing 2 mounted on a suitable wheeled frame 3 and within which housing is journaled a rotary shaft 4 on which is fixed a disk 5. At intervals around the periphery of the disk 5 are slots 6 in each of which is fixed a cutting blade or tooth 7 having a cutting edge 8 which projects beyond one face of the disk. The plane of rotation of the disk 5 constitutes a chipping station. Secured to and entering beyond the opposite face of the disk is a plurality of fan blades 9, the purpose of which will be explained hereafter.

At one side of the housing 2 is an opening 10 which is vertically spaced from the axis of rotation of the disk 5. Supported by the housing is a trough-like member 11 which communicates with the opening 10 and journals, adjacent the housing 2, a shaft 12 that is driven by an electrically controlled hydraulic motor 13. Fixed on the shaft 12 is a turning member 14 around which is trained an endless metal rod conveyor 15. The motor drives the shaft 12 in such direction that the upper run of the conveyor moves along a path leading to the chipping disk 5.

Means for rotating the disk 5 comprises an internal combustion engine 16 having a drive shaft 17 on which is fixed a pulley 18. A drive belt 19 is trained around the pulley 18 and around a pulley 20 which is fixed to the shaft 4. Operation of the motor 16 causes the shaft 4 to rotate clockwisely, as viewed in FIG. 1.

Stop means designated generally by the reference character 21 is provided forwardly or upstream of the chipping mechanism and comprises an arm 22 pivoted as at 23 between its ends on trunnions 24 supported on upright members 25. The arm 22 is of such length that one end overhangs the path of movement of the conveyor 15 and to that end of the arm is secured a depending, sharpened blade 26. The arm 22 is movable between raised and lowered positions by means of a double acting hydraulic ram 27 having a cylinder 28 pivoted as at 29 to a mounting bracket 30 and within which is a reciprocable piston having a piston rod 31 with a yoke pivoted as at 32 to the arm 22. Hydraulic fluid is introduced to an exhausted from opposite ends of the cylinder 28 via ports 34 and 35 by means of an electrically operated pump 36 supplying hydraulic fluid to an electrically operated ram reversing valve 37.

A speed sensing device 38, such as a tachometer, is mounted on the engine 16 and is coupled to the drive shaft 17 by conventional means (not shown). Incorporated in the device 38 normally open is a switch 39 (FIG. 3) which is adapted to open and close in response to changes in speed of rotation of the drive shaft 17. The switch 39 may be any one of a number of known speed sensitive switches. For example, a switch of the kind manufactured by Synchro-Start Products Inc. of Skokie, Ill. and disclosed in its 1961 copyrighted bulletins Nos. 604

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and 605 is satisfactory. The function and operation of the apparatus 37 and 39 will be referred to subsequently.

To condition the apparatus for operation, a debarked log or bolt 40 proceeds on the conveyor 15 after discharge from a debarking machine so as to be fed lengthwise toward the chipping station. To facilitate the handling of the log 40, inclined aprons 41 are provided on opposite sides of the conveyor 15. With the log on the conveyor, the motor 13 may be started by closing a master switch 42 and a start-stop switch 43 which are in circuit with the motor 13 and with a suitable source of electrical energy such as that produced by the generator or alternator of the engine 16. Also in circuit with the motor 13 is a normally closed contact 44 of a relay 45, the coil 46 of which is in circuit with the normally open switch 39. The relay 45 has a normally open contact 47 adapted to make and break a circuit which includes a relay 48 having a normally open contact 49 in circuit with advance solenoid 37*a* of the valve 37. The valve 37 also has a retract solenoid 37*b* in a circuit line with a normally closed contact 47*a*.

When the parts are in the positions shown in FIG. 3, closing of the switches 42 and 43 will actuate the motor 13 so as to cause the conveyor 15 to feed the log 40 toward the chipping station. As the log is fed toward the chipping station its leading end will be engaged by the rotating knives 7 so as to cause chips to be cut from the log. Chips thus cut from the log will be blown by the fan blades 9 through a tangential opening in the housing 2 into a chute 50 for discharge to a suitable truck or other vehicle which can haul the chips to the mill.

The speed at which the motor 13 operates is so selected as to drive the conveyor 15 at a rate calculated to feed the log 40 to the chipping member 5 at such speed as to enable the chips cut from the log to be of substantially uniform size and without imposing undue load on the driving mechanism for the chipping member. A typical speed for the shaft 17 may be 450 r.p.m.

Due to many considerations, however, such as the varying diameters of logs from one end to another, or of different logs, it is inevitable that the speed of rotation of the chipping member 5 will vary. As the chipping disk decelerates, it becomes increasingly difficult for the blades 8 to remove chips from the leading end of the log and this difficulty is compounded by the necessity of such chips being sufficiently large to keep pace with the rate of feed of the log. Thus, it is possible for the chipping disk to become stalled at times with larger diameter logs.

According to the present invention, the tachometer 38 functions to indicate the speed of the engine drive shaft 17, which speed is directly related to the speed of rotation of the shaft 4. When the speed of rotation of the chipper disk 5 decreases, the speed of rotation of the motor 17 also will decrease and the decrease in speed will be indicated by the tachometer 38. When the speed of the motor shaft 17 reaches a predetermined rate, as indicated by the tachometer, such as a rate corresponding to 350 r.p.m. of shaft 4, the tachometer will close the switch 39, thereupon energizing the relay 45 and effecting opening of the contact 44 and closing of the contact 47. Opening of the contact 44 will interrupt operation of the motor 13, thereby discontinuing the feeding of the log to the chipping station. Closing of the contact 47 will energize the relay 48 so as to close the contact 49, whereupon the solenoid 37*a* will be energized and the valve 37 will be adjusted so as to permit an extension of the hydraulic ram 27 to cause movement of the arm 22 counterclockwise, as viewed in FIG. 2, until the blade 26 moves into the path of movement of the log 40 and penetrates the latter to hold the log firmly against movement either toward or away from the chipping wheel 5. In this position of blade 26 the conveyor 15 is also hydraulically locked and cannot move until the normal speed of shaft 17 is regained.

When movement of the log toward the chipping station is restrained, the resistance to rotation of the chipping

disk 5 is diminished, thereby enabling the disk 5 to accelerate. When the speed of the shaft 17 accelerates to a predetermined rate, as indicated by the tachometer 38, the switch 39 opens and deenergizes the relay 45, thereby effecting closing of the switch 44, opening of the contact 47, and closing of contact 47*a*. The motor 13 thereupon will be reenergized and the valve 37 will be reversed so as to contact the ram 27, thereby restoring the stop blade 26 to a position clear of the path of the log 40. Feeding of the log to the chipping station thereupon recommences.

The foregoing operation may be repeated several times during the chipping of a single log.

This disclosure is representative of a presently preferred form of the invention but is intended to be illustrative rather than definitive thereof. The invention is defined in the claims.

What is claimed is:

1. Log chipping apparatus comprising: movable chipping means; means for moving said chipping means at a chipping station in a path of chipping travel at a predetermined rate of movement; means for feeding a log along a path toward said chipping station into engagement with said chipping means; means responsive to changes in the rate of movement of said chipping means for halting said log including log stopping means and means mounting said log stopping means for movement into and out of the path of movement of said log; and means responsive to changes in the rate of movement of said chipping means for effecting movements of said stopping means.

2. Apparatus as set forth in claim 1 wherein said chipping means comprises a rotatable vertically disposed disk member having cutting blades thereon.

3. Apparatus as set forth in claim 2 wherein said disk member has fan blades thereon.

4. Log chipping apparatus comprising: movable chipping means; means for moving said chipping means at a chipping station in a chipping path of travel; means for feeding a log along a path toward said chipping station into engagement with said chipping means; stop means; means mounting said stop means for movement from a first removed position to a second position in the path of said log for engagement therewith to interrupt movement thereof said station; and operating means for moving said stop means between said first and second positions.

5. Apparatus as set forth in claim 4 including sensing means operable to detect changes in the speed of movement of said chipping means, and wherein said operating means includes means responsive to operation of said sensing means for moving said stop means from one of said positions to the other.

6. Apparatus as set forth in claim 4 wherein said operating means comprises pressure fluid means.

7. Apparatus as set forth in claim 4 wherein said chipping means comprises a rotatable disk having chipping teeth thereon.

8. Apparatus as set forth in claim 7 including a housing surrounding said disk and having an opening therein to receive said log.

9. Apparatus as set forth in claim 8 wherein said housing has a second opening therein and wherein said disk has fan blades thereon arranged to discharge chips from said housing through said second opening.

10. Apparatus as set forth in claim 4 including means for driving said feeding means; and means for starting and stopping said driving means.

11. Apparatus as set forth in claim 10 including sensing means operable to detect changes in the speed of movement of said chipping means; and means coupling said sensing means to said driving means for operating the latter in accordance with speed changes of said chipping means.

12. Apparatus set forth in claim 4 wherein said stop means comprises a blade having a sharpened edge adapted to be driven into penetrating engagement with said log.

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13. Log chipping apparatus including: chipping means; means for moving said chipping means at a chipping station in a path of chipping travel at a predetermined rate of movement; means for feeding a log along a path toward said chipping station into engagement with said chipping means; and means responsive to a decrease in the rate of movement of said chipping means for halting the travel of said log until said chipping means regains a predetermined rate of movement.

14. Apparatus as set forth in claim 13 wherein said means for substantially halting the travel of said log comprises means for starting and stopping said feeding means.

15. Apparatus as set forth in claim 13 wherein said halting means comprises means for sensing the rate of movement of said chipping means; stop blade means; means mounting said stop blade means for movement into and out of the path of movement of said log; and

operating means responsive to said sensing means for moving said stop blade means.

References Cited

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3,199,793	8/1965	Sabi	241—34
3,332,461	7/1967	Ledergerber	144—176

GIL WEIDENFELD, Primary Examiner

U.S. Cl. X. R.

83—58; 144—242; 241—35

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Aug. 18, 1970 L. N. SMITH 3,524,485

LOG CHIPPING APPARATUS

Filed Aug. 5, 1968

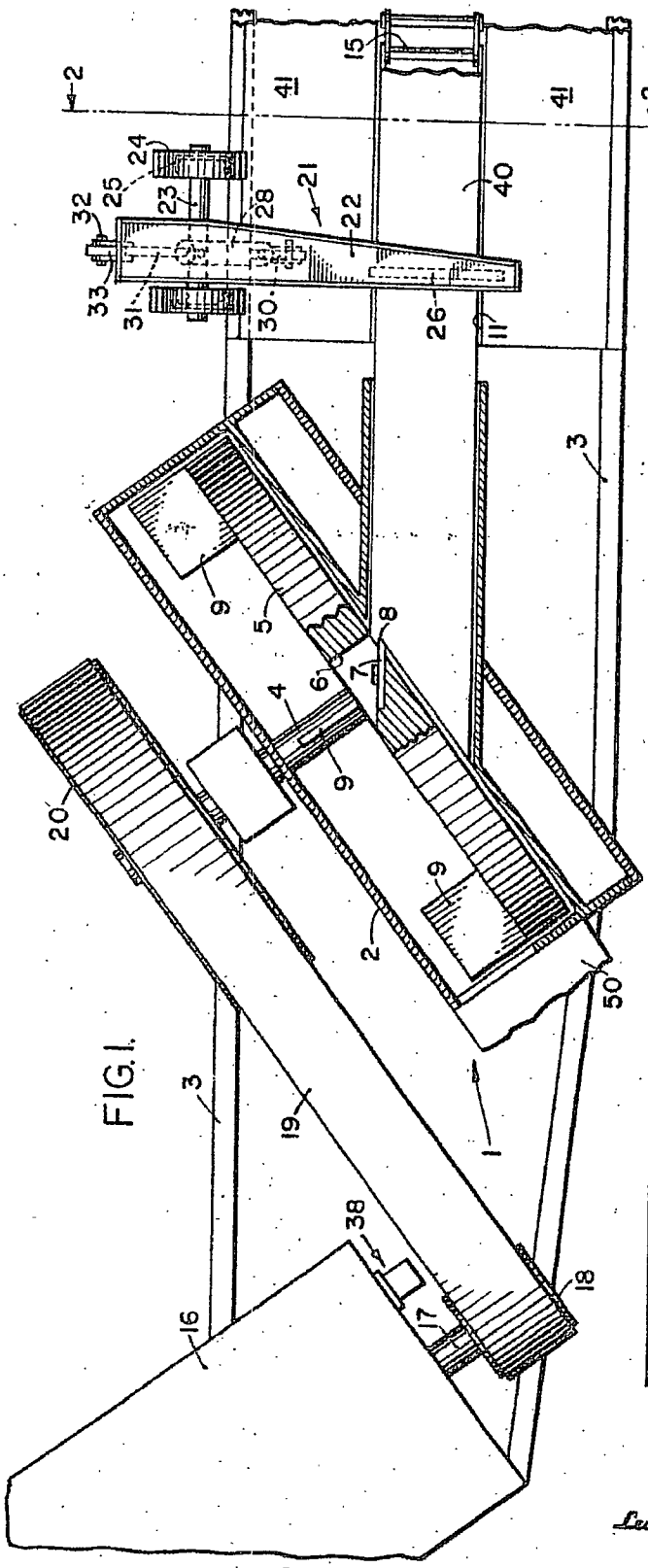


FIG. 1.

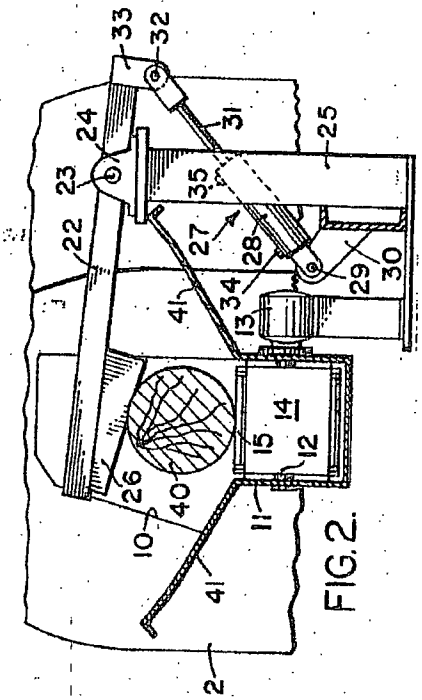


FIG. 2.

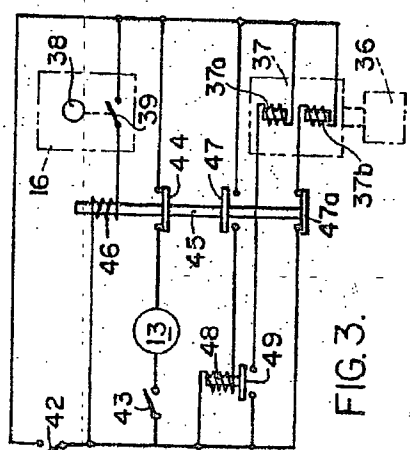


FIG. 3.

INVENTOR
LEWARD N. SMITH
BY his attorneys,
Learman, Learman & McCulloch

00609

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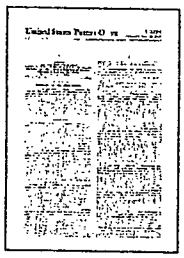
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LOG CHIPPING APPARATUS Leward N. Smith



› Overview
Abstract
Drawing
Description
Claims

Inventor: Leward N. Smith
Assignee: Morbark Industries

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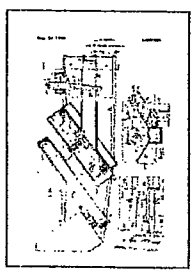
Go

Patent number: 3524485
Filing date: Aug 5, 1968
Issue date: Aug 1970

Referenced by

Patent Number	Title	Issue date
RE31048	Tree destroyer	Oct 5, 1982
4598745	Feeding wood chipping	Jul 8, 1986
4736781	Stump disintegrator	Apr 12, 1988
4771953	Retractable anvil chipper	Sep 20, 1988
4889169	Combination log debarker-chipper	Dec 26, 1989
5005620	Drum-type wood chipper	Apr 9, 1991
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Drawings



Drawing

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United States Patent [19]

Morey

[11] Patent Number: 6,016,855

[45] Date of Patent: Jan. 25, 2000

[54] **HOOD ASSEMBLY FOR A WOOD CHIPPER**

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[73] Assignee: **Tramor, Inc.**, Remus, Mich.

[21] Appl. No.: **09/262,252**

[22] Filed: **Mar. 4, 1999**

[51] **Int. Cl.**[7] **B27C 1/00**; B02C 21/02; B02C 13/00

[52] **U.S. Cl.** **144/162.1**; 144/176; 144/373; 241/92; 241/101.76; 241/188.1; 241/301

[58] **Field of Search** 144/162.1, 172–174, 144/176, 208.1, 208.7, 241, 369, 373; 241/79.2, 92, 93, 94, 298, 194, 195, 198, 101.72, 101.74, 101.76, 101.78, 189.1, 188.1, 301, 296

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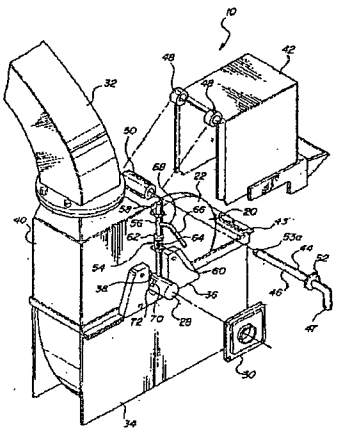
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Primary Examiner—W. Donald Bray
Attorney, Agent, or Firm—Bliss McGlynn, P.C.

[57] **ABSTRACT**

A hood assembly for wood chipper includes a housing and a cutting assembly partially disposed within the housing.

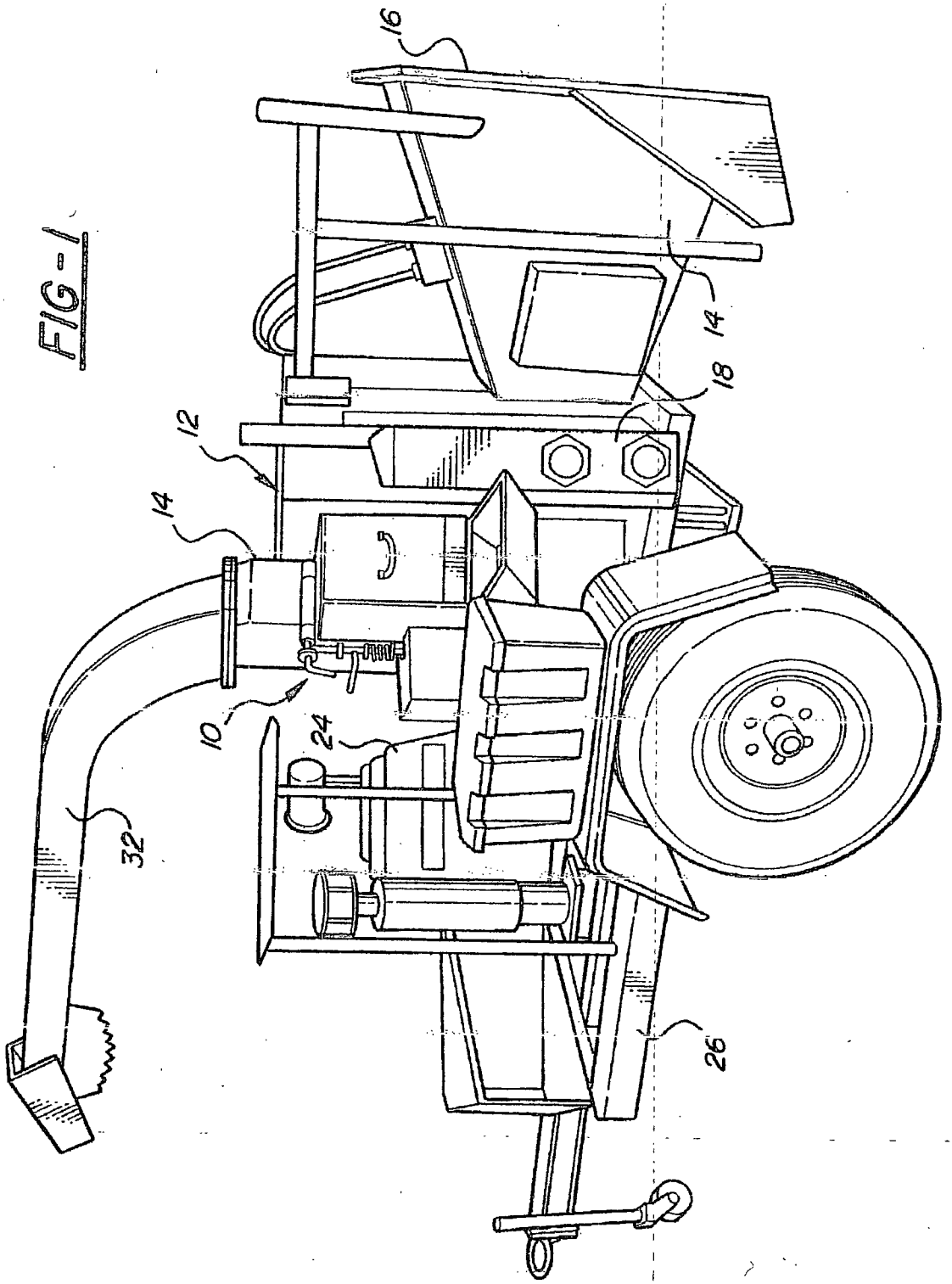


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The hood assembly also includes a first hood partially enclosing the cutting assembly and fixedly connected to the housing and a second hood pivotally connected to the housing and having a closed position covering the cutting assembly and an open position extending away from the cutting assembly. The hood assembly further includes a removable hood pin to secure the first and second hoods together in the closed position and a hood pin plunger assembly connected to the first hood and cooperating with the hood pin and having a bent handle to allow an operator to actuate the hood pin plunger assembly to remove the hood pin after the cutting assembly has stopped rotating to move the second hood to the open position.

20 Claims, 3 Drawing Sheets

FIG-1



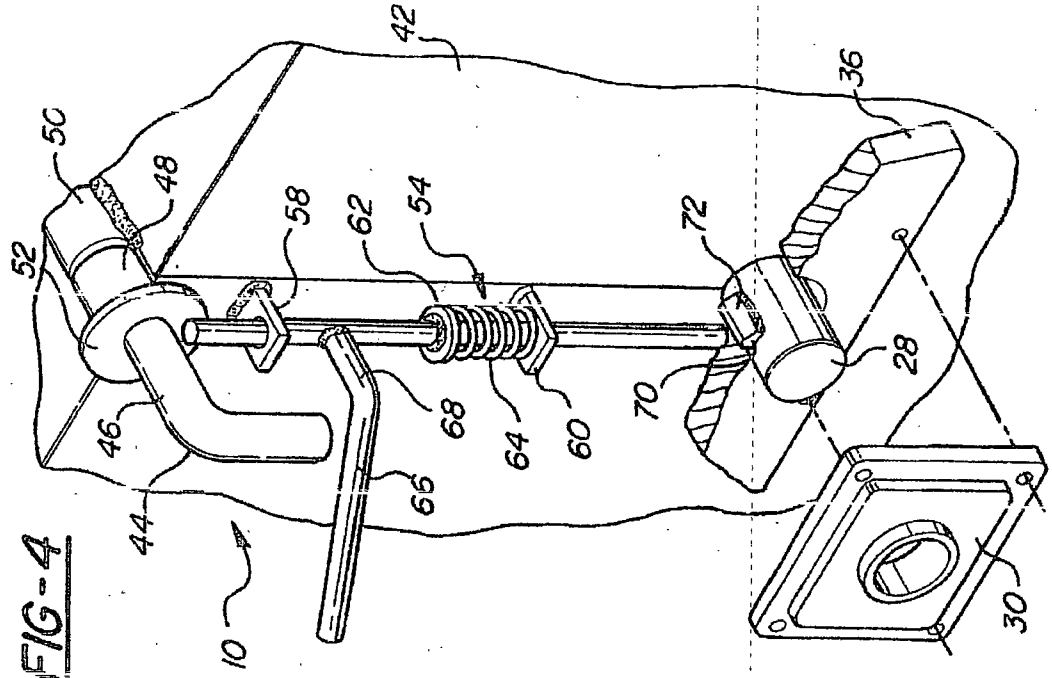

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FIG-4

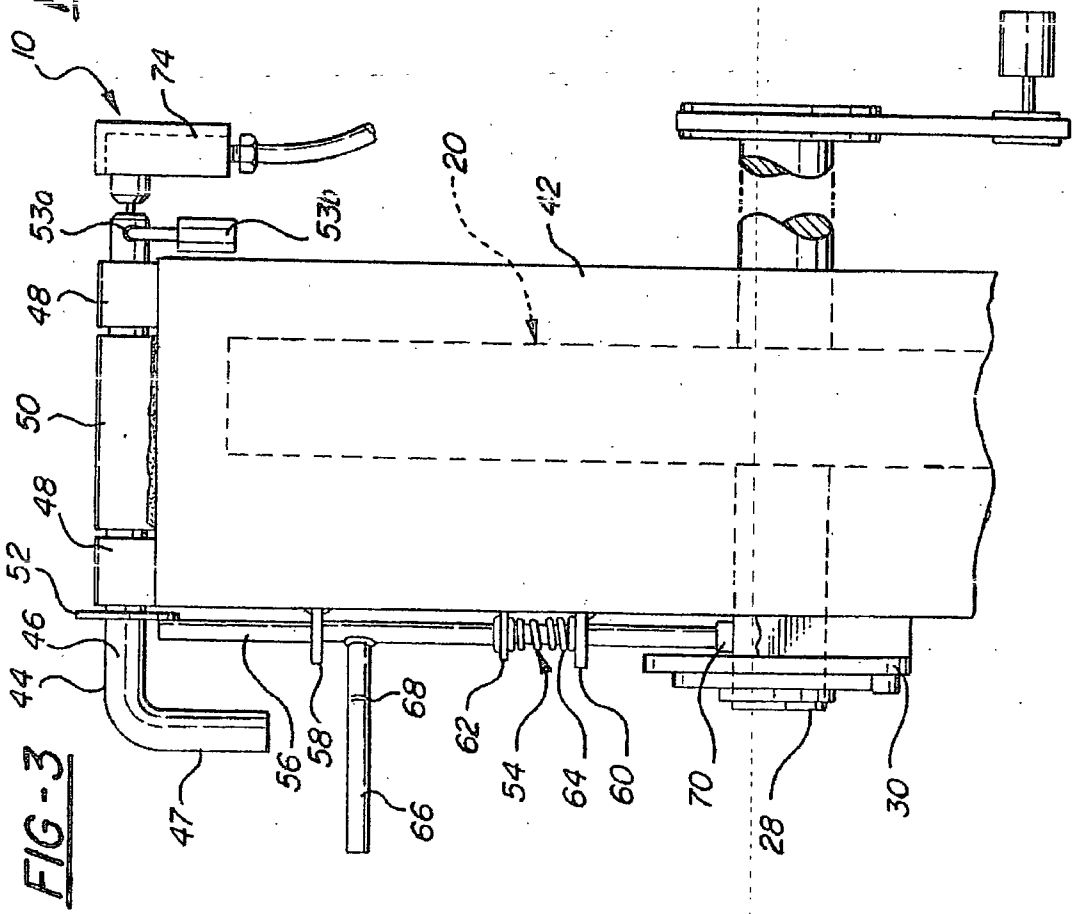

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FIG-3

HOOD ASSEMBLY FOR A WOOD CHIPPER

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to wood chippers and, more particularly, to a hood assembly for a wood chipper.

2. Description of the Related Art

It is known to provide a wood chipper for chipping wood such as brush, branches and the like to produce wood chips. One type of wood chipper known in the art includes a cutting assembly having a rotatable disc with at least one knife or blade for chipping the wood entering the wood chipper and reducing it to wood chips. Typically, the wood chipper includes a hood assembly surrounding the cutting assembly and having a stationary lower housing and an stationary upper half hood connected to the lower housing and a movable upper half hood hinged to the lower housing for allowing access to the cutting assembly. The hood assembly includes a removable hood pin connecting the upper half hoods together and a locking device to prevent an operator from unintentionally removing the hood pin and opening the hood assembly to allow access to the cutting assembly.

Although this type of hood assembly has worked well, it is desirable to prevent the operator from opening the hood assembly while the cutting assembly is rotating under normal or extreme operating conditions. Therefore, there is a preferred need in the art to provide a hood assembly for a wood chipper to prevent access by an operator to the cutting assembly while the cutting assembly is rotating.

SUMMARY OF THE INVENTION

Accordingly, the present invention is a hood assembly for a wood chipper including a lower housing and a rotatable cutting assembly partially disposed within the lower housing. The hood assembly also includes a first half hood partially covering the cutting assembly and fixedly connected to the lower housing. The hood assembly includes a second half hood pivotally connected to the lower housing and having a closed position covering the cutting assembly and an open position extending away from the cutting assembly. The hood assembly further includes a removable hood pin to connect the first half hood and second half hood together in the closed position. The hood assembly includes a hood pin plunger assembly connected to the first half hood for cooperating with the hood pin and having a bent handle to allow an operator to actuate the hood pin plunger assembly to remove the hood pin after the cutting assembly has stopped rotating to move the second half hood to the open position.

One advantage of the present invention is that a new and improved hood assembly is provided for a wood chipper. Another advantage of the present invention is that the hood assembly is provided with a hood pin plunger assembly to resist opening of the hood assembly by an operator while the cutting assembly is rotating. A further advantage of the present invention is that the hood assembly has a bent handle to allow an operator to actuate the hood pin plunger assembly to allow an operator to remove the hood pin and access the cutting assembly only once the cutting assembly has stopped rotating.

Other features and advantages of the present invention will be readily appreciated as the same becomes better understood after reading the subsequent description when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of a hood assembly, according to the present invention, illustrated in operational relationship with a wood chipper.

FIG. **2** is a perspective exploded view of a portion of the hood assembly of FIG. **1**.

FIG. **3** is an elevational view of the hood assembly of FIG. **1**.

FIG. **4** is a perspective view of a portion of the hood assembly of FIG. **1**.

DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

Referring now to the drawings and in particular FIGS. **1** and **2**, one embodiment of a hood assembly **10**, according to the present invention, is shown for a wood chipper, generally indicated at **12**. The wood chipper **12** includes an infeed chute assembly **14** having an inlet **16** to allow wood material to enter the wood chipper **12**. The wood chipper **12** also includes a feed wheel assembly **18** disposed adjacent to the infeed chute assembly **14** and a cutting assembly **20** for rotation about a horizontal axis adjacent to the feed wheel assembly **18**. The feed wheel assembly **18** includes rotatable upper, lower or vertical feed wheels (not shown) for pulling and pushing the wood material from the infeed chute assembly **14** to the cutting assembly **20**. The cutting assembly **20** includes a rotatable disc **22** having a plurality of blades (not shown) operatively connected to the disc **22** for chipping the wood material. It should be appreciated that the feed wheel assembly **18** and cutting assembly **20** are conventional and known in the art.

The wood chipper **12** includes an engine **24** mounted on a frame **26** and coupled to the feed wheel assembly **18** and cutting assembly **20** by suitable means to cause rotation of the feed wheels and disc **22**. The wood chipper **12** includes a rotatable shaft **28** operatively connected to the disc **22** of the cutting assembly **20** and a pulley (not shown) disposed about one end of the shaft **28**. The shaft **28** is rotatably mounted to the hood assembly **10** by suitable means such as bearings **30**. The wood chipper **12** also includes a rotatable shaft (not shown) operatively connected to the engine **24** and a pulley (not shown) disposed about the shaft (not shown). The wood chipper **12** further includes a belt or belts (not shown) disposed over and interconnecting the pulleys. It should be appreciated that the engine **24** rotates the shaft and pulley, in turn, rotating the belt, pulley and shaft **28**, in turn, rotating the disc **22** of the cutting assembly **20** and feed wheels of the feed wheel assembly **18**.

The wood chipper **12** includes an outlet or discharge chute **32** operatively connected to the hood assembly **10**. The discharge chute **32** is generally tubular and may be circular or rectangular in cross-sectional shape. The discharge chute **32** extends upwardly and forwardly. It should be appreciated that the discharge chute **32** may have any suitable cross-sectional shape.

Referring to FIGS. **1** through **4**, the wood chipper **12** includes the hood assembly **10** to surround and enclose the cutting assembly **20**. The hood assembly **10** includes a lower housing **34** having a generally rectangular shape with a generally inverted U shape cross-section to enclose a lower portion of the cutting assembly **20**. The lower housing **34** is stationary and connected to the feed wheel assembly **18** by suitable means such as welding. The lower housing **34** has an inlet (not shown) on one side to receive wood material from the feed wheel assembly **18**. The lower housing **34** has

a pair of opposed saddle members **36** extending upwardly. The saddle members **36** have a U-shaped aperture **38** extending therethrough to receive the shaft **28**. The bearings **30** are secured to the saddle members **36** by suitable means such as fasteners (not shown). It should be appreciated that the lower housing **34** may have any suitable cross-sectional shape.

The hood assembly **10** also includes a stationary upper half hood or first hood **40** fixedly connected to the lower housing **34** by suitable means such as fasteners (not shown). The first hood **40** is generally rectangular in shape with a generally inverted U shape cross-section to enclose or cover approximately half of an upper portion of the cutting assembly **20**. The first hood **40** has an outlet at an upper end to allow chipped wood material to exit the cutting assembly **20** and pass through the discharge chute **32**. The hood assembly **10** includes a movable upper hood half or second hood **42** pivotally connected by a hinge **43** to the lower housing **34** and having a closed position covering the cutting assembly **20** and an open position extending away from the cutting assembly **20**. The second hood **42** is generally rectangular in shape with a generally inverted U shape cross-section to enclose or cover approximately the other half of the upper portion of the cutting assembly **20**. It should be appreciated that the first hood **40** and second hood **42** may have any suitable cross-sectional shape.

The hood assembly **10** includes a removable hood pin **44** to connect the first and second hoods **40** and **42** together in the closed position. The hood pin **44** has a general L shape with a relatively long portion **46** and a relatively short portion **47**. The relatively long portion **46** extends through a pair of sleeves **48** spaced transversely on the second hood **42** and a sleeve **50** on the first hood **40** disposed between the sleeves **48**. The hood pin **44** is a generally cylindrical and made of a metal material such as steel. The hood pin **44** has a flange **52** extending outwardly from its relatively long portion **46** near the relatively short portion **47** for a function to be described. The hood pin **44** has an aperture **53***a* extending diametrically through one end of the relatively long portion **46** to allow a locking device such as a padlock **53***b* to pass therethrough. It should be appreciated that the hood pin **44** may have any suitable shape and the connection for the hood pin **44** may also have any suitable shape.

The hood assembly **10** also includes a hood pin plunger assembly, generally indicated as **54**, cooperating with the hood pin **44** and shaft **28** to prevent the second hood **42** from opening or being moved to the open position while the cutting assembly **20** is rotating. The hood pin plunger assembly **54** includes a lock pin **56**, which is generally cylindrical in shape with a circular cross-section. The lock pin **56** is made of a metal material such as steel. The hood pin plunger assembly **54** includes an upper guide **58** fixedly attached to the first hood **40** by suitable means such as welding. The hood pin plunger assembly **54** includes a lower guide **60** fixedly attached to the first hood **40** by suitable means such as welding. The upper guide **58** is spaced vertically from the lower guide **60** and the lock pin **56** extends through aligned apertures in the guides **58** and **60**. The lock pin **56** has a flange **62** extending outwardly. The flange **62** is generally circular in shape. The hood pin plunger assembly **54** includes a spring **64** such as a coil spring disposed about the lock pin **56** between the flange **62** and the lower guide **60** to urge an upper end of the lock pin **56** to overlap the flange **52** on the hood pin **44**. The hood pin plunger assembly **54** includes a handle **66** extending outwardly from the lock pin **56** to allow as operator to move the lock pin **56** downwardly past the flange **52** of the hood pin **44** by compressing the spring **64** to allow the hood pin **44** to be removed once the padlock **53***b* is removed. The handle **66** is bent **68** at an angle, preferably forty-five degrees, from a distance adjacent to the lock pin **56**, preferably one inch, to form a stop so that the handle **66** will not fold inside second hood **42** when closing or moving to the closed position.

The hood assembly **10** also includes a projection **70** extending radially and axially along the shaft **28**. The projection **70** has at least one, preferably two inclined sides **72** to move the lock pin **56** upwardly as it rotates. A lower end of the lock pin **56** engages the shaft **28** as it rotates and the projection **70** moves the lock pin **56** upwardly to further overlap the flange **56** of the hood pin **44**. The projection **70** is secured to the shaft **28** by suitable means such as welding. It should be appreciated that the projection **70** could be integral and formed as one-piece with the shaft **28**.

The hood assembly **10** may include a limit switch **74** or the like at one end of the hood pin **44** to prevent power to the engine when the hood pin **44** is removed.

In operation of the wood chipper **12**, the engine **24** rotates the shaft **26** and cutting assembly **20** and feed wheels of the feedwheel assembly **18**. Wood is fed into the inlet **16** of the infeed chute assembly **14** by an operator and is contacted by the feedwheel assembly **18** and fed to the cutting assembly **20**. As the cutting assembly **20** rotates and contacts the wood, the wood is cut or chipped into wood chips, which move through the outlet of the first hood **40** and are expelled out of the discharge chute **32**. The projection **70** on the shaft **28** does not allow the lock pin **56** to be lowered down while the shaft **28** is turning. Thus, the lock pin **56** stops removal of the hood pin **44** because it overlaps the flange **52** as long as the shaft **28** rotates. It should be appreciated that by rotation of the shaft **28**, the projection **70** keeps the lock pin **56** upwardly and does not allow the operator to compress the spring **64** and move the lock pin **56** past the hood pin **44** to remove the hood pin **44**. It should also be appreciated that there is not enough time between rotation of the projection **70** to compress the spring **64** and remove the hood pin **44**.

The present invention has been described in an illustrative manner. It is to be understood that the terminology, which has been used, is intended to be in the nature of words of description rather than of limitation.

Many modifications and variations of the present invention are possible in light of the above teachings. Therefore, within the scope of the appended claims, the present invention may be practiced other than as specifically described.

What is claimed is:

1. A hood assembly for a wood chipper comprising:

a housing;

a rotatable cutting assembly partially disposed within said housing;

a first hood partially covering said cutting assembly and fixedly connected to said housing;

a second hood pivotally connected to said housing and having a closed position covering said cutting assembly and an open position extending away from said cutting assembly;

a removable hood pin to connect said first hood and said second hood together in said closed position; and

a hood pin plunger assembly connected to said first hood for cooperating with said hood pin and having a bent handle to allow an operator to actuate said hood pin plunger assembly to remove said hood pin after said cutting assembly has stopped rotating to move said second hood to said open position.

2. A hood assembly as set forth in claim 1 wherein said hood pin plunger assembly includes a lock pin engageable with a shaft of said cutting assembly.

3. A hood assembly as set forth in claim 2 wherein said hood pin has a first flange extending outwardly.

4. A hood assembly as set forth in claim 3 wherein said hood pin plunger assembly includes an upper guide attached to said first hood, said lock pin extending through said upper guide and overlapping said first flange.

5. A hood assembly as set forth in claim 4 wherein said hood pin plunger assembly includes a lower guide attached to said first hood and spaced from said upper guide, said lock pin extending through said lower guide and contacting said shaft.

6. A hood assembly as set forth in claim 5 wherein said hood pin plunger assembly includes a second flange extending outwardly from said lock pin and spaced between said upper guide and said lower guide.

7. A hood assembly as set forth in claim 6 wherein said hood pin plunger assembly includes a spring disposed about said lock pin between said second flange and said lower guide to urge an upper end of said lock pin to overlap said first flange of said hood pin.

8. A hood assembly as set forth in claim 1 wherein said handle is bent adjacent said first hood to extend outwardly and away from said first hood.

9. A hood assembly as set forth in claim 1 wherein said shaft includes a projection extending radially and cooperating with said lock pin.

10. A hood assembly as set forth in claim 9 wherein said projection is inclined on at least one side.

11. A hood assembly for a wood chipper comprising:

a lower housing;

a rotatable shaft extending transversely to said lower said housing;

a cutting assembly partially disposed within said lower housing and about said shaft;

a first upper hood partially enclosing said cutting assembly and fixedly connected to said lower housing;

a second upper hood pivotally connected to said lower housing and having a closed position covering said cutting assembly and an open position extending away from said cutting assembly;

a removable hood pin connecting said first upper hood and said second upper hood together in said closed position;

a hood pin plunger assembly engagable with said shaft to prevent said second upper hood from being moved by an operator from said closed position to said open position while said cutting assembly is rotating; and

said hood pin plunger assembly comprising a lock pin having a bent handle to allow an operator to actuate said hood pin plunger assembly to remove said hood pin after said cutting assembly has stopped rotating to move said second upper hood to said open position.

12. A hood assembly as set forth in claim 11 wherein said hood pin has a generally L shape.

13. A hood assembly as set forth in claim 11 wherein said hood pin has a first flange extending outwardly.

14. A hood assembly as set forth in claim 13 wherein said hood pin plunger assembly includes an upper guide attached to said first upper hood, said lock pin extending through said upper guide and overlapping said first flange.

15. A hood assembly as set forth in claim 14 wherein said hood pin plunger assembly includes a lower guide attached to said first upper hood and spaced from said upper guide, said lock pin extending through said lower guide and contacting said shaft.

16. A hood assembly as set forth in claim 15 wherein said hood pin plunger assembly includes a second flange extending outwardly from said lock pin and spaced between said upper guide and said lower guide.

17. A hood assembly as set forth in claim 16 wherein said hood pin plunger assembly including a spring disposed about said lock pin between said second flange and said lower guide to urge an upper end of said lock pin to overlap said first flange of said hood pin.

18. A hood assembly as set forth in claim 17 wherein said shaft includes a projection extending radially and cooperating with said lock pin.

19. A hood assembly as said forth in claim 17 wherein said projection includes an incline on at least one side.

20. A hood assembly for a wood chipper comprising:

a lower housing;

a rotatable shaft extending transversely to said lower housing;

a cutting assembly partially disposed within said lower housing and about said shaft;

a first upper half hood partially enclosing said cutting assembly and fixedly connected to said lower housing;

a second upper half hood pivotally connected to said lower housing and having a closed position covering said cutting assembly and an open position extending away from said cutting assembly;

a removable hood pin connecting said first upper half hood and said second upper half hood together in said closed position; and

a lock pin engagable with said shaft to prevent said second upper half hood from being moved by an operator from said closed position to said open position while said cutting assembly is rotating and having a bent handle to allow an operator to actuate said lock pin.

* * * * *

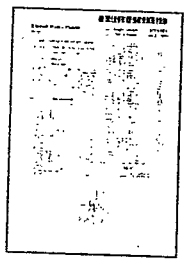
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Hood assembly for a wood chipper Michael Boyd Morey



› Overview
Abstract
Drawing
Description
Claims

Go

A hood assembly for wood chipper includes a housing and a cutting assembly partially disposed within the housing. The hood assembly also includes a first hood partially enclosing the cutting assembly and fixedly connected to the housing and a second hood pivotally connected to the housing and...

Inventor: Michael Boyd Morey
Assignees: Tramor, Inc.

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U.S. Classification
144/162.1; 144/176; 144/373; 241/92; 24110176; 241/188.1; 241/301

International Classification
B27C 100; B02C 2102; B02C 1300

View patent at USPTO

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4915310	Replaceable end cap assembly for the spider arm of a hammermill	Apr 10, 1990
4917314	Rotor for a hammer mill	Apr 17, 1990
4922977	Rotary cutter heads	May 8, 1990
4967969	Apparatus for chipping solid materials	Nov 6, 1990
4982904	Screen for comminuting machines	Jan 8, 1991
5005620	Drum-type wood chipper	Apr 9, 1991
5042727	Bushwood chopper and spreader attachment	Aug 27, 1991
5044567	Scrap crushing machine	Sep 3, 1991
5078328	Poultry litter disintegrating machine	Jan 7, 1992
5114085	Hammer for use in hammer mill	May 19, 1992
5205496	Universal grinder with reciprocal feeder	Apr 27, 1993
5209278	Drum chipper with knife and knife holder	May 11, 1993
5285974	Two-piece hammer for use in a shredder	Feb 15, 1994
5358189	Processor for chipping and shredding vegetation	Oct 25, 1994
5362004	Waste processing machine	Nov 8, 1994
5372316	Waste processing machine	Dec 13, 1994
5377919	Hammermill	Jan 3, 1995
5413286	Waste processing machine	May 9, 1995
5474239	Material shredding apparatus	Dec 12, 1995
5526988	Comminuting apparatus with tangentially directed discharge	Jun 18, 1996
5692548	Wood chipper	Dec 2, 1997

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6722596	Multiple wheel feed wheel assembly for a wood chipper	Apr 20, 2004
6729567	Side feed wheel assembly for wood chipper	May 4, 2004
6814320	Reversing automatic feed wheel assembly for wood chipper	Nov 9, 2004
6830204	Reversing automatic feed wheel assembly for wood chipper	Dec 14, 2004

06619

6955310	Remote control assembly for wood chipper	Oct 18, 2005
7121488	Spring assist assembly for infeed pan of wood chipper	Oct 17, 2006

Claims

What is claimed is:

1. A hood assembly for a wood chipper comprising:

a housing;
a rotatable cutting assembly partially disposed within said housing;
a first hood partially covering said cutting assembly and fixedly connected to said housing;
a second hood pivotally connected to said housing and having a closed position covering said cutting assembly and an open position extending away from said cutting assembly;
a removable hood pin to connect said first hood and said second hood together in said closed position; and
a hood pin plunger assembly connected to said first hood for cooperating with said hood pin and having a bent handle to allow an operator to actuate said hood pin plunger assembly to remove said hood pin after said cutting assembly has stopped rotating to move said second hood to said open position.

2. A hood assembly as set forth in claim 1 wherein said hood pin plunger assembly includes a lock pin engageable with a shaft of said cutting assembly.

3. A hood assembly as set forth in claim 2 wherein said hood pin has a first flange extending outwardly.

4. A hood assembly as set forth in claim 3 wherein said hood pin plunger assembly includes an upper guide attached to said first hood, said lock pin extending through said upper guide and overlapping said first flange.

5. A hood assembly as set forth in claim 4 wherein said hood pin plunger assembly includes a lower guide attached to said first hood and spaced from said upper guide, said lock pin extending through said lower guide and contacting said shaft.

6. A hood assembly as set forth in claim 5 wherein said hood pin plunger assembly includes a second flange extending outwardly from said lock pin and spaced between said upper guide and said lower guide.

7. A hood assembly as set forth in claim 6 wherein said hood pin plunger assembly includes a spring disposed about said lock pin between said second flange and said lower guide to urge an upper end of said lock pin to overlap said first flange of said hood pin.

8. A hood assembly as set forth in claim 1 wherein said handle is bent adjacent said first hood to extend outwardly and away from said first hood.

9. A hood assembly as set forth in claim 1 wherein said shaft includes a projection extending radially and cooperating with said lock pin.

10. A hood assembly as set forth in claim 9 wherein said projection is inclined on at least one side.

11. A hood assembly for a wood chipper comprising:

a lower housing;
a rotatable shaft extending transversely to said lower said housing;
a cutting assembly partially disposed within said lower housing and about said shaft;
a first upper hood partially enclosing said cutting assembly and fixedly connected to said lower housing;
a second upper hood pivotally connected to said lower housing and having a closed position covering said cutting assembly and an open position extending away from said cutting assembly;
a removable hood pin connecting said first upper hood and said second upper hood together in said closed position;
a hood pin plunger assembly engagable with said shaft to prevent said second upper hood from being moved by an operator from said closed position to said open position while said cutting assembly is rotating; and
said hood pin plunger assembly comprising a lock pin having a bent handle to allow an operator to actuate said hood pin plunger assembly to remove said hood pin after said cutting assembly has stopped rotating to move said second upper hood to said open position.

12. A hood assembly as set forth in claim 11 wherein said hood pin has a generally L shape.

13. A hood assembly as set forth in claim 11 wherein said hood pin has a first flange extending outwardly.

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14. A hood assembly as set forth in claim 13 wherein said hood pin plunger assembly includes an upper guide attached to said first upper hood, said lock pin extending through said upper guide and overlapping said first flange.

15. A hood assembly as set forth in claim 14 wherein said hood pin plunger assembly includes a lower guide attached to said first upper hood and spaced from said upper guide, said lock pin extending through said lower guide and contacting said shaft.

16. A hood assembly as set forth in claim 15 wherein said hood pin plunger assembly includes a second flange extending outwardly from said lock pin and spaced between said upper guide and said lower guide.

17. A hood assembly as set forth in claim 16 wherein said hood pin plunger assembly including a spring disposed about said lock pin between said second flange and said lower guide to urge an upper end of said lock pin to overlap said first flange of said hood pin.

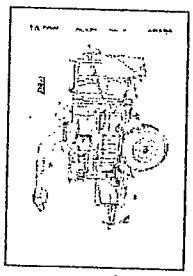
18. A hood assembly as set forth in claim 17 wherein said shaft includes a projection extending radially and cooperating with said lock pin.

19. A hood assembly as said forth in claim 17 wherein said projection includes an incline on at least one side.

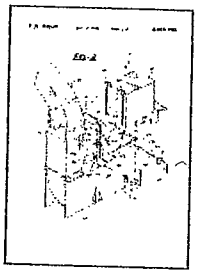
20. A hood assembly for a wood chipper comprising:

a lower housing;
a rotatable shaft extending transversely to said lower housing;
a cutting assembly partially disposed within said lower housing and about said shaft;
a first upper half hood partially enclosing said cutting assembly and fixedly connected to said lower housing;
a second upper half hood pivotally connected to said lower housing and having a closed position covering said cutting assembly and an open position extending away from said cutting assembly;
a removable hood pin connecting said first upper half hood and said second upper half hood together in said closed position; and
a lock pin engagable with said shaft to prevent said second upper half hood from being moved by an operator from said closed position to said open position while said cutting assembly is rotating and having a bent handle to allow an operator to actuate said lock pin.

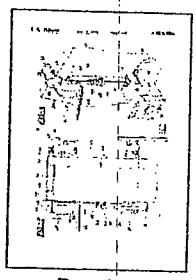
Drawings



Drawing



Drawing



Drawing

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United States Patent [19]

Peterson, Jr.

[11] **4,043,514**

[45] **Aug. 23, 1977**

[54] **COMMINUTION DEVICE**

[75] Inventor: **Russell I. Peterson, Jr., Bay City, Mich.**

[73] Assignee: **Conair, Inc., Franklin, Pa.**

[21] Appl. No.: **667,400**

[22] Filed: **Mar. 16, 1976**

[51] Int. Cl.[2] **B02C 23/04**

[52] U.S. Cl. ..... **241/36; 241/37.5; 241/285 B**

[58] Field of Search ..... 241/36, 37.5, 73, 222, 241/285 B

[56] **References Cited**

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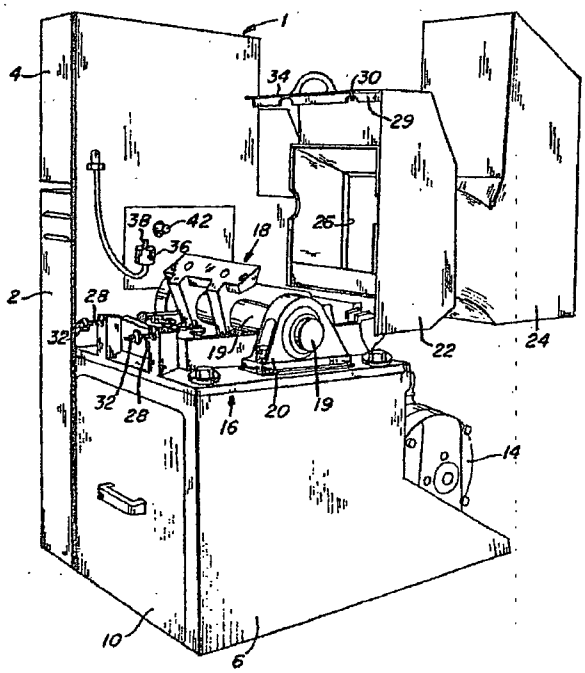
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Primary Examiner—Roy Lake
Assistant Examiner—Howard N. Goldberg

[57] **ABSTRACT**

A Comminution Device in which the comminution structure has its upper portion enclosed during operation within a movable cover which cover controls the actuation of the flywheel to prevent rotation of the flywheel when opening the cover is initiated.

9 Claims, 5 Drawing Figures



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FIG. 1

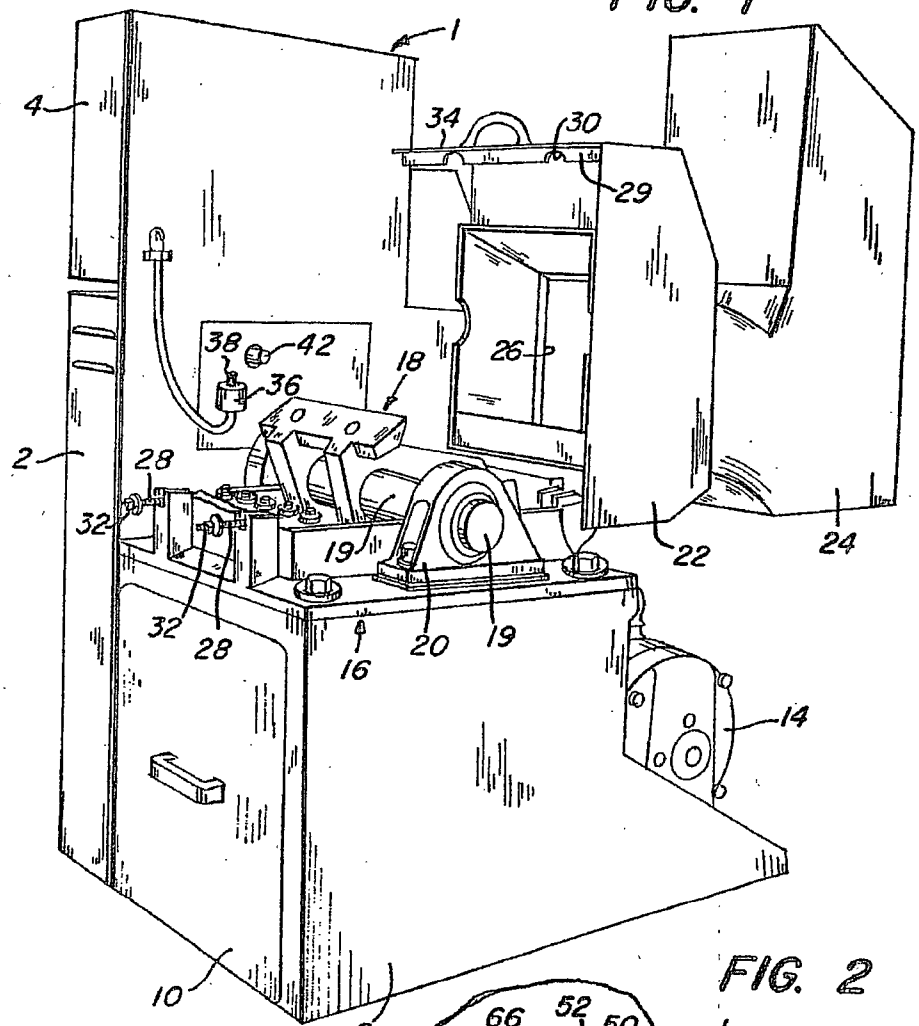

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FIG. 2

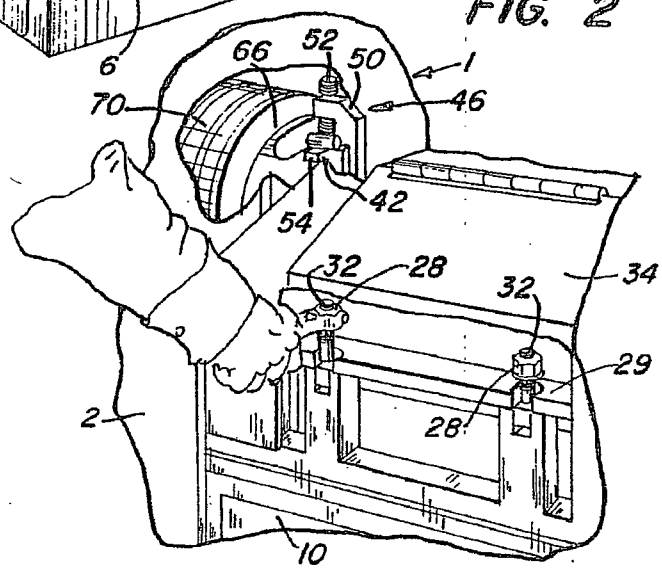

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FIG. 3

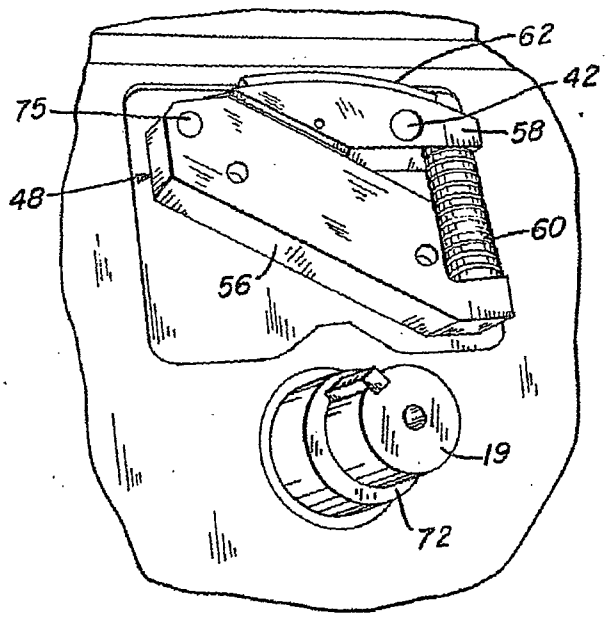


FIG. 4

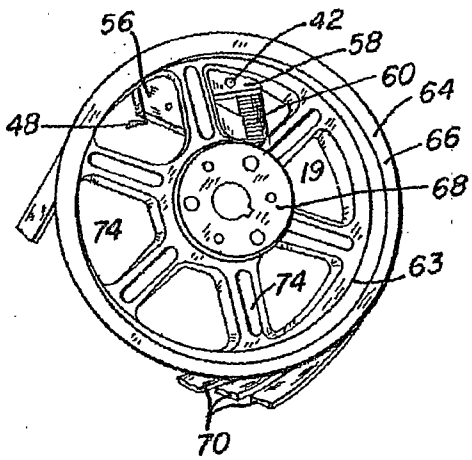
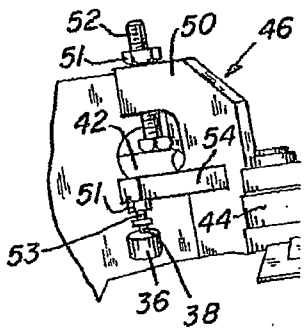


FIG. 5



COMMINUTION DEVICE

CROSS-REFERENCE TO RELATED APPLICATIONS

Ser. No. 668,062 and Ser. No. 667,301 filed concurrently herewith each entitled Comminution Device.

Comminution devices are used in various industries with one particularly well known prior use being in the plastics industry in which such devices are commonly referred to as plastics granulators. Plastics granulators are commonly used to fragmatize pieces or sections of plastic material which result from various plastic forming operations. Such plastic pieces are of a wide variety of size, thickness and shape so that during their fragmentation the amount and orientation of such material with respect to the rotating cutter means varies during the fragmentation process. Due to such irregularities in and hardness of such plastic pieces the energy per blow required to produce fragmentation of all pieces varies substantially which has resulted in frequent stalling of prior comminution devices or required a large horsepower drive. Prior granulators may be of various well known forms such as shown in U.S. Pat. Nos. 2,830,770; 3,419,223; 3,756,519; 3,790,093; 2,381,775, and my prior patent 3,643,880.

Generally prior granulators have employed a flywheel to rotatively drive the power input shaft of the rotor member of the comminution structure. Since the rotating member of the comminution structure can become stuck during operation it is necessary to provide reasonably easy access to the comminution structure during operation of the granulator to permit removal of the plastic piece preventing the rotor member from rotating. When the rotor member is stuck the access provided does not create any problem, however, since access is provided it is possible in other instances to obtain access to the comminution structure prior to the flywheel giving up all its energy. The structure of this invention provides a device which will not permit the operator to obtain hand access to the rotor member prior to the flywheel stopping.

Accordingly, one subject of this invention is to provide a new and improved comminution device having a flywheel the actuation of which is controlled by a cover for the comminution structure.

Another object of this invention is to provide a new and improved comminution device having cover controlled electrical and mechanical means for controlling the braking of the flywheel of the device.

A more specific object of this invention is to provide a new and improved comminution device having a brake shoe engagable with the rim of the flywheel of such device to cause substantially instantaneous stopping of the flywheel under selected conditions.

These and other objects and advantages of the present invention will become more readily apparent upon a reading of the following description and drawings of the presently preferred embodiment thereof in which:

FIG. 1 is a perspective view of a comminution device constructed in accordance with the principles of this invention with the feed hopper thereof in the open position;

FIG. 2 is a perspective view of the central portion of the device shown in FIG. 1 with a portion of the front flap removed;

FIG. 3 is a perspective view of the brake assembly for the flywheel as located within the housing as shown in FIG. 1;

FIG. 4 is a perspective view of the flywheel as located within the housing of the device as shown in FIG. 1, and

FIG. 5 is an enlarged perspective view of the actuator assembly as utilized in the device as shown in FIG. 1.

As shown in FIG. 1 the comminution device of this invention comprises a formed housing 1 having a vertically extending flywheel housing portion 2 at one side thereof, an electrical control receiving box 4 extending above the flywheel housing portion 2 and a hollow base portion 6 located to the side of the flywheel housing portion 2. Housing 1 is formed from any suitable material having sufficient structural strength such as steel with base portion 6 having an upper inwardly extending peripheral flange (not shown) to which a comminution structure is suitably rigidly secured. Base portion 6 is provided with a slidable drawer 10 for receiving comminuted material therein and to permit access thereto. Base portion 6 has a vertically extending rearward wall having a suitable electrical motor 14 suitably rigidly secured to the lower portion thereof.

The comminution structure consists of a formed stationary bed member 16 and a rotor member 18 having a central elongated shaft 19 supported for rotation by the bed member 16 in any suitable manner such as by axially spaced bearings 20 carried by the bed member 16. For the purpose of this invention the comminution structure may be of any suitable structure; however, the preferred form of the comminution structure is more particularly shown and described in my copending application Ser. No. 668,062 and the disclosure thereof is incorporated herein for the purpose of disclosure of this application. A cover 22 for enclosing the upper portion of the comminution structure is suitably hingedly connected to the rearward portion of the bed member 16. A formed hollow feed hopper 24 is suitably rigidly secured to the cover 22 and the cover 22 has an opening 26 in the upper portion thereof to permit material to be inserted through feed hopper 24 into the comminution structure. For the purposes of this invention the feed hopper 24 is secured to the cover 22 in any suitable manner and the bed member 16 is secured to the flange of the base portion 6 in any suitable manner; however, the preferred form for supporting such member is more particularly shown and described in my copending application Ser. No. 667,301 and the disclosure thereof is incorporated herein for the purposes of the disclosure of this application. The feed hopper 24 may be of any suitable form and material to permit proper feeding of material to the comminution structure.

The front portion of bed member 16 pivotably and captively supports a pair of elongated threaded access bolts 28 which are laterally spaced from each other and which are pivotably supported by bed member 16 and swingable from a horizontal position into a vertical position to permit access bolts 28 to enter into spaced open ended receiving slots 30 extending inwardly in a strap portion 29 rigidly carried by the cover 22. With bolts 28 so located within slots 30 suitable nuts 32 are tightened against the strap portion 29 whereby the cover 22 is properly securable in tight relationship to the bed structure 16. Cover 22 carries a suitable hinged flap 34 having an exterior handle to permit access to the nuts 32. Strap portion 29 is carried by cover 22 adjacent the lower edge of flap 34, when cover 22 is in the closed

position, to be aligned with and receive the bolts 28 when bolts 28 are in their upwardly extending position. A normally open electrical switch 36 is carried by the flywheel housing portion 2 having a suitable contact closing means, as illustrated a plunger 38, located so that the motor 14 is only electrically energizable when the cover 22 is properly secured to the bed member 16. A suitable armored cable electrically connects the switch 36 to suitable electrical controls (not shown) in the control box 4.

A suitable opening is provided in the flywheel housing portion 2 through which the free end of a brake shaft 42 of a brake assembly 48 extends. Cover 22 has a flange 44 (see FIG. 5), extending upwardly and around the opening 26, which is spaced inwardly of the housing portion 2 to which the lower end of the feed hopper 24 is secured so that a space is provided between the flywheel housing portion 2 and the lower end of the feed hopper 24 and cover 22. A switch 36 is located in and the free end of shaft 42 extends into the space between feed hopper 24 and housing portion 2. A formed switch and brake actuator 46 is rigidly carried by the cover 22 outwardly adjacent the flange 44 which extends into the space between hopper 24 and housing portion 2 to actuate the switch 36 and engage the end of the brake shaft 42. Actuator 46 is of any suitable form which as shown is somewhat in the form of a FIG. 7 with the upper arm 50 extending towards the housing portion 2. Upper arm 50 threadedly receives a suitable inverted threaded bolt 52 so that the head portion of bolt 52 engages the upper surface of shaft 42 to force the shaft 42 downwardly when cover 22 is properly closed. A side arm 54 rigidly carried by the upwardly extending portion or stem of actuator 46 extends towards the housing portion 2 which threadedly receives a suitable inverted bolt 53 which engages the plunger 38 to close switch 36 when the cover 22 is properly closed. Bolts 52 and 53 are axially adjustable to provide for proper engagement of shaft 42 and plunger 38 and suitable locking nuts 51 are also provided on bolts 52 and 53.

As shown in FIG. 3 the brake assembly 48 comprises a formed block 56 suitably rigidly secured to the flywheel housing portion 2 and a block 58 which is pivotably secured to the block member 56 and is biased outwardly from block member 56 by a spring 60 which spring 60 is shown in FIG. 3 in its open position. Pivot block member 56 has an upper arcuate surface to which a brake shoe 62 is suitably rigidly secured. Brake shoe 62 is engagable with the inner circumferential rim surface 63 of the outer rim portion 64 of a flywheel 66 for the purpose of stopping the rotation of the flywheel 66. The inner rim surface 63 engaged by the shoe 62 is not illustrated, however, the inner rim surface 63 is identical to the outer rim surface 63 shown as is known in flywheel construction. Accordingly, the brake shoe 62 is of an arcuate contour and width to obtain the maximum frictional engagement with the inner rim surface 63 and block member 56 has an upper arcuate surface to provide proper support for the brake shoe 62. For the purpose of this invention a standard industrial brake shoe is satisfactory for shoe 62.

As shown in FIG. 3 the rotor shaft 19 extends through the sidewall of the flywheel housing portion 2 and is provided with a suitable keyway structure cooperable with a central hub portion 68 of flywheel 66 whereby 66 rotatively drives rotor shaft 19. The outer surface of the rim portion 64 is suitably formed to receive suitable drive belts 70 which belts 70 are driven by a suitable drive pulley (not shown) on the output shaft of motor 14 as is well known in the art. The rotor shaft 19 has a shoulder 72 which extends radially outwardly at the inner end of the keyway structure which engages the hub portion 68 of flywheel 66 to position the flywheel 66 with reference to the vertically extending inner wall of the flywheel housing portion 2. With flywheel 66 so located the brake assembly 48 is located between the vertically extending wall of the housing portion 2 and the centrally located arms 74 of the flywheel 66 whereby brake assembly 48 does not interfere with the rotation of flywheel 66 other than when the brake shoe 62 engages the inner rim surface 63. The flywheel 66 is driven by motor 14 through belt 70 to obtain the desired rotation of the rotor member 18.

When flywheel 66 is being rotatively driven by motor 14 the brake shoe 62 must clear the inner rim surface 63 of flywheel 66 and accordingly brake shaft 42 is rigidly secured to pivot block member 58 so that the force required to close cover 22 by the anchoring of access bolts 28 is transferred through cover 22 to the actuator 46 and, by the engagement of bolt 52 with brake shaft 42, overcomes the bias of spring 60 to force the block member 56 inwardly away from the inner rim surface 63 to close the spring 60 as shown in FIG. 4. Conversely when the cover 22 is loosened the bolt 52 moves away from shaft 42 and spring 60 biases the block member 58 upwardly, as shown in FIG. 3, towards the inner rim surface 62 so that brake shoe 62 engages the inner rim surface 63 to stop the rotation of flywheel 66. Accordingly to obtain the best utilization of the forces for so actuating block member 58 one end of the block member 58 is pivotably supported by block member 56 by a suitable pivot connection 75, the spring 60 engages the under surface of block member 58 at the end of block member 58 opposite pivot connection 75 and extends vertically therebetween, and brake shaft 42 is received within block member 58 closely adjacent the upper end of spring 60 intermediate the spring 60 and the pivot connection 75. Obviously other mechanical arrangements can be employed to move the brake shoe 62; however, the specific structure shown and described is presently preferred due to its mechanical efficiency, compactness and simplicity of components.

When cover 22 is in the open position of FIG. 1 the motor 14 is deenergized and the flywheel 66 is restrained by the brake assembly 48. As described upon closing the cover 22 the actuator 46 releases the flywheel 66 from the brake assembly 48 and permits electrical energization of motor 14 by the closing of switch 36. The switch 36 is preferably an electrical interlock independent of the normal electrical control of the motor 14.

By adjusting bolts 52 and 53 a timed sequence between the release of brake shoe 62 and the closing of switch 36 can be obtained to insure that brake shoe 62 is properly clear of the rim surface 63 prior to permitting energization of the motor 14 by the switch 36, i.e. the shaft 42 is moved the proper distance to cause shoe 62 to clear the rim surface 63 prior to bolt 53 engaging the plunger 38. Conversely, upon release of cover 22 the motor 14 is deenergized to permit the flywheel 66 to decelerate prior to being engaged by the brake shoe 62 to minimize the load applied to brake shoe 62.

As is well known rotating flywheels when uncoupled from their drive have a flywheel effect (i.e. inertia) whereby their rotation continues after such uncoupling. Accordingly, the bolts 28 and nuts 32 for cover 22

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provide a period of time before the cover 22 can be released from the bed member 16. As shown in FIG. 2 an operator lifts flap 34 to obtain access to bolts 28 and must use a suitable wrench means to release the nuts 32 from bolts 28 which time period permits the flywheel 66 to stop prior to the operator being able to move the cover 22 away from the rotor 18. Obviously other time delay means can be provided to insure that the operator cannot remove the cover 22 prior to the stopping of the flywheel 66; however, the described structure is preferred due to its simplicity, strength and the fact that an ordinary shop tool is all that is required to release or secure the cover 22. Thus bolts 52 and 53 permit, when closing, the switch 38 to be closed after shaft 42 has been moved to release the shoe 62 from the rim surface 63 and, during opening, permit the switch 38 to be opened prior to the brake shoe 62 engaging the rim surface 63.

Although I have described a preferred embodiment of my invention in accordance with the Patent Statutes and indicated some modifications that may be made thereto, I am aware that other modifications may be made without departing from the scope of my invention by one skilled in the art and accordingly the invention is to be interpreted in accordance with the scope of the appended claims.

What is claimed is:

1. A comminution device comprising: a housing member, a comminution structure consisting of a stationary member and a rotatable knife means, said comminution structure being supported by said housing member with said comminution structure having an upwardly open extent, a rotatable flywheel supported by said housing and coupled to said rotatable knife means to cause rotation thereof upon rotation of said flywheel, enclosure means movably supported by one of said members for selectively enclosing said open extent of said comminution structure, means supported by said housing member having a movable portion selectively engageable with said flywheel for applying a motion restraining force to said flywheel, and said enclosure means being selectively movable into and out of engagement with said movable portion to control the application of said motion restraining force to said flywheel.

2. A comminution device as specified in claim 1 wherein said enclosure means engages said movable portion to move said movable portion out of engagement with said flywheel.

3. A comminution device as set forth in claim 1 wherein said movable portion is biased towards engagement with said flywheel and said enclosure means engages said movable portion to overcome such bias when said open extent is enclosed.

4. A comminution device as specified in claim 3 wherein said enclosure includes means to vary the force applied to said movable portion to overcome such bias.

5. A comminution device as set forth in claim 1 wherein said flywheel has a rim portion and said movable portion is biased towards said rim portion with an outer surface thereof being engageable with an inner surface on said rim portion.

6. A comminution device as set forth in claim 5 wherein said outer surface is defined by an arcuate brake shoe carried by said movable portion.

7. A comminution device as specified in claim 1 wherein mechanical means secure said enclosure means to avoid stationary member when said open extent is enclosed and which mechanical means require releasing before said open extent can be uncovered by moving said enclosure.

8. A comminution device as specified in claim 1 wherein said flywheel is driven by an electrically energized drive, said housing carries switch means for controlling the electrical energization of said drive, and means carried by said enclosure to selectively actuate said switch means.

9. A comminution device as specified in claim 8 wherein said switch means is actuated in timed relationship with respect to said engagement of said enclosure with said movable portion.

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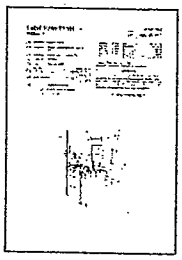
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Comminution device Russell I. Peterson et al



› Overview
Abstract
Drawing
Description
Claims

Go

Patent number: 4043514
Filing date: Mar 16, 1976
Issue date: Aug 23, 1977

A Comminution Device in which the comminution structure has its upper portion enclosed during operation within a movable cover which cover controls the actuation of the flywheel to prevent rotation of the flywheel when opening the cover is initiated.

Inventors: Russell I. Peterson, Jr.
Assignees: Conair, Inc.
Primary Examiner: Howard N. Goldberg

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U.S. Classification
241/36; 241/375; 241/285B

International Classification
B02C 2304

View patent at USPTO

Citations

Patent Number	Title	Issue date
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Patent Number	Title	Issue date
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4938425	Hinged feed roll housing	Jul 3, 1990
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5169075	Crushing device	Dec 8, 1992
5433577	Refuse bag opener	Jul 18, 1995
5639032	Comminuting unit	Jun 17, 1997
5639202	Refuse bag opener	Jun 17, 1997
5921477	Apparatus for tissue preparation	Jul 13, 1999

Claims

What is claimed is:

00628

1. A comminution device comprising: a housing member, a comminution structure consisting of a stationary member and a rotatable knife means, said comminution structure being supported by said housing member with said comminution structure having an upwardly open extent, a rotatable flywheel supported by said housing and coupled to said rotatable knife means to cause rotation thereof upon rotation of said flywheel, enclosure means movably supported by one of said members for selectively enclosing said open extent of said comminution structure, means supported by said housing member having a movable portion selectively engageable with said flywheel for applying a motion restraining force to said flywheel, and said enclosure means being selectively movable into and out of engagement with said movable portion to control the application of said motion restraining force to said flywheel.

2. A comminution device as specified in claim 1 wherein said enclosure means engages said movable portion to move said movable portion out of engagement with said flywheel.

3. A comminution device as set forth in claim 1 wherein said movable portion is biased towards engagement with said flywheel and said enclosure means engages said movable portion to overcome such bias when said open extent is enclosed.

4. A comminution device as specified in claim 3 wherein said enclosure includes means to vary the force applied to said movable portion to overcome such bias.

5. A comminution device as set forth in claim 1 wherein said flywheel has a rim portion and said movable portion is biased towards said rim portion with an outer surface thereof being engageable with an inner surface on said rim portion.

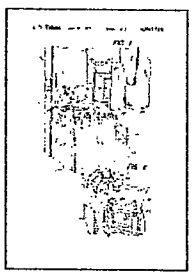
6. A comminution device as set forth in claim 5 wherein said outer surface is defined by an arcuate brake shoe carried by said movable portion.

7. A comminution device as specified in claim 1 wherein mechanical means secure said enclosure means to avoid stationary member when said open extent is enclosed and which mechanical means require releasing before said open extent can be uncovered by moving said enclosure.

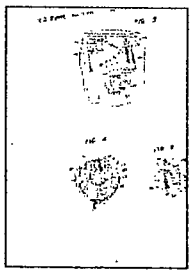
8. A comminution device as specified in claim 1 wherein said flywheel is driven by an electrically energized drive, said housing carries switch means for controlling the electrical energization of said drive, and means carried by said enclosure to selectively actuate said switch means.

9. A comminution device as specified in claim 8 wherein said switch means is actuated in timed relationship with respect to said engagement of said enclosure with said movable portion.

Drawings



Drawing



Drawing

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ENGINEERING CHANGE NOTICE # 1999

REQUESTED BY: JIM STRONG DATE: 5/13/97

APPROVED BY: [signature] DATE: 5-19-97

MACHINE NAME: STATIONARY CHIPPERS TO TAKE EFFECT ON SN: SEE BELOW

PART NAME: DEPT. OF LABOR (SAFETY STANDARDS) PART # SEE BELOW

SERVICE BULLETIN REQUIRED? YES ☐ NO ☒

DESCRIBE DESIRED CHANGE BELOW:

ALL STATIONARY CHIPPERS MANUFACTURED (NON-HAND FEED) SHALL COMPLY WITH DEPARTMENT OF LABOR GENERAL INDUSTRY SAFETY STANDARDS COMMISSION SAFETY STANDARDS, PART 52 "SAWMILLS". PAY PARTICULAR ATTENTION TO SECTION R 408.15231. PART 52 PROVIDES FOR THE SAFE MAINTENANCE OF MACHINERY AND EQUIPMENT BY THE EMPLOYER AND THEIR SAFE USE BY THE EMPLOYEES FOR SAWMILLS, INCLUDING WOOD PALLET AND BOX MAKING PLANTS, IN OR ABOUT PLACES OF EMPLOYMENT IN THIS STATE.

ALL SALES ORDERS SHALL CONTAIN LANGUAGE FOR COMPLIANCE.

REF. "PART 52, SAWMILLS" ATTACHED, 7 PAGES.

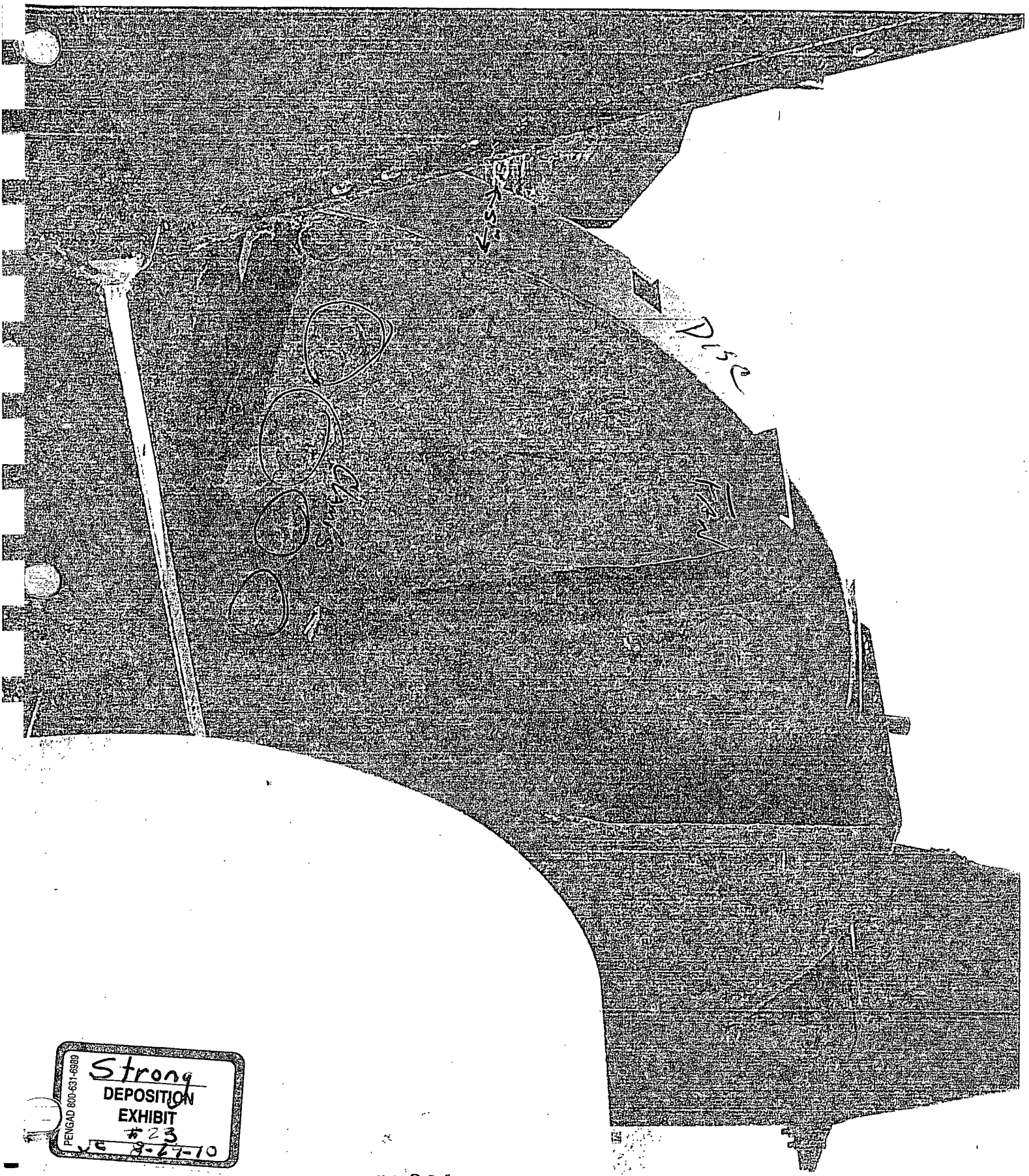
COPIES SENT TO:
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ALL PRODUCT MANAGERS

Changed By:_____ Date:_____

Engineering Coordinator_____ Date:_____

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DEPOSITION
EXHIBIT
#23
JC 8-27-10

IN THE STATE OF SOUTH CAROLINA
COUNTY OF CLARENDON

CIVIL ACTION NO: CV 2008-CP-14-0461

ANDREAL HOLLAND, by his Guardian Ad Litem, PEGGY KNOX,
Plaintiff,
vs.
MORBARK, INC., et al.,
Defendant.

COPY

DEPOSITION
OF
BOBBY RAY SMITH

REPORTED BY: Kelly Jackson
Registered Professional
Reporter
and Notary Public

DATE: November 18th, 2010

2015 THIRD AVENUE NORTH
(205) 397-2397 BIRMINGHAM, ALABAMA 35203 877-373-3660

nine-o-two a.m. on Thursday, November 18, 2010. This deposition is taking place at Lightfoot, Franklin & White, 400 20th Street North, Birmingham, Alabama. The videographer is Elizabeth Shehan. Would counsel please identify yourselves and state whom you represent?

MR. BORDEN: Gray Borden for Precision Husky and for Bob Smith.

MR. OTT: Curtis Ott for Morbark.

MR. SULLIVAN: Shawn Sullivan for AXIS Insurance.

MR. JONAS: Don Jonas, Red Bank, South Carolina for the plaintiff.

THE VIDEOGRAPHER: Would the reporter please swear in the witness?

BOBBY RAY SMITH,

being first duly sworn, was examined and testified as follows:

EXAMINATION BY MR. OTT:

Q. Good morning, Mr. Smith.

A. Good morning.
Q. Would you go ahead and give us your full name and tell us where you live?
A. My full name is Bobby Ray Smith. I live at 5209 Queens Ferry Lane in Hoover, Alabama.
Q. I represent Morbark in a lawsuit that is pending in the state of South Carolina that has been brought by a Mr. Holland and his mother Ms. Knox. We are here today in Birmingham to take your deposition by videotape so that we can present your testimony to our jury in Clarendon County during the trial of this case.

And I would like to start off with some background information about you. Can you tell us where it is that you work?
A. Presently?
Q. Yes, sir.
A. I work for Precision Husky Corporation in Moody, Alabama.
Q. How long have you worked for Precision Husky?
A. Forty something years.

Q. What is your position or title?
A. My title is chairman and CEO.
Q. How long have you been chairman and CEO for Precision?
A. For twenty plus years.
Q. Can you tell us something about Precision Husky Corporation, what it is, what its business is about?
A. Precision Husky manufactures equipment for the forest products industry, namely chippers, debarkers, chip screens, conveyors, that sort of thing.
Q. How long has it been in existence?
A. Precision Husky was organized in 1964.
Q. Has it been known by any other names over the years?
A. Yes.
Q. What were they?
A. I believe it started with Precision Chipper Manufacturing Company, Inc. and then it changed later to Precision Chipper Corporation. At one time it was Precision American Corporation. And in the early '80s,

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middle '80s maybe, it was changed to Precision Husky Corporation.

Q. And where are its offices or manufacturing facilities located?

A. In Moody, Alabama.

Q. How many employees does it have?

A. Presently eighty to ninety people.

Q. Do y'all have a production facility or a manufacturing facility there in Moody?

A. Yes, we do.

Q. Do y'all have any other facilities in Alabama or other states?

A. Yes.

Q. Tell us about those.

A. We have a fabricating facility in Lynn, Alabama.

Q. Who started Precision Husky or its predecessors?

A. Harold West.

Q. When was that?

A. 1964.

Q. Who are its current owners?

A. Myself and my children, grandchildren.

Q. Who are some of the competitors of Precision Husky?

A. Morbark, Fulghum, Peterson Pacific, bunches of them, CAE, just lots of competitors.

Q. And can you tell us what kind of products or machines that Precision Husky designs and manufactures? Give us sort of the spectrum.

A. We manufacture chippers, debarkers, chip screens, vibrating conveyors, mobile and stationary. We manufacture tub grinders, horizontal grinders.

Q. Mr. Smith, would you tell us how far you went in school and what you studied?

A. I finished high school. My father passed away between the eleventh and twelfth grade. So I had to go to work.

Q. Where did you start working?

A. I started with a little company here in town called Richardson Machine Company. It is a little machine shop. I was a machinist by trade and I started there in 1952.

started?
A. Yes, sir.
Q. Tell us about your involvement with their beginning to build chippers.
A. I was a machinist and I think the first thing that I did in the chipper line was to make -- machine the first chipper shaft that was actually ever produced in the southeast.
Q. After you stopped working for Budow, what did you do next?
A. We went into business for a short time. Didn't really work out. But I went with a competitor called Sudderham. It is a Swedish company who also manufactured similar products.
Q. Similar to?
A. Chippers, debarkers, et cetera.
Q. What did you do for that Swedish Company?
A. I was the plant manager.
Q. What were your duties as plant manager?
A. I ran the whole plant. Hired people and supervised the manufacturing process of all

its products.
Q. Were you involved with the design of chippers?
A. To some degree, yes.
Q. How long did you work for Sudderham?
A. About four years. So it would have been until 1967.
Q. What happened in 1967?
A. I joined Precision.
Q. You have worked there ever since?
A. Yes, sir.
Q. I guess you have worked your way up to the owner and head cook and bottle washer then, haven't you?
A. That is a pretty good description.
Q. Tell us about your rise within Precision, where you started and what sort of jobs and responsibilities you have had over the years to get to where you are today.
A. The first thing I did was to -- I was in the machine shop of Precision. When I joined them, I think I was probably the fifth employee. And so I did some machine work and

almost immediately took over the sales to expand our market. We were manufacturing parts only at that point. And were building -- we were getting into the building of chippers, but it started by just manufacturing parts.

Q. When you say parts, is it parts for all sorts of forestry products or chippers in general or specific?

A. It is parts for chippers that we had built in the past. Mr. West and I had worked for the other companies. And so there was two or three hundred chippers out that we had had something to do with, and so we started building replaceable wear parts.

Q. And then after working in the machine shop and sales, what did you do next?

A. Well, I was in charge of sales, and we began growing and hiring people and bringing on distributors and growing the company in general.

Q. Can you give us and our jury your experience with designing and manufacturing

stationary wood chippers?

A. My experience has been from building all of the parts. When I say all of them, I am speaking of any part that required machine work. I built those parts many, many times. And I worked in assembly, I worked in maintenance, I was a service man, I pretty much done all of it over the years.

Q. How many years then total, Mr. Smith, have you worked in the forestry industry in specific with wood chippers?

A. More than fifty years.

Q. Have you been involved with training operators of wood chipper machines?

A. Yes.

Q. Tell us about that.

A. In the early days -- we still send out service people to start up the chipper. And we train the operators how to change the anvils and change the knives and the safety aspects and generally stayed with the operator for a day, could be two or three days. But generally spend a day with them.

Q. Mr. Smith, I am going to get you to brag on yourself a little bit. But do you consider yourself as knowledgeable as anyone in the industry regarding the design and manufacture of wood chipper machines?

A. Do I have to answer that?

Q. You do have to answer that.

A. I have a lot of experience in manufacturing chippers, perhaps more than anybody that I know.

Q. At this time we proffer Mr. Smith as an expert in the areas of design and manufacture of wood chipper machines. Mr. Smith, this lawsuit concerns an accident --

MR. JONAS: Objection to the question. I would like to voir dire the witness at this point.

MR. OTT: Certainly.

VOIR DIRE EXAMINATION BY MR. JONAS:

Q. Mr. Smith, my name is Don Jonas. I represent Andreal Holland by his guardian ad litem Peggy Knox. You are familiar with that case since you were a party to it and having

know how to respond to that.
Q. Did you in your role as the owner and manufacturer of some of this equipment, did you ever certify any of your equipment as complying with industry standards and specifications?
A. I don't remember anything in a formal certification back that far.
Q. Are you familiar with industry standards and specifications as they apply to wood chipper mill equipment?
A. To some degree.
Q. Did you incorporate your understanding of those standards into the design of the Precision Husky equipment that was manufactured under your supervision in that time frame of -- I am not sure when you took over the responsibility, but from the late '60s through 1996?
A. You will have to repeat that question.
Q. Yes, sir. Did you during the period of time of the mid '60s through 1996, did you on your own behalf take responsibility for

complying or for manufacturing this equipment and certifying that it complied with the current industry standards and specifications during that time?

A. I don't know of any formal certification that was made by anyone in manufacturing chippers.

Q. Would you have been the person ultimately responsible?

A. After I gained control of the company, certainly.

Q. When would that have been?

A. That would have been in the early '80s, middle '80s.

Q. Does that role continue?

A. The role --

Q. Are you the ultimate authority for the design or certifying that the designs comply with current industry standards and practices?

MR. BORDEN: I think he has already told you there is not a formal certification process as a rule.

Q. Are you the person ultimately responsible for manufacturing the machinery that comes from Precision Husky even through today?

A. I am the owner of the company. Obviously I am responsible.

Q. Did you entrust that responsibility for the design specifications of the equipment to comply with industry standards and specifications, did you entrust that responsibility, that part of your job to anyone else?

A. That responsibility would have been in the engineering department. As I say, we had only one way back. But, of course, that has changed over the years. But ultimately obviously it would be my responsibility.

MR. JONAS: That is all the questions I have.

MR. OTT: Do you have any objection to put on the record regarding proffering him as an expert?

MR. JONAS: In what area?

MR. OTT: As I said, design and manufacture of wood chipper machines.

MR. JONAS: I think he is qualified.

EXAMINATION BY MR. OTT: (Cont'd)

Q. Mr. Smith, going back to the questions I was asking you. This lawsuit concerns an accident that Mr. Holland had while working for his employer A & K Mulch back on June 1, 2006. First of all, are you familiar with that accident?

A. Yes.

Q. And are you also familiar with this lawsuit?

A. Yes.

Q. How do you know about the accident and the lawsuit?

A. Only when we were served.

Q. By served, you mean you Precision Husky was a party defendant to the lawsuit brought by Mr. Holland and Ms. Knox?

A. That's correct.

Q. Is Precision Husky now a party at the time of our talk here today?

A. When I received the papers and the lawsuit.

Q. When you did receive those papers and the lawsuit, did you or someone on behalf of Precision Husky perform some research to see what involvement, if any, Precision Husky had with this Morbark fifty-eight inch stationary wood chipper?

A. Yes, sir.

Q. Tell us what involvement was discovered through that research.

A. The chipper was taken in on a trade and was brought into our facility. And I think several months elapsed, I am not sure of the time frame, but subsequent to that trade-in, we sold the machine to the user that was where the accident occurred.

Q. So Mr. Witherspoon who owns A & K Mulch?

A. Yes.

Q. When did y'all take it in as a trade-in?

A. Sir, I don't remember those dates.

Q. We'll look at something that might help you refresh your memory, but we will do that

in a break so as not to waste any time. Is that unusual for Precision Husky to take in and resell a chipper that was originally designed and built by another company such as Morbark?

A. No. We do that.

Q. And in the course of the work Precision Husky performed after taking that machine in, did Precision Husky at any time contact Morbark about this machine for any reason?

A. No. Not to my knowledge.

Q. Do you have any information that Morbark was aware that Precision Husky had resold this machine to A & K Mulch?

A. I have no knowledge of that, no, sir.

Q. Do you have any information that Morbark was even aware that Precision Husky had this machine in its possession?

A. No, sir.

Q. Did Precision Husky do any work on the chipper blades?

A. No, sir.

Q. The fan blades before they resold the

machine?

A. No, sir.

Q. I am going to represent to you that the facts have established that the blades on the machine at the time of Mr. Holland's accident were neither original equipment nor even built or designed or manufactured by Morbark.

MR. JONAS: Object to the question.

Q. With that understanding, do you know who manufactured the blades on the fifty-eight inch chipper when you resold it?

A. No, sir.

Q. Do you know when those blades that were on the machine at the time of the accident were added to it?

MR. JONAS: Object to the question.

A. No, sir.

Q. Can you describe generally the work that Precision Husky performed on the machine, if any, between the time that it took it in and the time that it resold it to Mr. Holland's employer?

A. The only thing that Precision Husky did

was to clean the chipper up and I believe repainted the machine and put decals on it, warning decals on it.

Q. Mr. Smith, I am going to hand you what has previously been marked as Exhibits 1 through 4 to your deposition. Have you had a chance to take a look at those exhibits?

A. Yes, sir.

Q. You mentioned Precision Husky added warning decals to the Morbark chipper before reselling it?

A. Yes, sir.

Q. Can you identify the warning label that was added to the machine?

A. Defendant's Exhibit Number 1 is the one that was on the hood itself.

Q. And would you read the written portion of the warning label shown in Exhibit Number 1?

A. It says danger, never operate chipper with missing hood bolts. Never operate chipper without hood lock secured. Never open a hood while disc is turning. To confirm disc

destroyed and what have you?
A. Yes, sir.
Q. Is it unusual to have to order new warning labels to put on a machine after it has been in use for some period of time?
A. No, sir. That is done.
Q. Who designed Exhibit Number 1, that warning label, that Precision Husky attached to this chipper?
A. I am not sure who designed it. I think it would have been in conjunction with the label supplier that we have used for so many years.
Q. Who was that label supplier?
A. I am sorry, but -- I am sure it is in the records, but I don't remember the name offhand.
Q. How long has Precision Husky been using that particular warning label?
A. I would say twenty years, fifteen or twenty years, maybe more.
Q. Mr. Smith, what is that warning label or decal designed to convey to the operator?

A. It says to the operator, number one, danger. And then it has four things specifically relative to the hood opening. And it is very clear you don't operate this chipper with missing hood bolts.

Q. Is it very clear that you don't operate the chipper before the drum has stopped moving?

A. Yes, sir.

Q. And what specific injury is shown in the diagram that can happen if someone prematurely opens that hood before the drum has stopped moving?

A. The hood can hit the operator or the person standing there.

Q. Does it show where it could hit them?

A. In this case, it is hitting them in the head.

Q. With your understanding of Mr. Holland's accident, does this label, this warning, warn Mr. Holland about the very danger that he experienced on June 1, 2006?

MR. JONAS: Object to the question.

Q. Mr. Smith, what is your response to someone who says that this warning label does not tell the operator about a danger of being struck in the head by the hood if you open the hood before letting the drum stop?

MR. JONAS: Object to the question.

A. I can't imagine anyone looking at this label and coming to that conclusion.

Q. Now, Mr. Smith, Precision Husky has this warning label designed, and I guess that you must use it on stationary wood chippers from Precision Husky that have a similar design to the subject Morbark stationary fifty-eight inch chipper?

A. Yes, sir.

Q. Before we get into those design details, can you tell us what these stationary wood chippers do and how they work?

A. In this particular case, the chipper is in a saw mill and it is chipping waste wood such as slabs and edgings and trim blocks and any waste wood that comes from the manufacturing the lumber.

Q. Are you familiar with the feed mechanisms that can carry that waste product into the chipper machine?
A. Yes, sir.
Q. Are you aware of what type of feed mechanism was attached to the Morbark fifty-eight inch chip at the A & K facility?
A. I am not. No, sir.
Q. If it was an automatic feed such that it didn't require anyone to hand feed the machine, is there any reason why an operator would be needed around the machine as it is performing its operations in mulching?
A. No, sir.
Q. Are there any particular standards or regulations that apply directly to the design of a stationary wood chipper that you are aware of?
A. Say that again. I am sorry.
Q. Are there any particular standards or regulations that you are aware of that apply directly to the design of a stationary wood chipper?

A. Not that I am aware of, no, sir.
Q. Morbark built this machine back in 1996. Can you tell us about the design of Precision Husky's similarly sized chipper back then?
A. The chipper or the hood or what part are you referring to?
Q. We will get specific to the hood, but tell us what generally the design of your similar size chipper was back in 1996.
A. The design is very similar. The fifty-eight inch means that the disc was fifty-eight inches in diameter. So the design is very similar in that respect.
Q. Did that design, Precision Husky design have a hood?
A. Yes, sir.
Q. Where was it located?
A. In the same place depicted on this danger label.
Q. What were the procedures that an operator would follow to use the Precision Husky machine as it was designed in 1996?

shine the disc like -- almost like chrome plating so you can see it very easily. And the easiest way is just simply look in the spout.

So the operator is standing by the machine to change his knives, and before he ever touches the hood in any respect, he just simply looks down in the spout. It takes that long to do it. Just two seconds, just look in the spout.

Q. How did Precision Husky advise its operators on the procedure for changing knives back in 1996?

A. Just like I just said, yes, sir.

Q. Was it in an operator's manual?

A. It was in a manual and then the warning decals was on the machine.

Q. Same as Exhibit Number 1?

A. Yes, sir.

Q. How was Precision Husky's hood design for its stationary wood chippers back in 1996 different, if at all, from the design of the Morbark hood?

A. We used a hood lock on the top mostly. We -- there are still some machines manufactured with pins. But this particular machine has pins in it. Our machine would have a hood lock like is depicted in Defendant's Exhibit Number 1. It just simply stays attached. It rotates over to be in operation.

Q. Does that design compared to Morbark's design offer any different safety measures?

A. No, sir, I don't think so.

Q. Is one more advanced or better in terms of safety, or is it simply just a different way of doing it?

A. Just a different way of doing it.

Q. As you understand Mr. Holland's accident, Mr. Smith, could he have been injured in the same way if he had been operating a Precision Husky chipper all other details about his accident staying the same?

MR. JONAS: Object to the question.

A. To be sure if I understand, if he had been operating a Precision chipper without

bolts and pins and/or hood lock attached, yes, sir, he would have been injured.

Q. When he opened those locks or took off the bolts or took off the pins before the drum had stopped moving, the drum could have struck the hood and pushed it forward as shown in that decal?

MR. JONAS: Object to the question.

A. Yes, sir.

Q. Back in 1996 did Precision Husky incorporate an inner lock on the hood of its stationary chippers?

A. No, sir.

Q. Back in 1996 did Precision Husky incorporate a motion detector on the hood of its stationary chippers?

A. No, sir.

Q. Are you aware of any manufacturer in the stationary wood chipper industry who incorporated either a motion detector or an interlock on the hood of a stationary wood chipper back in 1996?

A. No.

Q. Has Precision Husky ever researched the feasibility or performed a feasibility analysis of incorporating an interlock or motion detector on the hood of its stationary chippers?

A. No, sir.

Q. Are you aware of any manufacturer in the industry who has done a feasibility analysis or researched the feasibility of incorporating an interlock or motion detector on the hood of a stationary wood chipper?

A. No, sir.

Q. Mr. Smith, do you have an opinion to a reasonable degree of scientific certainty whether Precision Husky's hood design for its stationary wood chippers back in 1996 was defective or not?

MR. JONAS: Object to the question.

A. I am sorry?

Q. Do you have an opinion to a reasonable degree of scientific certainty whether Precision Husky's hood design for its stationary wood chippers back in 1996 was

defective or not?

MR. JONAS: Object to the question.

A. I do have an opinion.

Q. What is your opinion?

A. Absolutely not defective.

Q. Do you have an opinion to a reasonable degree of scientific certainty whether Precision Husky's hood design for its stationary wood chippers back in 1996 was unreasonably dangerous or not?

MR. JONAS: Object to the question.

A. I do have an opinion.

Q. And what is your opinion?

A. Absolutely not.

Q. Mr. Smith, do you have an opinion to a reasonable degree of scientific certainty whether the hood design of the Morbark fifty-eight stationary wood chipper was defective?

A. I do.

Q. And what is your opinion?

A. It is not defective.

Q. Do you have an opinion to a reasonable degree of scientific certainty whether the

hood design of the subject Morbark fifty-eight inch wood chipper was unreasonably dangerous?

A. I do.

Q. And what is your opinion?

A. It is not.

Q. Last two questions from me, Mr. Smith. Do you have an opinion to a reasonable degree of scientific certainty whether a stationary wood chipper of the approximate size of the Morbark fifty-eight inch that does not have an interlock or motion detector for the hood is defective because of the absence of such a device?

A. Do I have an opinion?

Q. Yes, sir.

A. Yes, sir.

Q. And what is your opinion?

A. It is not.

Q. And, lastly, is the design unreasonably dangerous because of the absence of such a device?

A. No, sir.

Q. And do you hold that opinion to a

reasonable degree of scientific certainty?
A. Yes, sir.
MR. OTT: Please answer any more questions that Mr. Jonas has and I thank you for your time.
A. Yes, sir.
THE VIDEOGRAPHER: Going off the record. The time is nine forty-five a.m.
(Short recess.)
EXAMINATION BY MR. JONAS:
Q. Let me ask you a few more questions about your background. As a machinist, you learned your trade, I guess, by actually operating the equipment?
A. I did.
Q. Apprentice?
A. Yes, sir.
Q. And you can competently operate lathes, milling machines in mills and that sort of thing?
A. I can, yes, sir.
Q. Have you ever actually manufactured any of the equipment at Precision Husky; that is,

gotten on the line and operated the machinery?
A. Have I ever manufactured anything?
Q. At Precision Husky. You have had a lot of jobs here. But did you actually work as a machinist at Precision Husky?
A. Yes, sir.
Q. What did you do there?
A. I was a machinist in the machine shop.
Q. What was the extent of your work there?
A. I believe I mentioned a moment ago that I turned the first shaft that was ever turned in the southeast. I made holders and clamps, and anything that is a part of a chipper, I have built personally.
Q. So industrial equipment is something you know all about?
A. Yes, sir.
Q. And you know about things like injuries while operating equipment, you have seen people hurt while operating these various forms of equipment?
A. Yes. Yes.
Q. You know that -- do you know what

ANSI -- do you know what that represents?
A. Yes, sir.
Q. What is that?
A. It is a set of regulations that controls a lot of different kinds of equipment.
Q. Do the products that are manufactured by Precision Husky other than the mill equipment comply or are they certified as complying with ANSI standards?
A. As I said, I know of no formal certification. I do believe they comply.
Q. Going back to the other range of products so I understand your experience. There are other products other than these mill chippers that Precision Husky -- at some point they even make parts for or they actually make the machinery?
A. What is the question?
Q. Does Precision Husky make more than just this mill chipping equipment?
A. Yes.
Q. Do they make mobile chipper equipment?
A. Yes, sir.

Q. And is that equipment that is taken to the field to be used to essentially chip materials while at the logging site rather than the mill?

A. Yes.

Q. Do you know about standards that apply to that type of equipment that may not be the same as the mill equipment, similar mill equipment?

A. I don't believe there are any.

Q. You said you were aware of competition or competitors over the years. You mentioned Morbark. How well do you know the equipment at Morbark, do you regularly trade this stuff?

MR. OTT: Object to the form of the questions.

A. No. Morbark is a competitor, and we make it our business to know what the competitor is doing. Everybody does.

Q. I appreciate that. Here you are reselling a piece of Morbark equipment?

A. Yes, sir.

Q. Do you sell other types of Morbark equipment?
A. I don't think we ever have. I don't think we have ever traded in anything but a chipper.
Q. At the time you traded this particular chipper, what was -- do you know the history of it?
A. When you say the history, I don't know who owned it before and --
Q. That is what I'm asking.
A. No, I don't know that.

(Whereupon, Plaintiff's Exhibits 1-3 were marked for identification and copy of same attached hereto.)

Q. Let me ask you because we have got some documents you have produced earlier. Maybe we can go through these quickly. Let me hand these to you. Those are -- the first one is at the bottom, it has some numbers on it, PH, I guess is supposed to be Precision Husky,

028. I think that goes through one thirty-three. What is this document?

A. I am sorry, I don't know which one you are talking about.

Q. Number one there.

A. Okay.

Q. At the bottom there are some numbers there.

A. Yes.

Q. What is this document, PH028?

A. It is just showing the general specifications of this particular chipper, the size of it and it's right hand and its horizontal feed, and it has three fan blades, just the general description of it.

Q. Who would have put this document together?

A. One of our engineers.

Q. There is a notation up in the right-hand corner, what is that? It says P5661 --

A. That would have been the work order in the shop.

Q. What was that work order for, if you

know?
A. We checked the chipper out. We simply checked the chipper out, cleaned it, steam cleaned it, repainted it and put decals on it.
Q. There is another notation at the top, used and it seems to say something I don't quite comprehend. What is that?
A. Used and I think that says not remanufactured, just used.
Q. So that would indicate that you didn't do anything to it other than clean it?
A. And paint it and put decals on it.
Q. One of the lines here, it says number of fan blades, you say three here. Somebody says three here on this document?
A. Yes, sir.
Q. Do you know -- did you have any hand in putting this together or while your company was involved in the litigation making certain that these documents are accurate?
A. I didn't put this together, no, sir. This is done by one of the engineers.
Q. But did you obtain this document from

the records of Precision Husky?
A. Yes, sir.
Q. So in reference to this, you believe these documents are regularly kept records of Precision Husky?
A. Yes, sir.
Q. Now, when it says this thickness, it says five inches; is that something that would have normally been measured by someone in your -- under your supervision or control?
A. Yes, sir.
Q. And the number of fan blades be the same, some person actually went and counted the fan blades?
A. Yes, sir.
Q. And when it gets to the wear plate thickness, knife bevel, knife size, are those documents or those specifications that would have actually been measured at that time or are those standard information?
A. It is standard.
Q. So these won't actually be measurements of the machine?

A. It could be, but not necessarily. A fifty-eight inch chipper carries that size knife.

Q. In terms of the specifications here, someone actually looked under the hood as some people would say and examined the Morbark machine?

A. Yes, sir.

Q. Who would that have been?

A. The gentleman who prepared this document.

Q. Can you tell me who that was most likely?

A. That would probably have been Jeff McLaughlin.

Q. What is his job?

A. He is a project engineer.

Q. And where does he work?

A. In engineering.

Q. Is that in Moody?

A. Yes, sir.

Q. And is Mr. McLaughlin still employed there?

A. Yes, sir.
Q. The second page of this is at the bottom PH-0029, it refers to some other under the term notes. What does that indicate to you?
A. The chipper was mounted on a common base and a motor plate was added to it for the customer to mount his motor on.
Q. And the next line, that third line there, what does that say to you? How do you understand it?
A. The third line?
Q. Hold eighteen and three-quarter inch to inside of spout?
A. To the inside of the spout, yes, sir.
Q. What does that mean?
A. Obviously his conveyor must have been eighteen and three-quarters of an inch. So this would match the conveyor.
Q. So you would have had some information from Mr. Witherspoon?
A. Yes, sir.
Q. Do you know Mr. Witherspoon?
A. I know him. I wouldn't know him if he

walked in the door, but I have met him, yes, sir.

Q. How many times have you had occasion to speak with Mr. Witherspoon since this litigation began?

A. I don't think I have spoken to him at all since this litigation. I stand to be corrected, but I don't remember that.

Q. And prior to that, how many occasions can you estimate that you have had occasions to speak with Mr. Witherspoon?

A. I have no idea. Two, three, something.

Q. Do you know a fellow by the name of Larry Noch from Winn, Michigan?

A. What is the name?

Q. N-o-c-h is how he spells it.

A. No, sir.

Q. Have you ever been to Winn, Michigan?

A. Yes, sir.

Q. What was the occasion you visited there?

A. When I visited there?

Q. Yes, sir.

A. Back in the '60s and '70s.

Q. That is the location where Morbark's plant is at?
A. That's correct.
Q. There are other locations there, other manufacturing facilities for chippers, aren't there?
A. That Morbark has --
Q. That essentially are nearby the Morbark plant, Bandit Industries, you know them, don't you?
MR. OTT: Objection.
A. I know of them, yes, sir.
Q. They manufacture brush chipping equipment, don't they?
MR. OTT: Objection to the form of the last few questions.
Q. Do they manufacture brush chipping equipment; that is, Bandit?
A. Yes, sir.
Q. Near Winn, Michigan?
A. I don't know where they are located, but yes.
Q. Do you know the Morey family?

A. Yes, sir.
Q. How do you know them?
A. I knew Norvel Morey, the founder of this company way back in the '60s.
Q. Do you know Lon or Lonnie?
A. I have never met Lonnie.
Q. What about some of the Moreys that operate those other facilities nearby the Morbark plant, like Bandit Industries, do you know them?
MR. OTT: Object to the form.
A. I knew the one at Bandit. I knew Norvel's brother. I can't recall his name. But it has been years since I have been there.
Q. How is it as a competitor that you would have ended up in Winn, Michigan meeting these folks?
A. Well, we -- they visited us and we visited them. That is no big deal. They had a debarker that at one time we sold for them in the early days.
Q. So over the course of time, how many occasions would you have had to have some

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business relationship with Morbark or the Morey family?

A. I would judge a couple of times. I don't know. It is -- I have no idea.

Q. Do you order parts from Morbark?

A. No, sir.

Q. How do you get Morbark parts that you have to replace?

A. We manufacture parts.

Q. So you would have manufactured parts, if necessary, for this fifty-eight inch chipper if it had needed something?

A. We manufactured no parts for this machine.

Q. Have y'all ever ordered parts from Morbark?

A. No, sir.

Q. Does Morbark sell some of your used equipment?

A. I have no idea. I am sure they probably have, but I have no idea.

Q. How do you advertise your used equipment?

A. I don't know that we have ever done any advertising of used equipment. It is usually just the salespeople have a used equipment list and they sell it.

Q. You have brokers that -- machinery brokers certainly that advertise this stuff on line?

A. I don't know of any that advertise it per se.

Q. And you have a website that you advertise used equipment; is that right?

A. Yes, sir.

Q. Who operates that website?

A. My son.

Q. What is his name?

A. Scott.

Q. What type of inventory do you keep of used equipment?

A. What is the question?

Q. In Moody, Alabama do you have an inventory of equipment on a yard some place?

A. Yes, sir. There on the yard in Moody, Alabama.

Q. If I was looking for a fifty-eight inch Morbark chipper, I might be able to find one in Moody, Alabama?

A. Yes, sir.

Q. A used one?

A. Yes, sir.

Q. I am only trying to get to the point. You regularly deal in used equipment, don't you, either Precision Husky's or someone else's on these trade-ins?

A. We sell a lot of used equipment.

Q. And so does Morbark?

MR. OTT: Objection to form.

A. Yes, sir.

Q. Back to the document that we are looking at. If you had gotten some information about the size feed that was going to come to this used piece of equipment that was going to go to South Carolina, where would that have come from?

A. The size feed?

Q. This PH-0029. It is the second page of Exhibit 1.

A. What is the question?
Q. We are looking at the third line again. Hold eighteen and three-quarter inch to inside of spout. Are you talking about the feeder that essentially would feed this fifty-eight inch Morbark machine?
A. Yes, sir.
Q. Where would that information have come from?
A. We have a salesman in that area and he would have gone by. And he is the one that wrote up this order.
Q. Who is that?
A. His name is Clayton Hooper.
Q. Is Mr. Hooper still employed?
A. Yes, sir.
Q. Where does he reside?
A. He lives in North Carolina.
Q. How would you get in touch with Mr. Hooper?
A. We have his address and telephone number and all at the office.
Q. Where in North Carolina is he from?

A. I think it is the Ashville area, I believe.

Q. So Mr. Hooper would have written some information that would have been transferred back to Moody, Alabama?

A. Yes, sir.

Q. At some point the next two lines there, set up like KC unit, see drawing 2601-100 for details, what does that mean?

A. That means you set it up like a kwik chip unit, which means that the chipper and the screen is set on the same foundation and the drawing number is the -- gives you the configuration of that kwik chip unit.

Q. Where does that information come from, Mr. Hooper again?

A. Yes. Not the drawing numbers. He would say he wanted it set up like a kwik chip unit, and engineering would have taken it from there.

Q. We are almost out of tape here.

THE VIDEOGRAPHER: Here marks the end of tape number one in the deposition of Bob

Smith. Going off the record. The time is ten-o-seven a.m.

(Short recess.)

THE VIDEOGRAPHER: Here marks the beginning of tape number two in the deposition of Bob Smith. We are back on the record. The time is ten twelve a.m.

Q. Mr. Smith, I think we got through PH-029 there. The next one is PH-0030. It is still part of Exhibit 1. I am looking at the quotation here dated March 14th, '06.

A. Yes, sir.

Q. If you would, help me understand what is this -- how this fits into the process of Mr. Witherspoon's purchase of this Morbark chipper from Precision Husky.

A. Our salesman would have gone on one of his regular trips and he knows Mr. Witherspoon obviously and sold him the chipper.

Q. So if I understand the process, then Mr. Witherspoon would have dealt in most respects with Clayton Hooper?

A. Yes, sir.

A. No, sir. I saw the pictures.
Q. Let me get clear about it. On some occasion you had an opportunity to form an opinion about how this accident happened?
A. Yes, sir.
Q. Before you got here today?
A. Yes, sir.
Q. Who asked you to do that?
A. No one asked me to do that.
Q. The first matter you refer to is that the hood wasn't bolted to the base of the machine?
A. That's correct.
Q. What else did you decide or form an opinion about before you got here today?
A. The chipper, the hood that came off was not bolted vertically to the hood that is stationary.
Q. You are talking about bolted vertically, you're talking about flange to flange?
A. Yes, sir.
Q. All right. What else?
A. And the pins that are part of that

locking device were not in the hood.
Q. All right. Anything else?
A. That is basically it.
Q. Do you know anything at all about what the operator was doing?
A. No.
Q. The pictures that I showed you, Plaintiff's Exhibit 4 through 6, also reveal a feed system to the machine?
A. Yes, sir.
Q. Can you identify the feed system?
A. That is a vibrating conveyor.
Q. Can you identify the manufacturer?
A. I cannot, no, sir. I don't see a decal at all.
Q. The photograph that has that large piece of equipment with the name plate Precision Husky on it, do you see that?
MR. BORDEN: Which photograph?
Q. I think it is the one you have in your right hand.
A. Okay.
Q. Do you see that?

A. Yes, sir.
Q. What piece of equipment is that?
MR. BORDEN: For the record we are on Number 5.
A. Are we speaking about the green?
Q. Yes, sir.
A. That is the chip screen.
Q. That would have been the chip screen that was referred to in the quotation --
A. I think so, yes, sir.
Q. Now, do you know anything about how this machine was controlled, where the controls for the vibrating conveyor and machine were located?
A. No, sir.
MR. BORDEN: Which machine?
Q. The fifty-eight inch Morbark horizontal feed top discharge fifty-eight inch machine, weighs approximately thirty-five hundred pounds on the disc, that machine.
MR. OTT: Objection to the form of question.
A. What is it that weighs thirty-five

hundred pounds?
Q. Let me strike the question and get to the point. You have the photographs in front of you of a machine, is that the machine you sold to Mr. Witherspoon?
A. I think that it is.
Q. How would you further identify it?
A. There is nothing on here that would identify -- it is a Morbark chipper. And it has a six by six screen attached to it, but that is all I can confirm.
Q. When did you have a chance to examine any part of the machine other than looking at the photographs of the damaged hood?
A. I never examined the machine after the accident.
Q. But you did see the photographs of the damaged hood?
A. Yes, sir.
Q. So your conclusions are based on looking at photographs of the damaged hood?
A. Yes, sir.
Q. But not the machine?

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A. Yes, sir.
Q. The next number document in Plaintiff's Exhibit 1, if you could go back to that, PH-033.
MR. BORDEN: This doesn't have a Bates label on it. I assume the terms and conditions are what we are trying to get at.
Q. Part of Plaintiff's Exhibit 1 is PH-033. It has some information recorded there. What is that document?
A. This is the back side of the quote. There are two -- they sign on the front and this is the back side of it.
Q. There is a signature block at the bottom as seller and purchaser?
A. Yes, sir.
Q. Who is the seller?
A. I think it would be Clayton Hooper, but I can't read this.
Q. Who is the purchaser?
A. This is backwards. This is an error. The seller is Precision Husky and purchaser should have been Witherspoon. This is signed

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in the wrong place.
Q. There is a name at the top, Kenny Wheeler it looks like?
A. Uh-huh (nodding head affirmatively.)
Q. Who is Kenny Wheeler?
A. I have no idea.
Q. Let's go to Number 3, Plaintiff's Exhibit 3.
MR. BORDEN: I have what looks like two copies of the same thing that is labelled 2 and 3, is that correct, AK053, 054 and 055?
Q. Hand the witness Number 3, please. What is Number 3?
A. Number 3 is an invoice to J.C. Witherspoon for a bearing.
Q. The date of this is what?
A. April 13, 2006.
Q. And who would have originated this invoice?
A. The accounting department.
Q. Why was a bearing sent to Mr. Witherspoon?
A. Mr. Hooper apparently called in and as I

recall, Mr. Witherspoon thought the bearing was not -- was making a little noise. So we sent him new bearings at no charge.

Q. These part numbers, what do these relate to?

A. That's the part numbers of the bearings that we sent him.

Q. Are those from some manufacturer other than Precision Husky?

A. No, sir. That is our numbers.

Q. And where did these bearings come from, are these bearings that are universal?

A. They come from probably SKF.

Q. SKF is a supplier of yours?

A. Yes, sir.

Q. How would you have been able to identify the proper size bearings for this Morbark machine to send as a replacement part?

A. Because we know the fifty-eight inch Morbark takes the same bearing as the fifty-eight inch Precision Husky.

Q. You have studied the two?

A. I am sorry?

Q. You have studied the Morbark machine enough to know that?
A. Yes, sir.
Q. You have a parts manual for the Morbark machine?
A. No, sir.
Q. Well, how would you have gotten that information?
A. We just simply know that that is the bearing that is on the machine.
Q. Have you ever disassembled and examined it, how would you know what parts to order a bearing for a shaft?
A. The number is on the bearing itself.
Q. And in terms of getting the proper bearing and the adaptor and the other things that -- the oil seals and washers that are listed there, is that information you keep on record about Morbark machines?
A. All fifty-eight inch chippers to my knowledge take the same bearing.
Q. Now, one of the questions about -- prior to getting here had to do with an affidavit

you had prepared, do you recall that?
A. Yes, sir.
Q. You did that on the advice of counsel?
A. That's correct.
Q. Now, as I understand, you don't have any records of the work that was actually done to the chipper before resale?
A. That's correct.
Q. I further understand that after investigation that you determined that Precision Husky had not made any alterations or modifications to the chipper except for cleaning and adding Precision Husky decals we have already talked about?
A. That's correct.
Q. And the only decals we are referring to now are the decals that appear in those photographs of the hood on the back and the sides?
A. That's correct.
Q. No other Precision Husky decals?
A. No, sir.
Q. It is my understanding that after

investigation and consideration that you are uncertain as to whether there were any warnings or labels at all on the machine or whether they were legible if they were there when it arrived at Precision Husky?

A. No, sir, I do not know that.

Q. Is it your practice that the applied Precision Husky labels of this specific type that we have referred to, I think it is Defendant's Exhibit 1, I believe, do you apply those labels to every piece of equipment, chipper equipment with two piece hoods?

A. Yes, sir. Typically those go on every machine that goes out. If it is a used machine and the decals of the manufacturer is not legible, we would have put on our own decals.

Q. At some point who makes that decision whether to put the Precision Husky decals on or not?

A. Very simple. If they are not legible -- if there is anything on it and it is not legible, then we put our own on it.

Q. Would you look at the photograph, Number 2? The labels that are on the back of that damaged hood that you have identified, it looks like there is more there than just what is referred to as Defendant's Exhibit 1 here, this -- the specific warnings. Is the rest of the information there added by Precision Husky?

A. There are two other labels on the periphery of the hood beside the one that we have been talking about.

Q. That's correct. My question is are those other two labels Precision Husky's labels?

A. I believe so, yes, sir.

Q. So what other labels were added?

A. I can't tell by this, but I think it is the lockout/tagout, and I think it is one that refers to pinching, to pinch a finger or something.

Q. But you do identify them as Precision Husky labeling?

A. I believe that's correct.

Q. Have you had any hand in approving the Precision Husky manual that accompanies the Precision Husky fifty-eight inch chipper machine that you identified as similar to the Morbark equipment?

A. The manual is produced in the department of engineering. We have people that are specifically involved in producing those manuals. I think your question was did I approve it?

Q. Yes, sir.

A. Specifically I guess you would say, yes, but I did not actually sit down and prepare the manual, if that is what we are saying.

Q. Ultimately you are testifying now as an expert, not just a fact witness today. Have you as I understand and have referred to in response to counsel's questions about operational techniques for changing chipper knives -- you referred to the manual as I recall and the procedure in the manual?

A. Yes, sir.

(Whereupon, Plaintiff's Exhibit 7 was marked for identification and copy of same attached hereto.)

Q. Now, I am going to hand you has been marked now as Plaintiff's Exhibit 7. Is that the Precision Husky manual that accompanies the fifty-eight inch chipper machine and other models?

A. It appears to be, yes.

Q. This is a copyrighted document?

A. I am sorry?

Q. It is a copyrighted document?

A. I believe that's correct. I am not sure it is copyrighted, but I think that's correct.

Q. It claims to be so on the first page or the second page.

A. Sure.

Q. The information that is contained here, where did it come from?

A. As I say, we have a group of engineers that are responsible for preparing manuals on

all of our equipment. And it would have come from that department.

Q. You have referred to a couple of specific warnings that I think you were reading from something, but essentially looking at page 2.3 of the manual, there are operational instructions about a machine with a two part hood. 2.3 is at the bottom, right-hand corner.

A. Okay.

MR. BORDEN: What is the question?

Q. Is that the section you are referring to when you talk about the operational characteristics or procedures to operate a Precision Husky machine?

A. Certainly part of it, yes, sir.

Q. In here referring to the two piece hood, what does it say?

A. It says never unlock the hood lock or try to raise the chipper hood while the disc is still turning.

Q. A hood lock, what is that?

A. That is the lock that goes across -- in

our machine, it would be the lock that goes across one-half of the hood to the other. In this Morbark machine, it is a couple of pins, one pin on each side.

Q. I appreciate your distinction. But this is a Precision Husky term. It says a hood lock.

A. I just responded to that.

Q. Do you know how many times that phrase is used in that manual, more than twenty would you say?

A. Don't know.

Q. There is no doubt that in the glossary of terms and throughout the manual that that device, that bar that essentially you have demonstrated rotates back against the two part hood is a locking device?

A. That's correct.

(Whereupon, Plaintiff's Exhibit 8 was marked for identification and retained by counsel.)

Q. I am going to show this to the camera as

Plaintiff's Exhibit 8. Mr. Smith, Plaintiff's Exhibit 8, is that a photograph that you supplied my office?

A. I would think so, yes.

Q. Does that demonstrate the locking device in the position of locking the two part hood of the Precision Husky?

A. Yes, sir.

Q. Fifty-eight inch chipper?

A. Yes, sir.

(Whereupon, Plaintiff's Exhibit 9 was marked for identification and retained by counsel.)

Q. Showing the camera Plaintiff's 9. Mr. Smith, Plaintiff's 9, is that another photograph of you and your son in front of the fifty-eight inch chipper machine?

A. Yes, sir.

Q. With the hood lock in the locking position?

A. Yes, sir.

Q. Showing the camera Plaintiff's Exhibit

10. Mr. Smith, another photograph that was supplied to my office of the fifty-eight inch Morbark machine from a side view.

A. Yes, sir.

MR. OTT: Objection. You said Morbark.

A. Not the Morbark machine.

Q. I am sorry, the Precision Husky machine.

A. Yes, that's correct.

Q. Referring to Plaintiff's 10, there is also a visual port or a screen on the side of the two part hood?

A. That's correct.

Q. What is the function of that screen or access?

A. It is the air intake for the fans to pick up air to blow the chips out the top.

Q. On the back and sides of the hood, there seems to be labeling?

A. Yes, sir.

Q. Are those labels applied in a consistent way and according to a procedure that is outlined in the manual on all the Precision Husky equipment?

A. I would think so.
Q. So you can look in the manual and see what goes where, where on the machine these particular labels go?
A. I believe so.
Q. Yes, sir. Through that screen and that port on the side of the machine as shown in Plaintiff's 10, can you see the disc?
A. Yes, sir.
Q. Let me refer you to 2.4. in the waste chipper operation and maintenance manual, Precision Husky manual. Under the term maintenance safety, do you see that?
A. Yes, sir.
Q. Number one, if you would, read it back for me.
A. Before servicing or making any adjustments to the chipper, shut down the chipper and wait for it to come to a complete stop and then lockout/tagout the chipper power source. Disc will continue to rotate after chipper is shut down. To confirm disc is stopped, visually check disc shaft or drive

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wheel.

Q. Mr. Smith, you have indicated in your testimony that in addition to that, you would think that one place else to look would be in the chute or the opening to the machine?

A. The chipper spout, yes, sir.

Q. That doesn't appear in the operation and maintenance manual here anywhere, would you agree with that?

A. It doesn't appear on this page, if that is what you are referring to.

Q. If you know someplace else it does appear, I would be happy to point it out.

A. Yes, sir. I have not looked at it that closely.

Q. Mr. Smith, if it is there, would you please notify your counsel so he can point it out to me at some future time?

A. Sure.

MR. BORDEN: I don't plan to have him read the entire manual.

Q. Mr. Smith, one of the things that -- if you would look at page 2.15, you refer to

placement of decals for chippers with two piece hoods.

A. Okay.

Q. This seems to illustrate specifically where these decals are supposed to be placed?

A. Okay.

Q. What is the reason for the placement of the decals on the hood, on the two piece hood, the specific decals that you have identified as Defendant's Exhibit 1?

A. The operator is standing right there to change knives and it is line of eyesight. It is just normally that is the place where they would be.

Q. It is your understanding that the design of this label, Defendant's Exhibit 1, is intended to take the attention of the operator at the point where he would be operating the machine?

A. Where he is about to change knives, yes, sir.

Q. Going back to the question about you don't know how this accident happened, you

don't know what the operator was doing?

MR. OTT: Objection to the form of the questions.

Q. Do you know what the operator was doing?

A. I wasn't there, but obviously he was about to change the knives.

Q. What basis do you have to make that assumption?

A. Because the hood -- maybe I was told that by the owner of the mill. I don't know. I don't remember that. But it seems obvious to me that he was about to change the knives.

Q. Mr. Smith, is there a problem with operating chippers something called plugging, do you know about plugging?

A. Yes, sir.

Q. What is that?

A. A chipper could stop up.

Q. How would it stop up?

A. The motor could lug down and lose the blowing power. It hardly ever happens. But that's what would cause it to stop up.

Q. It would happen if you, for instance,

cut off the machine power, but you continued to feed material into the machine from a vibrating conveyor, that would be one way it could happen?

A. That's correct.

Q. Is there any warning against such procedure that you are aware of that is included either on the machine or in this manual?

A. I don't think so.

Q. You recognize that as a problem that could happen if there are two separate controls for the vibrating conveyor and the machine?

A. No, sir. I don't recognize it as a problem at all.

Q. Would you concede that plugging could be a problem?

MR. BORDEN: Object to the form.

A. Plugging has never been a problem to us in our chippers.

Q. Are you aware of any -- with your long experience with operating a manufacturing

facility that produces wood chipping machines, you have never been aware that operators leaving the feed conveyor automatically feeding these machines would allow the machines to slow down quicker by continuing to feed it after the power in the machine was shut off, you have never heard of that?

A. I can't imagine shutting the chipper down and continuing to feed the chipper.

Q. That could happen if you had two separate controls?

A. Could it happen, yes, it could happen.

Q. How long does it take -- let me first ask you. The fifty-eight inch machine that Precision Husky makes and made at that time that is similar to the Morbark machine, what are the operating characteristics of that machine? I started probably too soon that refer to the weight of the disc. What is the weight of the disc on that fifty-eight inch machine?

MR. OTT: Object to the form of the questions.

A. I am guessing it is approximately thirty-five hundred pounds.
Q. And is that a similar weight that the Morbark machine has?
A. I believe so, yes, sir.

(Whereupon, Plaintiff's Exhibit 11 was marked for identification and copy of same attached hereto.)

Q. Let me show you Plaintiff's 11. That is a piece of material that Morbark distributes with the characteristics of its machine. Are you familiar with it?
MR. BORDEN: Is he familiar with the exhibit or the machine?
Q. With the exhibit.
A. No, sir.
Q. Are you familiar with the characteristics as described there as typical of a fifty-eight inch Morbark chipper machine horizontal feed top discharge?
A. I am sorry, but I don't understand the

question.
Q. I am trying to make a comparison. Is that information that you are aware of about that fifty-eight inch Morbark horizontal feed top discharge machine?
MR. BORDEN: I don't understand that question.
A. I don't either. I don't understand it. I have never seen this document to my knowledge.
Q. That is fine. That would be the answer. So what do you know about that fifty-eight inch Morbark machine, about the operating characteristics, for instance, by comparison to the disc size and weight?
A. I know the disc is the same diameter, I know the disc is generally the same thickness, I know that the RPMs are generally the same, I know that the fan blades are for the purpose of blowing chips out of the machine.
Q. The Precision Husky fifty-eight inch machine with the disc weighing approximately thirty-five hundred pounds, it operates a

variety of RPMS, but at seven hundred and twenty RPMs, that would be one of the operating speeds that maximize the efficiency of the Precision Husky machine, you advertise that, don't you?

A. That's the max that the disc should turn, yes, sir.

Q. So fifty-even inch disc, seven hundred and twenty RPMs, has a maximum feed rate of two hundred and seventy feet per minute, something like that?

A. It could, but that's not necessarily the case.

Q. Does the Morbark equipment, that fifty-eight inch horizontal feed top discharge Morbark machine that was involved in this accident have similar operating characteristics?

A. Yes, sir.

Q. How long does it take if you can make a reasonable estimate of the Precision Husky fifty-eight inch machine to run down after it is powered off and without continuing to feed

it?
A. I would guess it could be ten to fifteen minutes.
Q. Do you know if that is a similar period of time for run down in comparison to the Morbark machine?
A. I believe so.
Q. Ten to fifteen minutes?
A. Yes, sir.
Q. Is that stated anywhere in your manual or on the instructions to the operator?
A. Not in number of minutes, I don't believe so.
Q. Would you say the maximum time-out of the machine is fifteen minutes assuming no feeding?
A. I am saying that is a guess on my part, but that is --
Q. A reasonable estimate?
A. Right.
Q. Is there any reason that the hood couldn't be secured with the device that timed out the maximum length of time it takes for

the machine to run down?
A. Is there any reason --
Q. If you cared to produce a machine that secured the hood in place until some maximum rundown time had been achieved, you could build such a machine, could you not?
A. Sure.
Q. And there are similar machines in the brush chipping industry, are there not?
MR. OTT: Objection to the form as to similar machines.
A. I don't know what similar machines we are talking about.
Q. With a hood that won't open until a certain rundown time had been achieved? Vermeer makes one.
A. I don't know of any machines that has such a device on it.
Q. Do you know of the mechanical device that Bandit has patented and sells with a mechanical device that won't allow the hood to open until the rundown time or the wheel has stopped turning?

A. I do not know of that, no, sir.
Q. Do you study any of the tree industry literature or the wood manufacturing literature?
A. Sure.
Q. What sources do you regularly rely on or read, consult, whatever the word might be?
A. What are you relating to specifically?
Q. Your present knowledge of what exists in the industry. As an expert, I am allowed to ask you that question. What is the basis for this expert knowledge that you have got? I accept that you know a lot about machinery. And I am just curious as to what you know about the industry specifications and standards. Where do you get your information about that?
A. I know of no machine manufactured as a chipper that has any such device as that on it.
Q. Counsel asked you whether you knew about any standards that were applicable to the design of this warning or warnings that are on

the Precision Husky machine, specifically the ANSI Z535 standard, are you familiar with that?

A. Not as I sit here, no, sir.

Q. Somebody else do you depend on to comply with ANSI 535?

A. Sir, I haven't seen that document.

Q. Do you know anything about -- let me ask you this to start with. You mentioned that your machinery is sold across the United States and foreign countries?

A. That's correct.

Q. Including I think you have got a distributor in British Columbia?

A. That's correct.

Q. Are you familiar with the standards, the OSHA standards in British Columbia?

A. Not specifically, no.

Q. Who do you rely on to comply with those standards, to make sure your equipment satisfies the Canadian government standards when you sell it in British Columbia?

A. The Canadian dealer would be the ones --

if there are any changes, the Canadian dealer would be the one that you would rely on.

Q. Do your dealers and your customers depend on you to produce equipment that satisfy OSHA standards?

A. I am assuming that would be correct. I don't know that I have ever been asked that question.

(Whereupon, Plaintiff's Exhibit 12 was marked for identification and copy of same attached hereto.)

Q. Let me hand you Plaintiff's Exhibit 12 to start with. I will represent that to you as a standard, an OSHA standard from the British Columbian government, providential government. It is part 27.41 referring to hog and chipper chutes. Do you see number three there?

A. Yes, sir.

Q. It refers to a mill chipper with a shroud, hood or inspection plate that can be

removed before the rotor has stopped must have an effective brake. Does your equipment that you distribute as a fifty-eight inch Precision Husky chipper horizontal feed top discharge have a brake, an effective brake?

A. We offer brakes as an option, yes, sir.

Q. What option do you offer and where is that addressed in your literature?

A. It would be on the spec sheet, the price list would show a brake as an option.

Q. How is that referred to? What would be the technical jargon for a brake?

A. Disc brake for a certain size chipper.

Q. How big of a chipper would that be an option for?

A. Any size chipper.

Q. So if necessary, you could have equipped or could equip a fifty-eight inch horizontal discharge or horizontal feed top discharge machine with such a brake?

A. Yes, sir.

Q. And how would that brake work?

A. It is a brake that is connected to the

shaft and you have calipers with brake pads on them that is operated with a cylinder that would come together and stop the machine.

Q. How long has that been an option at Precision Husky?

A. Thirty, forty years.

Q. Is that a patent device?

A. No, sir.

Q. Is it advertised within the industry? Is it common knowledge that Precision Husky makes such equipment?

A. Sure.

Q. If it were applied in the case where someone was powering down the machine awaiting for it to stop, would it effectively stop the machine in a faster quicker manner than ten to fifteen minutes?

A. Yes, sir.

Q. How fast would it operate?

A. Depending on your setting, but you could stop a fifty-eight inch chipper disc in less than a minute.

Q. What is the cost of such a device?

A. I am thinking you are probably talking about four or five thousand dollars. That is a guess.

Q. As opposed to a percentage of the cost for the equipment, what -- is it five percent, ten percent?

A. About ten percent.

Q. What type of equipment -- I am going to be redundant here, but as I understand, it is optional on all chipper equipment?

A. That's correct.

Q. Even up to the larger chippers, sixty-six or whatever they go up to?

A. That's correct.

Q. Do you know of any other manufacturer that offers similar brakes for the chipper equipment?

A. I believe all manufacturers offer that.

Q. If the machine involved in this case, this Morbark fifty-eight inch machine, had such an option to have an effective disc brake, would that have changed your opinion about how this accident happened if a brake

was in use at that time?

A. No, sir.

Q. One of the things that you have talked about is hood bolts. Have you ever looked at the Morbark manual, the safety operator's manual, the company's fifty-eight inch chipper?

A. I don't believe so.

(Whereupon, Plaintiff's Exhibit 13 was marked for identification and copy of same attached hereto.)

Q. Mr. Smith, I am going to hand you what is marked in this deposition as Plaintiff's Exhibit 13, previously the deposition Exhibit Number 8 in the deposition of Larry Noch. By way of comparison, and I don't mean to make this simply a physical comparison, but it seems to be less extensive than the manual produced by Precision Husky. If you look through the pages there about halfway through the manual, it actually gets around to talking

about the operation of the machine.

MR. BORDEN: What part of that was a question?

Q. I take that as an objection?

MR. BORDEN: Correct.

Q. Go ahead and answer.

A. I don't know what the question was.

Q. Let's go off the record.

THE VIDEOGRAPHER: Here marks the end of tape number two in the deposition of Bob Smith. Going off the record. The time is ten fifty-nine a.m.

(Off-the-record discussion.)

THE VIDEOGRAPHER: Here marks the beginning of tape number three in the deposition of Bob Smith. We are back on the record. The time is ten fifty-nine a.m.

Q. Mr. Smith, if you would look at Morbark page 0040. If you notice, the Morbark manual starts at number 0024, but at page 0040, there is a reference to changing chipper knives.

A. Okay.

Q. If you would, look through the steps

there, one through three, I think.

A. Yes, sir.

Q. In reference to number one, number one seems to address the question about allowing the chipper disc to coast or rotate for several minutes?

A. Yes, sir.

Q. I know it is not a name you are familiar with, but if you would, look a little further into the manual and see if you see any other reference to changing chipper knives or allowing the disc to rotate and stop or where one might look to see if it has stopped.

A. Do you want me to go through this manual?

Q. I think you need to do that to satisfy yourself. I am going to represent to you that is the only section I know of that refers to stopping a disc. But I want to take the opportunity to look --

MR. BORDEN: Can we just operate under the assumption that there is not another reference so we won't have to have Mr. Smith

look through an entire manual for a chipper he didn't manufacture?

Q. If he was a fact witness, I would agree with that, but he is now an expert. Take your time and if you would, just briefly go through the manual and if you need more time, we will provide it. I want to ask you some other questions about it.

THE VIDEOGRAPHER: Going off the record. The time is eleven-o-one a.m.

(Short recess.)

THE VIDEOGRAPHER: We are back on the record. The time is eleven-o-eight a.m.

Q. Mr. Smith, I had just a few questions in comparison to the Precision Husky manual. This one seems to not have as much detail information, that is the Morbark manual, would you agree with that?

A. What I have been shown, yes, sir.

Q. At some point I asked you to look specifically through the manual. I think we had looked at that Morbark number -- it is actually 000040 by changing chipper knives.

Did you see any other reference in the manual that refers to the procedure that changed the manual or to wait for the chipper wheel disc to stop coasting?

A. I didn't see any, no, sir.

Q. At the point that I asked you about the Precision Husky manual and this reference to the hood locking device, I think -- I understood from your testimony in your affidavit that you can't pinpoint when that device was first designed and manufactured?

A. That's correct.

MR. OTT: Objection to the form.

Q. When can you say for certainty -- you said twenty years I think that that hood locking device has been used for two piece hoods?

A. That is a good answer, yes, sir.

Q. I had looked at some used equipment and I saw things in the range of the late '80s with that device.

A. Okay.

Q. That would be consistent with your

answer?
A. Yes, sir.
Q. Where is that device manufactured?
A. At our plant.
Q. And looking at again the manual, I am looking specifically at Precision Husky manual in the -- page B-30, can you turn to that, please, sir?
A. Give me that number again.
Q. B-30.
A. There is no B-30 here.
Q. I think it is in to the inside corner.
A. I see B-29, and then I don't see -- then I go to B-36.
Q. If you would look behind that. Let me give you B-30.
A. It is all out of place, but I found it.
Q. B-30 shows the part that I am referring to as the hood locking device.
A. Yes, sir.
Q. What is -- it consists of parts with these T handles, some locking bolts and some pins. What is the part number on the hood

locking device?
A. I don't see a part number on the hood lock itself.
Q. I have recently ordered one. I am not sure how it got sent. The hood locking device as it is represented there is an assembly, and how would you describe it in terms of the materials that are used to manufacture?
A. It is a fabricated item out of steel, and it has two bolts that push one part of the hood against the other, and it pivots on the -- it is like a horse shoe.
Q. This is in addition to the things you referred to as hood bolts?
A. Yes, sir.
Q. Now, in that Morbark manual, did you see any reference to hood bolts?
A. I did not just the part that I scanned.
Q. At the time that you were referring to lack of hood bolts, you would assume there would be some instruction as there is in the Precision Husky manual about securing the hood bolts?

A. Sir, I am sorry, your questions are running together. I don't understand your question.
Q. Let's look at page 3.2.
A. Where are we now, on what?
Q. In your Precision Husky manual.
A. That's 3.2?
Q. Yes, sir.
A. Okay.
Q. That refers to the operating instructions?
A. Yes, sir.
Q. And at page 3.2, what does it refer to with regard to the hood bolts?
A. The first one I see is number eleven. It says check that all hood bolts are in place and properly torqued. Twelve, make sure that all access doors are in place and properly secured. Thirteen, make sure that the hood lock is in the locked position and the t-handle bolts are tight. Fourteen, conduct a thorough visual inspection of the machine, checking for loose bolts, nuts, et cetera.

Q. If you would, look at 4.14.
A. Okay.
Q. What does this refer to?
A. This is changing the knife on a chipper with a two piece hood.
Q. And what is the procedure as outlined there and shown by photographs?
A. Number one, shut down the chipper, number two, wait for disc to come to a complete stop, disc will continue to rotate after chipper is shut down. To confirm disc is stopped, visually check disc shaft or drive wheel. Number three, to lockout/tagout chipper power source. Number four, remove the bolts securing the two hood sections together. Number five, remove all bolts securing the hinged portion of the chipper to the base. Number six, loosen t-handle bolts on hood lock and rotate hood lock into unlocked position. And number seven using handle, open the chipper hood.
Q. And after the knives are replaced, referring to page 4.16, what is the procedure

to resecure the hood?

A. Twenty-one, close hood; twenty-two, replace all bolts that secure hood to base; twenty-three, replace nuts and bolts that join the two sections of hood together; twenty-four, rotate hood back into locked position and tighten the t-handle bolts.

Q. If that hood lock and the t-bolts had not been placed in the unlocked position; that is, the bolts on the flange had all been removed, but that the hood lock was still in the locked position with the t-handle bolts hinged, do you have an opinion about what would happen if there was some internal malfunction to the machine that kicked some force back against that hood, would it -- would that hood lock keep the hood from opening?

A. It depends on the force obviously. But generally it would keep it locked.

Q. Now, that is a substantial piece of equipment, isn't it? This hood lock probably weighs twenty-five or thirty pounds?

A. Probably, yes, sir.
Q. And it is fashioned, as you say fabricated with what looks like and -- what is your estimate that the gauge metal that is welded to these channels, that it is formed from?
A. I think it is the light gauge tube, eight inch walls or something like that.
Q. What other purpose does that hood locking device have except to prevent the hood from opening after the bolts are removed from the flange?
A. It is a safety item that is in addition to, not -- it is not intended for that to be used without hood bolts.
Q. I take your point. Did you see anything in the Morbark manual, I think I asked this question, but as to hood bolts, using them or replacing them after knives are changed?
A. I didn't see that in what you showed me, no, sir.

(Whereupon, Plaintiff's Exhibit 14 was

marked for identification and copy of same attached hereto.)

Q. I am going to hand you Plaintiff's 14, which is the forty-eight and fifty-eight inch stationary right-hand chipper parts manual of the Morbark machine. If you would, open it up to the illustrated section and see if you can find any hood holes that are illustrated there.

MR. BORDEN: Is there a specific page he should be looking at or is there a series of pages?

A. There are some bolts mentioned in the -- some of the detailed lists, but I have no idea that that is hood bolts or what that bolt is. I don't see anything in the -- where it shows the hood itself. I just see bolts, but I don't know what bolts that refers to.

Q. Let me try to move -- I know you have had quite a round of it here. You described I think briefly the purpose of the fan blades of chipper machines as creating air stream to

expel the chips, I think you were -- something along those lines?

A. That's correct.

Q. Just for basic vocabulary purposes, these knives, which are also attached to this rotating disc along with the fan blades, they are not the same things?

A. That's correct.

Q. And so the knives themselves need regular maintenance according to your experience and what you have proposed in your manual?

A. That's correct.

Q. How often do they need to be changed?

A. It depends on the wood. It could be changed typically everyday after the shift is over, but it could be at noon also.

Q. There could be conditions that create some dulling or some problem with the knives?

A. That's correct.

Q. If you would look at page 4.5 of the Precision Husky manual.

A. Yes, sir.

Q. At the time that these adjustments are made to the machine, changing the knives, there is also a counterpart of the knives that is called the anvil?

A. Yes, sir.

Q. And the chipping process occurs because of the clearance between the knife and the anvil?

A. That's correct.

Q. Where is the anvil located?

A. The anvil is located on the base of the chipper.

Q. So the fixed part of the machine, the wheel carries the knife and the anvil --

A. Is fixed.

Q. Is fixed. And that clearance you propose something in the range of ten to twenty-five thousandths of an inch?

A. That's correct.

Q. How is that set?

A. Simply remove the feed plate and it is checked with a gauge, a feeler gauge, and then you have a mechanism there moving it back and

forth.

Q. How many people does it take to carry out this operation of changing knives and making sure that clearance is adequate?

A. Generally it takes two people to change knives.

Q. Why is that?

A. Well, one needs to be on the back of the machine and one -- you can do it with one person, but it is safer to have one person in the back and one person in the front.

Q. Just so the jury can understand this, you have this fifty-eight inch wheel on an axle inside of this machine, how do you hold in place while you pull these -- essentially unbolt the knives to make this change?

A. Typically people just use a wedge of wood and put it between the edge of the disc and the edge of the base.

Q. So a wedge of wood goes to the top of the wheel?

A. No, on the side.

Q. On the side?

A. Uh-huh (nodding head affirmatively).
Q. Let me go back to 5.5 and the note that is referred to there with regard to discharge or blow pipes that plug.
A. Okay.
Q. Now, at that page there is a note at the lower left-hand corner about this concept of trying to understand the plugging. A machine can plug in various places?
A. I am sorry, I thought I had the page. It is 5.5?
Q. It is 4.5.
A. I was looking at five. 4.4?
Q. 4.5.
A. 4.5. I am close. Okay.
Q. What I was asking about is this idea that a machine can plug either -- I suggested the possibility of feeding it after the machine was powered off. There are other reasons a machine might plug?
A. That's correct.
Q. What are the other reasons?
A. It spells it out here. Producing an

excessive amount of oversized chips, worn out fan blades or round blades, holes in the lower casing band or the hood, holes in the blow pipe, blow pipe is too narrow, holes in the hood of the blow pipe transition.

Q. Once this happens, what is the effect on the machine?

A. It can stall the machine.

Q. Before it actually stalls what -- does it slow it?

A. Obviously it slows down, yes, sir, until it stops.

Q. Just a couple of more questions. I am almost done here. This Defendant's Exhibit 1, this diagram, pictogram I think is what they call it, this has nothing to do with the Morbark machine, this is just general warnings, I take it?

MR. OTT: Object to the form of the question.

Q. Does this have anything to do with a Morbark machine?

MR. OTT: Are you talking about --

Q. Defendant's Exhibit 1, this danger pictogram.
A. It was placed on a Morbark machine.
Q. It certainly is. But this isn't a Morbark machine that is illustrated here, is it?
A. This is just typifying what happens when a hood opens. It can go on any chipper. I don't know if I am understanding your question.
Q. My question is the machine as it is described in this pictogram, there is a hood locking device on it --
A. Yes, sir.
Q. -- that Morbark doesn't use?
A. That's not true, no, sir. Excuse me. Let me rephrase that answer. They use -- in this case, they were using pins. It performs the same thing. But this in our case we used the hood locking device.
Q. Yes, sir.
A. But it does the same thing.
Q. The machine that is pictured in the

pictogram is not a Morbark machine?
A. That's correct.
Q. The diagram as it shows as you described it some portion of the hood opened with an operator behind it?
A. Yes, sir.
Q. And now you suggest that that means that the operator is in danger?
A. Yes, sir.
Q. What danger is he in?
A. He is in danger of being injured.
Q. In what way?
A. In any way. If he opens that hood while the disc is turning, it could hit him in the head, it could hit him anywhere.
Q. Would you go back and look at the photographs that you were shown -- those aren't going to do. Let me get my own photographs out. As we are addressing this, in your interpretation, the pictogram shows the operator being struck in the head?
A. Yes, sir.
Q. You recognized that as a hazard sometime

at least by the mid '80s?
A. Yes.
Q. Of opening the hood?
A. It is only a hazard if it is operated without bolts and pins or locks.
Q. At some point though in your experience in the mid '80s at least, you recognized the specific hazard that an operator could get hit in the head by the hood?
A. Yes, sir.
Q. That is what you were trying to demonstrate here?
A. Yes, sir.
Q. Where on your machine -- you have used a couple of words in your manual about disc shaft or drive wheel for instructions to an operator to check to see if there was rotation of the disc in the Precision Husky machine?
A. Yes, sir.
Q. Those words, where did they come from, is that universally understood, disc shaft and drive wheel?
A. I think so, yes, sir.

Q. I didn't find it in the glossary of terms in your manual. Do you try to define it anywhere else?
A. I don't know of any other place, no, sir.
Q. Is it identified on the machine, is there a label or a warning saying look here?
A. No, sir.
Q. So there is some assumption about disc shaft and drive wheel that you are inferring is universally understood?
A. You can see the shaft.
Q. I understand that. And --
A. And depending on the covering over the belts, you can see the drive wheel.
Q. What position can you see these things from?
A. From the position where the operator would typically change the knives.
Q. If he was changing the knives?
A. Yes, sir.
Q. Now, in the Morbark manual, Morbark 00040, they use the word chipper sheave.

A. Shield is the same thing for a pulley or a drive wheel.
Q. Your understanding of the Morbark manual is pulley or drive wheel shield?
A. Same thing, yes.
Q. At the time that you had incorporated this warning on the Precision Husky equipment and apparently followed the procedure of applying it to other equipment that you serviced or resold, that became a procedure at Precision Husky?
A. Yes.
Q. At the time that you made that decision -- was it your decision or someone else's?
A. Sir, I don't remember.
Q. Was it common practice that you originated it or did somebody say, hey, we are going to put labels on this?
A. No. It is a common practice that we originated, yes, sir.
Q. And did you apply those labels to equipment that already had manufacturer

warnings on them that were legible and able to be read?
A. No, sir.
Q. Why would you not?
A. Depending on the labels, if we felt like they were legible and they were understandable, we would not have changed them.
Q. Did you know where to order labels from Morbark?
A. Did I ever order labels?
Q. Did you know how to?
A. No, sir.
Q. Do you know if Mr. Witherspoon knew how to do that?
A. No, sir.
Q. And do you know whether he ever ordered such labels?
A. No, sir.
Q. Did you ever send him any other labels after you sent the machine to him?
A. I don't believe so. We could have.
Q. What labels do you think -- I don't want

you to guess. Do you know of any labels that you sent him?

A. Not as I sit here, no, sir.

Q. This idea that you needed a specific label, you have mentioned I think the name of your distributor was Quality Labels or something of that nature?

A. That sounds right.

Q. And you essentially must have worked with them to design something, they didn't know anything about chipper equipment, did they?

A. That's correct.

Q. Who would have been the person to interact with Quality Labels?

MR. BORDEN: Are we talking specifically about PH003 right now?

Q. We are.

A. One of the engineers that helped put this manual together would have worked with them.

Q. Do you know of any other person? Can you give me a name or a reference?

A. No, sir.
Q. Do you know if that was done after evaluating the risks of the machine and the equipment?
A. I don't know when it was done. It has been so long. We have used it for so many years, I don't remember specifically when it happened.
Q. Did you depend on that label to suffice for proper operating instructions? Was that going to fix the problem of not having understandable operating instructions by Morbark?
MR. OTT: Objection to the form of the questions.
A. The label specifically refers to what happened in this accident. And if it had been followed, it wouldn't have happened.
Q. I don't want to go back and argue the point with you because it is your opinion. The basis of your opinion is that you don't know how the accident happened?
A. I wasn't there.

Q. So you don't have any idea what the operator did or didn't do?
A. That's correct.
Q. You have looked at the hood, you know that there were no bolts in the hood and the pins must have been removed, that's your assumption?
A. That's correct.
Q. When and how that happened is something you don't know about?
A. That is true.
Q. Let me ask you about the brake system that is available as an option on the Precision Husky equipment and apparently other similar devices manufactured by others. How long -- you mentioned thirty years or more that you have had that option available?
A. That's correct.
Q. Do you know anything about how often and how -- how long that option has been available at Morbark?
A. I do not know that.
Q. Do you know how it came to be that the

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option was incorporated into the Precision Husky design?

A. Say that again.

Q. At some point the decision must have been made to engineer a brake system for the Precision Husky chipper equipment?

A. Yes, sir.

Q. Who made that decision?

A. I don't know that. It has been too many years ago.

Q. You have been there most of the time?

A. That's correct.

Q. Who else would possibly know or have been responsible for that decision?

A. It could have been in engineering. It could have been a request from a customer. It could have happened for many reasons, but that is forty years ago.

Q. Where would I go to find the specifications of that brake system if I went looking for it today as an option for a Precision Husky piece of equipment, a chipper?

A. It would be on our price list with

USED N.C. - REMOV.

P.5600
3-30-06

CHIPPER SPECIFICATIONS

CUSTOMER: J.C. WITHERSPOON JR., INC.
LOCATION: ALCOLU, SC
DEALER:
DELIVERY DATE: 4-6-06

Wastewood ✓
Roundwood
Tree Harvester
Rechipper

Size:	58" MORBARK
Serial No.:	914 —
Chip size:	5/8"
Knife gauge:	N.A.
Type of discharge:	TOP
Hand:	RIGHT
Feed:	HORIZONTAL
Disc thickness:	5"
Number of pockets:	SIX (6)
Blank off:	NONE
Number of fan blades:	THREE (3)
Type of fan blades:	FULL
Type of hood:	MORBARK
Access doors in hood:	—
Type of spout:	MORBARK
Wearplate thickness:	1/2" MORBARK
Knife bevel:	29 1/2°
Knife size:	19 5/8 x 4 x 3/8"
Counterknife size:	19 5/8 x 2 1/8 x 3/8"
Vertical anvil:	MORBARK 15 3/4 x 3 x 1
Horizontal anvil:	MORBARK 13 x 3 x 3/4"

PLAINTIFF'S EXHIBIT 12 Witherspoon
PENGAD 800-631-6989

PLAINTIFF'S EXHIBIT 1

HUSKY SALES DOCUMENTS TO WITHERSPOON
0742 DELIVERY 4/16/06
JGH 030

PH 0028

Type of knife clamp:	MORBARK
Half or full clamp:	MORBARK
Equipped with disc brake:	NO
Equipped with hydraulic hood opener:	NO
Equipped with separator:	NO
Equipped with rechipper spout:	NO

NOTES: TO BE MOUNTED ON A USED COMMON BASE (ADD MOTOR PLATE) HOLD 18 3/4" TO INSIDE OF SPOUT

SET UP LIKE KC UNIT. SEE DWG. #2601-100 FOR DETAILS

PRECISION HUSKY

PRECISION HUSKY CORPORATION
PHONE (205) 640-5181 • FAX (205) 640-1147 • LEEDS, ALABAMA 35094

DRAWER 506 • P.O. BOX 11407
BIRMINGHAM, AL 35246-0506

J.C. WITHERSPOON, JR INC
P.O. BOX 289
ALDERMAN CAMP ROAD
ALCOLU, SC 29001

#1

J.C. WITHERSPOON, JR INC
P.O. BOX 289
ALDERMAN CAMP ROAD
ALCOLU, SC 29001

SLS/ 59861
04-06-2006
1st # 102905
667945
04-05-2006
Page: 1

INVOICE

	179350	51		00	BALANCE ON RECEIPT

240	1	1	EA KWIK CHIP 58" KWIK CHIP UNIT WITH USED 58" 6K MORBARK CHIPPER IN GOOD RUNNING CONDITION. MOUNTED ON KC BASE WITH A 6X6 REMANUFACTURED PRECISION CHIP SCREEN 60"-3/16 NEW CYCLONE WITH PIPE TO CONNECT TO CYCLONE. NO MOTOR ON CHIPPER NO CHIP LOADING SYSTEM P-5661 S/N S-1753 5662 5663	$25,977.00	25,977.00

Post-It® Fax Note 7671 | Date 3/27/06 | # of pages ▶ 3
To | From
Co./Dept. | Co.
Phone # | Phone #
Fax # | Fax #

dep - 5,000.00

25977.00	0.00	0.00	PAY THIS AMOUNT ▶	INVOICE AMOUNT 25977.00

AMOUNTS PAST DUE ARE SUBJECT TO A SERVICE CHARGE OF 1/2% PER MONTH. NO MATERIAL MAY BE RETURNED RETURNED MATERIAL WILL BE SUBJECT TO A RESTOCKING CHARGE.

Received Time AM Mar 27. 06 11:15AM

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FENGAD 800-631-6989

PLAINTIFF'S EXHIBIT 2

AK053

00744

PRECISION HUSKY

PRECISION HUSKY CORPORATION
POST OFFICE DRAWER 507 • LEEDS, AL 35094-0507 • PHONE (205) 640-5181 • FAX (205) 640-1147

QUOTATION

USE THIS NUMBER WHEN ORDERING → Nº 5804

WE ARE PLEASED TO QUOTE AS FOLLOWS:

J. C. Witherspoon, JR, INC. P.O. Box 289 ALCOLU, SC 29001	Date: 3-14-06 Payment Terms: 20% with Order— Balance on Delivery
Reference Your Inquiry No. Date:	Phone: 843-473-4865 Fax 843 473-4865

Item	Qty	Description	Unit Price	Total Price
	1	58" Kwik chip unit with used 58" 6 knife chipper in good running condition mounted on kwik chip base with a 6 x 6 REMANUFACTURED PRECISION CHIP SCREEN 60"-3/16 new cyclone with pipe to connect to cyclone No Motor on chipper. No chip loading system		25,977
			Paid ck # 3975	5,000

Plus any applicable sales tax.

F.O.B. Point: Leeds, Alabama — Delivery: 4 weeks

This Quotation, which consists of both sides of this page and any attachments or exhibits, when accepted by Purchaser shall constitute a conditional sale contract. This Quotation expires 30 days after the date hereof unless otherwise stated. Seller hereby gives notice of its objection to any additional or different terms contained in any purchase order or other writing sent to Seller by Purchaser. Acceptance by Purchaser is hereby expressly limited to the terms of this Quotation.

The terms and conditions set forth above and on the reverse side are hereby accepted by purchaser.

By: J C Witherspoon

Date: 3-14-06

Its: Pres.

Respectfully Submitted

PRECISION HUSKY CORPORATION

By: Clayton Bass

Its: _____

AK054

PLEASE SIGN FRONT AND BACK

Received Time Mar. 27. 11:15AM

00745

PRECISION HUSKY

PRECISION HUSKY CORPORATION
PHONE (205) 640-5181 • FAX (205) 640-1147 • LEEDS, ALABAMA 35094

DRAWER 506 • P.O. BOX 11407
BIRMINGHAM, AL 35246-0506

SHIP TO
J.C. WITHERSPOON, JR INC
P.O. BOX 289
ALDERMAN CAMP ROAD
ALCOLU, SC 29001

SOLD TO
J.C. WITHERSPOON, JR INC
P.O. BOX 289
ALDERMAN CAMP ROAD
ALCOLU, SC 29001

INVOICE#	BUS/ 80022
INVOICE DATE	04-13-2005
	List # 183184
ORDER #	187884
ORDER DATE	04-13-2005

INVOICE Page: 1

CUSTOMER P.O.#	CUSTOMER ACCT.#	SALES-PERSON	SHIPPING AND SPECIAL INSTRUCTIONS	WH. #	TERMS
CLAYTON HOOPER	179350	51	B/W PPD N/C	00	30 Days Net With Penalty

ITEM CODE	QTY. ORD.	QTY. SHPD.	QTY. B/O	DESCRIPTION	PRICE/DISC.%	EXTENDED AMOUNT
901000430	1	1		EA ADAPTER SHAFT 58 CHIPPER FOR 58" CHIPPER		
901000315	1	1		EA BRG HOUSE CUP/CONE REAR FOR 58" CHIPPER R&RA		
901000310	1	1		EA BRG BRONZE CUP/CONE FRT FOR 58" CHIPPER FRONT		
901000502	1	1		EA NUT BNGX 58 CHPR		
901000470	1	1		EA WASHER W20 58 CHIPPER		
901000690	2	2		EA SEAL OIL LIP 100 (SAE 52)		

NO CHARGE PER SCOTT SMITH
PARTS FOR USED NOBARK CHIPPER ON ORDER#88700

UPS # 1Z 332 364 03 4563 649 6

PLAINTIFF'S EXHIBIT 5

CHANDISE TOTAL	SPECIAL CHARGE TOTAL	TAX TOTAL	PAY THIS AMOUNT →	INVOICE AMOUNT
0.00	0.00	0.00		0.00

AMOUNTS PAST DUE ARE SUBJECT TO A SERVICE CHARGE OF 1/2% PER MONTH. NO MATERIAL MAY BE RETURNED WITHOUT PRIOR AUTHORIZATION. ANY RETURNED MATERIAL WILL BE SUBJECT TO A RESTOCKING CHARGE.

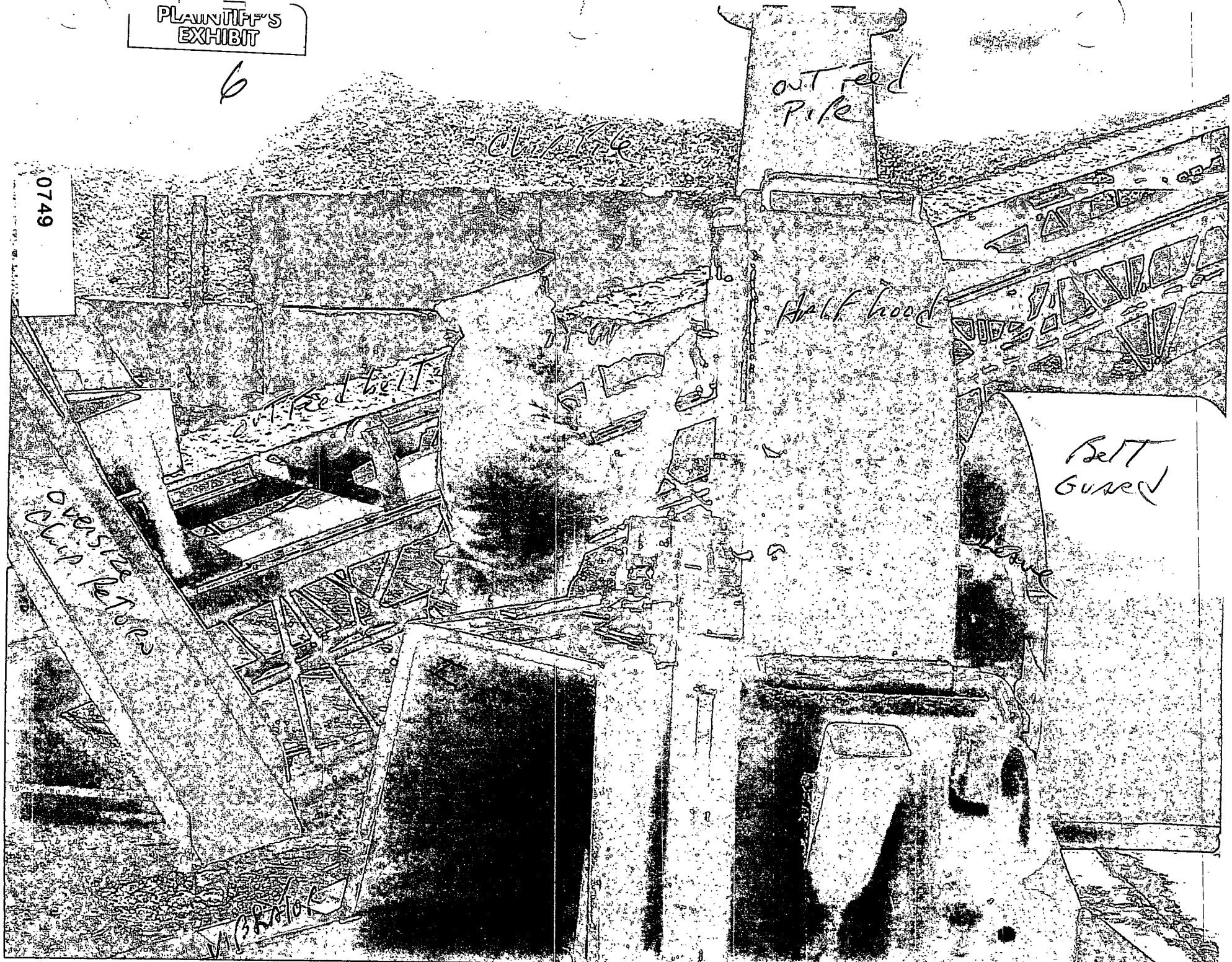
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PLAINTIFF'S EXHIBIT
9-B
Witherspoon
PENGAD 800-631-6989
PLAINTIFF'S EXHIBIT
4
DANGER
0747

PLAINTIFF'S
EXHIBIT
5
Back Side
DANGER!
LOCK OUT FOR
SAFETY
Hydraulic Pressure
0748

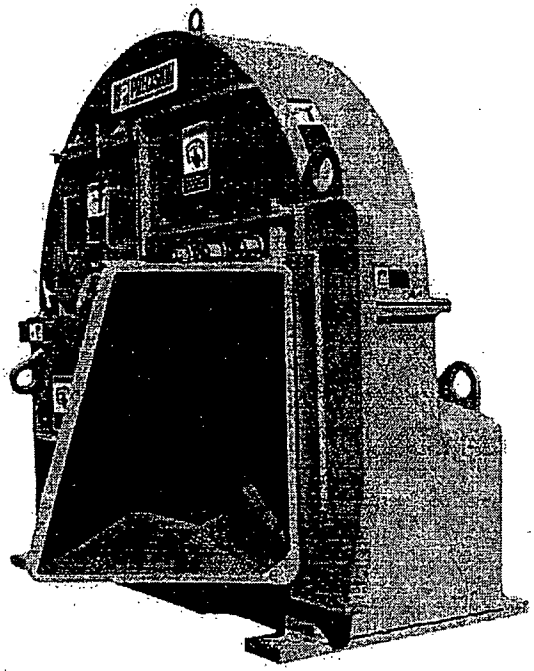
PLAINTIFF'S EXHIBIT

6



WASTE WOOD CHIPPER

PLAINTIFF'S EXHIBIT 7



Operation & Maintenance Manual

PRECISION HUSKY

00750

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D. Glossary
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Warnings & Precautions

For Your Protection

Before you read the operating instructions and other information, it is important that you understand the Signal Words and Color Codings used on the machine's decals. They identify information relating to your safety while operating the equipment, as well as ensuring that the machine will run in a safe manner.

Hazard Safety Message Boxes

Safety messages concerning the operation and care of the machine are displayed on the decals on the machine. Similar boxes appear throughout the manual. Carefully read each box that appears in the text and how it relates to you and the machines operation. The different kinds of boxes are displayed below. The immediacy their hazard information carries is defined below.

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ DANGER

Immediate hazards which **WILL** result in severe personal injury or death.

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ WARNING

Hazards or unsafe practices which **COULD** result in severe personal injury or death.

CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

⚠ CAUTION

Hazards or unsafe practices which **COULD** result in minor personal injury or property damage.

Informational Message Box

Throughout the manual important informational messages concerning the operation of the machine are displayed. Make sure you carefully read each of these boxes to avoid damaging the equipment.

A NOTE box message contains special information, usually about the operation of the machine.

NOTE

Information to which you should pay special attention.

00754

Decals for Chippers with 2-Piece Hoods

Replacement safety decals are easy to re-order and they are free. For further information contact:

Precision Husky Corporation
P.O. Drawer 507
Leeds, Alabama 35094-0507
Phone: (205)640-5181
Fax: (205)640-1147
Web Site: www.precisionhusky.com
Email: precisionhusky@msn.com

Figure 2.14-A Precision Husky Logo.
The Precision Husky logo is placed at the top of the hood on the back and the front.

PN 97-8017 - 25" x 4"

PN 97-4271 - Obsolete
PN 97-8018 - 17" x 3"
Quantity 2

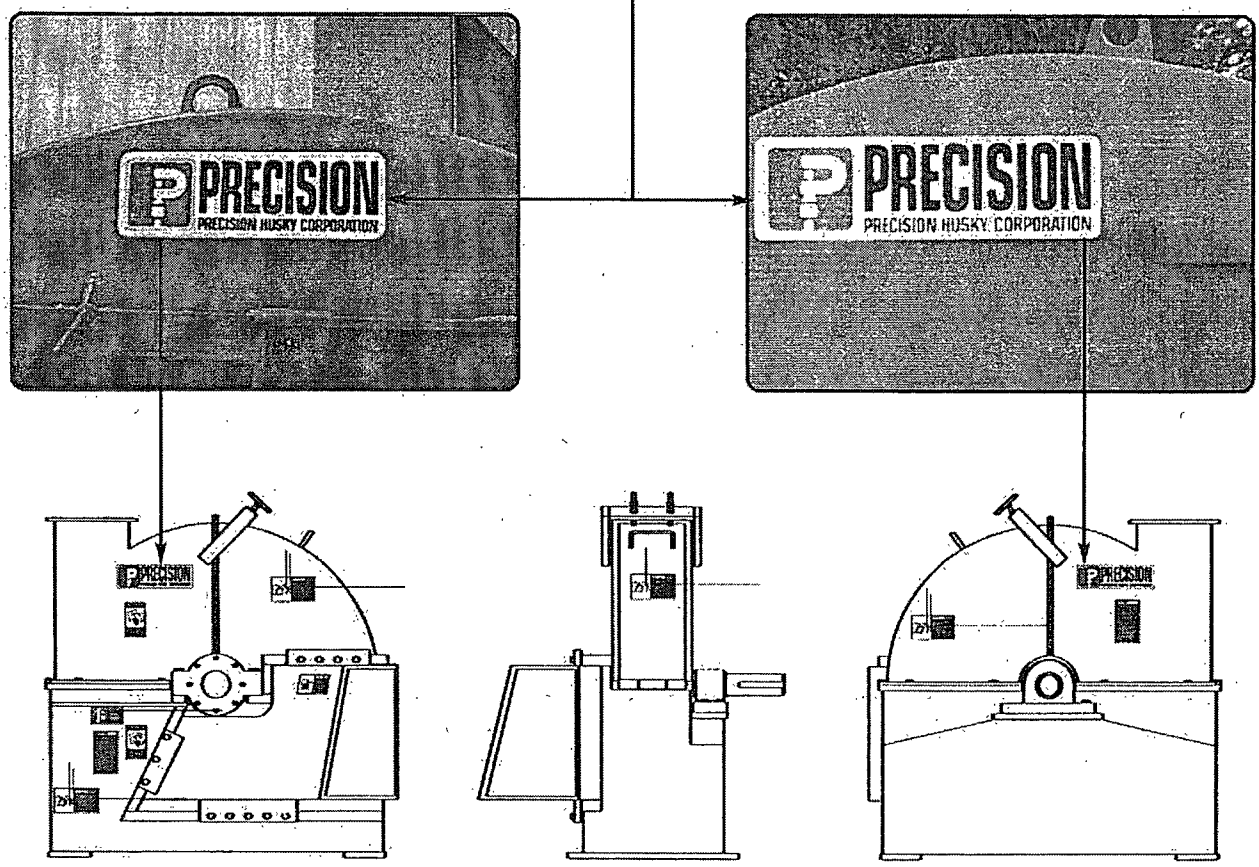
PN 97-8027 - 38" x 6"

obsolete - 97-4271





97-8017, 97-8018, 97-8027



00755

Decals for Chippers with 2-Piece Hoods

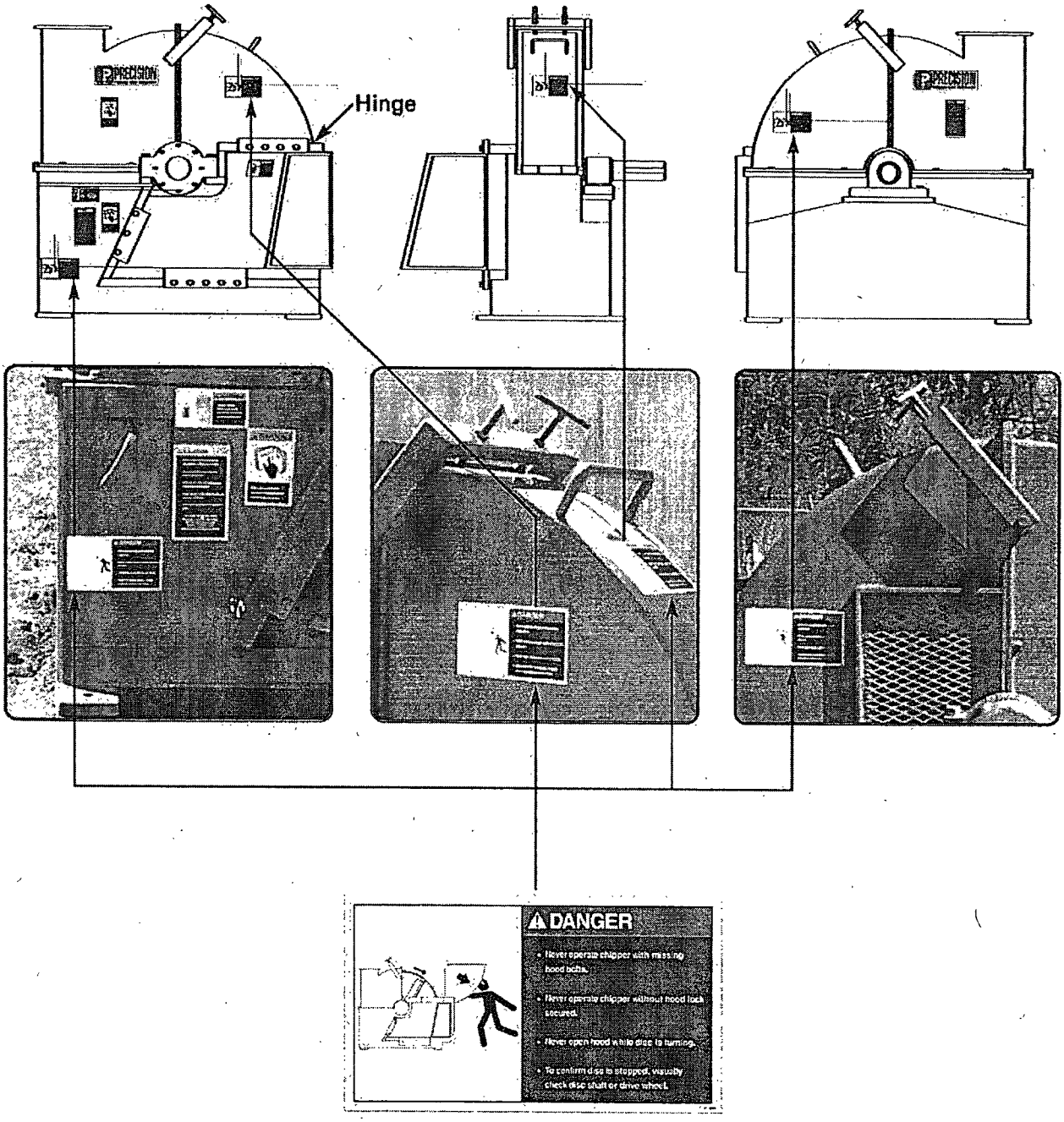


Figure 2.15-A Danger, Never Operate Chipper with Missing Hood Bolts.
Placed on the front of the base, and on the back, front, and side of the hood section that is hinged.

PN 97-4263
Quantity 4

06756

Decals for Chippers with 2-Piece Hoods

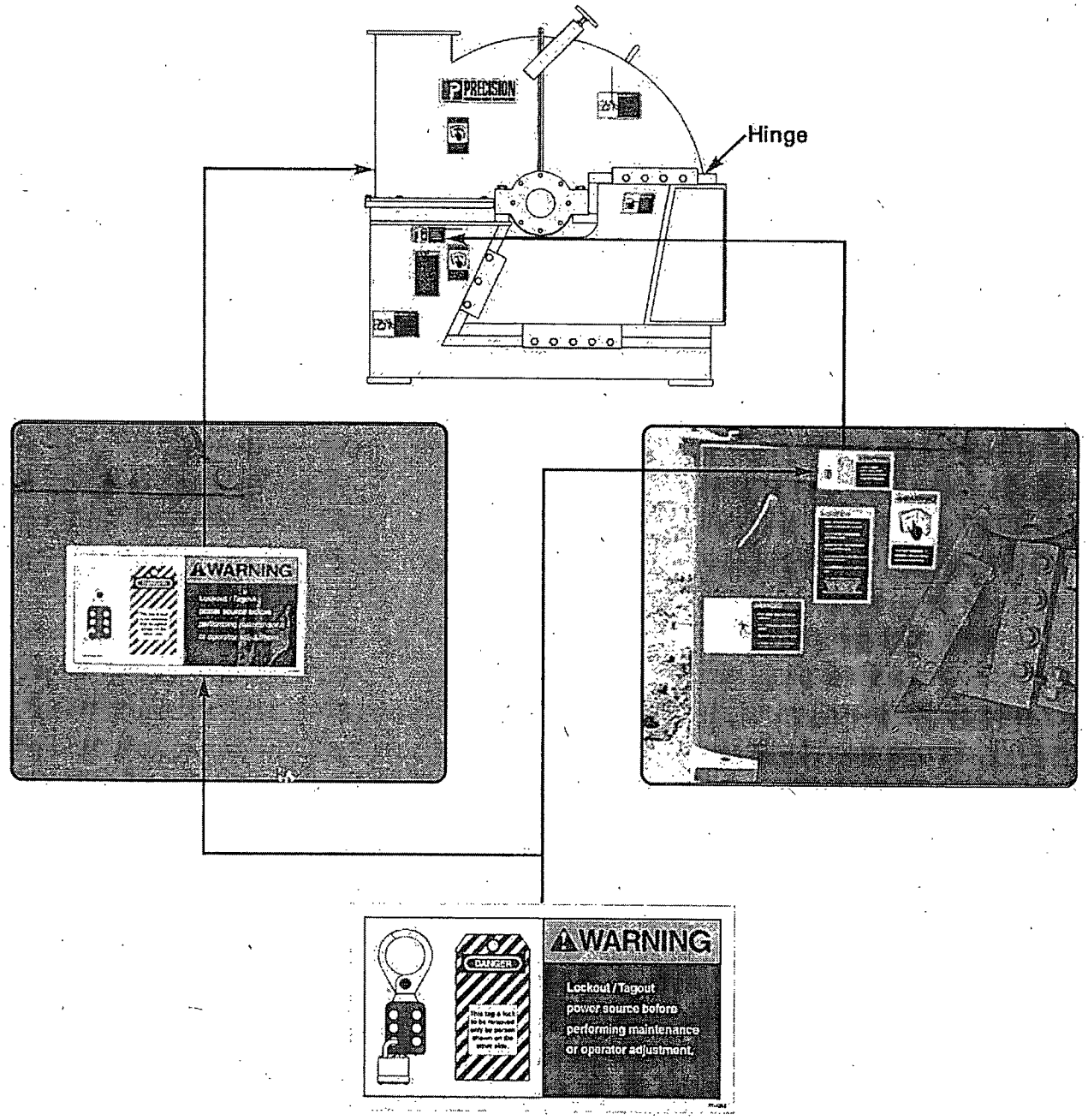


Figure 2.16-A Warning, Lockout / Tagout Power Source Before Performing Maintenance or Operator Adjustment.
Placed on the side of the hood section that is not hinged, and on the front of the chipper base.

PN 97-4262
Quantity 2

00757

Decals for Chippers with 2-Piece Hoods

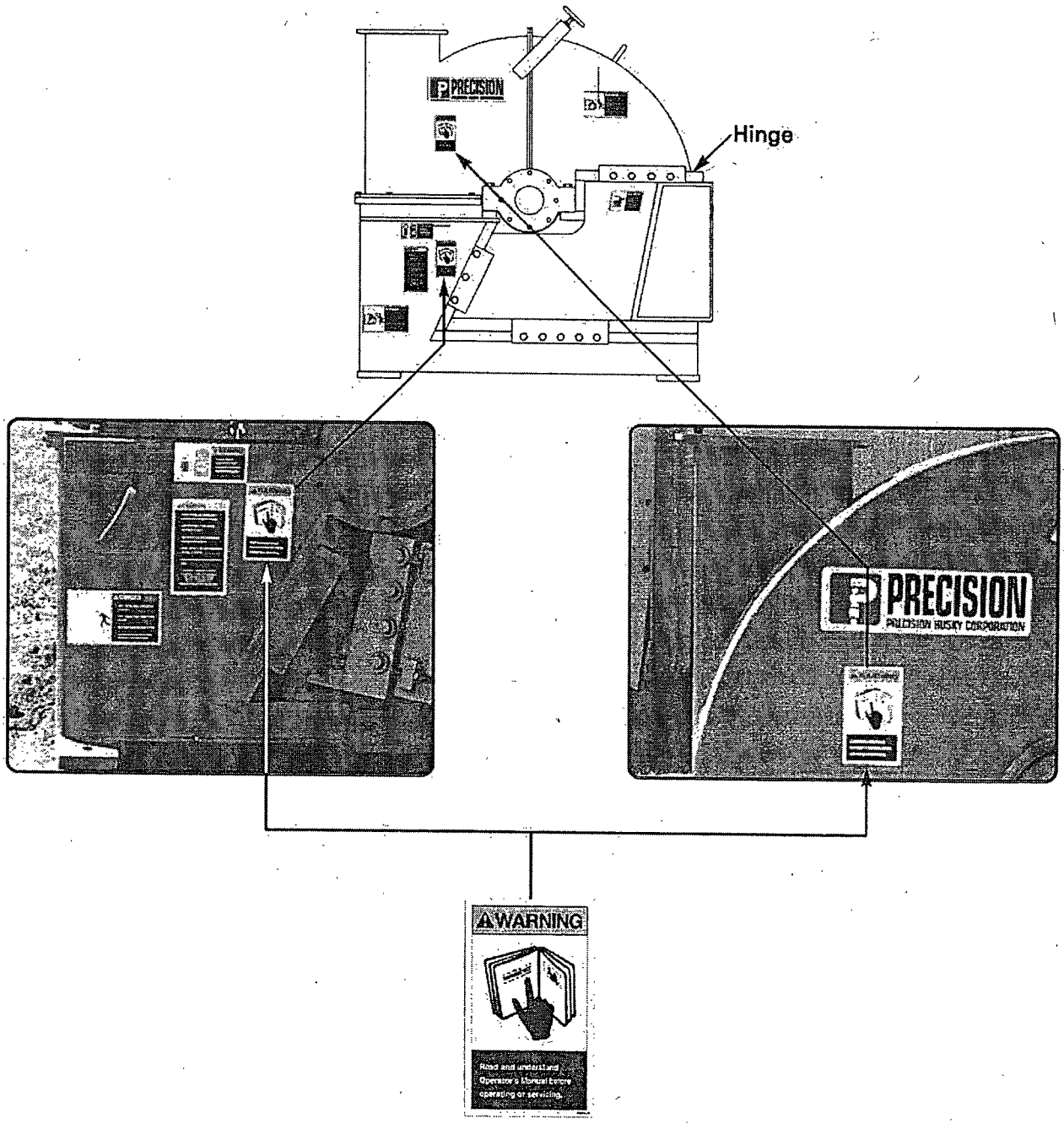


Figure 2.17-A Warning, Read and Understand Operator's Manual Before Operating or Servicing. Placed on the front of the base, and on the front of the hood below the Precision decal on the side of the hood that is not hinged.

PN 242-150-678
Quantity 2

00758

Decals for Chippers with 2-Piece Hoods

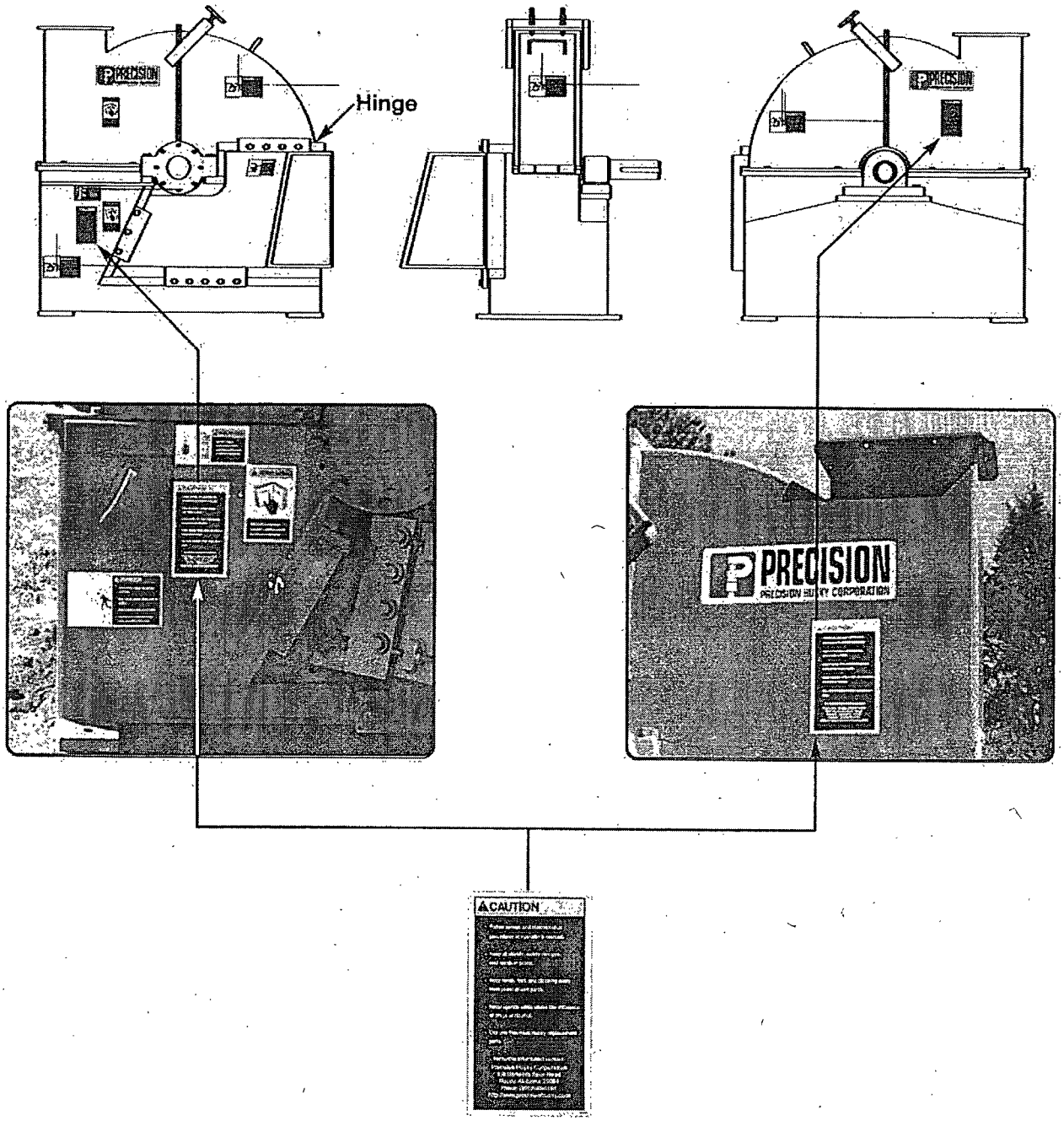


Figure 2.18-A Caution, List
Placed on the front of the base and on the back of the chipper hood below the Precision decal on the side of the hood that is not hinged.

PN 97-4259
Quantity 2

00759

Decals for Chippers with 2-Piece Hoods

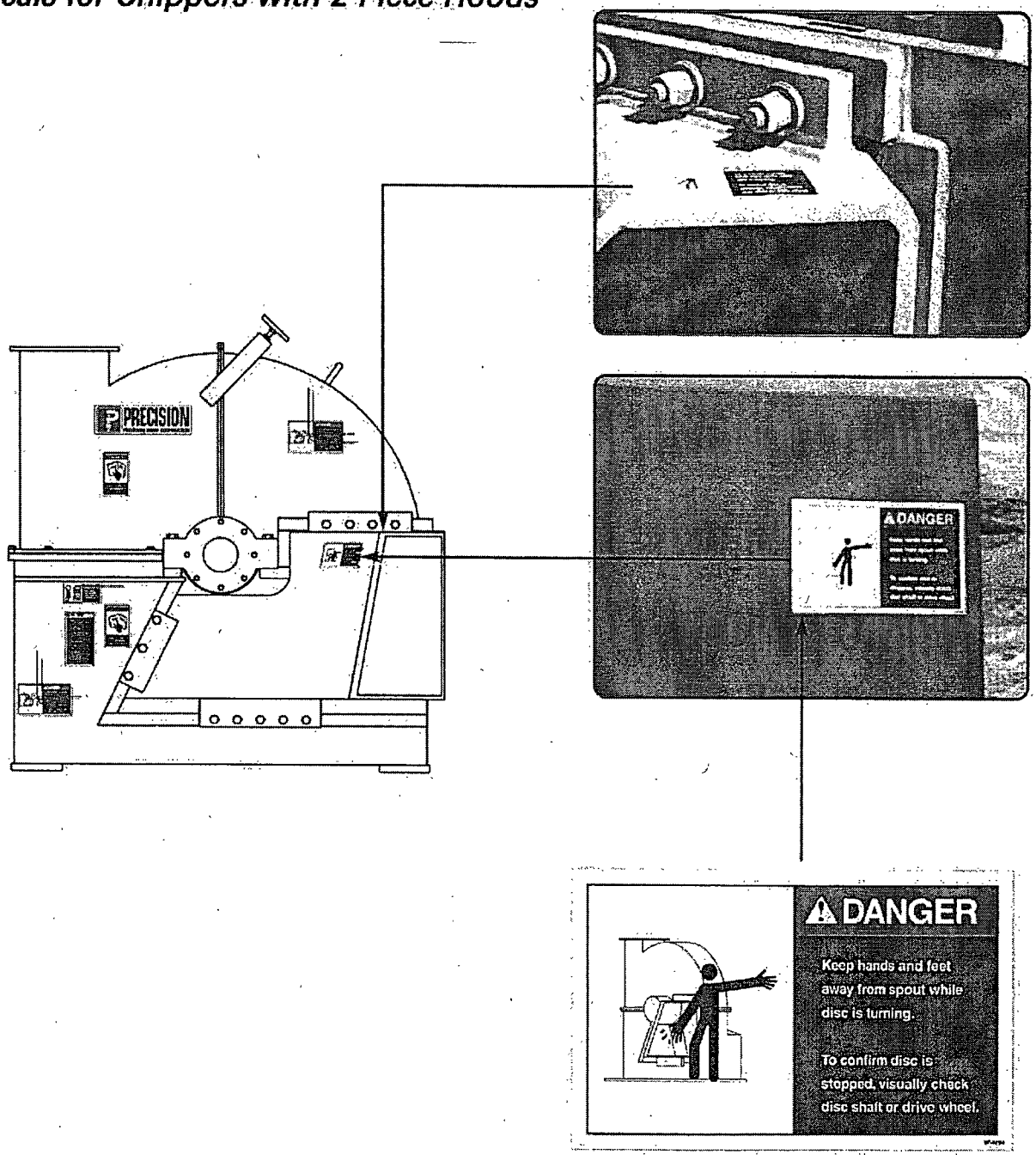


Figure 2.19-A Danger, Keep Hands and Feet Away from Spout While Disc is Turning. Placed on the canted side of the spout and also on the top.

PN 97-4264
Quantity 2

00760

Decals for Chippers with 2-Piece Hoods

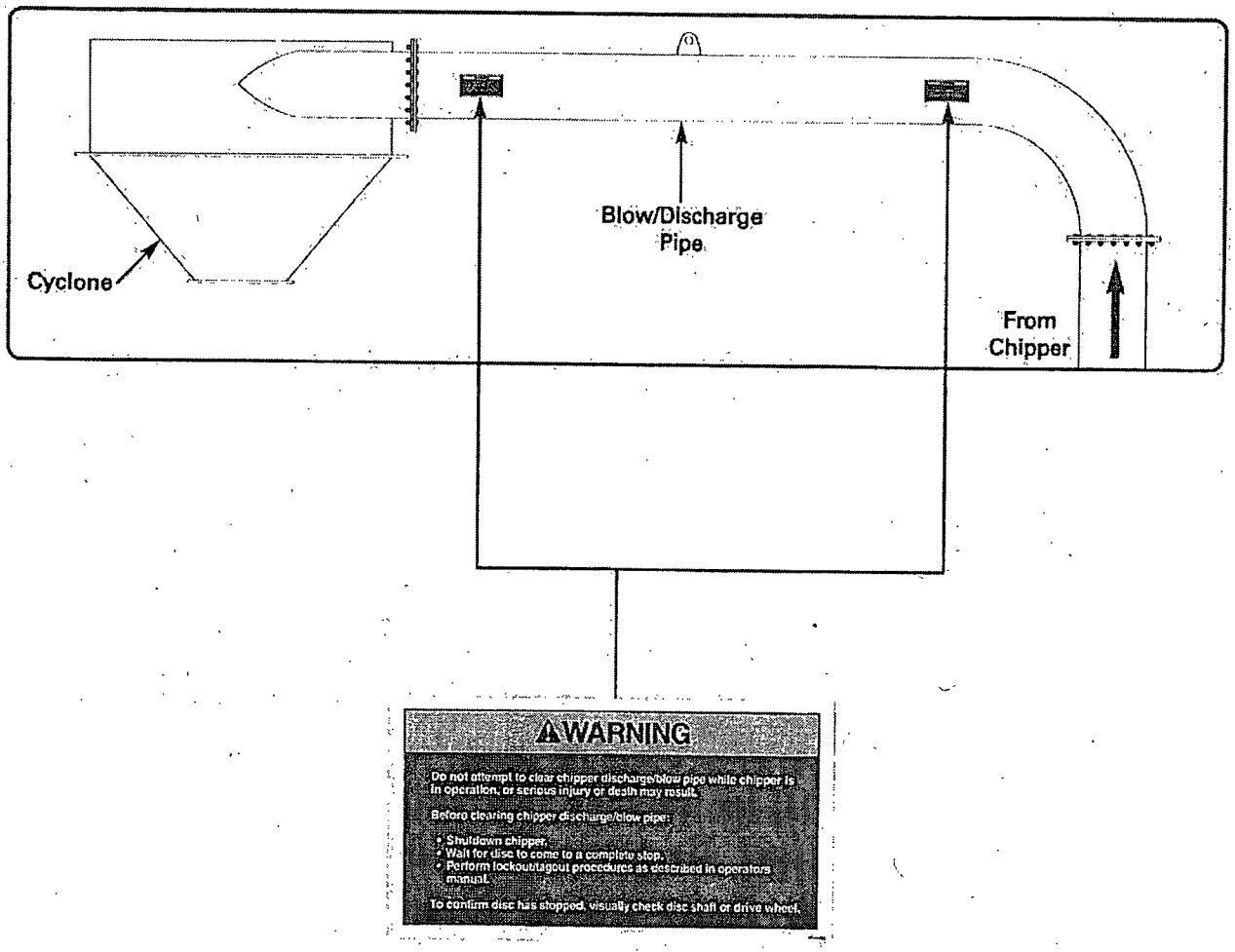


Figure 2.21-A Warning, Blow/Discharge Pipe
Placed at each end of the blow/discharge pipe: one near the chipper and one at the opposite end.

PN 97-4455
Quantity 2

This decal is shipped with Top & End Discharge Chippers only.

00761

hair to avoid possible entanglements. Avoid wearing jewelry *(rings, wrist watches, necklaces and bracelets).*

7. Always wear safety glasses, safety shoes, long pants and a hard hat. This is required by some local ordinance and insurance regulations.

8. **One piece hood - ALWAYS CHECK THAT THE HOOD IS PROPERLY SECURED TO THE BASE AND THAT ALL ACCESS DOORS ARE CLOSED AND SECURED.**

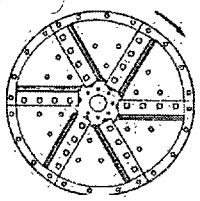
   Two piece hood - ALWAYS CHECK THAT THE TWO SECTIONS OF THE CHIPPER HOOD ARE BOLTED TOGETHER AND PROPERLY SECURED TO THE BASE AND THAT ALL ACCESS DOORS ARE CLOSED AND SECURED.

9. Clean the infeed spout of any foreign objects.

While Operating

DANGER

Wait for disc to come to a complete stop before servicing or inspecting the chipper.



Follow these safety rules while the chipper is in operation:

1. **One piece hood - NEVER OPEN ONE OF THE ACCESS DOORS WHILE THE DISC IS STILL TURNING.**

   Two piece hood - NEVER UNLOCK THE HOOD LOCK OR TRY TO RAISE THE CHIPPER HOOD WHILE THE DISC IS STILL TURNING.

2. Keep hands, feet and clothing away from power driven parts.

3. Never try to remove debris from the chipper spout while the chipper is operating.

4. Do not attempt to hang onto material as it is being fed into the chipper.

5. Be careful to not overload the infeed spout.

6. Have a fire extinguisher on hand and know where it is at all times, and have it inspected and serviced regularly by a qualified professional.

DANGER

Trying to remove debris from the chipper while it is operating can result in serious or fatal injury.

7. **Never try to clear blow/discharge pipe, infeed spout, or discharge chute of obstructions until chipper has been shutdown, disc has completely stopped, and lockout/tagout procedures have been performed.**

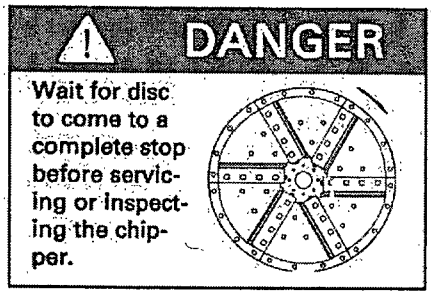
8. If the chipper knives strike a solid object or the machine vibrates abnormally, stop the chipper immediately, and wait

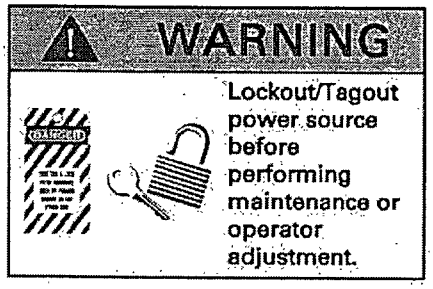
00762

for all moving parts to come to a complete stop. Inspect for damage. Repair or replace any damaged parts before resuming operation of the chipper.

Maintenance Safety

Adhere to the following safety rules while performing maintenance on the chipper:





1. **Before servicing or making any adjustments to the chipper, shutdown the chipper and wait for it to come to a complete stop, and then lockout/tagout the chipper power source. Disc will continue to rotate after chipper is shutdown. To confirm disc is stopped, visually check disc shaft or drive wheel.**

2. Assure the chipper is properly maintained and in good operating condition. Frequently check all nuts, bolts, and screws.

3. Always wear gloves when changing or servicing the chipper knives or making any adjustments to the chipper.

4. For optimum performance and safety use, genuine Precision Husky replacement parts and accessories. Replacement parts and accessories made by other manufacturers could be dangerous and will void the product warranty.

5. All nuts and bolts on the chipper should be properly torqued. Failure to tighten the nuts properly could permit them to loosen while the machine is operating. Over-torquing can create stress which will cause the studs to break. *See the Maintenance Section Quick Reference Page in Section 4 Preventive Maintenance* for torque ratings for all fasteners used on the chipper.

6. Any guards or safety devices that may have been removed while performing maintenance on the chipper, should be replaced before restarting it.

7. After completing any maintenance procedure, make sure all tools/materials used to complete the procedure have been removed from the chipping area.

8. When restarting the chipper after performing any maintenance procedures, operator's should listen for any abnormal sounds or vibrations. These can indicate that the components were not reinstalled properly or that adjustments were made incorrectly.

00763

8. Check that all the knife clamp nuts, are properly torqued.

9. Inspect the knives removing any foreign material or loose objects.

10. Turn the chipper disc one full revolution to ensure that there is no interference.

11. **Check that all hood bolts are in place and properly torqued.**

12. **Make sure that all access doors are in place and properly secured.**

13. **Make sure the hood lock is in the locked position and the t-handle bolts are tight.** *(Chippers with 2-piece hoods)*

14. Conduct a thorough visual inspection of the machine, checking for loose bolts, nuts, etc.

15. Check the inside of the chipper spout for any loose debris or other loose objects. Make sure the area is clean.

16. Apply blow pipe decals as shown in *Section 2 Preventive Maintenance. (Top & End Discharge Chippers Only)*

Starting the Chipping Process

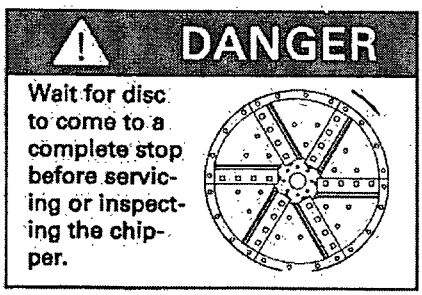
Once you have completed all the pre-operating steps you should complete the following steps to break-in the chipper.

1. Make sure the area is clear of all personnel.

2. Start the chipper and let it run for a half hour without any material being fed to it.

3. Check bearing temperature and listen for unusual noise.
The bearings should heat up immediately after start-up, but the temperature should begin to drop once the grease becomes evenly distributed throughout the bearings. If the bearings are excessively hot release some of the grease from the housing following the instructions in *Section 4 - Preventive Maintenance.* If overheating persists contact Precision Husky.
The bearings should produce an even purring noise. Whistling or screeching indicates inadequate lubrication, see *Section 4 - Preventive Maintenance* for information on adding lubricant to the bearing. If the noise persists or the bearing makes an uneven rumbling or hammering noise contact Precision Husky.

4. **Shutdown the machine and wait for disc to come to a complete stop. Disc will continue to rotate after the chipper is shutdown. To confirm disc is stopped, visually check disc shaft or drive wheel.**



00764

Preventive Maintenance & Service

Proper Maintenance of the Precision Husky Waste Wood Chipper

Regular maintenance and service checks of the chipper not only enhance the machine's performance, but also increase its durability and production life. If you find worn or damaged parts during an inspection, replace them immediately.

Standard maintenance includes:

1. Checking the condition of the knives, and knife clamps before each operation. If they are damaged, replace them before beginning the chipping operation.
2. Cleaning studs and nuts and checking periodically for tightness.
3. Sharpening the chipper knives.
4. Setting the horizontal and vertical anvils.
5. Checking the wear plates, feed plate, knife holders, counter knives, vertical and horizontal anvils, hood, base, disc, and chipper infeed spout for excessive wear or damage.
6. Setting the knife width with the knife gauge.
7. Changing the chipper knives.
8. Checking the fan blades and rim blades. *(Top Discharge & End Discharge Chippers)*
9. Checking the lower casing band for wear. *(Top Discharge & End Discharge Chippers)*
10. Checking the disc brake pads and rotors for excessive wear. *(Optional Disc Brake)*

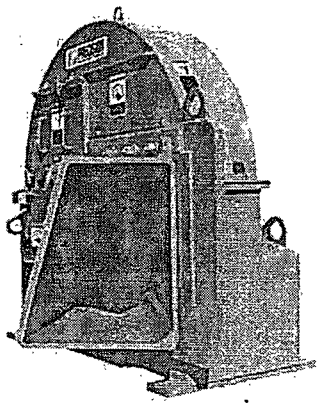


Figure 4.1-A. Setup Maintenance Schedule.
Follow the prescribed maintenance schedule to ensure top operating performance for your Waste Wood Chipper.

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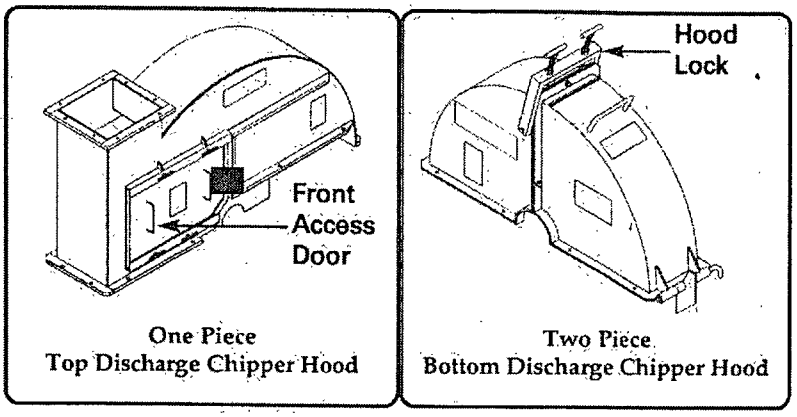
Changing the Knives

NOTE

For optimum performance and safety, use genuine Precision Husky replacement parts and accessories. **Replacement parts and accessories by other manufacturers could be dangerous and will void the product warranty.**

Under normal operating conditions the knives should be changed at least once a day, and more often when the volume of material or foreign matter dull the knives. Be sure to thoroughly clean out the chip pocket, and remove any debris that may have collected around the knife assembly with each change.

Before beginning the steps to replace the chipper knives, examine the illustration below and determine whether your chipper has a one piece hood or a two piece hood and follow the appropriate set of directions.



One Piece
Top Discharge Chipper Hood

Two Piece
Bottom Discharge Chipper Hood

Figure 4.11-A. Chipper Hoods. The illustration to the right shows the two types of available hoods for the waste wood chipper. The one piece hood has front and rear access doors for chipper knife removal. The two piece has a hinged section and a hood lock. Either style hood is available for the various discharge options.

Changing the Knives on a Chipper with a One Piece Hood

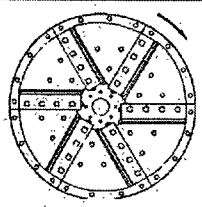
TO CHANGE THE CHIPPER KNIVES ON A CHIPPER WITH A ONE PIECE HOOD:

The materials/tools required to complete this procedure are:

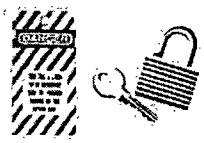
- 1 set of sharpened and gauged knives
- Lock and tag
- 1 set of wrenches
- Wooden wedge
- Air impact wrench and socket set
- Air compressor and air hose
- Short piece of wood
- 1 extra person
- Torque wrench
- Feeler gauge

DANGER

Wait for disc to come to a complete stop before servicing or inspecting the chipper.



WARNING



Lockout/Tagout power source before performing maintenance or operator adjustment.

1. Shutdown chipper.
2. **Wait for disc to come to a complete stop. Disc will continue to rotate after chipper is shutdown. To confirm disc is stopped, visually check disc shaft or drive wheel.**
3. Lockout/Tagout chipper power source.

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Changing the Knives on a Chipper with a Two Piece Hood

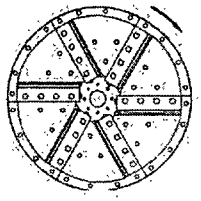
TO CHANGE THE CHIPPER KNIVES ON A CHIPPER WITH A TWO PIECE HOOD:

The materials/tools required to complete this procedure are:

- 1 set of sharpened and gauged knives
- Lock and tag
- 1 set of wrenches
- Wooden wedge
- Air impact wrench and socket set
- Air compressor and air hose
- Short piece of wood
- 1 extra person
- Torque wrench
- Feeler gauge

DANGER

Wait for disc to come to a complete stop before servicing or inspecting the chipper.

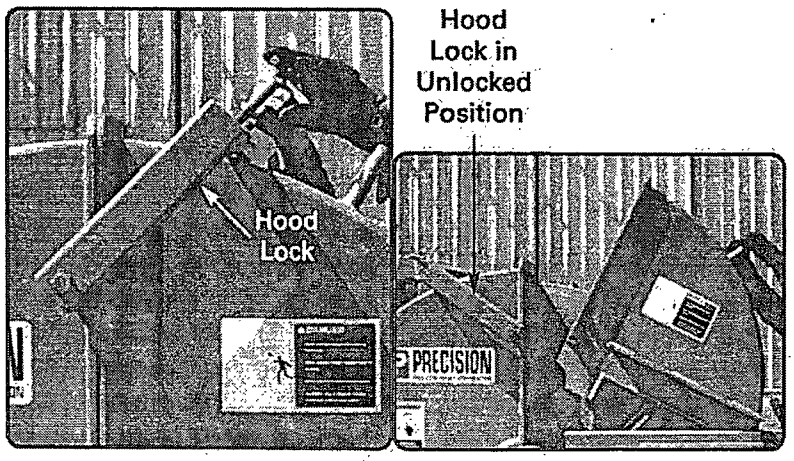


WARNING



Lockout/Tagout power source before performing maintenance or operator adjustment.

1. Shutdown chipper.
2. **Wait for disc to come to a complete stop. Disc will continue to rotate after chipper is shutdown. To confirm disc is stopped, visually check disc shaft or drive wheel.**
3. Lockout/Tagout chipper power source.
4. Remove the bolts securing the two hood sections together.
5. Remove all bolts securing the hinged portion of the chipper to the base.
6. Loosen t-handle bolts on hood lock, and rotate hood lock into unlocked position.
7. Using handle open chipper hood.



NOTE

Depending on the size of your chipper it may require more than 1 person to raise and lower the chipper hood.

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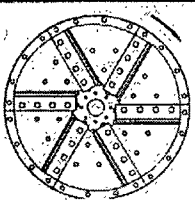
Top or End Discharge Chipper Maintenance

DANGER

Never try to clear discharge/blow pipe while chipper is operating, while disc is still turning, or before performing lockout/tagout procedures or serious injury or death can result.

DANGER

Wait for disc to come to a complete stop before servicing or inspecting the chipper.



WARNING



Lockout/Tagout power source before performing maintenance or operator adjustment.

NOTE

Conditions that can cause frequent plugging of the discharge/blow pipe:

- Producing an excessive amount of oversize chips.
- Worn fan or rim blades.
- Holes in lower casing band or hood.
- Holes in blow pipe.
- Blow pipe is too narrow.
- Holes in hood to blow pipe transition.

Oversize chips or air flow problems can cause the discharge/blow pipe from the chipper hood to the cyclone to become plugged with chips. Perform the following procedure to safely remove any obstructions from the discharge/blow pipe.

Clearing Chipper Discharge/Blow Pipe

TO CLEAR THE CHIPPER DISCHARGE/BLOW PIPE:

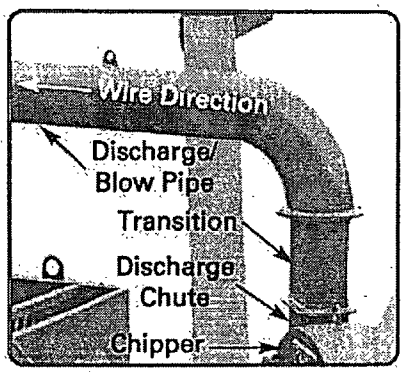
The materials/tools required to complete this procedure are:

- Lock and tag
- 1 set of wrenches
- Crane
- Long piece of stiff wire

1. Shutdown chipper and all associated equipment such as: chip screen, chip blower, and chipper infeed conveyor/system.
2. **Wait for all equipment to come to a complete stop. The chipper disc will continue to rotate after it is shutdown. To confirm disc is stopped, visually check disc shaft or drive wheel.**
3. Lockout/Tagout all equipment that was shutdown.
4. Attach crane to discharge/blow pipe.

THE REMAINING INSTRUCTIONS ARE FOR A STANDARD PRECISION KWIK CHIP UNIT SETUP. INSTRUCTIONS FOR CLEARING BLOW/DISCHARGE PIPES MADE BY OTHER MANUFACTURERS MAY VARY:

5. Remove screws and nuts that attach transition to chipper hood.
6. Remove screws and nuts that attach transition to discharge/blow pipe.
7. Remove transition.
8. Run a piece of stiff wire through the end of the discharge/blow pipe **away from the chipper** *(towards cyclone or screen)*. Repeat until discharge/blow pipe is clear.



9. Remove wire.
10. Replace transition and fasteners.
11. Detach crane from discharge/blow pipe.

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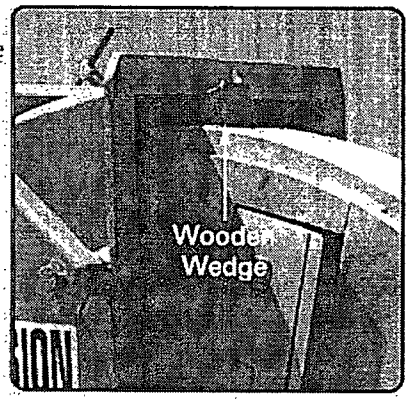
7. Chipper not feeding properly.	1. Dull chipper knives. 2. Incorrectly sharpened knives. 3. Wood is dry or dirty. 4. Wood is frozen. 5. Chipper disc RPM is too low.	1. Sharpen knives. 2. Resarpen knives following instructions in Section 4. 3. Countergrind knives. 4. Countergrind knives. 5. Increase chipper disc RPM.
8. Top discharge chipper not discharging chips properly.	1. Worn or damaged rim blades or fan blades. 2. Holes in chipper hood. 3. Holes in lower casing band.	1. Replace worn fan or rim blades. 2. Repair or replace chipper hood. 3. Repair or replace lower casing band.
9. Knives require sharpening too frequently.	1. Tramp metal or excessive dirt or grit in material being fed to chipper. 2. Knife to anvil clearance is incorrect. 3. Wood is extremely hard. 4. Wire or feather edge not removed after sharpening knives.	1. Check material being fed to chipper. Install metal detector to remove tramp metal from material. 2. Reset knife to horizontal and/or vertical anvil clearance. 3. Countergrind knives. 4. After sharpening, use a hone to remove wire or feather edge.
10. Frequent plugging of blow pipe. *(Top or end discharge chippers)*	1. Fan or rim blades are worn, reducing air flow. 2. Holes in the lower casing band, reducing air flow. 3. Holes in blow/discharge pipe are reducing the air flow. 4. Holes in hood are reducing air flow. 4. Improperly designed blow/discharge pipe.	1. Replace fan or rim blades. 2. Replace or repair lower casing band. 3. Replace or repair blow/discharge pipe. 4. Replace or repair hood. 4. Blow/discharge pipe needs to be large enough to prevent plugging and any bends in the pipe need to be large enough to prevent material packing.

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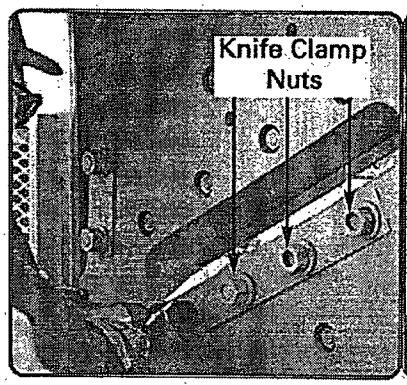
⚠ CAUTION

- When rotating the chipper disc by hand always turn the disc backwards. This prevents the knife edge from causing accidental personal injury.
- Secure chipper disc before removing any attached components.
- Removing attached components from a free turning-disc will cause it to become unbalanced, and may cause the disc to rotate unexpectedly.
- For additional safety, two (2) personnel should perform all chipper disc maintenance operations. One person should perform the work, while the other person holds the disc in a secure position.

8. Rotate disc by hand, until knife is in an easily accessible position.
9. Secure disc in place by inserting wooden wedge in the space between the chipper disc and the hood.
10. Use an air impact wrench to loosen the knife clamp nuts. *It is not necessary to remove them.*



11. Remove chipper knife.





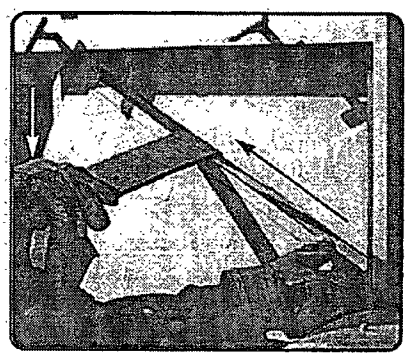
NOTE

- A plugged chip slot will increase the production of pin chips.
- Installing knives that vary in width in the chipper can unbalance the disc which can reduce the life of the bearings.

12. Using compressed air, clean out any debris that may have collected around the components of the knife assembly.
13. Inspect counter knife, knife holder, and knife clamps for wear. Replace if necessary.



14. Place the newly sharpened and gauged knife into place between the knife clamp and the counter knife.
15. Push the knife toward the outside rim of the chipper disc. Place the short piece of wood into the chip slot and press down on the end to hold the knife in place.

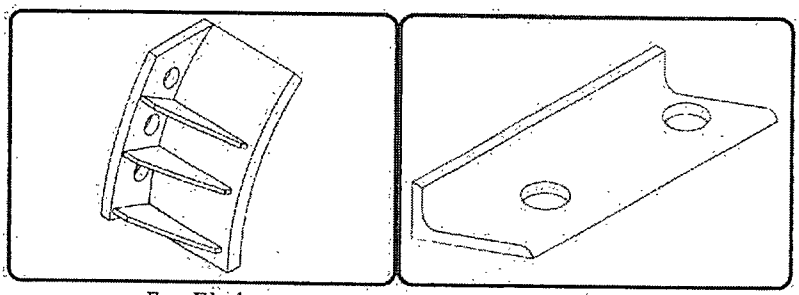


Top Discharge Chipper Components

The following components are used only in top discharge chippers:

Fan Blades and Rim Blades

The fan blades and rim blades are responsible for creating the air stream that expels the chips out the discharge chute. The fan blades are mounted on the rear of the chipper disc and remove the chips as they exit the chip slot onto the lower casing band. The rim blades are attached along the outside edge of the chipper disc and remove any chips that get caught under the chipper disc.



Fan Blade | Rim Blade

Figure 4.46-A. Standard 58" Waste Wood Chipper Fan Blades and Rim Blades.
The fan blades and rim blades are responsible for creating the air stream that expel the chips out the discharge chute.

DANGER

CHIPPERS WITH 2 PIECE HOODS

- Never operate chipper with missing hood bolts.
- Never operate chipper without hood lock secured.

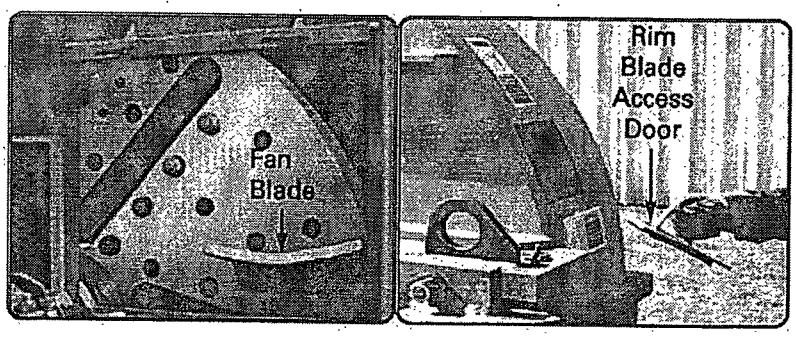
WARNING

CHIPPERS WITH 1 PIECE HOODS

Never operate chipper without all access doors closed and secured.

The fan blade capscrews should be checked periodically for tightness and should be properly torqued. The fan blades can be inspected through the rear access door on chippers with 1-piece hoods or by raising the hood on chippers with 2-piece hoods.

The rim blade capscrews should also be checked periodically checked for tightness and should be properly torqued. Maintenance and inspection of the rim blades can be performed by removing the small access door located on the side of the chipper hood on chippers with 1-piece hoods or by raising the hood on chippers with 2-piece hoods.



Fan Blade and Rim Blade Conditions

Worn fan or rim blades reduce the effectiveness of the air stream in removing the chips from the base. This causes excessive production of fines or pin chips, as the acceptable chips that are unable to escape from the base are eventually broken up.

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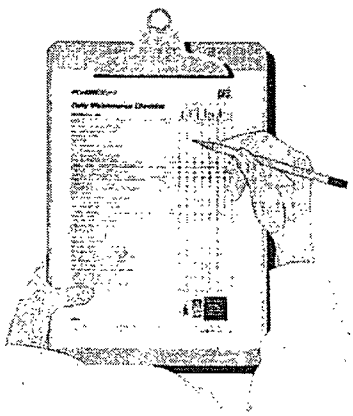
Maintenance Schedule

Do not attempt any maintenance which you do not fully understand or cannot do accurately and safely. If problems are encountered or you don't understand the solutions, contact Precision Husky.

Maintenance intervals are based on normal operating conditions. When operating under severe and high usage conditions, the maintenance intervals should be shortened.

Maintenance Intervals

Keep and follow a list of all maintenance performed on your chipper. Follow as closely as possible the different time intervals indicated below.



Use the daily checklist provided in *Appendix E - Service Log* to checkoff daily maintenance items as they are performed.

Daily Maintenance *(10 Hours)*

Perform each of the following maintenance functions daily.

- Change or sharpen the chipper knives.
- Reset knife width with knife gauge.
- Clean out chip slot, removing any debris that may have collected around the knife assembly components.
- Check knife points to horizontal and vertical anvil clearance.
- Visually check knives, knife clamps, and wear plates for excessive wear and/or damage.
- Remove debris from around bearing platforms.
- Conduct a complete walk-around inspection of the chipper and visually check for loose bolts or fasteners.
- Check quality of chips produced.

Weekly Maintenance *(50 Hours)*

Perform these maintenance functions **every 50 hours**, or on a weekly basis.

- Inspect knife holders and counter knives for signs of wear or damage.
- Visually inspect hood, checking for signs of wear or possible holes.
- Visually check disc and base card breakers. *(Bottom Discharge Chippers)*
- Visually check fan blades, lower casing band and rim blades. *(Top Discharge & End Discharge Chippers)*

Monthly Maintenance *(250 hours)*

Perform these maintenance functions **every 250 hours**, or on a monthly basis.

- Visually check infeed spout, anvils, disc, and chipper base.

500 Hour Maintenance

Perform these maintenance functions **every 500 hours.**

- Visually check the disc brake pads and rotor for excessive wear. *(Optional Disc Brake)*

6 Month Maintenance

Perform these maintenance functions every 6 months.

- Repack the front and rear bearings with grease.

NOTE

- The overall performance of your chipper will be affected by the care and daily maintenance it receives. Follow the suggested maintenance intervals to ensure top performance for the chipper.
- See *Section C - Engine & Service Manuals* for more maintenance information.

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Safety Instructions

Make Safety Checks

Before each use, make a complete visual check to ensure all nuts, bolts and screws are tight. Review the pre-operating instructions for a complete rundown on all checks that should be made.

⚠ CAUTION

Accidents can happen in moments of neglect. Do not allow familiarity *(frequent use of the chipper)* to affect your safety habits.

Improper use or maintenance by the operator or owner of the machinery can result in injury and/or death. Reduce the potential for injury by complying with all safety instructions.

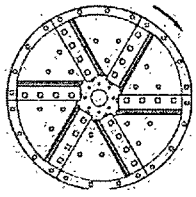
The safety of the operator and bystanders while a chipper is in operation is of great importance to Precision Husky. Decals, shields and other safety features are provided for your protection. In addition, we ask you to be a careful operator who uses and services your Precision Husky equipment properly.

Each of the following safety precautions must be observed at all times when operating the chipper. Safety should always be practiced, regardless of the operator's familiarity with the machine.

Before Operating

⚠ DANGER

Wait for disc to come to a complete stop before servicing or inspecting the chipper.



⚠ WARNING

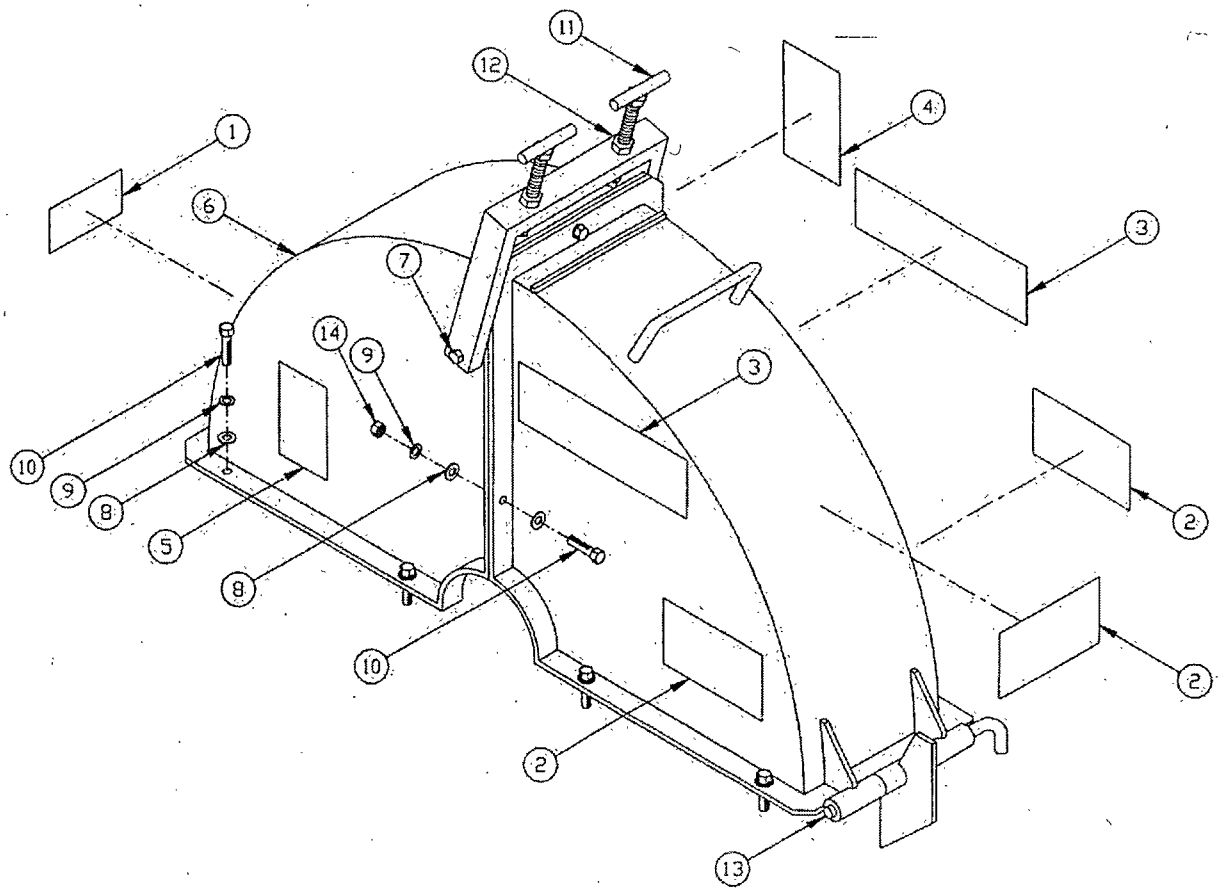


Lockout/Tagout power source before performing maintenance or operator adjustment.

Adhere to the the following safety rules before beginning a chipping operation:

1. Read and understand the contents of this manual before operating the machine. To get replacement manuals, send complete model and serial numbers to: **Precision Husky Corporation, 850 Markeeta Spur Road, Moody, AL 35004.**
2. Do not allow children to operate the machine, or anyone who hasn't had proper instruction. Inexperienced operators should be supervised by a qualified, trained operator.
3. Never operate the machinery while under the influence of drugs or alcohol.
4. Become familiar with the controls and know how to stop the machine. Know where the emergency shutdown switch is located.
5. Keep all shields, safety devices and decals in place. If a shield, safety device or decal is malfunctioning, illegible or damaged, repair or replace it before operating the machine.
6. Always wear substantial shoes. Do not operate machine while wearing sandals, tennis shoes, sneakers or when barefoot. Do not wear loose fitting clothing that could get caught in moving parts and possibly cause personal injury. Confine long

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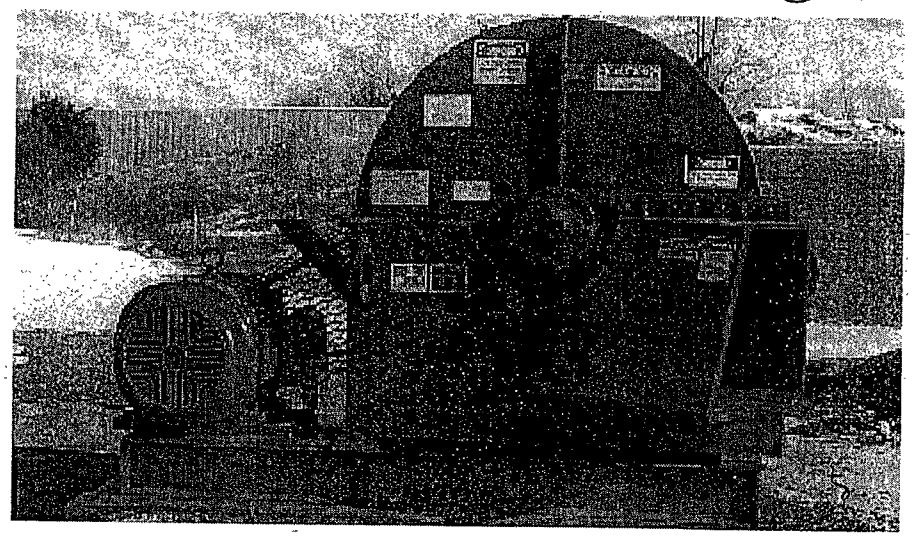


TWO PIECE HOOD

Ref. No.	Part No.	Description	No. Used
1	97-4262	Decal, Lockout/Tagout	1
2	97-4263	Decal, Do Not Open Hood	3
3	97-4271	Decal, Prec. Husky Logo	2
4	97-4259	Decal, Caution List	1
5	242-150-678	Decal, Read & Understand	1
6	Call	Hood	1
7	944 000 170	HHCS, 3/4-10 X 2 3/4"	2

Ref. No.	Part No.	Description	No. Used
8	944 000 766	Flatwasher, 5/8"	varies
9	944 000 738	Lockwasher, 5/8"	varies
10	944 000 131	HHCS, 5/8-11 X 1 3/4"	varies
11	Call	T-Handle Bolt	2
12	Call	Hood Lock	1
13	Call	Pin	1
14	944 000 688	Hex Nut, 5/8-11	3

STATIONARY CHIPPERS



OPTIONS

- (6) steel chipper support legs to accommodate 60" elevation to bottom of infeed spout
- Transition piece for 48", 58", and 66" chippers to go from square discharge to round blowpipe.
- 10" - 12" round blowpipe straight pipe.
- Hydraulic telescoping swivel discharge spout. (requires auxiliary hydraulic power supply to operate)
- Hyrdaulic hood opener includes cylinder and lugs. Does not include hydraulic power supply to valve to operate same. (Available for 75", 83", and 96" chippers)
- Manual swivel discharge spout. (includes transition piece)
- 12" Black Blowpipe with 3/8" wall thickness bent 90 degrees. Height is 48" and lenght is 90"0.
- "F" wheel assembly for 75" chippers includes hydraulic drive, forward and reverse controls for drive wheels and controls to raise and lower "F" wheel assembly. (requires hydraulic power supply from another source)
- "F" wheel assembly for 83" chippers include all of the above standard equipment
- 11-30' long spout extension to load open top rail cars, complete with legs, down spout, sliding hood and component. Requires hydraulic power supply from another source.
- 4" Thick chipper fronts
- Heavy duty fan blades with inserts
- 5" thick chipper disc

PLAINTIFF'S EXHIBIT 11

SPECIFICATIONS

Note: Specifications may vary with equipment options

03052010

GENERAL

96" Chipper

Capacity	30" roundwood
Length	104"
Weight	30,000 lbs.
Width	75"
Heigth	104.5"

83" Chipper

Capacity	27" roundwood
Length	92"
Weight	19,000 lbs.
Width	63"
Height	90"

75" Chipper

Capacity	22" roundwood
Length	83"
Weight	15,600 lbs.
Width	81"
Height	84"

66" Chipper

Capacity	18" roundwood
Lenght	82"
Weight	11,000 lbs.
Width	68"
Height	74.5"

58" Chipper

Capacity	15" roundwood
Length	67"
Weight	8,200 lbs.
Width	58"
Height	65"

48" Chipper

Capacity	15" roundwood
Lenght	67"
Weight	8,200 lbs.
Width	67"
Height	65"

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00775

Part 27 Wood Products Manufacturing

See what's *new!*

Chippers, Hogs and Planers

27.41 Hog and chipper chutes

(1) Hog and **chipper** feed chutes must be equipped with baffles or other effective means to prevent material from being thrown from the equipment.

(2) A worker feeding or clearing a hog or **chipper** must be restrained by a safety belt and lanyard, unless otherwise protected from falling into the conveyor or machine.

27.42 Hogs, chippers and cutting heads

(1) Until the rotor has stopped turning, no attempt must be made to remove a guard, hood, shroud or inspection plate from a hog, **chipper**, or cutter head.

(2) A makeshift device that may cause injury to a worker must not be used to brake or slow down a rotor or cutter head.

(3) A mill **chipper** with a shroud, hood or inspection plate that can be removed before the rotor has stopped must have an effective brake.

(4) Subsection (3) does not apply to a whole log **chipper**.

(5) A hog or **chipper** must have a means of determining if rotating parts are in motion or have stopped.

(6) A production planer installed after January 1, 1999 must be equipped with brakes on the heads, and all production planers must have brakes on the heads by January 1, 2000.

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You can return to the Top of this page

Disclaimer: WorkSafeBC ("Workers' Compensation Board of B.C.") publishes the online version Occupational Health and Safety Regulation ("OHS Regulation") in accordance with its mandate under the *Workers Compensation Act* to provide information and promote public awareness of occupational health and safety matters. The online OHS Regulation is not the official version of the OHS Regulation, which may be purchased from **Crown Publications**.

WorkSafeBC endeavours to update the online OHS Regulation as soon as possible following any legislative amendments. However, WorkSafeBC does not warrant the accuracy or the completeness of the online OHS Regulation, and neither WorkSafeBC nor its board of directors, employees or agents shall be liable to any person for any loss or damage of any nature, whether arising out of negligence or otherwise, arising from the use of the online OHS Regulation.

Employers are legally obligated to make a copy of the *Workers' Compensation Act* and the OHS Regulation readily available for review by workers. The circumstances under which WorkSafeBC may consider an employer's providing access to electronic versions of the Act and OHS Regulation to have satisfied this obligation are described in **Guideline G-D3-115(2)(f)**.



PLAINTIFF'S EXHIBIT 13

MODEL 48" AND 58"

STATIONARY R.H. CHIPPER

SAFETY, OPERATORS MANUAL

PENGAD 800-631-6989
Noch
DEPOSITION EXHIBIT #3
JC 8-24-17

S/N_____

SOLD AND SERVICED BY:

_____

MOBARK SAFETY,OPERATORS MANUAL 024 THROUGH 061

00777

Morbark-000024
Holland v. Morbark, et al.

Manufactured By:
Chiparvestors, Inc.

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Safety Maintenance

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Trouble Shooting **Section2**

Chipper ____ 2-1
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Specifications

48" Chipper

Disc Diameter	48"
Disc Width	4"
Knife Length	14 3/4"
Knife Configuration	2,3,4 or 6
Chip Size	5/8" to 1"
Capacity	11" Roundwood
Weight	7,300 lbs.

58" Chipper

Disc Diamter	58"
Disc Width	4"
Knife Length	15 5/8"
Knife Configuration	2,3,4 or 6
Chip Size	5/8" to 1"
Capacity	15" Roundwood
Weight	8,200 lbs.

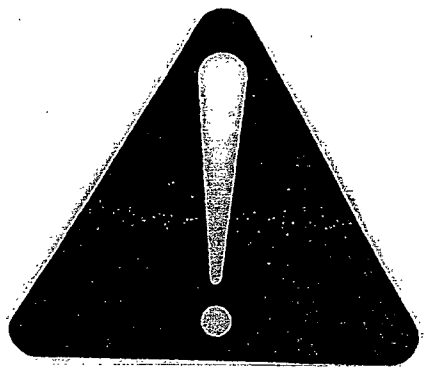
OBSERVE SAFETY SIGNS AND MESSAGES

THINK SAFETY. Safety is a combination of operator common sense and alertness at all times when the machine is being operated or serviced.

CAUTION: This message is used for general reminders of good safety practices or to direct attention to unsafe practices. The message will appear in your operator's manual and/or the sign will appear on the machine with the color combination of yellow and black.

WARNING: This message denotes a specific potential hazard. The sign will be displayed on the machine in areas of potential hazard. The sign will have the color combination of yellow and black.

DANGER: This message denotes the most serious specific potential hazard. The sign will be displayed on the machine in areas of potential hazard. The sign will have the color combination of red and white.



Alert Symbol

OBSERVE "IMPORTANT" MESSAGES

Messages labeled "Important" will appear in your operator's manual to provide specific instructions for performing adjustments, services, etc. If these instructions are not followed it could result in damage to the machine.

DO NOT MODIFY MACHINE

Unauthorized modifications to the machine may impair the function and/or safety and affect machine life.

BEFORE OPERATING

Become familiar with the operator's manual, instructions, and safety signs on the machine, and all controls affecting machine functions.

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OPERATE SAFELY

IMPORTANT: Do not allow familiarity (gained from frequent use of your machine) to become commonplace. Always remember that a careless fraction of a second is sufficient to inflict severe injury.

Be sure everyone is clear of the machine.

Be sure shields and guards are in place and in good condition.

Never attempt to clean infeed spout unless chipper disk locks are in place and power unit is shut off.

Never leave the machine running and unattended.

Always wear proper personal protective equipment at all times.

Always wear gloves when changing or servicing chipper knives.

Always use grab rails and safety steps.

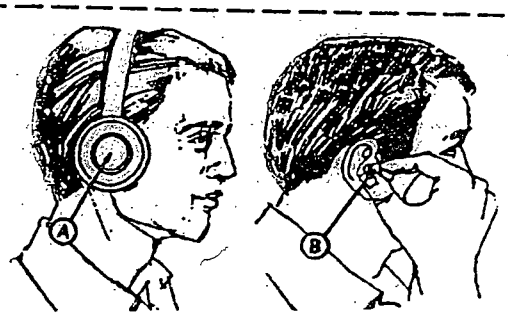
Never smoke, weld, or use any type of flame near the machine during refueling.

IMPORTANT: All personnel should read this manual thoroughly before start-up.



PROTECT AGAINST NOISE

Prolonged exposure to a loud noise can cause impairment or loss of hearing. Wear appropriate hearing protective device such as earmuffs (A) or earplugs (B) to protect against uncomfortably loud noises.

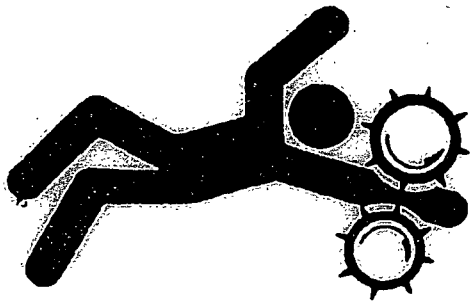


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SAFETY

AVOID CONTACT WITH MOVING PARTS

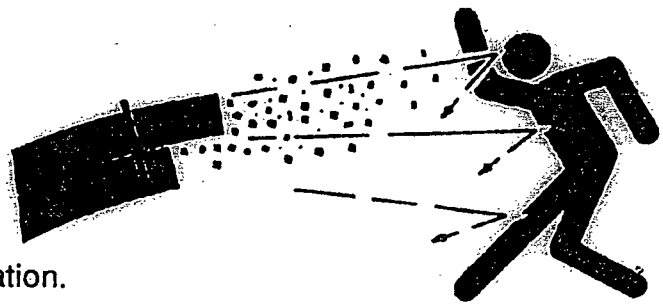


Keep hands, feet, and clothing away from chain and belt driven parts.

Never attempt to hand feed chipper.

Never attempt to unplug infeed or discharge spout until disc locks are in place and power unit is off.

AVOID DISCHARGE AREA



Never enter chip van while chipper is turning.

Never work or stand by discharge during operation.

AVOID FIRES

Never refuel with power unit running.

Never smoke or have an open flame when refueling.



Be careful when cleaning with diesel fuel so that it does not ignite. Use only in a well ventilated area and away from any sparks or flames.

Clean dirt, oil chips, and bark material from engine area.

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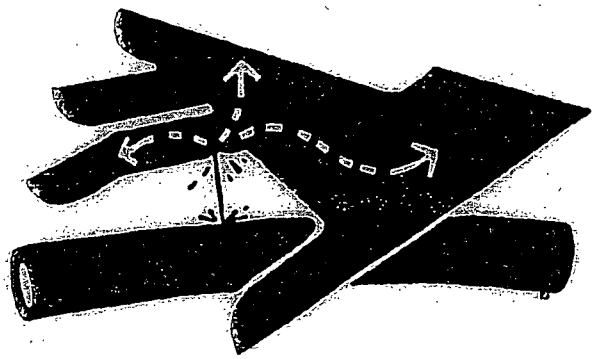
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AVOID HIGH PRESSURE FLUIDS

Escaping fluid under pressure can penetrate the skin, causing serious injury. Relieve pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure. Keep hands, face, and body away from pinholes and nozzles which eject fluids under high pressure. Use a piece of cardboard or rag to search for leaks.

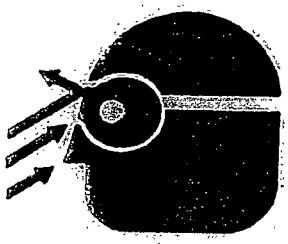
Never use your hand.

If any fluid is injected into the skin, it must be surgically removed within a few hours by a doctor familiar with this type of injury or gangrene may result.



BATTERY SAFETY

Batteries generate explosive gases. Keep sparks, flames, burning cigarettes, or other ignition sources away at all times. Always wear safety goggles when working near batteries.



AVOID SHARP EDGES

When handling any steel with sharp or jagged edges use caution at all times. Gloves must be worn when handling chipper knives.



AVOID ELECTRICAL HAZARDS

Understand all Electrical Schematics before attempting any maintenance. Shut main power switch OFF.



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FIRST AID

EMERGENCY FIRST AID

A. GENERAL

CAUTION - This section is not a substitute for proper first aid training by the American Red Cross or other agencies. It is only a guide to help you remember the most important steps in administering first aid. Recommendations are derived from current policies of the American Heart Association, American Red Cross, and American Academy of Orthopedic Surgeons.

1. First aid is the immediate and temporary care given to the victim of an accident or sudden illness until professional medical help can be obtained.

2. First aid kits sufficient for the number of employees shall be provided at all logging sites and in all personnel transport vehicles. First aid kits shall be regularly inspected and replenished as needed. It is everyone's responsibility to be familiar with the contents of these kits and to acquire a basic first aid knowledge.

3. A person or persons trained in first aid method as prescribed by the Amercian Red Cross or equivalent organizations, shall be in the operating area.

4. In the event of an accident or emergency, if possible, immediately summon medical assistance and be sure to give complete directions to the accident scene.

5. While awaiting medical assistance, follow these procedures;

   a. Check the victim's breathing. If the victim is not breathing, open the airway by opening the mouth and tilting the head back. If breathing does not resume spontaneously, maintain the open airway and perform mouth to mouth resuscitation.

   b. Check for heartbeat. If the victim does not have a heartbeat, perform cardiopulmonary resuscitation (CPR) if qualified.

6. Accident victims must not be moved unless it is essential to protect their lives or to prevent additional injury.

7. If the victim is conscious, reassure them. Keep them calm and quiet, and treat for shock while awaiting medical assistance

B. ARTIFICIAL RESPIRATION

Artificial respiration is the procedure for causing air to flow in and out of the lungs by artificial means when natural breathing stops. Breathing stoppage may be due to accidents such as electric shock, drowning, or asphyxiation, or from internal medical problems. A life may be saved if you act quickly.

1. Turn victim on their side and clear the mouth and throat of all foreign material (chewing gum, food, loose false teeth, etc.)

2. Place the victim on their back. Keep the head tilted back by placing fingertips under the bone of the chin and the other on the forehead. Use the fingers of the hand on the forehead to pinch the victim's nose closed.

3. Seal your mouth over the victims and blow air into the lungs without delay.

4. Ensure that the air you blow into the mouth does not leak out of the nose (keep the nose pinched shut) or leak from around the mouth (form a tight seal with your lips). You must see the victim's chest rise when you blow into the mouth.

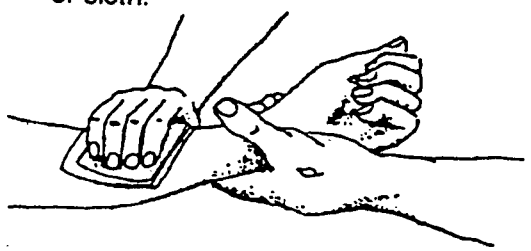
5. Blow vigorously into an adult's mouth (gently into a child's mouth) until you see the chest rise, then remove your mouth and allow the victim to exhale.

6. Repeat inhalations every four to five seconds for adults (20 times a minute for children). Continue artificial respiration until the victim revives or until qualified medical personnel take over.

C. SEVERE BLEEDING

Bleeding from an open wound can usually be stopped by direct pressure.

1. Use a sterile compress of cloth if available. Otherwise use a clean handkerchief, towel or cloth.



2. Place the compress over the wound and press directly on the compress with your hand.
3. If the compress soaks through, place additional compresses over the wound and continue direct pressure. Do not remove compresses once applied.
4. Elevate the injured part as high as possible over the victims body to reduce blood flow and allow the blood to clot.
5. Treat the victim for shock.
6. If these efforts fail to stop the bleeding, apply firm pressure to the nearest recognized pressure point until bleeding stops. If all of these measures fail to stop bleeding on an arm or leg, a tourniquet may be considered. The decision to apply a tourniquet is a decision to risk the sacrifice of the limb in order to save a life. Once the tourniquet is applied, do not loosen or remove it. Write the time and location that the tourniquet was applied on a note, attach to the victim, and have them transferred as quickly as possible to a medical facitlity.

D. SNAKE BITE

1. Attempt to identify and/or kill the snake.
2. Keep the victim quiet and calm. Do not allow the victim to move around unless absolutely necessary.
3. Try to keep the bitten part lower than the rest of the body.
4. Cover the wound with a sterile compress.
5. If possible, place the affected area in cold water or wrap with a cold wet cloth or ice wrapped cloth.
6. If the bite is on an arm or leg, apply a constricting band two or four inches above the bite, between the wound and the victim's heart. The band should be tight enough to slow, but not to stop, the flow of the blood to the area.
7. Treat the victim for shock. Be prepared for possible breathing difficulty, and be ready to administer respiration if needed.
8. Transport the victim to medical help. If possible, notify them you are bringing in a snake bite victim and the type of snake if known.
9. Bring snake if possible to the medical facility, preferrably dead.
10. First aid treatment in addition to the above, depends on organizational policy or recommendations from local physicians.

E. SHOCK

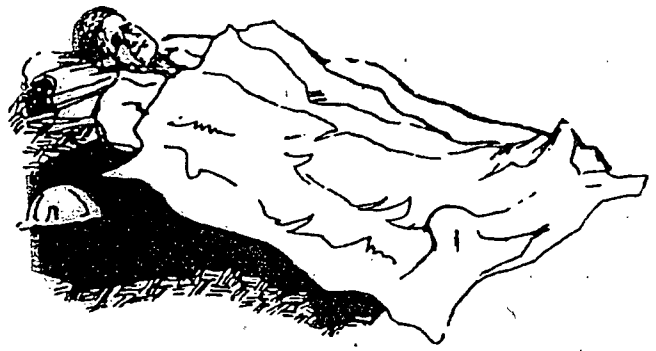
Shock is the term used to describe adverse body reactions to injuries, infections, heart attacks, and other sudden body changes. Traumatic shock occurs after an accident or injury and results in poor blood circulation, loss of consciousness, and in some cases death. All injury and accident victims should be treated for shock using the following procedures.

1. Keep the victim quiet and lying down.
2. Cover the victim to prevent body heat loss.
3. Victims with head injuries should have their head slightly elevated.

⚠ **CAUTION: Never move victims who have suspected neck, back or spinal injuries.**

4. Victims without head or back injuries may have their feet elevated 8 to 12 inches to improve blood flow to head.
5. Victims who cannot receive medical attention for an hour or more and who are fully conscious and do not have head injuries may be given small amounts of water. If the victim is vomiting, has convulsions, or is nauseated, do not give any fluids.

IMPORTANT - Never give fluids to a semiconscious or unconscious person.



FIRST AID

F. OTHER PROBLEMS

1. HEART ATTACK

Symptoms: Persistent chest pain, shortness of breath, pale color, weak feelings, shock.

Treatment: Keep the person calm and quiet. Never allow the person to walk. Loosen tight clothing and make the person comfortable. Help the person take prescribed medication when available. Obtain medical assistance.

2. STROKE

Symptoms: Paralysis or weakness of one side of the body. Difficulty breathing, talking or swallowing.

Treatment: Keep the victim's mouth and throat clear. Keep them calm and quiet. Obtain medical assistance.

3. HEAT STRESS DISORDERS

It is vital that you do not only understand heat stress and how it affects you but, more importantly, what steps you can take to avoid it. Heat stress occurs when the humidity, air temperature, radiant heat, and too little air movement combine with heavy physical work and clothing to dehydrate the body and/or raise the body temperature beyond safe limits. Perspiration, as it evaporates, is the body's main defense against heat. By evaporating, perspirating cools the body. In high humidity, sweating becomes profuse but does not evaporate, so no heat is lost. When body fluids lost through sweating are not replaced, the body's heat controls break down and subject the body to heat stress.

a. HEAT CRAMPS

These painful muscle cramps are caused by the imbalance of salt and other minerals in body fluids. Drinking lightly salted water, tomato juice, or commercial "athletic" drinks in moderation will help maintain a proper balance of salt and other minerals.

To treat heat cramps, continue intake of these type of drinks and stretching exercises to relieve muscle cramps.

b. HEAT EXHAUSTION

Heat exhaustion is caused by inadequate water intake, salt and mineral losses, or both. It is characterized by wet, clammy skin; body weakness or extreme fatigue; unstable walk; nausea; and collapse. Heat cramps are often associated with heat exhaustion. Treatment includes rest in a cool place and drinking lightly salted fluids in moderation.

c. DEHYDRATION EXHAUSTION

This form of heat disorder may occur after several continuous days of work in the heat. If daily water losses are not replaced, progressive dehydration can severely reduce work capacity. Body weight loss is a key indicator of progressive dehydration. A loss of 2% or more is often accompanied by diminished work output. Exhaustion and collapse may follow weight loss exceeding 5%. Treatment includes fluid replacement and rest.

d. HEAT STROKE

Heat stroke results when the body's heat controls totally fail. This condition is characterized by;

1. Hot, dry skin.
2. High body temperature.
3. Mental confusion, delirium, loss of consciousness, convulsions, or comma.

Heat stroke is a medical emergency. Begin treatment immediately and obtain medical assistance. Brain damage and/or death may result if treatment is delayed. First treatment is to cool the victim quickly. One method is to soak the clothed victim with cold water and vigorously fan to promote evaporation. Continue until the victim's body temperature drops, then proceed to treat for shock.

e. HEAT STRESS PREVENTION

It is not enough to know how to recognize and treat heat disorders. You must know how to prevent them. The two important keys to preventing heat stress are physical fitness and your ability to become accustomed to a new environment.

Fitness: Maintaining a high level of physical fitness is one of the best ways to protect yourself against heat stress. Workers who are physically fit adjust or adapt to work in the heat almost twice as fast as others. Workers in poor physical condition who are also overweight are even more unsuited for work in the heat. Their greater weight produces more heat without a proportionate increase in surface area for cooling.

Adaptation: A person adapted to work in heat runs less risk of heat stress. The body adjusts to hot working conditions in four to eight days by;

1. Increasing sweat production.
2. Improving blood distribution.
3. Decreasing skin and body temperature.
4. Decreasing heart rate.

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Always adjust to hot weather activity gradually. Set a reasonable pace, take frequent breaks, replace fluids, and do not expect full production until the body adapts. Specific steps to prevent heat stress are:

1. Replace fluids: Drink a lot of fluids to prevent dehydration;
   a. Drink 1 or 2 cups of juice or water before beginning work.
   b. Drink fluids frequently during each hour of work.
   c. Drink as much as you can at lunch and at the evening meal.
   d. Continue replacing fluids throughout the evening.

2. Replace salt: Replace salt lost through sweating. Fit, adapted workers should be able to accomplish this with normal salt intake at meals, but do not overdo it. Too much salt impairs temperature regulation, and heat disorders become more likely. Avoid salt tablets.

3. Replace potassium: Potassium can become depleted over extended periods of work in the heat. Make potassium rich food such as bananas and citrus fruits a part of your daily diet. Drink lemonade or tomato juice to replace lost fluids. Commercial "athletic" drinks also help make up potassium losses.

4. Establish good work habits: There are individual differences in heat tolerance. Know your own limits and work to them.

5. Take rest periods: Work-rest cycles must be adjusted to prevent progressive fatigue. Rest frequently in cool shaded areas to minimize heat buildup and progressive fatigue.

Stresses can add up. Physical work in a hot environment is very demanding.

4. **EYE INJURIES**
   a. If acid, caustic, or other irritating liquids get into eyes, flush eyes with large amounts of water.
   b. If objects get into eyes, place a sterile bandage over both eyes.
   c. If an object is stuck in the eye and protruding, place a cup over the eye and blindfold both eyes.
   d. In all eye injury cases, take the victim to medical help.

5. **SPRAINS AND DISLOCATIONS**
   Elevate injured extremity. Apply cold packs to reduce swelling. Splint to prevent movement. Seek medical assistance.

6. **BURNS**
   Immediately cool the affected areas using cold water and/or cold packs. Cool for a minimum of 30 minutes, if help has not yet arrived. Cover area with sterile dressings. Treat for shock. Obtain medical assistance.

7. **BROKEN BONES**
   Immobilize broken bones and adjacent joints using splints and bandages. Treat victim for shocks. Seek medical assistance.

8. **INSECT BITE**
   Cool affected areas with cold water or cold packs. Stay with the victim in case they have an allergic reaction. If they have a history of allergic reactions, treat for shock, help them take prescribed medication when available, and seek immediate medical assistance.

9. **CHOKING**
   a. If victim is coughing or if air exchange is satisfactory, let them continue to cough.
   b. If a complete obstruction is present and breathing ceases, attempt to dislodge stuck particles. By grabbing the victim from behind, make a fist with your hand, and place it below the ribs. Grasp your fist with the other hand, and press firmly in and up to dislodge particles.
   c. If the victim loses consciousness, lay them on their back and place both of your hands palm down on the victim's upper abdomen. Give several firm upward shoves to attempt to dislodge obstruction. If breathing does not return spontaneously after the blockage is cleared, begin artificial respiration.

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CRIME PREVENTION

GOOD ADVICE



Keep your machine damage-free and YOURS.

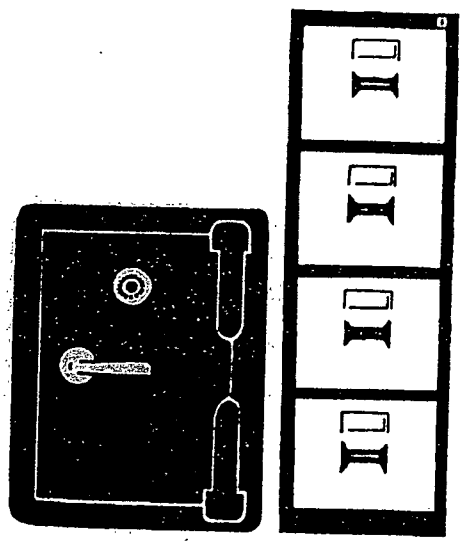
Follow the advice on these pages to reduce vandalism, discourage theft, and help recover your machine if it is stolen.

RECORD IDENTIFICATION NUMBERS



1. Record Serial Number (S/N) of machine and identification numbers of engine, clutch hydraulic components, etc. EXACTLY as they appear on the plates.
2. Check that the complete and correct numbers appear on all documentation (insurance, financial, warranty, etc.). Keep all documents in a safe location.
3. If available, participate in an "Owner Applied Numbering Program" and mark your own machines.

MAINTAIN DOCUMENTED PROOF OF OWNERSHIP



1. Keep in safe location all documents (invoices, warranty, etc.) that accompanied your machine at the time of purchase.
2. Take color photographs of each machine from all sides and several different angles.
3. Maintain an up-to-date inventory of all equipment and machines. Check regularly to insure no machines have been stolen.
4. Update all documents and photographs when a major change is performed to your machine - changing power unit, clutch, loader, etc.

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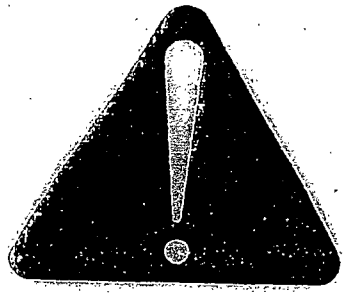
SAFETY OPERATION

For a safe and productive operation, read the safety section thoroughly along with the controls section before start up.

Safety guidelines are noted with the safety symbol (⚠) throughout this section and should be carefully read and fully understood to insure a safe operation.

All personnel (not just the operator) should read this section and understand the operation of this machine and dangerous areas to avoid.

IMPORTANT: Remember, this is a dangerous piece of equipment if not maintained and operated properly.



Safety Symbol

PRIOR TO STARTING

Check for foreign objects in the chipper housing, infeed area and engine area. Keep these areas clear.

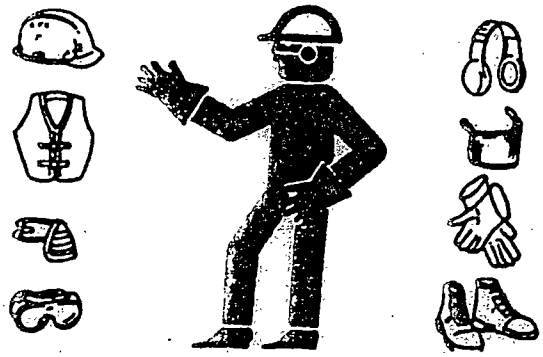
Make sure the chipper hood is closed and secured with hood pins.

Make sure discharge is bolted down and all other chain and belt guards are in their proper place.

Make sure all walking surfaces are free of dirt debris, grease, snow, and ice. Clean as often as needed to maintain safe mounting and dismounting.

Make sure you are set up in a safe, open area away from power lines and ditches whenever possible.

IMPORTANT: It is your responsibility as an owner/ operator to make sure that all bystanders are a safe distance from the equipment (approximately 200 feet) at all times.



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CRIME PREVENTION

REPORT THEFT



1. If a theft occurs, notify the law enforcement agency having jurisdiction and the insurance carrier immediately.
2. Give a full description and a complete set of serial and identification numbers to the investigating officer and insurance carrier.
3. If available, provide the investigating officer with photographs of the actual machine, manufacturers literature and knowledge of any identifiable marks that would assist in identifying the machine.
4. Ask for verification that the stolen machine has been entered into the National Crime Information Center (NCIC) operated by the FBI in Washington D.C.
5. Regularly check the identification plates on all machines and report any missing or destroyed plate.

FIRE PROTECTION

1. Perform daily maintenance.
2. Clean unit daily. Remove debris and accumulated oil, grease, etc. under the power unit and around bearings, at least two times per week. Pressure wash your Chipper at least one time per month. During dry conditions or heavy leaf fall periods, clean the unit twice daily or as frequently as needed.
3. Have an approved, charged fire extinguisher on the machine or on the site AT ALL TIMES. Check the extinguisher regularly to be sure it remains charged. Other fire suppression equipment should be installed on the unit. Water tanks are very good fire suppression units as is a Halon gas extinguisher.
4. Have the operator watch and check the equipment for 15-20 minutes after shut down to ensure adequate "cool down time."
   IMPORTANT: Many fires occur after shut down.

SAFETY MAINTENANCE SCHEDULE

CHIPPER	Daily	Weekly	Monthly	Procedure
Chipper Knives	X			Sharpen or replace.
Counter Knives	X			Replace when worn. Do not sharpen.
Clamps			X	Replace when worn.
Holders			X	Replace when worn.
Knife Clearance			X	Adjust.
Chipper Anvil		X		Adjust or replace insert.
Fan Blade Insert		X		Tighten and/or replace when worn.
Fan Blade		X		Tighten
Chipper Wear Plates		X		Replace when worn down to 1/4".
Chipper Bearings				Clean, repack and adjust twice yearly.
Chipper Drive Belts	X			Tighten to proper tension.
Belly Pan	X			Replace when worn.

NOTE: During the first week of operation, tighten chipper and hydraulic belts and all bolts daily. After the first week, check tightness of belts and belt tension weekly. Refer to Torque Chart and Tension Chart.

HOW TO USE A V-BELT TENSION GAUGE

1. **CAUTION:** Before doing maintenance or tensioning on belt drives, turn equipment off and lock out the power source. Use guards on machinery when running.

   Place a matched set of belts over the sheave grooves. Take up the slack until the belts appear fairly taut.

2. With the drive stopped, measure the belt span length of your drive (see sketch). Set the rubber O-ring on the body of the tension gauge at the dimension equal to 1/64 inch for every inch of span length. for example, the deflection for a 32 inch span is 1/64 inch x 32, 1/2 inch.

3. Set the O-ring on the plunger at 0 against the body of the tension gauge.

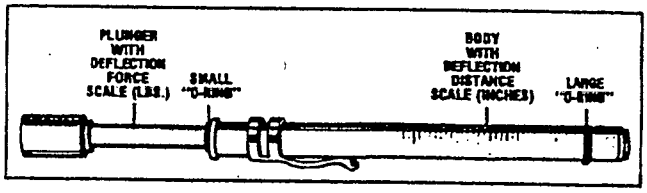
4. With the tension gauge perpendicular to the span, apply a force to a belt in the center of the span. Deflect the belt until bottom of the large O-ring is even with the top of the next belt, or the bottom of a straightedge laid across the top of other belt(s) on the drive. Release pressure and read pounds of force used at O-ring on plunger.

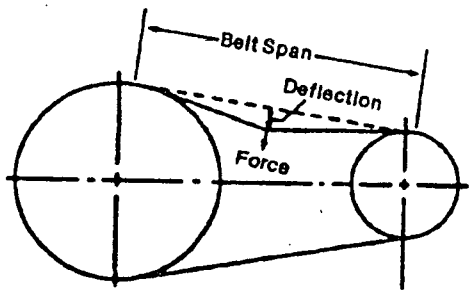
Note: When new belts are installed on a drive, the tension will drop rapidly during the first few hours. Thus, for new belts, tighten to the initial installation defection force shown in the tables below. Check tension frequently during the first 24 hours of operation. Subsequent retensioning should fall between the minimum and maximum forces shown in the tables.

5. Compare the force required in step 4 with the ranges in the tables below.

   Tighten or loosen belts to bring them into the recommened range.

Note: The proper tension for V-belt drive is the lowest tension at which the belts won't slip under peak load conditions.





V-Belt Cross Section	Small Sheave Diameter Range (Inches)	Recommended Deflection Force (Lbs.)		
		Initial Installation	Retensioning	
			Maximum	Minimum
A	3.0- 3.4	3.3	2.9	2.2
	3.6- 4.2	3.5	3.1	2.4
	4.6- 6.0	3.7	3.3	2.5
B	4.6- 5.4	6.0	5.1	4.0
	5.6- 7.4	6.3	5.5	4.2
	8.6- 9.4	6.6	5.7	4.4
C	7.0- 8.5	13.2	11.5	8.8
	9.0-12.0	13.9	12.1	9.3
	13.0-16.0	14.6	12.6	9.7
D	12.0-15.5	26.5	22.9	17.6
	16.0-18.0	27.8	24.3	18.7
	22.0-27.0	29.1	25.6	19.6
E	17.7-23.8	39.7	34.4	26.5
	23.7-31.5	41.7	36.2	27.8
	31.8-39.3	43.7	37.9	29.1
AX	2.1- 3.4	4.4	3.7	2.9
	3.6- 4.2	4.6	4.0	3.1
	4.6- 6.0	4.9	4.2	3.3
BX	3.7- 5.4	7.7	6.6	5.1
	5.6- 7.4	8.2	7.1	5.5
	8.6- 9.4	8.6	7.5	5.7
CX	5.8- 8.5	17.2	15.0	11.5
	9.0-12.0	18.1	15.7	12.1
	13.0-16.0	19.0	16.5	12.8

V-Belt Cross Section	Small Sheave Diameter Range (Inches)	Recommended Deflection Force (Lbs.)		
		Initial Installation	Retensioning	
			Maximum	Minimum
3V	2.65- 3.35	5.5	4.8	3.9
	3.65- 4.12	6.4	5.7	4.4
	4.50- 5.60	7.5	6.6	5.1
	6.00-10.60	8.6	7.5	5.7
5V	7.10- 8.50	19.2	16.7	13.0
	9.00-11.80	23.3	20.3	15.6
	12.50-16.00	27.3	23.8	18.5
8V	12.50-16.00	50.9	44.3	34.4
	17.00-20.00	57.1	49.8	38.6
	21.20-24.80	61.3	53.3	41.4
3VX	2.20- 3.35	5.5	4.8	3.9
	3.65- 4.12	6.4	5.7	4.4
	4.50- 5.60	7.5	6.6	5.0
	6.00-10.60	8.6	7.5	5.7
5VX	4.40- 8.50	19.2	16.7	13.0
	9.00-11.80	23.3	20.3	15.6
	12.50-16.00	27.3	23.8	18.5

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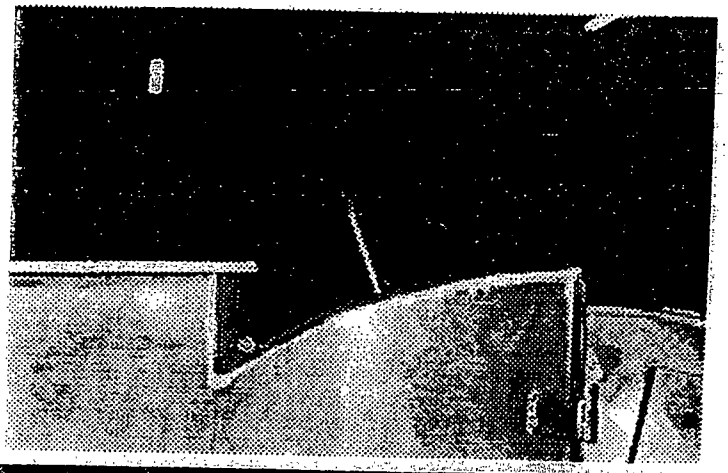
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CHANGING CHIPPER KNIVES

WARNING: Read maintenance safety procedures carefully before beginning.

DANGER: Always use Disc Lock when changing knives.

1. After power is disengaged chipper will coast (rotate) for several minutes until it completely stops. Check the chipper sheave to verify it has stopped before opening the hood.



DANGER: Shut power unit off before any maintenance is performed.

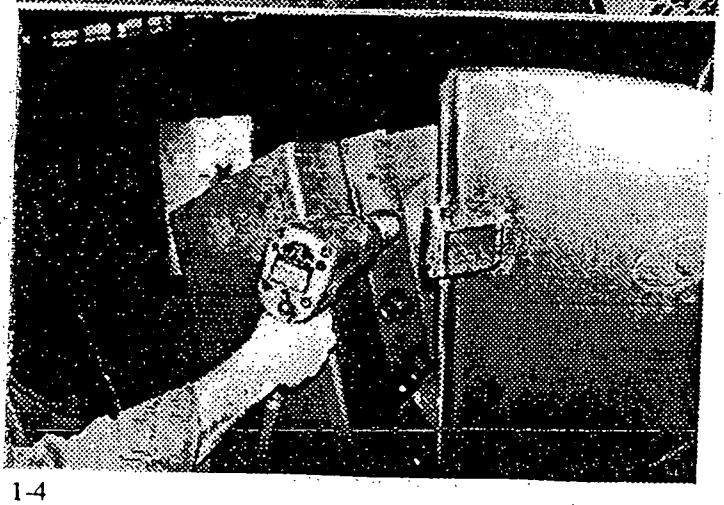
2. Place hood pin into disk lock tube. Rotate chipper disc clockwise until the pin drops into the notch on the rim of the disc.



CAUTION: Two (2) people are required at all times when changing chipper knives.

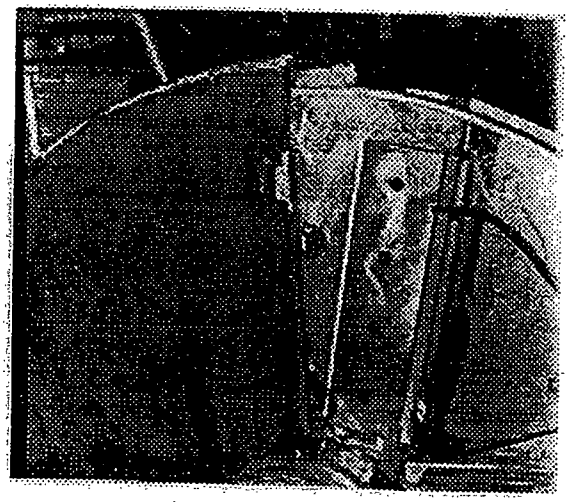
3. Loosen the nuts on the knife clamps. It is not necessary to remove them at this time.

DANGER: Never get inside base or climb up on disc or hood while changing knives.

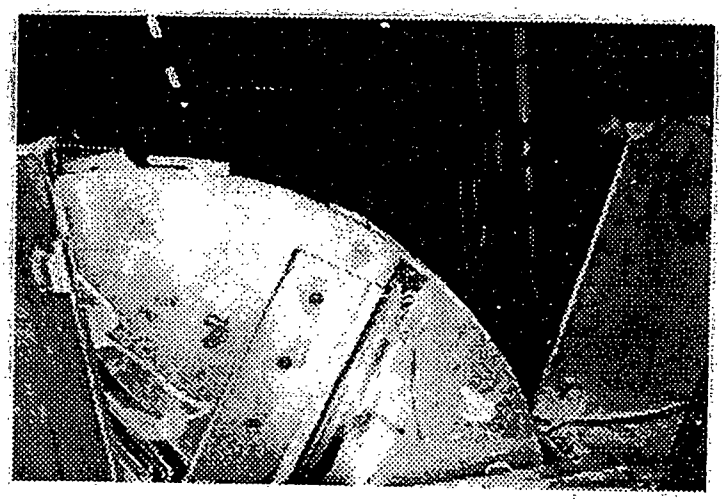


DANGER: Never stand or jump on chipper wrench to break nuts loose. Two (2) people are required at all times when changing chipper knives.

4. Remove knife - Always wear leather gloves.

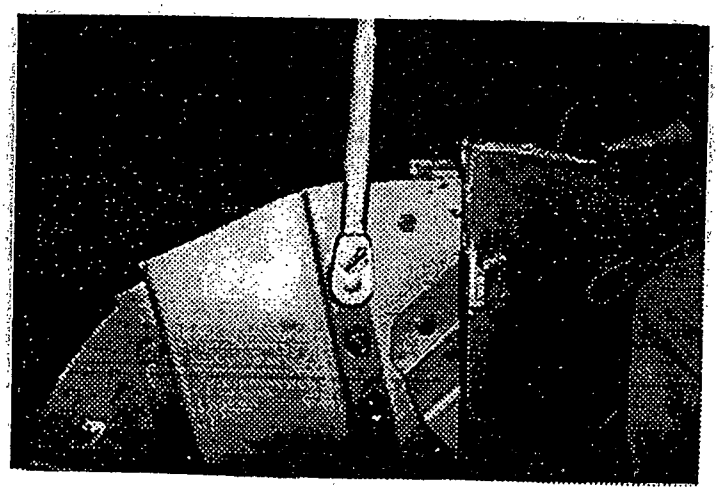


5. Blow dirt and debris out of the knife pocket with compressed air.



6. Inspect counter knife wear. Replace if worn excessively or if any sign of wear appears on the holder (see Inspecting Counter Knife).

7. Place newly sharpened knife into the knife pocket. Keep knives in sets at all times. With a screwdriver, pry the knife to the outer diameter of the disc. Place a small wedge at the bottom of the knife pocket to hold the knife into position.



8. Tighten the knife clamp by tightening the center nut or nuts on each clamp first

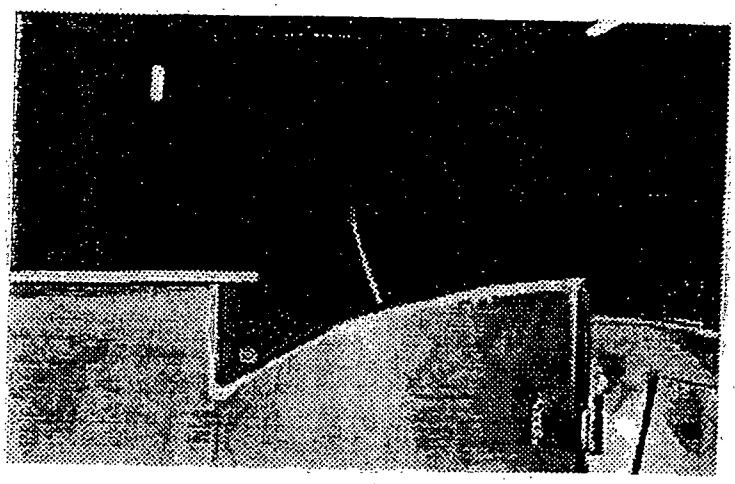
IMPORTANT: Torque clamp nuts between 500-800 ft./lbs.

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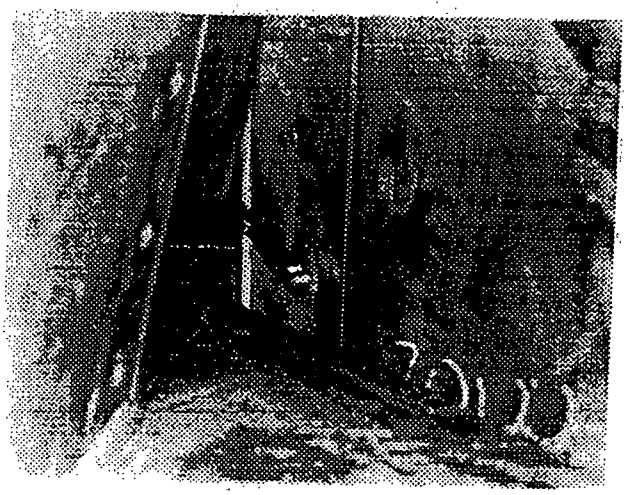
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9. Pull disc lock pin and slowly rotate disc clockwise until the pin drops into the next notch.

Note: Chippers with rim blades will interfere with disk lock pin between notches. Be sure pin is in disk lock watch and not against rim blade.



10. Repeat Steps 5-11 for each pocket.



11. Once all knives have been changed rotate disc clockwise or backwards to check for clearance.

12. Inspect Feedplate clearance (see Inspecting Feedplate Clearance).



13. Close and pin hood before start-up.

TROUBLE SHOOTING

CHIPPER AND FEED WHEELS

PROBLEM	PROBABLE CAUSES AND SOLUTIONS
Chipper feeding	1. The vertical anvil is set too close to the knives. This will cause a burning effect on the knives. Change setting. 2. Knives ground at incorrect angle. Grind knives at 31 degrees. (Refer to Maintenance Section.) 3. Wood is extremely dry or dirty. 4. Wood is frozen or very hard. Grind knives for frozen wood according to knife grinding instructions. 5. Poor quality of chipper knives. Morbark recommends knives manufactured by Sharp Edge, Inc. 6. Dull chipper knives. This tears the wood. Sharpen. Refer to knife grinding instructions. 7. Chipper disc R.P.M. is too slow. Do not operate chipper disc above 900 R.P.M. (48" Chipper), 750 R.P.M. (58" Chipper) (with no load).
Excessively oversized chips	1. Worn counter knives. Replace. 2. Chipper disc R.P.M. is too slow. Do not operate at speeds above 900 R.P.M. (48" Chipper), 750 R.P.M. (58" Chipper) (with no load). 3. Worn knife anvil. Rotate or replace. 4. Worn infeed spout. Build up with weld.
Excessively fine chips	1. Dull knives. Sharpen or replace. 2. Anvil clearance too close. Clearance should be .010 to .015. 3. Obstruction in discharge spout or in chipper base. 4. Feed rate too slow. 5. Excessive disc speed. Chipper disc should not exceed 900 R.P.M. (48" Chipper), 750 R.P.M. (58" Chipper). 6. Damaged knife anvil. Replace.
Wood packing between knife and counter knife	1. Counter knives worn. Replace hardware. 2. Clamps not properly tightened. Tighten to 500 to 800 ft. lbs. 3. Foreign material in pocket, not allowing the hardware to seat properly. Always clean the knife pocket properly when changing knives.

TROUBLE SHOOTING

CHIP QUALITY

Consistent uniform quality chips are becoming more important every day in the pulp industry and standards are always being raised. This section was produced to help the chip producer meet and exceed the pulp industry standards and keep you chipper in good chip condition.

CHIP SIZE AND QUALITY

1. **Varying Engine R.P.M. (operating R.P.M.'s @ 2150)**
   a. A drop from 2150 to 1950 has no noticeable effect on size and quality although you may produce less fines and a small amount of cards.
   b. A drop of R.P.M.'s below 1950 has no noticeable effect on chip quality, however the power unit is at the end of it torque curve. From this point the engine will lose R.P.M.'s more rapidly, creating more cards.
2. **Operating with Dull Knives**
   a. Will produce fines and slivers
   b. Will require more horsepower causing faster engine R.P.M. drop, creating cards.
3. **Feedplate, Anvil Settings**
   a. This setting will vary according to wood species and chipper. (See Maintenance - Inspecting Feed Plate Clearance)
   b. Setting too close burns knives and shortens life.
   c. Setting too wide creates overs.
4. **Knife Length**
   a. No effect in chip quality if feed rate is proper.
   b. Longer chip length allows more tons per set of knives.
5. **Knife Cutting Edges and Angles**
   a. Wrong knife angle would cause poor feeding and shorten knife life.
   b. The suggested angles are 29 1/2 for soft woods to 31 for hardwoods. This is not a written rule that always works. Experimentation with different angles is the best procedure to find one that fits your own set up.
6. **Feed Rates**
   a. The feed rates are set at the factory on all Chiparvestors and should only be adjsuted by a person familiar with the procedure.
   b. Feed rate too slow will produce short chips and fines.
   c. Feed rate too fast will cause disc to heat up from friction. This will drag down disc R.P.M.'s and could create overs.
7. **Chipper Bearings**
   a. If front bearing is loose the disc will float, changing anvil setting. If extremely loose the disc will be drawn toward the anvil and the knives will hit.
8. **Wear points that affect chip quality.**
   a. Dull knives cause fines and also consumes more horsepower which slows the disc, causing cards.
   b. Worn counter knives causes fines, broken chips and also lets chips wear knife holders.
   c. Worn wearplate causes longer chips.
   d. Worn radius at the end of the pocket will cause slivers.
   e. Worn feedplate insert will produce oversized chips and long slivers.
9. **Chipping frozen wood.**
   a. Requires more horsepower
   b. Shortens knife life
   c. Chips don't break up as well

What can a chip producer do to maintain good chip quality?

Actually, quite a bit. the answer lies in keeping the equipment in the same condition as when it was new. Normal wear and tear can and does take its toll on chippers. A set schedule of machine inspection and preventive maintenance is the best and least expensive way insure good chip quality.

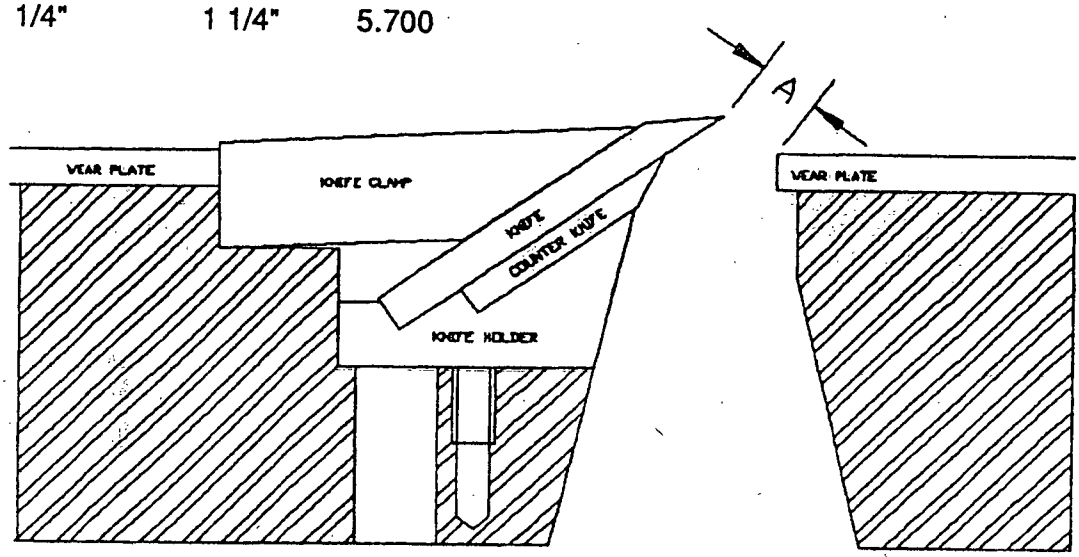
TROUBLE SHOOTING

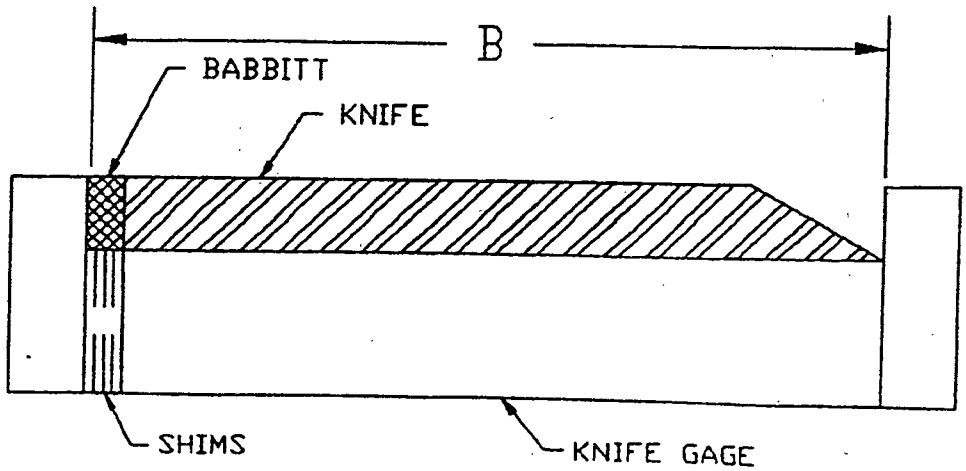
CHIPPER SETTINGS

Feedplate	48"	- .010-.015
	58"	- .010-.015
Spout	48"	- .020-.040
	58"	- .020-.040

Chip Slot and Knife Gauge

Chip Size	A	B
5/8"	5/8"	5.075
3/4"	3/4"	5.200
7/8"	7/8"	5.325
1"	1"	5.450
1 1/4"	1 1/4"	5.700





INSPECTING COUNTER KNIVES

The counter knives backing the cutting knives are important for proper operation of the chipper and should be examined at regular intervals. These counter knives, made of high carbon steel, serve two different purposes:

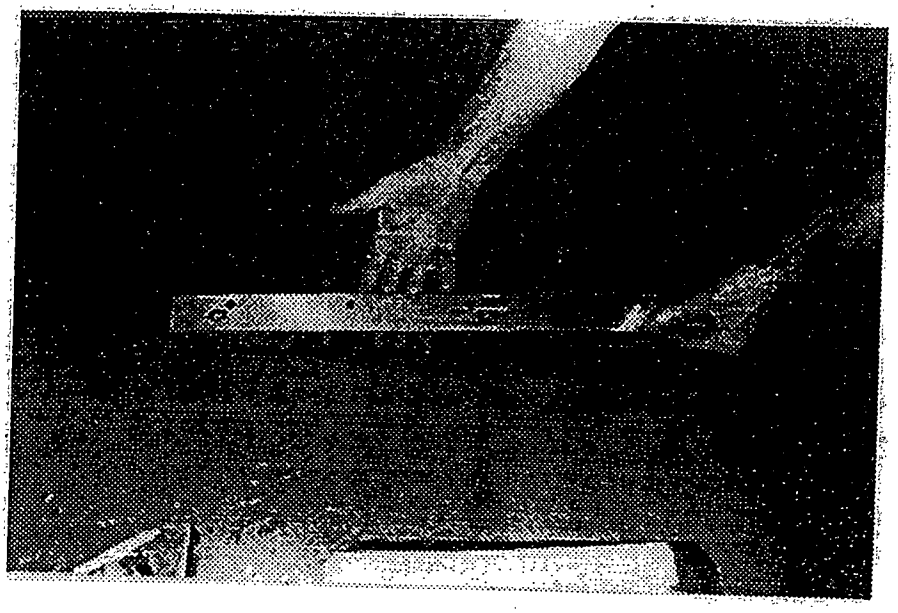
First they serve as a wear surface to deflect the chips from the knife holder, thus preventing excessive wear on the holder itself.

Secondly, they serve as card breakers to help break any cards into proper size chips.

If counter knives become seriously eroded and blunt, they will allow wear on the knife holder and also may tend to excessively break chips into fines.

The counter knife should be inspected at every knife change and should be changed if excessive wear is noticeable.

IMPORTANT - Counter knives should only be ground when edge is accidentally damaged.



KNIFE GRINDING

The time between knife grinding will vary with the type of wood and operating conditions. Sharp knives are very essential to good chip quality and nothing is gained by running the chipper with dull knives. Indications of dull knives are poor chips, excessive oversize, fines and poor feed characteristics of chipper. A few more hours chipping may sometimes be gained by hand honing the knives while still in the disc.

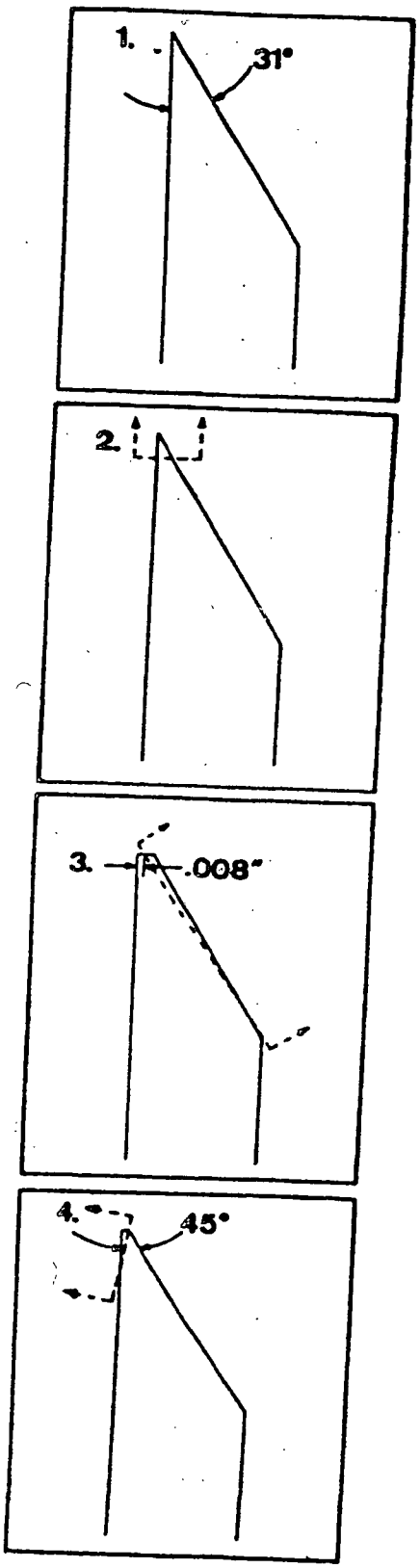
The chipper knife is factory ground to a 31 deg. bevel. There are exceptional conditions where the angle may vary from 29 deg. to 31 deg. to improve performance.

IMPORTANT - Angle should never exceed 31 deg.

The most suitable angle for any particular condition can only be determined by the trial and error method right on the job.

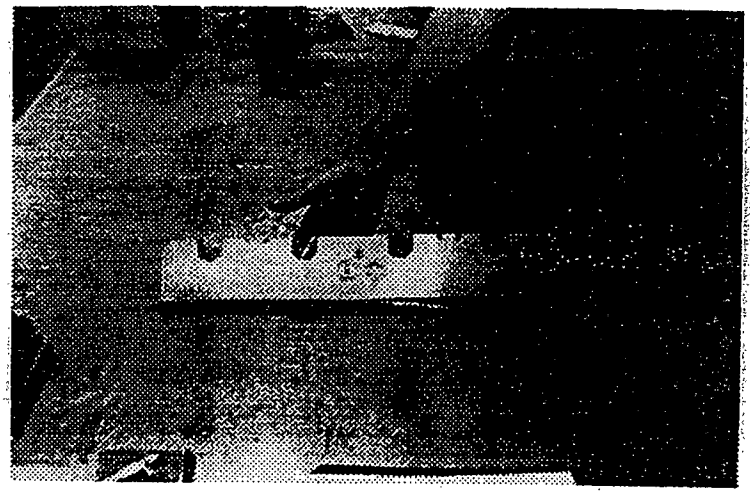
To achieve longer knife life, follow these steps.

1. Grind the knives at 31 degrees.
2. Cut the very tip of the knife off by using a 10 inch single cut bastard mill file.
3. File the tip down to the width of a ball point pen line thickness (approx..008). This can be done with a couple of passes of the file.
4. Using a file, sharpen the backside of the flat side of the knife to a 45 degree angle off the front edge.



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This procedure has increased knife life up to three times and has reduced the amount of steel the grinder takes off the knife. It may be necessary to do some experimenting with this backgrind for your particular application. For example, with tougher or drier wood, you may have to file a larger 45 degree backgrind on the knife.



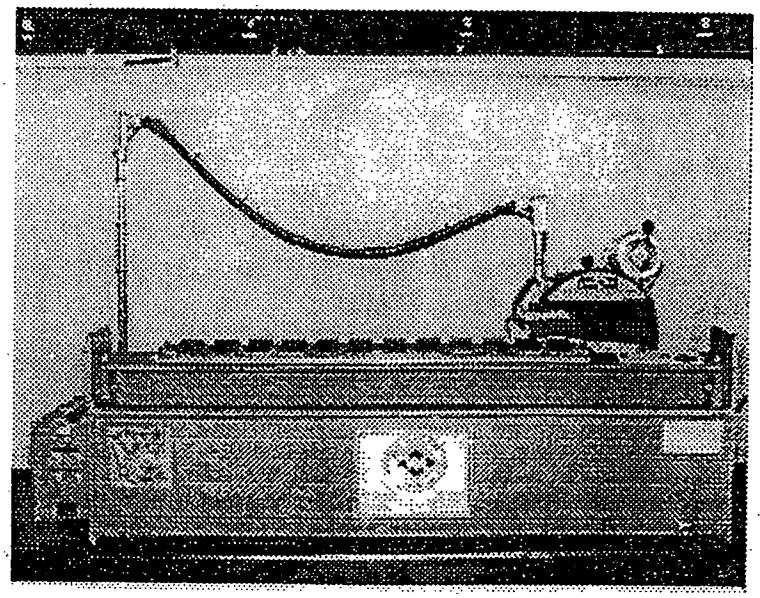
A good thing to remember is to make the edge of the knife as blunt as possible, yet still maintain a good chipper feed.

IMPORTANT - Sharp Edge, Inc. knives are recommended.

Listed below are several recommendations which are important for a quality knife grinding operation:

1. Sometimes hand-honing the knives when they are still in the disc and appear ready for changing may result in additional knife life between grinding.

2. Always use a grinding machine that will repeat the desired angle and grind true and straight, avoiding the straight wheel grinding.



IMPORTANT - Straight wheel grinding will give a hollow or concave effect. This shortens the life of the knife and produces poor chips.

3. The grinder should never overfeed the grinding machine. (A straw brown or blue color will appear on the back side of the knife if the machine is overfeeding.) All knives should be ground with the cutting edge up so that any heat that might develop will be pulled from the cutting edge rather than on to it.

4. We recommend a non-petroleum base coolant such as De Santo (orange label) grinding coolant, mixed approximately one quart to 22 gallons of water. The coolant should be applied on the wheel about 1" above the knife with full pressure. This will keep the wheel clear and free to cut without burning or damaging knives.

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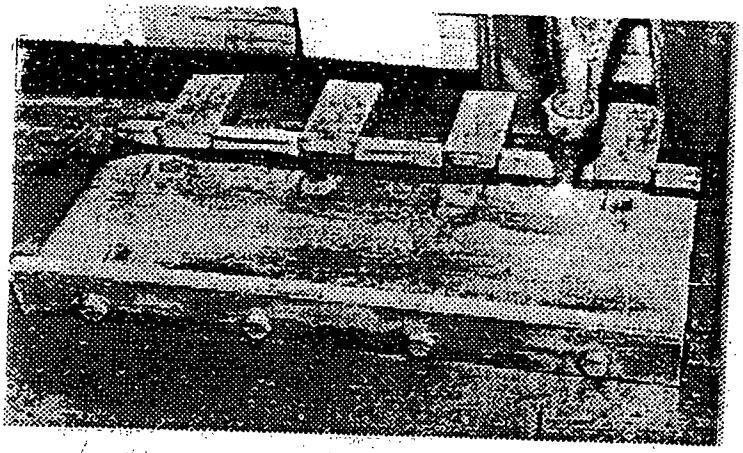
KNIFE BABBITTING

To maintain the desired chip size, it is important that you babbitt your knives after each grinding.

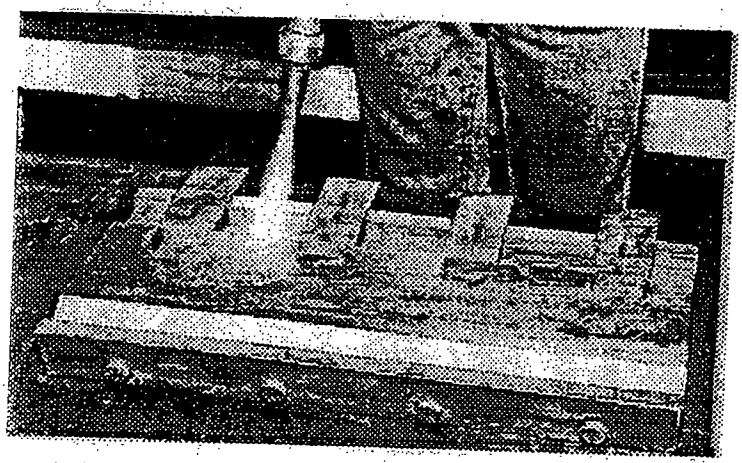
IMPORTANT - Never babbitt a knife that measures less than 2 1/2 inches in width.

To babbitt your knives, follow these steps:

1. Warm knives and all babbitting hardware with a torch until all moisture is eliminated from the surface of the parts.



CAUTION: All parts must be moisture free or blowback may occur, causing personal injury.



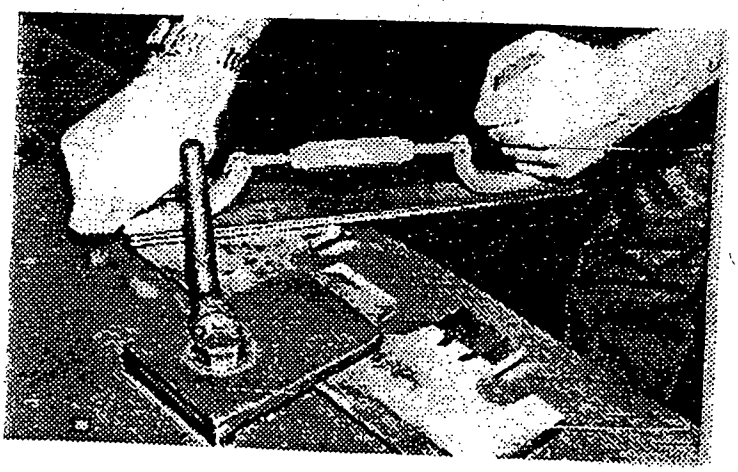
2. Place knives into the babbitting fixture and bring spacers up to the back of the knife.



3. Place the babbitting funnel over the cavity and slowly pour the babbitt from the ladle until the cavity is filled.

4. Let babbitt cool.

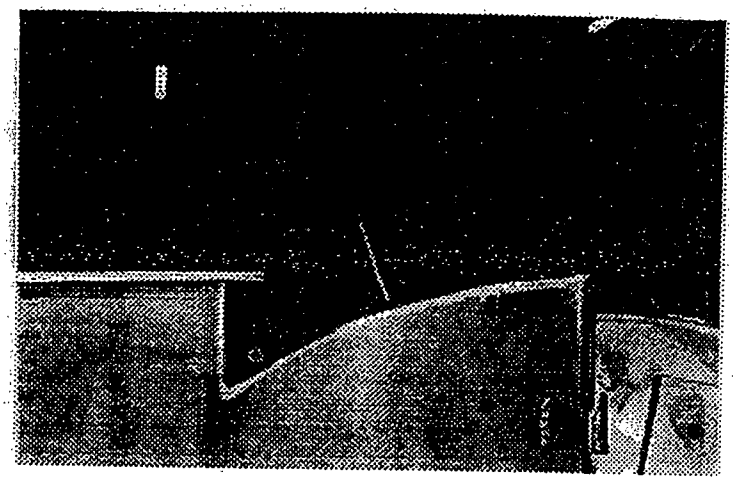
5. After babbitt is cool, remove the knife from the babbitting fixture.



6. Place the knife on a table and file off the excess babbitt until babbitt does not project beyond the sides of the knife.

INSPECTING INFEED SPOUT

When inspecting the spout every possible safety precaution must be followed!



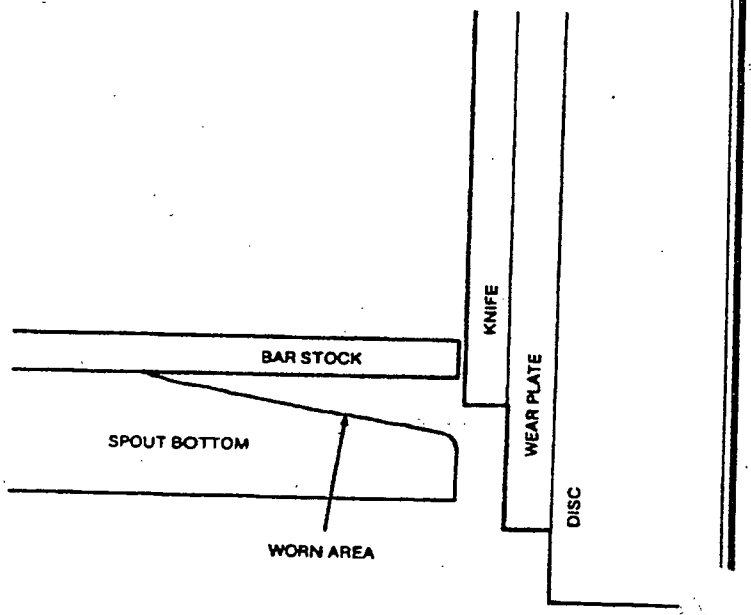
DANGER: Power unit must be shut down and key removed. Main control panel must be locked out on electric motor applications.

WARNING: Disk lock pin must be in the lock position.

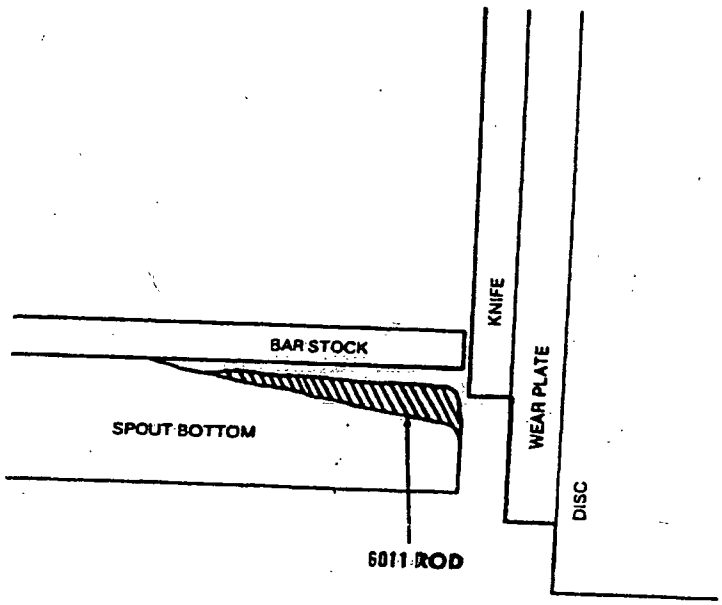
1. Before entering spout, some type of light will be required and some bar stock 1/4 x 1/4 x 36".
2. Never enter spout with disc still rotating. Check disc lock pin.

The chipper spout is designed to guide the wood into the anvil and the knife. If chip quality begins to fall off, the chipper spout may be worn. Build up the worn area as described in the following steps.

1. The spout should cover the bottom 1/4" of the knife through its rotation of the opening.
2. Begin by laying the bar stock into the bottom of the spout. The spout should be built back up to where the bar stock is.



3. Slide bar up both sides of spout keeping it level and check wear. The right front corner normally will wear the most and will need the most attention.



4. Equipment needed for build up:
   a. Wire or stick welder
   b. Hard surfacing wire (Stoody 101 HC) or equivalent
   c. Hard surfacing rod (Rexarc 1/8" 60) or equivalent
   d. Build up rod (Lincoln 6011) or equivalent
   e. Grinder

CAUTION: Keep heat as low as possible. Make 2 or 3 passes and let cool naturally.

6. Finish build up with a hard surfacing wire or rod until you are even with the bar stock. Stagger hard surfacing one short and one long. Begin at the disc and pull the welds down the spout parallel with the sides.

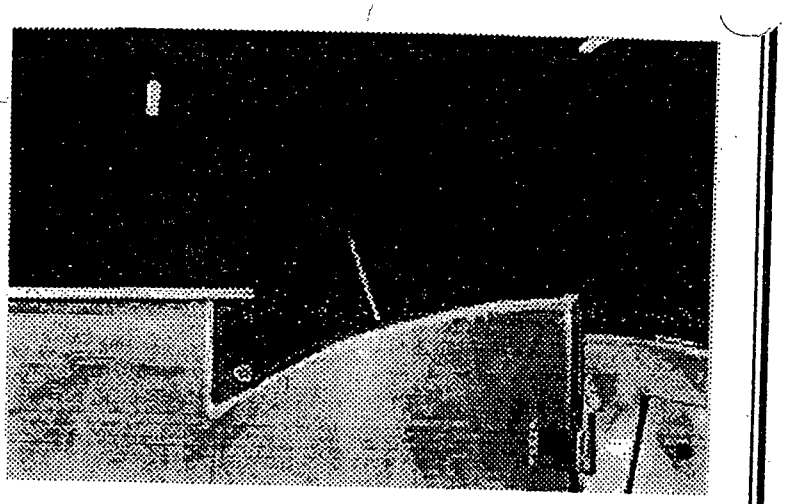
7. Finished spout should be 1/4 inch above the bottom of the knife and no closer to the knife in front then: .020 - .040

Inspect spout weekly for wear. Once spout wear drops below the end of the knife, a build up must be done immediately to prevent loss of chip quality.

INSPECTING WEAR PLATES

CAUTION: Read maintenance safety procedures carefully before beginning.

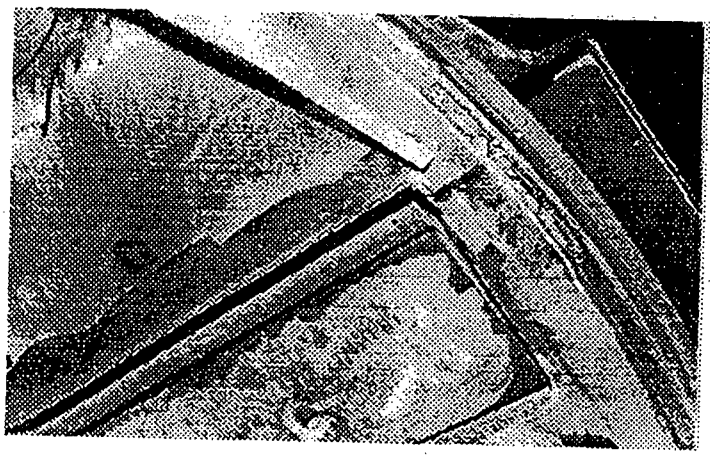
WARNING: Chipper disk lock must be used at all times.



The wear plate is a high wear resistant metal used to protect the front of the chipper disc and helps maintain the proper pocket opening. As the wear plate becomes worn, the wood is allowed to feed farther and farther into the pocket before the knife hits it, resulting in a change in chip dimensions.

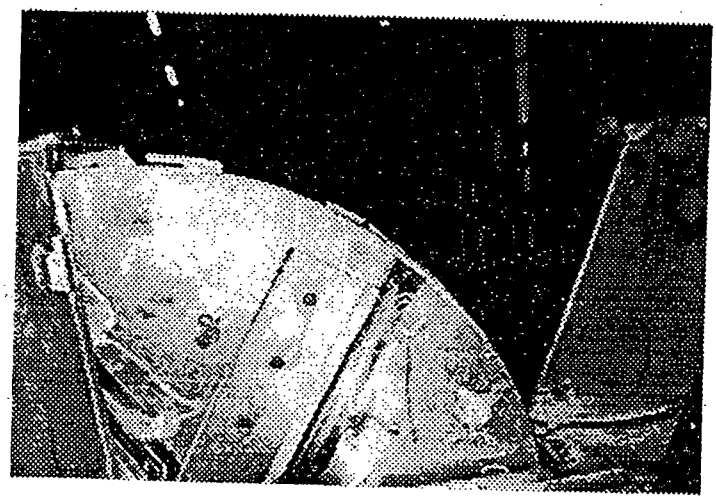
IMPORTANT - If the wear plates are allowed to become excessively worn, damage to the chipper may result.

DANGER: Shut off power unit.



1. To replace the wear plate, remove the bolts on the drive side of the chipper and cut above each pocket with a torch to remove and separate the sections.

WARNING: The wear plate will pop loose and slide down after the bolts are removed. Proceed with caution on the last bolt removed.

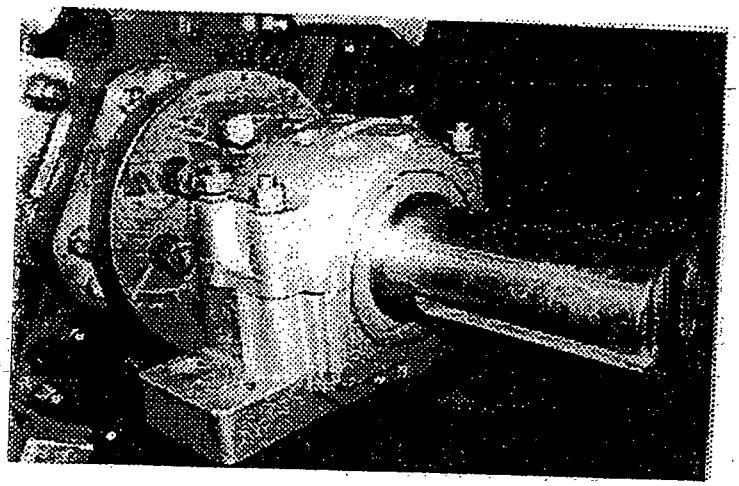


2. The new wear plate comes with bolts ready for easy installation.

3. Install the new wear plate. Tighten the wear plate bolts according to the Torque Chart. The joints on the end of each pocket must be welded together using a low hydrogen welding rod. Sometimes after welding a crack will appear, this is normal.

INSPECTING PILLOW BLOCK BEARING

CAUTION: Read maintenance safety procedures carefully before beginning.

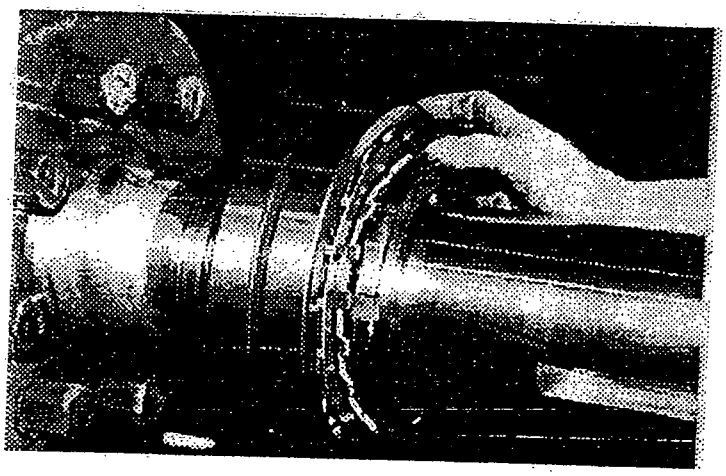


To inspect and/or replace bearing:

1. First remove the cap from the bearing housing and remove all of the old grease.

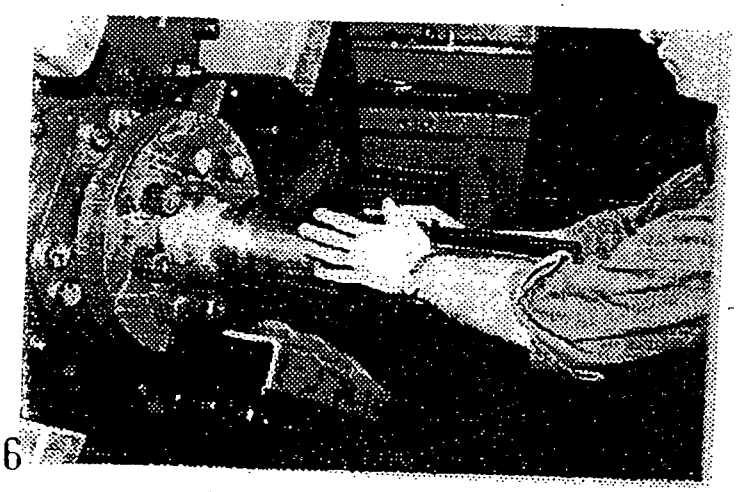
2. Release the lock ring from the nut and loosen nut at least 3 full turns.

DANGER: Do not remove nut at this time.



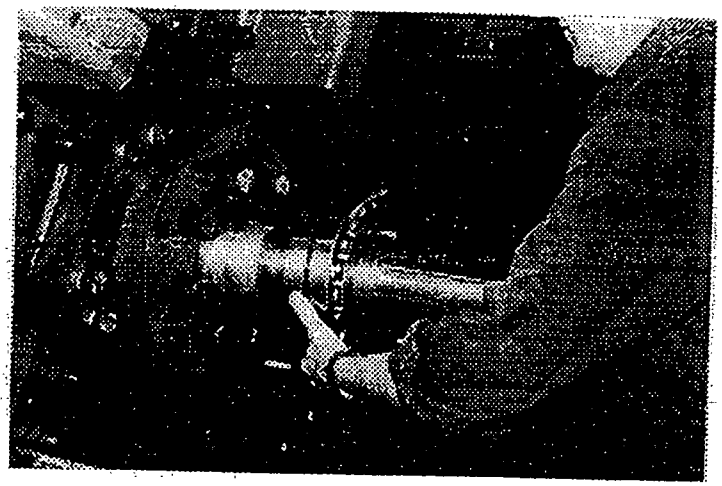
3. The bearing is on a tapered sleeve. Use a piece of 3/4" or 1" bar stock and hammer. Tapping sleeve should loosen it from the bearing.

4. Remove the bolts from the bottom of the bearing housing.

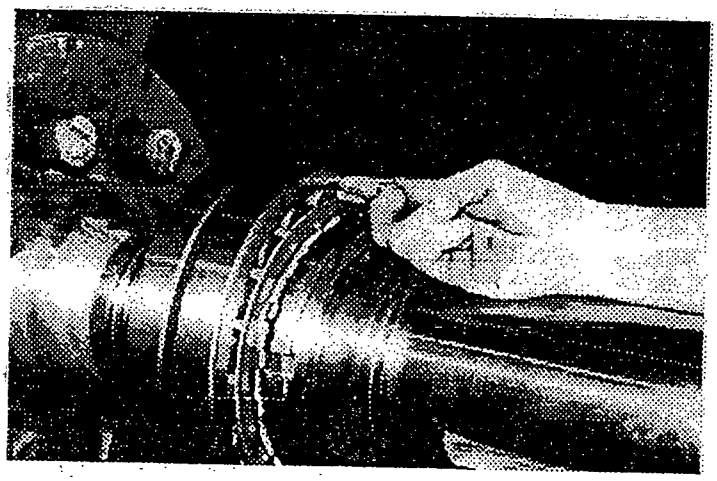


5. Raise the chipper disc enough to remove the bearing and housing.

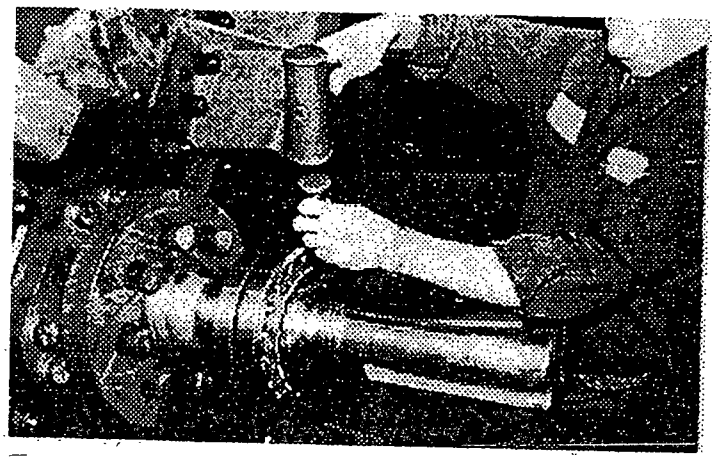
6. Install new sleeve and install bearing on sleeve. Replace lock ring and nut.



7. Center bearing in housing and tighten the nut until .009 can be attained between the roller and race at the top of the bearing.



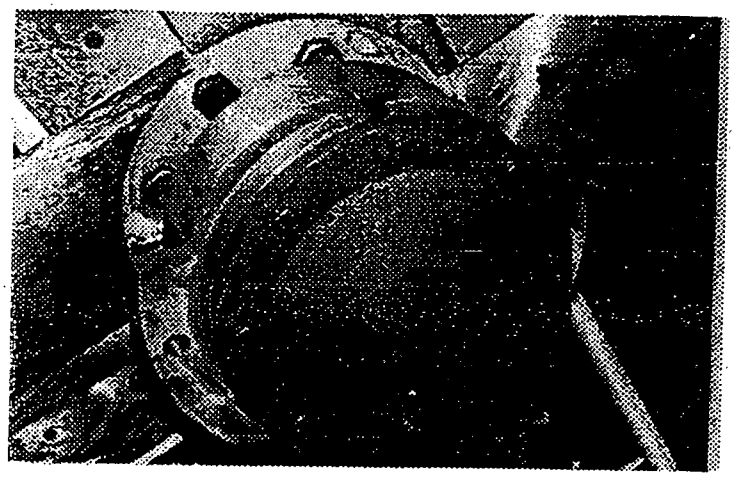
8. Lock the lock ring.



9. Repack the bearing with EP-1 grease and install housing cap.

IMPORTANT - Too much grease may cause the bearing to overheat. If so, remove the plug from the cap and release some of the grease from the housing. If the bearing still overheats, follow the above procedure and loosen the bearing and retighten to .009 at the bearing race.

INSPECTING CHIPPER FLANGE BEARING

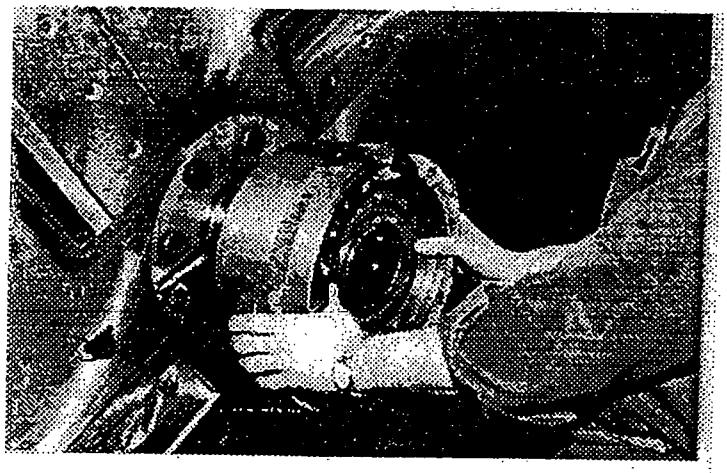


CAUTION: Read maintenance safety procedures carefully before beginning.

If bearing is making more noise than normal and is heating up, inspection of the bearing should be done immediately.

To inspect and/or replace bearing:

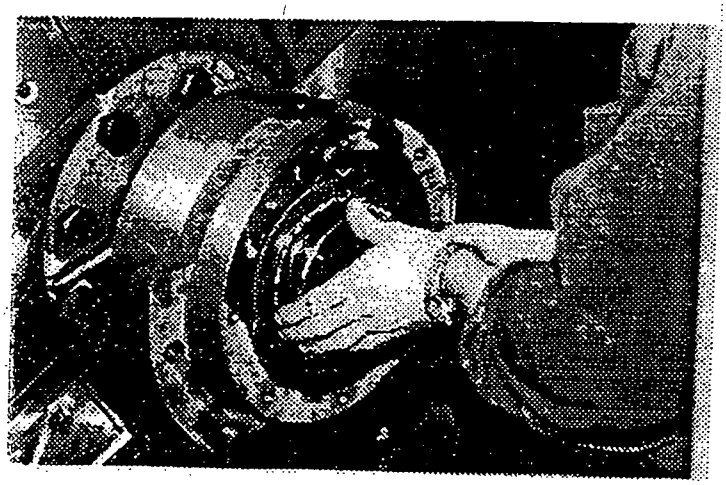
1. First remove the cap from the bearing housing and remove all of the old grease.
2. Release the nut and back it off 4 or 5 turns.



DANGER: Do not remove nut at this time.

3. Raise the disc enough to take pressure off from the housing.
4. Using a grease gun on the end of the shaft, pressurize the shaft until the bearing pops out to the nut (you may need to pry on the bearing to help the grease gun).

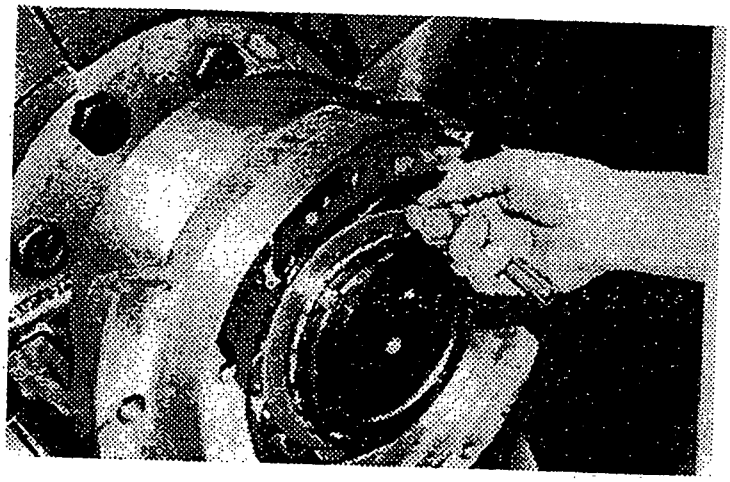
IMPORTANT - If the bearing was damaged or overheated during operation, it may have to be cut off with a torch. Use this as a last resort only.



5. Remove, lock ring, bearing and bearing housing. Clean shaft and place bearing housing back on shaft.

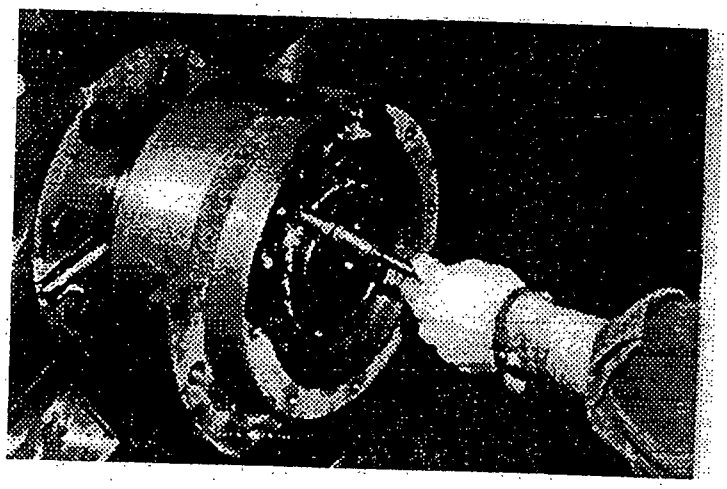
00808

6. Replace the bearing, lock ring and nut.

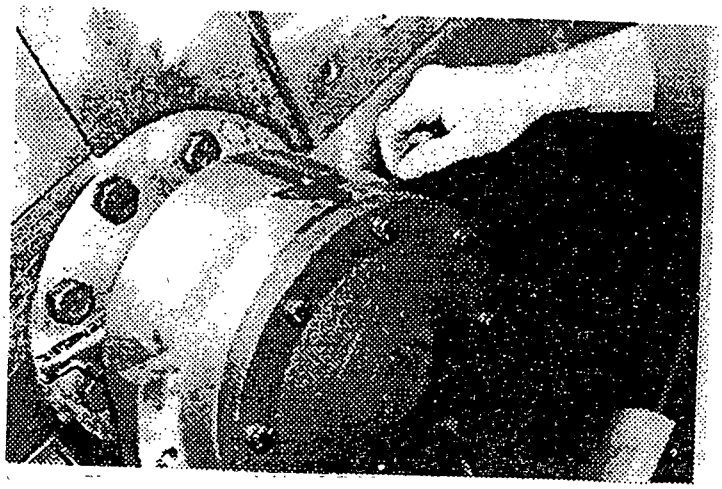


7. Using a .002 feeler gauge, tighten the nut until there is exactly a .002 clearance between the top roller of the bearing and the race. Lock the nut and pack the bearing with EP-1 grease and replace the end cap.

IMPORTANT - Too much grease may cause the bearing to overheat. If so, remove the plug from the cap and release some of the grease from the housing. If the bearing still overheats, follow the above procedure and loosen the bearing and retighten to .002 at the bearing race.



IMPORTANT - When tightening cap, a gap should remain between cap and housing. The cap is designed to hold the bearing in place and not fit up to the housing.

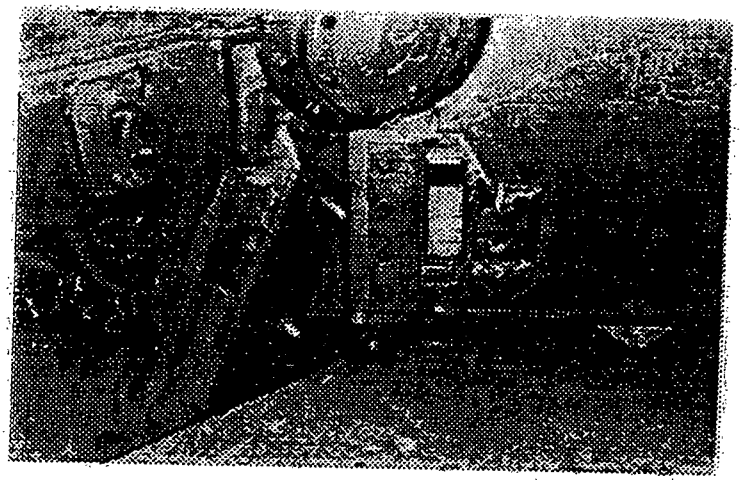


INSPECTING FEEDPLATE CLEARANCE

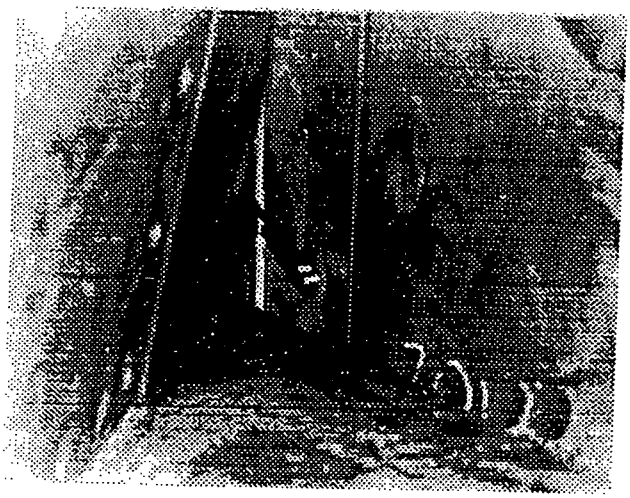
When inspecting inside the spout every possible safety precaution must be followed!

⚠ **CAUTION: Read maintenance safety procedures carefully before beginning.**

⚠ **DANGER: Power unit must be shut down and key removed. Electric Panel must be locked out on electric motor application.**



1. Crawl into the chipper spout with a feeler gauge and a light.
2. Rotate disk backwards (clockwise) until the knife is aligned with the feedplate.
3. Check the distance between the knife and feedplate with the feeler gauge. Check both top and bottom to make sure the feedplate is parallel with the knife.
4. The clearance should be kept at .010 to .015. Inspect the clearance of each pocket by rotating the disc backwards.



5. To adjust feedplate, loosen feedplate bolts slightly and adjust to proper clearance.

IMPORTANT - this procedure works the best with two people, one in the spout and one adjusting bolts.

6. Once proper clearance is set, tighten feedplate bolts. Rotate disk backwards to assure clearance.
7. Before leaving the spout inspect the feedplate insert. If worn or broken replace immediately.

CHANGING CHIP SIZE

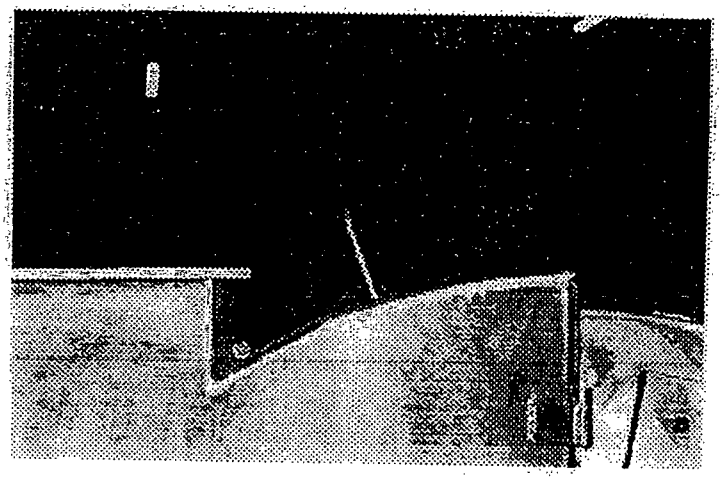
CAUTION: Read maintenance safety procedures carefully before beginning.

DANGER: Always use Disc Lock when working with disc and knives.

1. Disengage the clutch and install clutch lock.

1a. Lockout electric panel on electric motor applications.

2. After clutch is disengaged chipper will coast (rotate) for several minutes until it completely stops. Check the chipper sheave to verify the disc has stopped before opening the hood.



DANGER: Power unit must be shut off before any maintenance is performed.

3. Place hood pin into disc lock tube. Rotate chipper disc clockwise (backwards) until the pin drops into the notch on the rim of the disc.

Note: Chipper with rim blades will interfere with disk lock pin between notches. Be sure pin is in disk lock notch and not against rim blade.

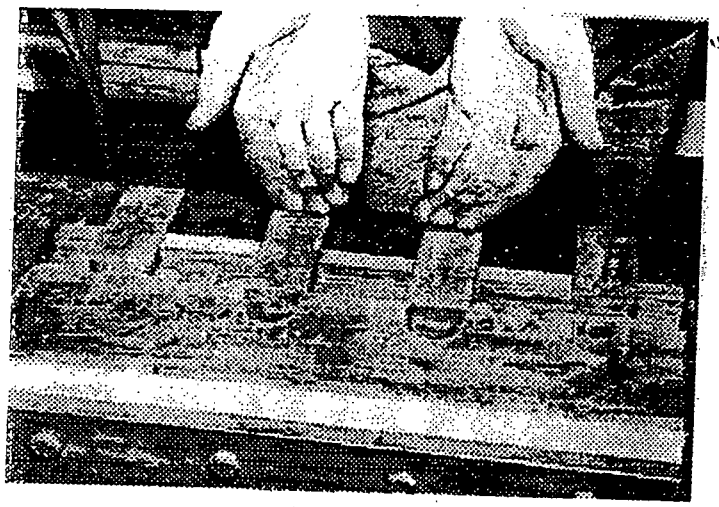


CAUTION: Two (2) people are required at all times when changing chipper hardware.

4. Loosen the nuts on the clamps and remove old knives.

WARNING: Always wear gloves when handling knives.

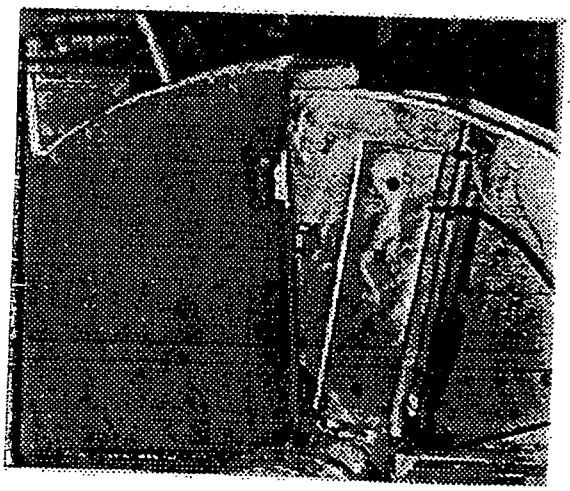
5. New knives must be babbitted to the new chip size before replacing. (See Chipper Knife Babbitting)



6. Clean pockets and put in new knives set up for the new chip size. (See Illustration)

7. Tighten clamps. Rotate disc backwards to assure clearance.

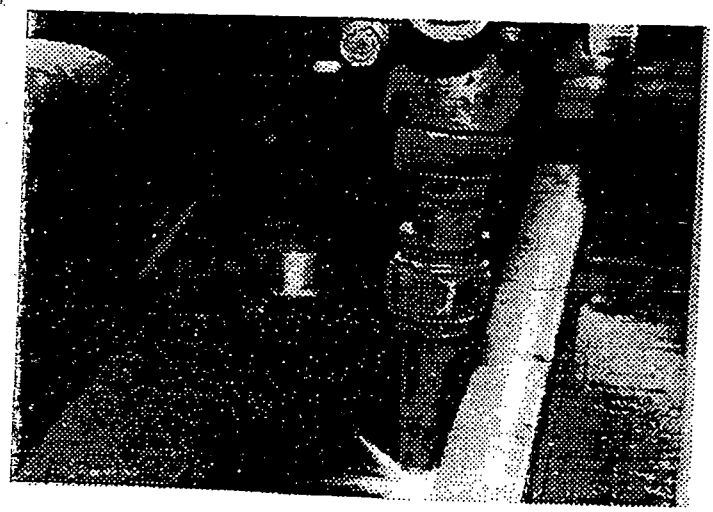
8. Wear plate must be cut for new chip slot. Take a measurement from the tip of the knife down to the wear plate. Chip slot should be cut to the same dimension as desired chip size. Example: for 3/4" chip, cut slot at 3/4" opening.



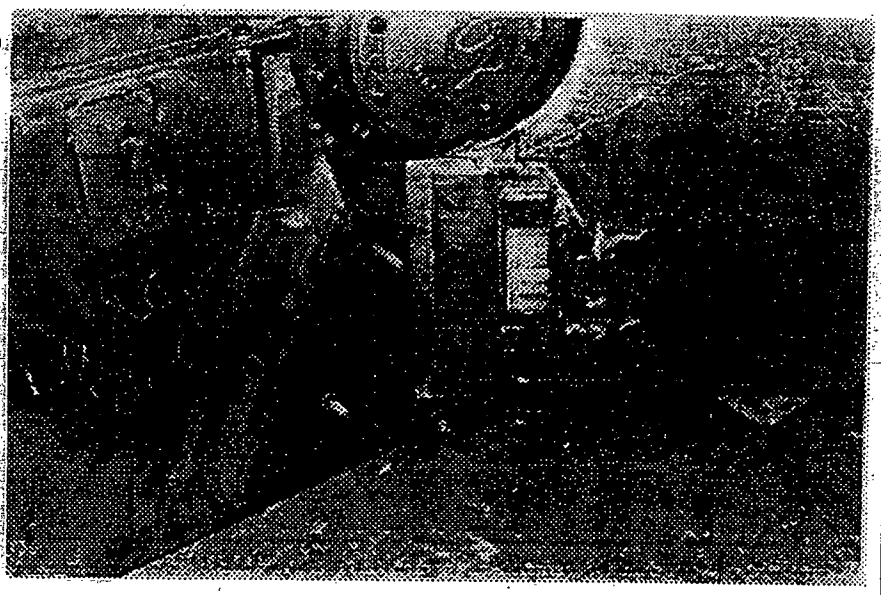
9. For larger chip size mark and cut wear plate with a torch.

10. For smaller chip size mark and fill in with a welder. If a big change is necessary a piece of bar stock may be required to help fill the gap.

11. Clean and smooth up new chip slot with a grinder.



12. Reset infeed Spout and Feedplate to the new knife setting. (See Maintenance)



INSPECTING BELLY BAND

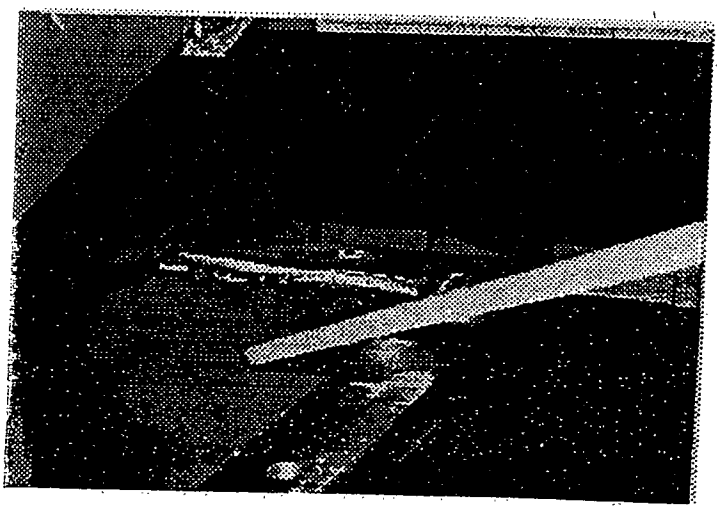
CAUTION: Read maintenance safety procedures carefully before beginning.

When replacment of belly band is necessary, it is best to remove the discharge spout and both chipper hoods.

WARNING: When removing both hoods the disk lock cannot be used. To help insure your safety we suggest wedging 2 blocks of wood between the disk and base to minimize the disk's movement.

The belly band has a small weld on the corners to help hold it in place. Simply cut weld and unbolt. Pull belly band up over the disc and remove. Install a new belly band, and weld down each corner.

Remove blocks and slowly rotate disk to check clearance. Replace hood and discharge.



COPY

State of South Carolina) In the Court of Common Pleas
)
County of Clarendon) C.A. No.: 2008-CP-14-00461

Andreal Holland,
by his Guardian Ad Litem,
Peggy Knox,

Plaintiff,

Vs.

Morbark, Inc., Precision Husky Corporation, A & K Mulch, LLC, and Watford Industry, Inc.,

Defendants.

Deposition of
DAVID E. CLEMENT, Ph.D.

September 13, 2010

Deposition on oral examination of

DAVID E. CLEMENT, Ph.D.,

reported by Ilene K. Schreiner, certified court reporter, and notary public in and for the state of South Carolina; said deposition taken pursuant to Notice and in accordance with the South Carolina Rules of Civil Procedure, at the law firm of Turner, Padget, Graham & Laney, P.A., 1901 Main Street, Plaza 17th Floor, Bank of America, Columbia, South Carolina, on Monday, September 13, 2010, commencing at the hour of 9:00 a.m.

for all witnesses, is now that the deposition has begun, if you have any questions about what I'm asking you or anything that occurs during the deposition, you need to direct your questions towards me rather than Mr. Jonas. Do you understand that?

A. Yes, sir.

Q. What is your occupation?

A. I am a human factors psychologist.

Q. By whom are you employed?

A. I'm currently retired. So my only employment is self-employment, with some little consulting which is what -- I'm in that role now.

Q. When did you retire?

A. June 30th, 2008.

Q. Do you have a name of the business under which you do consulting work?

A. It's just my name with -- I was trying to sort things out separately here, but I think -- oh, I know. When I sent you a letter back at the end of May, it's just what's in the masthead on that, is my consulting name. It's just David E. Clement, Ph.D, CPE.

Q. You don't have a separate business through which you run any income derived from your consulting practice?

A. That is correct, I don't.

Q. What is your proposed area of expertise for this lawsuit?

A. Human factors psychology.

Q. Are you an expert in machine design?

A. No.

Q. Do you have any opinions about the design of the subject chipper?

A. Yes. In terms of human factors psychology, not in terms of the mechanics of it.

Q. You don't have any design opinions concerning such, correct?

A. Well, maybe I misstated or stated it badly. I have critiques about some of the aspects of the design from the standpoint of human factors psychology. The critiques are not in terms of it should have been this specific thing or here is something else wrong or right in terms of mechanics. It's just in terms of how people are likely to have their attention grasped, et cetera.

Q. Do you have any engineering criticisms of the subject machine?

A. Again, from the human factors psychology point of view, yes. I do have an engineering degree, but it's stale. That's not the area of expertise that I'm tapping.

Q. And that's what I'm trying to narrow down.

what I had to say in terms of the deposition.

Q. Tell me what those two sentences are.

A. I'm not sure it's a sentence, but two things. One is that the design of this particular piece of equipment was flawed from a human factors psychology point of view in terms of there being a hazard that an operator might inadvertently contact, and that, of course, is the continued operation, turning of the shafts and so forth in the equipment so that the accident could have physically occurred. And I'm taking it under people's word that the sequence that I've read is the description of what actually happened.

The flaw from a human factors point of view is the person had to -- or was supposed to not take off the hood on the machine until all of the motion, the drive shaft and so forth and so on and the like, there was no -- let's put it this way. There's no positive input that changed or maintained the motion, but when the equipment was tagged out and locked out, from that point onward, even if everything is turned off, there is a period of time, which isn't terribly specific in the depositions, but somewhere between five and 15 or 20 minutes that the machine has to run down. It's just the inertial effects. So the chopper/cutter still is rotating so that materials could still be coming down

the belt that leaves there and so forth. And what the person --

Q. Go on.

A. Okay. And what the person operating this was supposed to do is wait until there was no longer any of that motion, the inertial effects were totally finished. And at that point, and only at that point my understanding is, was it safe to be able to begin to take that hood off that covers up the area of where the cutters are. That's one. It's a little longer than a sentence.

Q. What is two?

A. Two is that there was no potentially effective warning on the equipment available to an operator at the time that the operator should have been recalling that nothing gets done until this whole system is stopped.

Q. Are you criticizing a warning that was actually on the machine at the time of the accident?

A. That's a good question. I only have photographs, and I don't know if any of those were taken immediately following the accident. I am criticizing warnings that were in the photographs, and I have no independent knowledge about whether or not those were there at the time of the accident. If they weren't,

there still was no warning. But even if they were, that warning was not sufficient.

Q. Which warning are you talking about?

A. I'm talking about the -- let's see if I can find it. There, I think, are colored versions of it which is in -- the things that are currently or at the time of the photographs the things that were on the machine were in color, black, white and red predominantly. This one, which is Bates numbered PH 0003.

Q. Your second opinion is critical of PH 0003?

A. Yes.

Q. You are assuming that was on the machine at the time of the accident?

A. Hypothetically. I mean, I'm assuming that it was on the machine, but I have no independent information about that. I mean, I wasn't there. I didn't see it.

Q. Well, don't you think it's important for you to understand what warnings were on the machine at the time of the accident if you're going to offer opinions on this?

A. I can offer opinions on what the impact would have been even if they weren't on the machine or if they were on the machine.

Q. What are you assuming?

A. I was assuming this one was on the machine, but I don't know. I know it was on the machine at the time the photographs were taken. I don't know the history of them.

Q. Do you know who created PH 0003?

A. I believe, and I may be mistaken, but I believe that Mr. Jonas said that that warning was one that came from Husky Equipment rather than Morbark.

Q. Don't you think it's important to know who designed the warning you're criticizing?

A. From the standpoint of what the jurors have to decide, of course. But from my standpoint, no. A potentially ineffective warning or potentially effective warning retains those kinds of characteristics whether they're on the machine or not, whether they're used properly or not.

Q. Are those all the opinions that you've generated in this lawsuit?

A. The way I categorize them, yes. I mean, it's those two areas.

Q. So you don't have any criticism of the warnings that were on the machine at the time they originally left Morbark's hands, do you?

A. I'm quite sure that I have opinions, but I

don't know at what point they got to Morbark, left Morbark, whatever. I may not be responding to your question.

Q. No, you're not.

A. Sorry.

Q. Do you have any opinions as to the propriety of any warnings that were on the machine at the time it left Morbark's hands? Yes or no.

A. I can't answer that question yes or no.

Q. Why not?

A. I don't know what you mean by "propriety." I mean, I know what the word means.

Q. Do you have any criticisms of any of the warnings that were physically present on Morbark's machine at the time it left Morbark's hands? Yes or no.

A. Yes. If they were, the things that I've looked at, were on the machine.

Q. Which ones were you talking about, the things that you've looked at?

A. The ones that refer to the necessity of having the mill come to a stop, and all its parts, prior to opening that quarter, what I'm calling a quarter wheel.

Q. What is your understanding of what warnings were on the machine at the time it left Morbark's hands?

A. The slight amount was that at least one, maybe a couple, presumably these are on a website from the manufacturer, the manufacturer touted that there were safety features that they had, and I inferred from the way it was stated that these were things that they think they had and other people didn't have. But simply I saw nothing in there that said here is something that's bad and we need to take care of it or there's nothing that's bad about this. Generally just positive kinds of statements about the company's involvement.

Q. Are you aware of any manufacturer of a stationary wood chipper that has a system that makes it impossible to remove the hood of the chipper until the rotor has come to rest?

A. I'm not aware of anyone that has done that to this point. I am aware that there's a patented design that purportedly would come up with that effect, but that's beyond my expert abilities to judge.

Q. So then, if I understand your first opinion, that the design of the chipper is flawed because there might be inadvertent contact because of this time duration between lock-out/tag-out and the rotor actually coming to rest, it would be your opinion that the entire industry has a defective or flawed design?

A. No.

Q. Why not?

A. Because I haven't looked at things for the entire industry.

Q. Are you aware of anyone, any manufacturer in the stationary chipper industry, who has a design that you would say is proper from a human factors standpoint?

A. Not completely proper. I would say that some wouldn't have this as a potential problem because of the way in which it's designed. The operator would be directly aware of whether there was still motion going on in the chipper or any other part of the equipment. But these are smaller ones in general. I'm thinking of the kinds of things that you see more in private neighborhoods where somebody has come in to cut tree limbs and things like that and they've wheeled up something that's certainly not much larger than a subcompact car that they're using to do all of the threshing and chopping of the detritus.

Q. You understand we're not talking about that kind of machine in this case, you understand that?

A. You didn't ask me that question. You asked me if I've ever seen any that were -- although maybe we're not on the same plane here or the same track. I'm talking about anyone that manufactures equipment that's supposed to take and chop up wood.

Q. I said a stationary wood chipper.
A. Okay.
Q. Are you aware of any manufacturer of a stationary wood chipper similar to the one we're talking about here that has what you would consider a proper, nondefective design from a human factors standpoint?
A. There may be one or more.
Q. I'm not asking if there may be. Are you aware of any?
A. There were references somewhere in the various depositions to what may have been something that fits the category you said but which actually had a kind of brake mechanism on the drive shaft.
Q. Who? Who manufactures this?
A. I don't remember.
Q. Where were you looking for it? Because that would be the first time we've seen it.
MR. JONAS: Object to the form of the question.
A. I'm not positive of this. I do remember reading it, but I think that it may have been in somebody's statement in deposition rather than --
Q. All right. Let me make this real simple.
A. Okay.
Q. As you sit here today as a designated expert

there, the initial review is IR, meetings or phone conference, and then the last one should be subsequent reading review.

MR. OTT: Okay. Mark that as Exhibit 4.

(Defendant's Exhibit No. 4 marked for identification.)

Q. So No. 4 is a Post-it note that summarizes the time you spent before today on this case?

A. Yes. It's a copy, an identical copy of the one that's sticking on the side of my computer, which is my only record now.

Q. Now, since you responded to my subpoena on August 30, you've been provided a copy of the actual transcript of Mr. Woods' deposition?

A. Yes, sir.

Q. What else is new to your file since August 30?

A. I'm not positive that it's all of it, but I believe this is all of the material from the U.S. Patent Office on a patent for a wood chipper design. The inventor is Michael Boyd Morey. And the description, there's some diagrams of it of course, but the description essentially was that this was a design that would assist, if not completely eliminate, you know, control or eliminate the potential for the accident that

happened in this case.

Q. Are you relying upon this patent for any opinions in this case?

A. I'm relying on this as being indicative that there are designs not involving a braking procedure that are accessible to people in the industry that would appear to eliminate part of the hazard.

MR. OTT: Mark this as No. 5, please.

(Defendant's Exhibit No. 5 marked for identification.)

Q. What is the date of that patent?

A. March 4th, 1999.

Q. Is that design --

A. Or wait a minute. Wait a minute. Sorry. That was the filing date. The date of the patent is January 25th, 2000.

Q. Has that patent ever actually been put into a workable machine?

A. I have no idea.

Q. What was the date Morbark manufactured the subject machine?

A. I think it was in the late 1990's.

Q. Do you know when Morbark manufactured the subject machine?

A. Probably, but I can't recall. My

recollection is that the machine was more like nine years old, since this occurred in the mid 2000s.

Q. Do you have any evidence to dispute the machine was manufactured and sold in 1996?

A. I'm sorry, I've got -- the double negative tripped me up.

Q. Do you have any evidence to dispute that the machine was manufactured and sold in 1996?

A. No.

Q. Do you have any other patents that you claim help support your opinions in this case other than Exhibit No. 5?

A. I'm not even sure I'd say that that supports my expert opinion. As I said, that was information that suggested there's at least one kind of tactic that was available. But I'm not an expert on how that operates, nor what expense it would have been, et cetera, et cetera.

Q. That's what I'm trying to get. Are there any other patents or other materials that you claim to help support a different way of doing things?

A. Not from the engineering design.

Q. From a human factors design?

A. The research bases for applied psychology, specifically for human factors, supports the idea that

is reflected in most safety organizations, the development of instruction, warnings, things of that nature. So that's a lot of stuff that says if there is something that could go wrong and you know about it, then there are various tactics that can be used to try to reduce or eliminate the outcome of contacting some hazard.

Q. And I understand general, you can just call it your general knowledge or general safety information on warnings?

A. I'd call it my expert knowledge.

Q. Okay. What I'm looking at is any other patents or the like similar to Exhibit No. 5?

A. No, sir.

Q. Are you aware of any other accident on a stationary chipper machine manufactured by any company where someone attempting to change the cutting knives was injured when he or she opened the hood before the disk had stopped moving?

A. The information that I've read that has to do with accidents did not -- my recollection is it did not break down classifications of what the basis for the accident was. The only distinction was between the difference of fatality or if there was simply injury. And somewhere in these documents, actually I think it's

somewhere in that binder, are a couple of big blocks that say something to the effect of during this period of time this many serious injuries or during this period of time this many fatalities occurred. And I don't remember whether it's stationary wood chippers or wood chippers.

Q. Okay. Let me try my question again. That was a long answer. This is just a yes/no question. Are you aware of any other accident on a stationary chipper machine manufactured by any company where someone attempting to change the cutting knives was injured when he or she opened the hood before the disk had stopped moving? Yes or no.

A. I'm not aware of the data supporting that allegation.

Q. Are you aware of any such accidents I just described?

A. I am not, no, sir.

Q. Have you prepared a written report?

A. No, sir.

Q. Are your opinions final?

A. Unless I receive a -- given that I receive no more information that's relevant to the case.

Q. Have you completed all the work that you feel you need to do to arrive at the opinions you've

the chipper? Yes or no.

A. Yes or no? I don't know.

Q. So you can't dispute that Mr. Holland violated those procedures on the day of the accident, can you?

A. I can't dispute that there were procedures in effect. I was focussing on my -- I'm not going to attribute those to either A & K Mulch or Morbark, except I did not see a separate set of instructions, warnings, et cetera, et cetera, from A & K Mulch.

Q. Were you aware that A & K Mulch trained Mr. Holland on the procedure to follow when changing the cutting knives on the chipper?

A. Yes.

Q. And the training included the actual procedure for him to follow when changing those blades?

A. I assume it did. What I got from things was that he was instructed. I don't know whether the instruction extended to demonstrating and then having him show himself. I don't know how the training went about, but there was a set of things of which he would have been aware.

Q. And will you agree that Mr. Holland on the day of the accident violated the procedures for changing the chipping knives as he was trained by A & K Mulch?

A. I will agree that he violated them technically. I have been assuming that he had a general understanding of it. The reason I make that distinction is that either way, what he did was a foreseeable kind of error on the part of the operator.

Q. Will you agree that Mr. Holland had been warned prior to the day of the accident not to do what he did on the day of the accident?

MR. JONAS: Object to the form of the question.

A. At least two other workers, and I can't remember which two now, but at least two other workers and perhaps the mill manager, I don't know what his title was, but the chap whose deposition I read -- oh, that's Woods. Wait a minute. Well, phooey. Sorry. My recollection is that there were two other employees, whether anyone was supervising him or not, who stated that they were aware that he had been warned.

The chap Mr. Woods, who identified himself as the foreman at the time, and was at the front end of the machine, said that he was unaware of any such violations, any such warnings. And in fact if he had been aware of those actions before, he would have written up the plaintiff for violation of them. He said he wasn't aware of somebody that -- he also pointed out

he wasn't aware of things that happened that no one had ever told him about.

Q. Are you aware that Mr. Witherspoon --

A. That's the one.

Q. -- warned Mr. Holland prior to the accident never to open the hood to do any work on the chipper until the drum had stopped moving?

MR. JONAS: Object to the form of the question.

A. My recollection is he said that he did.

Q. Are you aware that Mr. Roseboom had warned or seen Mr. Holland open up the chipper hood before the drum had stopped moving on at least two occasions?

A. That's what he stated in his deposition, yes, sir.

Q. But you haven't read his deposition, have you?

A. I'm sorry, which one was that?

Q. Mr. Roseboom.

A. I believe that was one of the three that are clipped together somewhere in here that I got a one-plus page summary. I do remember --

Q. But you haven't read the deposition, you read a summary?

A. That's correct. But I believe in the

summary that statement was made, so I'm assuming it was in the deposition.

Q. Will you agree that if Mr. Holland had followed A & K Mulch's procedures for changing the knives on the chipper, that it would be impossible for the accident to have happened the way he says it did?

MR. JONAS: Object --

A. No.

MR. JONAS: -- to the form.

THE WITNESS: (To Mr. Jonas) Sorry.

A. No.

Q. Are you aware that A & K Mulch's procedures for changing the knives on the chipper require the operator to wait for the drum to stop moving before touching the machine?

A. I agree with that, yes, sir.

Q. Well, if the operator waits for the machine drum to stop moving and confirms that as he was trained and instructed, how would this accident have happened the way he alleges it did if he would have waited for the drum to stop moving?

MR. JONAS: Object to the form.

A. Had he assumed that the drum had stopped moving for whatever reason, then he might have done the same things but without awareness that he was actually

violating that instruction.

Q. If he waits for the drum to stop moving and the drum stops moving, it's impossible for this accident to happen the way he claims it did, correct?

MR. JONAS: Object to the form.

A. I can't tell you what -- his claims were very skeletal because he has obviously a lot of poor memory about what went on. If you leave that part off where you get a yes or no, then you can deal with that.

Q. If any operator actually waits for the drum to stop moving, this accident can't happen the way it's been alleged in this lawsuit, correct?

A. I do not know, because I don't know all the allegations about what he did.

Q. Well, if the drum is not moving, it can't hit the hood and cause the hood to kick back, correct?

A. Yes. And as I said before, the front end of that question, I can agree with that. But when you make it specific to him and what he allegedly said or what he said was allegedly true, I don't have any way of judging that.

Q. Will you agree that if Mr. Holland had followed the procedures in the operator's manual for how to change the cutting knives, that it would be impossible for the accident to happen?

Q. Because you don't have the knowledge?

A. No. Because you asked do I have any information about whether the blades were the same or different than the original, after I've just told you that I have no information as to whether those were the original blades.

Q. Because you don't know?

A. I don't know. That's what I've said three times now.

Q. Have you ever been employed by a company that manufactures industrial equipment?

A. Yes.

Q. What company?

A. Eastman Kodak.

Q. What did you do for them?

A. I was a developmental engineer with them. My background was in chemical engineering. I and the two assistants who taught me my job, the three of us were responsible for doing evaluation on the effectiveness, et cetera, of some equipment for making photocopies that could be used on an offset press, the kind in those days before computers, the kind that everybody had in major kinds of business offices.

Q. Are you talking about photocopying machines?

A. No. Back then, Xerox was the only

photocopying machine and it had a slight disadvantage over others that it did a lousy job of any color stuff. It couldn't copy solid, for example, solid black or solid red or something like that. They were using their photography knowledge to develop a kind of photographic material that could be used to make an offset press. You've got to have a map that you put down. The map goes on one and then that's offset onto the copies that you send through. When I got there, they already had a design or some designs for this. I learned actually how to operate an offset press and learned that that was not something I wanted to do for a living.

Q. What period of time did you work for Eastman Kodak?

A. Fall of 1957 to summer, late summer of 1960.

Q. Do you consider an offset press to be industrial equipment?

A. Well, they manufactured it. You said equipment manufactured, industrial equipment. And I observed their printing because we were in the same building as the -- I was paper service division. The paper manufacturing division was in the same building. So I got to see how they actually turned scuzzy-looking swamp into highly-polished paper.

Q. Have you ever been employed by a company

that manufactures construction equipment?

A. No, sir.

Q. Is Eastman Kodak the only company that you've worked for that manufactures industrial equipment?

A. Yes.

Q. Have you ever been employed or hired by a company that manufactures wood chipping equipment?

A. No, sir.

Q. Have you ever drafted warnings to be displayed on a wood chipper machine?

A. I may have in terms of the legal consultation, but not for the company. I just really can't remember whether it was a situation where I was focussed upon the likelihood of somebody encountering something bad and focussed upon what kinds of changes and instructions or markings and so forth could be done that would make the accident less likely. And when I try to push past that, that's all I can remember.

Q. Have you ever been hired by a manufacturer of a commercial product either to write a warning for the product or to conduct research on the effectiveness of a warning?

A. You're now limiting it to equipment?

Q. Commercial product.

A. I can't answer that without permission from the people with whom I was consulting. I'm pointing out -- I'm answering you that way because I will not go to trial and say, oh, I have all this experience about doing this for companies when I won't tell you who they are and I can't tell you who they are.

Q. So any such experience, if you have any, would be litigation related?

A. Any experience that I will speak to would be litigation related, yes, correct.

Q. Have you ever been hired by a manufacturer in a lawsuit?

A. Frankly, I can't remember, because I hadn't classified it that way. If I was hired by a manufacturer, it would have been by a defendant's attorney probably. About 10 to 20 percent of the consulting I do is with defense attorneys. But I really don't recall.

Q. So can you tell me the name of any manufacturing company that you were retained by its attorney or the company directly in a consulting case?

A. All I can tell you is if -- I'm not sure. I just don't remember. I've got a list of depositions and trial appearances for the last 40 years.

Q. I looked through it.

were allowed to fully give all the opinions?

A. As far as I can recall. An individual question might have been squelched or quashed or whatever by the judge, but we went through whatever things I had that I could say about the human factors involvement.

Q. Are you aware of any published research in the area of assessing the effectiveness of warnings pertaining to chipper machines?

A. I don't recall having read anything that was focussed upon chipping machines in that regard.

Q. Are you aware of any published research in the area of assessing the effectiveness of warnings pertaining to land clearing equipment?

A. I can't think of any. General literature that I read is not focussed on a specific -- it might give some specifics as an example, but not focussed upon just one specific kind of setting.

Q. We'll just go through briefly the bases for your two opinions. Let me see if I can summarize the first one that took you a while to spill it out so I don't want to miss anything in my summary.

A. Sure.

Q. So correct me if I'm wrong, but is it a fair summary to say that the design of the chipper is flawed

from a human factors psychology standpoint because the operator might inadvertently open the hood before the drum had actually stopped moving?

A. Yes, sir.

Q. What is the bases or what are the bases for that opinion?

A. Because of the way that -- assuming that the person has the knowledge or is trained or has warnings and such involved that are potentially effective, when somebody is performing the same action over and over again, they learn, which for the most part is a very good bit of learning, but they learn what requires the most attention, what things require very little, if any, kind of attention.

From the human factors psychology standpoint, someone who is standing in the general area of where he or she would subsequently be lifting pins and so forth and moving that shell off would not be in a position where they could confirm that there was no motion whatsoever in the system. Therefore, it's possible that somebody who has done this many times and every time that they have opened the equipment up everything had come to a halt, if they've done that and either they've inaccurately, perhaps moving very slowly and they don't pick up on that, but if they've done this

and they have not opened it up when it's in motion, and every time that it is stopped -- let's say when it's opened up is, pick a figure, something like eight minutes after the power was cut off and locked out. That's just an example. So if eight minutes goes by and the person knows the eight minutes has gone by, that person will expect that everything will be stopped and there is no need to leave that station to go run somewhere else to look and see whether or not there's -- try to get visual confirmation that it isn't moving.

If you sort of look at everybody's report in terms of how this machine operates, it appears that when the power is shut off, at minimum it takes something like a few minutes, maybe less than five, for all the motion to come to a halt. And it's quite possible it may take more than 20 minutes depending on what speed it had been at at the time that the power is cut.

So someone whose experience turns out to be it's not moving anymore, whether or not they go around and check, and they open it up and there's no motion, at that point they start shifting attention away from that, because they'll assume that it's taken them five to ten minutes to go up and lock this out, come back down, wait there for a little bit of time without looking at a watch or anything of that sort.

Now, from that point of view, that's why I was trying to redirect one of your questions, one part of your questions, into what does the person actually think is happening? What do they expect? If they're used to when I open this up after I've done these other things and I've waited a little bit, it's always stopped, unless they had information to the contrary, the person could open it up, not knowingly at the point where they're starting to open it, not knowing that it had not come to a halt and there was in fact still that danger present because the turning is still going on. The inertial effect is still there.

So a way of -- well, there are various ways of avoiding that. But where that comes in in terms of human factors psychology design is, is it likely that some people, because this is a very serious kind of outcome even if it doesn't do as much damage as it did here, is it likely that sometime a person will come to rely upon insufficient cues to say that this is stopped and therefore I can open this up.

There's a couple ways to deal with this, of course. One is to put effective or at least potentially effective warnings on the equipment and provide the aspects that are demanded in a warning in terms of various safety organizations, professional

organizations, systems safety people, engineers, psychologists, what have you. It makes it more likely that when someone comes up, they will see that warning, and, having read it at least a few times, they probably won't read much detail subsequently.

But if they've read it a few times and have used that as reason to go around and check one of the couple of places where, as far as I can recall there were only two, where you could look and visually determine whether or not there was still inertial movement going on, and if they've kept being reminded of that and followed that instruction, what they're doing is keeping that check level at an important point and are less likely to come up after they finish doing what they're doing, and whether they're in a rush or not, stand there and say, well, gee, in the past this has always been stationary. And then, hey, look at the warning, and say, well, it won't hurt to walk around, take a look at it. So that's one aspect.

The other aspect is: Is there some way, and again given that you don't make any changes in the equipment that would reduce this continued kind of motion after the power is cut, at that point is there some better way of getting the information to a person so that it would really require effort on their part not

to process accurate information about the machine still having all this inertial movement and having the blade still turning and the like.

And I don't have the expertise to say how that should be done. I have enough understanding that you have to evaluate cost benefit kinds of things. But from my point of view, putting a brake on is asking for -- no matter how expensive this is, that's asking for a lot of braking power to bring this to a stop.

Some other kind of signaling at the location where the person is going to remove this top. No idea what the best design would be. But something, for example, that would have a go/no-go kind of light on it. So you have like a green and a red light. If you come up and the red light is on, that means things are still running, you shouldn't proceed with this. If the green light is on, that says that you can go ahead and do whatever you want to do. And you'd have to have some kind of way of checking to make sure the bulbs aren't burned out and so forth. So you'd have, like, a test button the person could push and both of those lights should come on.

And that's already gone way beyond -- the functions, I can say those are things that could be done, doing it in that specific way. That's an

engineering design kind of question, but there are possibilities that would seem to be reasonably priced that would help. So you can eliminate it, is one kind of way, or seriously guard it so that it's impossible to overcome the guarding when it would be dangerous. That's one tactic.

Another is to have a good -- I'm really combining the two things. The other is having a good potentially effective warning that is sufficiently strong and accurate that a person who has read that not only will be aware, made aware at the time they come up to open it up, but also will have a process available to them and a reminder that you can get badly injured.

So coming at it, it's warning, coming at it in terms of making some kind of informational design. Either way they have to receive training to use this and so forth.

Q. Is that the entirety of your bases for your first opinion?

A. Well, it's actually a summary of the research literature in terms of motivation and perception and in learning and recall. That applies to both kinds of opinions.

Q. I'm just making sure I understand all the bases for your opinion about the design of the machine

from a human factors standpoint. Have you discussed all of them?

A. With regard to this particular -- not this person and so forth, but to this particular design and good/bad things about the impact of that design on the operator.

Q. And as far as design changes that could be made, you're going to let somebody else talk about that?

A. If I were asked and were allowed to respond, I would mention something like the lighting thing as a possibility. I would also point out -- well, I wouldn't have to because one side or the other is going to jump up and ask me, are you sure this could work? No. But there should be ways that are reasonable economically that could provide the right kind of information so this could be made less likely in terms of an outcome.

Q. But whether there are or not, that's not your role in this case; that's for somebody else, correct?

A. I don't know what everybody else is doing.

Q. Well, you haven't attempted to do that?

A. That's correct.

Q. And you don't consider yourself qualified to do that, to actually do the engineering?

A. No. I'm qualified to evaluate if it's

meeting the kinds of things that I'm describing.

Q. I understand.

A. But if someone said, you know, here's the layout for it, here's another layout, here we put your little lights in, here we put a brake in, which is better? I could say, well, you know, obviously you're removing the hazard, the access to the hazard on one and not on the other, so that's a better tactic. But I really wouldn't expect that to be one of the alternatives.

Q. So then your second opinion is that PH 0003 was not a potentially effective warning at the time of the accident?

A. Correct.

Q. Does the diagram depict the hood moving toward the operator and striking the operator in the head?

A. No. It could, but the whole point of a pictogram is that it can't be misinterpreted. I don't see little lines, little impact lines, cartoonish kind of impact lines from the sitting person. What is a potential -- because this arrow just says this is moving in this direction. This arrow says this is moving in this direction. Well, neither of those is actually real relevant, because you might have this going 1000 RPM and

this is only going to move somewhere between what the person is trying to move it and that speed. So back the person up, show this coming down with impact. Do something about not suggesting that the right arm is going to get cut off when you do this, which is what this drawing is suggesting.

It wouldn't take much to -- if this were a warning and were going to be effective, it wouldn't take much to dress this out, because these things are cut and paste from various kinds of documents, so that it would be effective in terms of reminding people of what a good instruction, good warnings would have to say. "Danger" is the one good thing that's in that warning. That's the correct signal word for this situation, because you face serious injury or death if you don't do the things that you're instructed to do.

Q. Does the diagram portion -- we'll talk about the written portion in a second.

A. Okay.

Q. Does the diagram portion show the hood coming into contact with the operator's head?

A. Not clear. What if the operator's head were on the other side of that, so it's just coming past the head? It doesn't say anything about the speed.

It's a pictogram in our jargon, but the

point of the pictogram is that all the things that a good warning would have in it are going to take, even here, going to take perhaps 30 seconds for somebody to scan through the first time. Which means if they're really slow and they're thinking about it, it could take them a minute, a minute or two. It is highly unlikely that somebody that's read that, understood that, would come back and read those again after the second or third time they saw it. Still, that doesn't make it a bad warning. That just says that when you read it, think you understand it, you've now got other things that your attention will focus upon.

The reason for pictograms, one of the reasons, one is that you might be dealing with somebody who is illiterate and so you're trying to give a picture of the outcome so they can figure out at least what the bad thing is. So if they can't figure out how to avoid it, they would ask for instruction from somebody else.

But a good pictogram is one that encapsulates all the things that are in a good warning and just simply reminds a person -- it takes less than a second for somebody that's had a good warning here, is used to doing the right thing, they come up and it's been a horrible day and everybody is trying to rush and get out in the traffic, get out of there or whatever,

they come up and glance and see that, they will then recall, oh, there's a reason for slowing down and doing this in the right way. So a pictogram, good idea. This is a little misleading pictogram.

Q. Are you aware of any operator of this chipper at A & K Mulch who had any confusion understanding the pictogram?

A. No.

Q. Are you aware of any other person besides you who has difficulty understanding what the pictogram is showing?

A. Yes.

Q. Who?

A. You.

Q. Anyone else?

A. What you're pointing out is that -- or it could be me. What you're pointing out is that this is an ambivalent kind of thing. You don't want to put your hand in there. Well, I knew that, says somebody, and they're not thinking about this. That's why I say it could be, like, a two-step thing. Drawing the arrow there sounds like, well, this is your instruction, you pull it over. Or if somebody sees that is dangerous, they're looking, saying, what, you chop off your arm when this comes out? And although that would be a good

way of getting their attention, it's not always the truth and that would cause people to simply start ignoring it.

And of course what it's supposed to be representing for people who are literate in English is to have a warning that contains the agreed-upon aspects that any kind of potentially effective warning would have.

Q. Is Mr. Holland illiterate?

A. I don't know. I mean, I know he can read, but I don't know what you mean by "illiterate." I don't know what I mean by "illiterate" because I'm not an evaluator in that.

Q. Do you have any criticism of the written portion of PH 0003?

A. Yes.

Q. Which ones?

A. All of them are informational statements or instructions and aren't part of a warning. Except if you've communicated what you're warning about, it's certainly okay to put on an instruction that tells you how to avoid the hazard. But as I say, it's got the signal word or what some people used to call the key word, danger, which means serious kinds of outcome can occur. What it should have then is a description, and

all this as brief as possible of course, but a description of the hazard.

A description of the hazard here would be removing -- I don't know that this is true, but if it were true, removing pins while there's any motion can cause this to lash back and strike you. That's the hazard and the outcome. If it strikes you, it could cause serious damage or death; that's the outcome. At that point you would expect somebody to be sort of interested. Okay, what do I do to not have this occur?

And there the next thing could be, and I don't want to drag you through that again, but it isn't -- I'm not concerned about whether all that gets put there is check at point A or B whether the motion has ceased. So before you do anything, you go to that place and check it. And you've already been told if you don't do that and you try to open this up, you can have it fly back and hit you and maybe even kill you.

Then the fifth thing would be then to have something there that a quick reminder is something horrible is happening here. So you don't have to read back through here, but they will get a constant reminder of this.

Q. Will you agree that the operator can actually determine whether the disk has stopped moving

or not by looking at the machine?

A. By walking around the other side of the machine and looking in those places, that's my understanding, yes. But it's important that you have to leave that station to be able to go and check this out.

Q. Well, but don't you have an understanding that this is a machine that operates by itself without an operator?

A. I believe somebody has to turn it on and turn it off. I believe that -- at least my recollection is that at least twice a day, when it's operating on certain kinds of materials, it has to have blades sharpened or replaced, the knives. That's not self-operating.

Q. But the actual operation of the chipping/grinding is done without involvement of an operator?

A. That's what it's designed to do.

Q. The material is automatically fed in the machine, correct?

A. That's correct.

Q. And then the machine grinds it without involvement of an operator, correct?

A. It can grind it without the involvement of an operator.

Q. And it discharges what is ground without the involvement of an operator, correct?

A. As long as it's not jammed, yes, sir.

Q. Is it your contention that it was jammed on the day of the accident?

A. No.

Q. Do you know whether Mr. Holland looked on the day of the accident to determine whether the disk was moving or not?

A. I don't know whether he did. Actually, in describing what would be an acceptable kind of warning, I'm more or less assuming, at least hypothetically, that he never looked on the day of the accident. That he never looked also suggests that he has reason to believe that he's waited long enough and in the past that's always been long enough for the motion to stop.

Q. But you don't have any information or evidence to support that; that's just your assumption?

A. That was an assumption I made to be able to talk about this, yes, sir.

Q. All right. Any other bases for the criticism of PH 0003?

A. I haven't really told you the bases. It just violates all of the agreed-upon by standard makers, like American National Standards Institute, businesses

and manufacturers like Westinghouse and FMC, American Society for Testing and Materials, which it's an independent group, but it's not a group that comes up with separate things from ANSI because they tend to share, adopt each other's standards. And the ANSI standards from back in 1960, '58 to '62, that were adopted by the new body, which was OSHA, from then onward those are the kinds of -- the things that I've described are the kinds of necessities in a warning to make it maximally likely to have an impact.

Q. Any other bases?

A. And it all fits with what I know about the impact of learning on the way in which people modify their responses. Which generally is a very good thing, but it's not very good if you don't have everything highlighted that somebody should be paying attention to. You wouldn't have aircraft pilots if they couldn't start ignoring things for the most part and only occasionally monitor. Usually when you get to that place, nowadays you've got an automatic warning that comes up if you haven't looked for a while and somebody says, essentially in better language than this, you know, you're running out of fuel.

MR. OTT: All right. Let's take a break.

(Recessed at 11:05 a.m.; reconvened at

11:15 a.m.)

MR. OTT: Dr. Clement, I appreciate your time. Those are all the questions I have.

THE WITNESS: Thank you.

EXAMINATION

BY MR. JONAS:

Q. Let's go back to PH 003, if you would.

A. Okay.

Q. Just by way of demonstrating -- well, first let's compare that to what I'm going to mark as Plaintiff's Exhibit 1, which is PH 027.

(Plaintiff's Exhibit No. 1 marked for identification.)

Q. Take a look at that and compare the pictogram that's on the back of that hood there with what you see in front of you as PH 003.

A. Aging eyesight. Excuse me. It appears to be -- except that it's in black, red and white, it appears to be the same detail. I'm just having trouble seeing the fine lines that are drawn in the background.

Q. All right. Well, there's other labels on there, also?

A. Yeah, sure.

Q. Can you make out the other labels?

A. That one in the middle is "Warning" -- I

can't read it, no.

Q. And the bottom one, can you read that one?

A. Oh, that's about a pinch point, so that's probably what it says. It's white on black.

Q. So in this PH 027 you see the pictogram that we've been discussing and two other labels?

A. Correct.

Q. Now, just one thing about PH 027, or 003 rather, I think you already identified that as a Precision Husky label that got on this machine?

A. Yes, sir.

Q. Is there anything about the pictogram other than the criticism you've made about the design of that machine?

A. Well, the diagram doesn't have highlighted someplace that would actually -- where you could actually obtain visual confirmation that the wheels were turning or not.

Q. All right. I'll come back to that in just a second. Let me show you -- I'm going to mark these, Morbark 87 as Exhibit 2, Morbark 90 as three, and Morbark 91 as four.

(Plaintiff's Exhibit No. 2, No. 3, and No. 4 marked for identification.)

Q. Looking at 087, which I'll represent to you

is one of the exit photos of the original machine, serial No. 914. Do you see what I'm referring to?

A. Yes, sir.

Q. Does it have this bar that appears in PH 003 over the top of the hood?

A. I don't think it has. I can't see anything on the top except that one.

Q. All right. Well, let me be more specific.

(Plaintiff's Exhibit No. 5 marked for identification.)

Q. I'm going to show you what is Plaintiff's 5, which I previously provided as PH 035, a copy of a green piece of equipment. You've looked at that piece of equipment, haven't you?

A. I've looked at a picture of it. Oh, I've looked at the L -- or the U-shaped bracket, yes.

Q. In terms of that particular piece of equipment, do you understand that's what is represented in PH 003, is that bar?

A. I'll accept that. I mean, it's reasonable that that's a drawing of it. This is looking head-on.

(Plaintiff's Exhibit No. 6 marked for identification.)

Q. PH 006, or I'm sorry, Plaintiff's 6, which is unnumbered, is showing what essentially is an

advertisement for a machine that claims to have been built by Precision Husky in 1989. Do you see that same bar piece at the top?

A. I see a bar piece, yes, sir.

Q. Yes, sir. And in looking back at this device, whatever it is, you don't see that on the Morbark machine?

A. I don't, no.

Q. This pictogram has got an additional piece of information here, doesn't it, that doesn't apply to this Morbark machine?

A. Yes, sir.

Q. Do you understand this has anything to do with opening the hood?

A. I'm sorry. If in fact this is not what's on the Morbark machine at the time of the accident, it doesn't conform.

Q. So the Morbark machine with this piece, this pictogram we've been describing as 003, comes from a different type of machine?

MR. OTT: Objection to form.

A. I would agree that given this, it comes from a different machine. I don't know if it's a different type of machine.

Q. All right. Well, let's look at some other

photographs. Plaintiff's 4, which is Morbark 91. You see this is another version of the exit photo on March the 29th of 1996 of what apparently is serial No. 914?

A. Okay.

Q. You see a variety of labels on this machine?

A. Yes, sir.

Q. Now, looking back at Plaintiff's 2, they seem to be the same machine from different views?

A. Yes. This looks like the operator's at the front, and seeing what's at the operator's right, this would be on the operator's left.

Q. Okay. Looking at Plaintiff's 4, you say it's on the left?

A. I'm sorry, yes, looking at four. Looking at two, that would be on the right of the operator.

Q. And looking at Plaintiff's 3, see that's another photograph, that's Morbark 90?

A. Okay.

Q. Another view?

A. Right. This one would be opposite the operator.

Q. It's looking directly at the back of the hood, isn't it?

A. Yes.

Q. Are there any labels on the back of the hood

there?

A. There are a couple. I can't read those. This one looks like it has that cross bar at the top.

Q. Well, let's look at the labels on the back of the hood that's been marked as Plaintiff's 1. Okay?

A. Okay.

Q. Where we've seen the pictogram?

A. Yes.

Q. All right. Looking at the back of this hood on Plaintiff's 3, is there any labeling on there that looks anything like Plaintiff's 1? I mean, there doesn't appear to be any labels there?

MR. OTT: Objection to form.

A. Well, there are two labels. The big one -- I can't read the small one, either; it's even worse in terms of size. But something has three lines on it anyway, which is not one of -- on Exhibit 5, which is not one of the three that are on Exhibit 1.

Q. All right. Well, then the question, of course, becomes whether these are Morbark, all three of these, or any of these three are Morbark labels? I mean, you don't know the answer to that, I take it?

A. That is --

MR. OTT: Objection to form.

A. -- correct. (To Mr. Ott) Sorry.

Q. Let me look at -- we'll mark this as six, Morbark 062. Morbark 085 --

MR. OTT: It should be seven.

MR. JONAS: Hmm?

MR. OTT: Six is the advertising for a Precision Husky machine with a bar.

MR. JONAS: Oh, is it? Okay. Well, great. Seven. Thank you.

(Plaintiff's Exhibit No. 7 marked for identification.)

Q. (By Mr. Jonas) Just looking at Plaintiff's 7, then, which are the Morbark original labels produced in discovery, just if you would, you've seen these before in the materials that you were provided?

A. Yes.

Q. Did you see within those materials anything like a pictogram?

A. I think the only one -- I'm not positive about this, but the only one I recall having the pictogram is on PH 003.

Q. So other than the Precision Husky label, I'm representing these to you as labels --

A. Yeah.

Q. -- that were produced as being on the Morbark machine as was originally equipped.

A. None of them have both a set of materials and a pictogram.

Q. Have you examined those labels in regard to the hazards you've identified in your opinions as complying with the requirements of the ANSI 535 standard?

A. Almost all of them -- maybe not all, but almost all of them have a categorized kind of attention grabber such as "danger" or "warning," and almost all of them have no description of the hazard or the outcome and do in fact -- I would say more than half do in fact have an instruction about how to avoid the hazard, which hasn't been mentioned, and how to avoid getting the impact from the hazard.

Q. What hazard are they warning about?

A. Well, there are different things. This one is about the chipper disk lock. They use that when they're changing chipper knives. And that's fine, except it doesn't tell you the reason we're saying this is that you can get your hand chopped off or what have you.

Some are simply labels. Chipper Disk Lock. "For the safety of yourself and others, do not remove the decals from this machine. Knife clamps must be torqued to a minimum of 500 foot pounds. Do not exceed

800 foot pounds." That has zero information about being a warning of any kind. Nice instructions, "Read Operator's manual."

Again, it speaks -- "danger," fine. But rather than making the description of what could happen bad and how you avoid it, it jumps to how you avoid it and it makes a negative statement, which is at least somewhat less likely to have immediate impact. It says: Do not attempt to make any adjustments, et cetera, while the engine is running.

Q. Do these labels compete for space on a machine?

A. On some of the pictures they do. Two or three on a big side, if they're all useful, isn't too much in the way of clutter. But when you get four or five, it's starting to detract from the person's likelihood of paying attention to individual ones.

Q. Do you know how long this Morbark chipper machine, serial No. 914, was in place at the A & K Mulch before the accident happened on June the 1st of 2006?

A. This may have been from Mr. Woods, but I recall some statement about the 58-inch machine being in place perhaps three weeks or a month prior to the accident, which would be in 2006.

Q. Did you also notice in Mr. Woods' deposition

that he claims that various labels were applied by both he and Mr. Witherspoon sometime after the machine arrived and was installed but before the accident?

A. Yes, sir.

(Plaintiff's Exhibit No. 8 marked for identification.)

Q. With regard to the machine that was previously in that position, I'll show you Plaintiff's 8 which I represent to you is a 48-inch Morbark machine. I think we've previously identified it as one that was at A & K Mulch previously. Is it your understanding that was the machine that Mr. Holland was trained and learned on someplace between April of 2004 and April of 2006?

A. Yes, sir.

Q. Now, with regard to that machine, it has a lot of information on the side that's being shown in the photograph. It doesn't look like those are exactly the same arrangement of labels on the same original 58-inch machine design. So if you look -- I'll represent this to you, Plaintiff's 8 is the left side view of the 48-inch machine. And if we look at the left side view of the 58-inch machine that's identified as Plaintiff's 2, it looks like there's some different arrangement of labeling?

A. Correct.

MR. OTT: Objection to form.

THE WITNESS: (To Mr. Ott) Sorry.

Q. All right. Well, I'm just going to speed this up. Is there any difference between the two, the arrangement of labels?

A. Yes, there is a difference. One of them is that this, Plaintiff's Exhibit 8, has about 15 signs up there, ranging from the identification of it being Morbark to a variety of instructions, and at least two that say "Caution," and I can only read part of one of those, and one that says "Danger," but again only describes part of the actions that someone should take.

Q. There are no pictograms shown on that 48-inch machine, the view at least that you can see?

A. That's correct.

Q. Now, let me just ask you -- well, there is one other exhibit. Let me mark as Plaintiff's 9 Morbark Bark Bulletin dated May 21st of 2003. It's Morbark numbers 106 and 107.

(Plaintiff's Exhibit No. 9 marked for identification.)

Q. This refers to adding some lock-out/tag-out information or labeling to existing Morbark equipment. Will you take a look at that just briefly? It's

actually three pages, Morbark 106 through 108.

A. Okay.

Q. Are you familiar with that OSHA standard that's referred to there, the regulation 29CFR 1910.147?

A. I don't know what year, because I don't recognize the volume number. I mean, the detail number. But this is dated 2003, so it probably -- it's most likely that it's referring to ANSI Z535 from 1999.

Q. All right. Let me ask you about 535. How does that relate back to and fit into what essentially is the hierarchy of safety, the principle of machine design, as particularly I guess it's now incorporated as ASTM WK 28145, how does the labeling requirement of that ANSI 535 and its predecessors fit into the hierarchy of machine design?

MR. OTT: Objection to form.

A. It's focussed upon the development of potentially effective warnings, focussing upon what they hope are effective warnings, but being critical, it has to be attempts at potentially effective warnings.

Warnings are -- I like the system safety hierarchy because that sounds like such wonderfully subtle things of what you can do to keep somebody from being hurt on equipment. And it deals with the same things that are supposed to be cited on warnings, the

hazard, consequences of encountering the hazard, the ways in which the hazard can be avoided. And then if you've got the -- and, you know, initially get a term like "danger" or "warning," whatever, and if possible and appropriate, having a drawing such as the cartoonist kinds of things that you see so that a person -- the primary reason is so a person will get a quick reminder of that without taking the time to read through the entire warning. Which makes sense, because they will rarely read through the entire warning more than once or twice. They will assume I know what that is. If they come up and see that pictogram, it will remind them immediately of the kinds of things that they read. So it doesn't take as much of their attention to be able to monitor that.

But the system safety hierarchy says you've got a hazard. The ideal thing is you get rid of the hazard. Probably logically most injuries occur on equipment where you can't get rid of the hazard because it's performing -- the thing that's making it hazardous is performing a necessary action on the part of that equipment under that system and what have you. Which is just saying if you've got debarking or chipping or whatever kinds of equipment, you've got to have sharp knives in there, and getting rid of the problem is

another way of saying essentially, you know, mechanically committing suicide. This has to stop, it can't run anymore because people would get cut on it. That's ridiculous.

So you go from okay, if we can't eliminate the hazard rationally, then what can we do to guard against a person coming into contact with the hazard? And it's very rare that you have a total -- just like it would be rare to get rid of the function, it's rare to have a totally effective guard. So really almost all the time it's saying do your best shot at guarding, keeping people away from this hazard, but at the same time be sure and provide them warning and information about how they might be able to get around the guard and what that could do to them.

So let's say you have no possibility of guarding. In this case we're talking about somebody that's going to change the knives, has to get the thing opened up, change it. So guarding it so that you could never open it up, it's just like eliminating the hazard itself, you know, weld the thing shut. Well, then how do you clean the knives and reset them and sharpen them and that sort of thing? Well, you do it in this fashion. And the warning tells you why you're going to be doing this and so forth and so on that I've already

talked about.

That warning is usually a good supporter for partial guarding, things of that nature. Sometimes, though, it's the last ditch, the only thing that can keep a person focussed upon, for any period of time, upon what could go wrong. Because the longer that somebody has worked on this stuff without any risk whatsoever to themselves as far as they know, say they never encountered the hazard, nothing bad ever happened before, the less and less attention they're going to pay to anything. The pictogram warning is sort of a desperate last shot at, okay, if you don't remember what you're supposed to be doing and you found yourself in this situation, at least do A, B, C.

At that point A, B, C has got to be made simple enough and not punitive, and "punitive" meaning seen by the operator as a waste of time. It's sort of like say if you're here working with somebody else that's using these knives or sharpening them to work on a 58-inch machine, how do you communicate to somebody that's 100 yards away at the other end of the machine that you don't want anything else running down here?

Well, you've got a procedure. You go and lock -- tag-out/lock-out. If somebody has got to help you, they better -- they really should also be tagged

out and locked out so that if somebody goes away, gets distracted, comes back at the other end, they won't take their lock off and now turn the machine on while you're using it. All of that is to try to provide some simple way that a person can deal with this and assure to themselves that they will not be putting themselves at risk.

Unfortunately, more often it's like bad driving and everything else. The more often you get away with doing something, in a sense you weren't hurt, nobody else was hurt, the less importance that you're going to give attention, the less important the things would be that you should be attending to, and your attention gets more and more focussed on the particular actions that you're just going to take assuming everything else goes well.

Q. All right. The specifics about Z535, you mentioned earlier that these evolved after World War II and the war Standards Act. I think GE and some other contributors formalized their safety signs, labels and messaging standards?

A. I misspoke. It was Westinghouse.

Q. Westinghouse?

A. Yeah.

Q. Okay.

A. Westinghouse and FMC developed in-house standards. In fact, FMC probably, this is a personal opinion, but developed the best tactics to approach coming up with some kind of warnings of various levels and so forth and said it in such a nice fashion that anybody that got into high school can sit there in those days with a Xerox machine, nowadays with a computer, can sit there and cut and paste things to come up with a reasonably good kind of warning. And it's all in language that everybody, including me, can understand.

A lot of that actually was incorporated into -- Z35 was in effect at those times and incorporated by committees from ANSI over a decade into the first Z535 and literally with concordance by FMC. It's just taking big chunks out of that and trying to put this in to make it more palatable to persons that might want to use it.

Q. Let me ask you, no one asked you about your background and your educational history and I want to just get it on the record as quickly as possible. You're a retired professor emeritus from the University of South Carolina?

A. Distinguished professor. I'm sorry.

Q. You're a distinguished professor emeritus?

A. Yes.

Q. All right. What was the scope of your

responsibilities, your last assignment with the University?

A. I taught both undergraduate and graduate level courses, ranging from things from my specialty areas of industrial-organizational psychology and human factors psychology and undergraduate only courses in statistics and the overall, you know, introductory psych.

Q. These principles you talked about, these behavioral responses and things that go into, that are included in the basis of your opinions, these are matters that you've taught?

A. Oh, yes.

Q. How many years have you been involved in teaching those principles?

A. Including graduate school, I did part-time teaching 60 years. I'm sorry, 50 years. I'm making myself ten years older. God, time flies.

Q. You mentioned that you had on some occasions published in this area and I think that you were responding to a question that was very specific about human factors warnings. Are all your publications listed in the materials you've provided?

A. Yes, sir.

Q. And do those generally address the same

basic principles of human factors psychology?

A. My research has addressed certain aspects primarily having to do with perception, how people organize information, the decision process about taking some action as a result. So it's learning and decision making and perception. And also things that are time related, response times under various circumstances. I'd say probably about 85 percent of the publications are related to those, one or more of those areas.

Q. Are there other texts that you've relied on in forming your opinions?

A. There's a set of things that I usually attach, if I write a report, that give reference, books that cover technically ugly kinds of summaries of a whole bunch of research. So things like the Handbook of Human Factors. Well, for that matter, actually very good resources are the books that I've used as textbooks in the graduate level human factors course.

Q. Do you stay abreast of current publications, conferences, professional organizations and their materials in the area of human factors?

A. I desperately try to keep up with it.

Q. And have you relied on any of that in forming your opinions?

A. Probably. Because when I see things that

are new, I synthesize a combination of what I've seen before and those. Those are the few that I really enjoy. Once in a while I find something that says no, no, you got it backwards here. I love to read that and see what looks like the right argument.

Q. Are some of these, the material you rely on, does it include international participants and publications, particularly Canadian?

A. Generally, the Canadian laws are -- Canada does the same kind of things that we do when it comes to safety, usually quicker, which is not always a good thing but it's just a difference. Things like the general systems safety, American Society of Safety Engineers, professional safety, are international in the sense that they get authors from all sorts of places, including Canada. Others are pretty much focussed upon U.S.-based research.

MR. JONAS: All right. That's all the questions I have. Thank you.

MR. OTT: Book it.

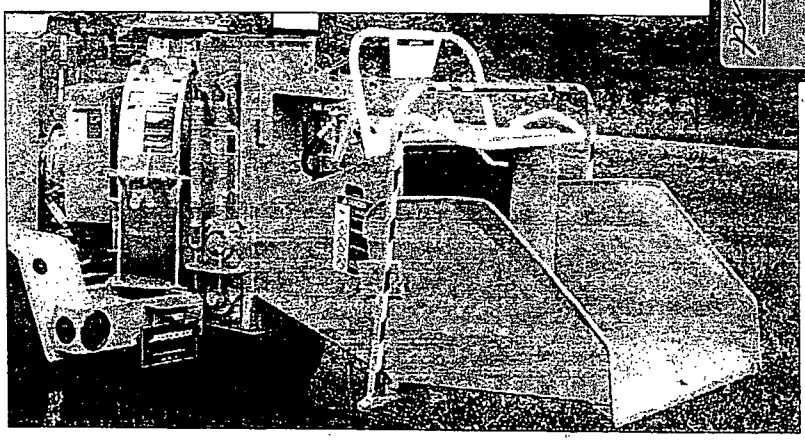
Further deponent sayest not.

(Whereupon the taking of the deposition was concluded at 11:45 a.m.)

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DEFENDANT'S EXHIBIT

Chippers: Can Safety Be Engineered?

By Peter Gerstenberger



Wood/Chuck developed the patent pending "Panic Bar," painted yellow above, to provide a dedicated, durable mechanism to stop the controlled feed system, and to lock the system out, in an emergency situation.

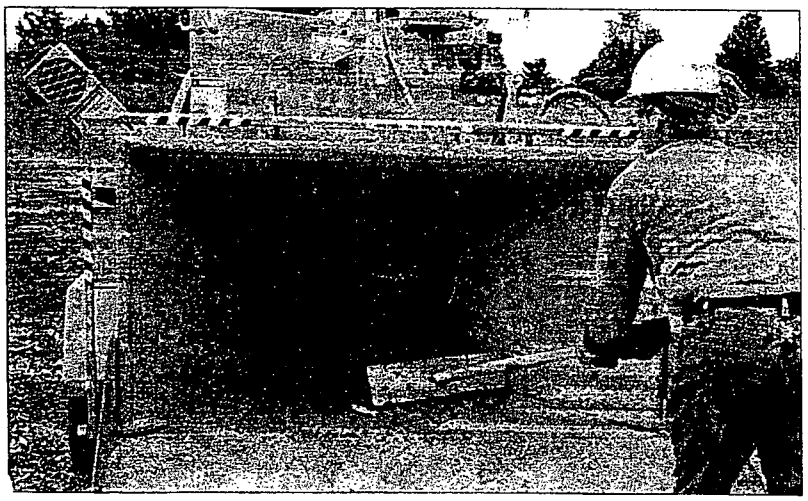
The short answer to the question our title poses is a qualified, "Yes." There are a few, fairly simple principles that need to be explained. A "hazard," we probably all know, is something with the potential to cause harm. Hazards are created by conditions and by actions.

Just as there are two broad causes of hazards, there are two ways to reduce hazard. An engineering control modifies a condition to reduce the hazard. An administrative control is something that changes behavior, and therefore reduces the hazard in an action.

In a perfect world, safety would be completely engineered. There would be nothing to think about, and no chance of making a mistake and causing an accident.

But of course our world, and especially our work environment, is far from perfect. As someone responsible for the safety of yourself and others, you need to be aware of every safety opportunity out there.

Brush chippers provide the perfect example of these principles. They are a vital part of the arborist's world. Their very purpose – reducing large tree limbs to small chips – points to the most significant hazard condition they create. The best way to mitigate the hazard is with awareness, attitude, training, specific procedures for operation, and appropriate supervision. All of these things are considered administrative controls. These are the areas in which you should concentrate your efforts if you want to have accident-free chipper operations.



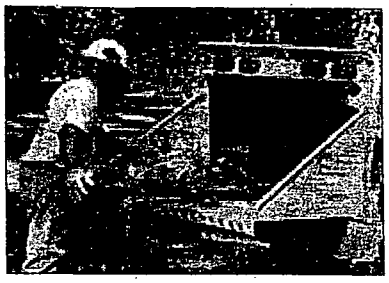
Bandit's wooden push paddle is a simple, expendable tool to help the operator resist the temptation of reaching into the infeed chute to push small pieces.

But our title talks about engineering, and we started by saying that to some extent, safety can be engineered into chippers. There is no engineering standard for brush chippers, nor does the ANSI Z133 Standard get into considerable detail on chipper design, preferring to concentrate on chipper operator procedures.

All major manufacturers adhere to three specifications that Z133 does make: 1) Chippers not equipped with a mechanical infeed must be equipped with an infeed hopper not less than 85 inches, from the blades or knives to ground level over the centerline of the hopper; 2) chippers without mechanical infeed also need to have a flexible anti-kickback device installed in the infeed hopper to reduce the risk of injury from flying chips and debris; and, 3) chippers equipped with mechanical infeed need to have a quick stop and reversing device located across the top, along each side of, and close to, the feed end of the infeed hopper.

Another feature that is generic to most manufacturers (but not necessarily all models!) is some sort of feed sensor system. These systems enhance performance, but they also reduce the risk of injury. A feed sensor reduces the likelihood of engine stall and plugging. Because it reduces plugging,

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Vermeer's upper feed control bar, combined with the bottom feed stop bar, provides a means for the operator to stop the feed rollers.

it reduces the need for the operator to unplug the machine, reducing exposure to the feed wheel and chipper knives.

The absence of any comprehensive standard left manufacturers free to analyze the risks associated with chipper operation and maintenance, and to engineer their own solutions. The remainder of this article is an overview of some of the newer, and more innovative, safety features from some of the leading U.S. chipper manufacturers.

Wood/Chuck

Some of the engineered safety features available on Wood/Chuck chippers include:

• **Panic Bar:** The Panic Bar is an innovative safety device intended to provide a dedicated, durable mechanism to stop the controlled feed system, and to lock the system out, in an emergency situation. In an effort to reduce accidents that may be caused by inattention to the surroundings, improper feeding techniques, improper material preparation, or ingestion of non-wood material, Wood/Chuck developed the patent pending "Panic Bar." The name derives from the fact that even in a "panic" situation all the operator must do is grab the bar. It does not employ any electrical components, and when activated daily as directed by Wood/Chuck, requires very little maintenance. Also, the panic bar is activated outside of the feed chute, preventing the suggestion that it is acceptable to place any part of the body into the feed chute.

The Panic Bar feature is unique in the following respects: It can be activated from almost any location around the feed area, even from the front of the chipper; it operates independently from the ANSI Z133-mandated feed system control bar; it is powder-coated a distinctive color to differentiate it from the control bar; and unlike some devices, it must be reset before the chipper will commence feeding.



Morbark lock pins lock the chipper drum or disc when changing knives, and when raising the top feed wheel for maintenance.

• **Discharge deflector/chute adjustment bar:** This device allows the operator to adjust the chip deflector and the discharge chute position without climbing on the chipper. This will reduce the opportunity for an operator to fall during adjustment or be hit by discharged chips, while facilitating proper chute and deflector placement.

• **Chipper hood safety latch:** Wood/Chuck's system reduces the chances of opening the hood while the disc is still rotating, and prevents starting the unit with the disc hood open.

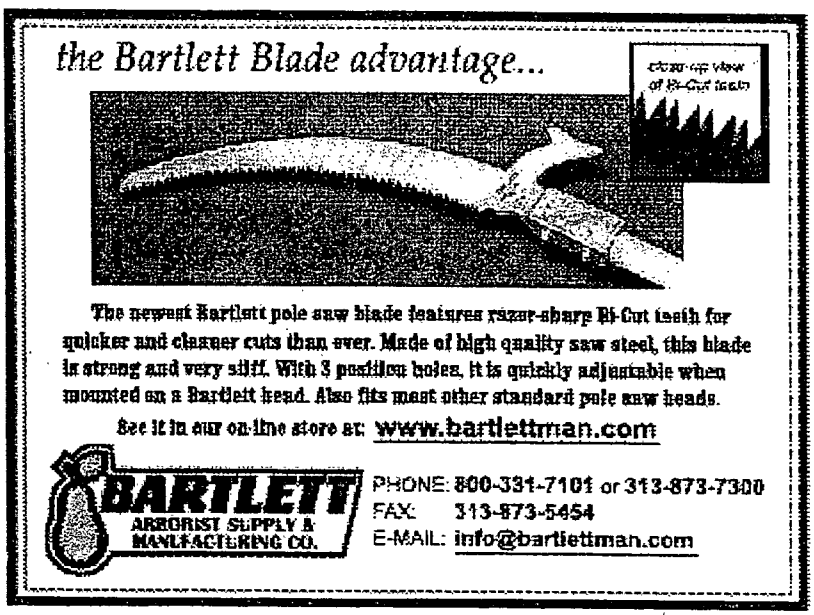
Bandit

Some of the engineered safety features available from Bandit include:

• **Last chance pull cable:** Located in the infeed hopper, these cables actuate the system that reverses the infeed rollers, giving the operator a "last chance" to extricate themselves from the chipper. Bandit makes this device available to other manufacturers to retrofit their machines.

• **Disc hood pin with keypad lock:** The keypad lock prevents unauthorized persons from accessing the disc.

• **Hood pin electronic limit switch:** This device positively prevents the engine from being started without the hood pin in place, so someone turning the ignition key cannot inadvertently set the disc in motion.



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• **Fold down feed tray cushion spring:** The spring reduces the effort needed to raise and lower the fold-up infeed chute, a nice back-saving feature that is standard on some of Bandit's heavier models.

• **Wooden push paddle:** This is a simple, expendable tool to help the operator resist the temptation of reaching into the infeed chute to push small pieces.

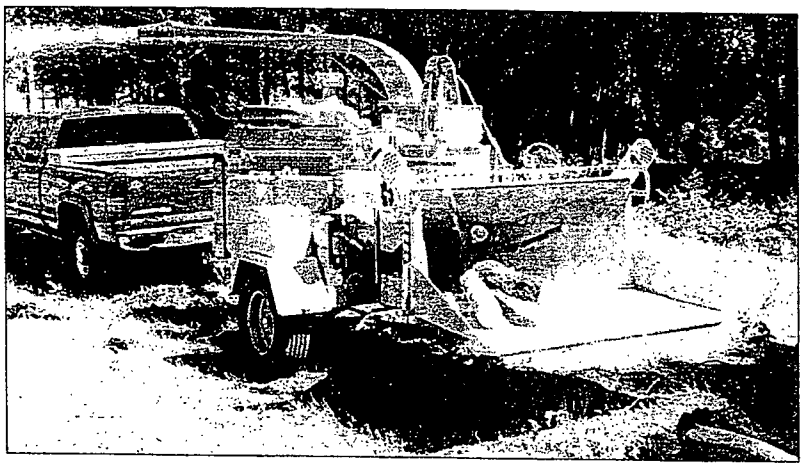
• **Mechanical spring lock pin:** With this device, the disc's hood cannot open until the disc has come to a complete stop.

Vermeer

Vermeer has been a leader in brush chipper safety innovation since the mid 1980's, starting with long feed tables with upward sloping sides that help keep operators from reaching and touching the feed rollers from anywhere around the in-feed table. To reduce the risk of injury for maintenance and service personnel, Vermeer designed the access time to the cutting mechanism to be longer than the coast down time of the disc/drum when using the prescribed shut-down procedure. This ensures that the sharp knives and the rotating disc/drum have stopped before the system is exposed.

Vermeer's latest technological advancement to improve brush chipper operator safety, include:

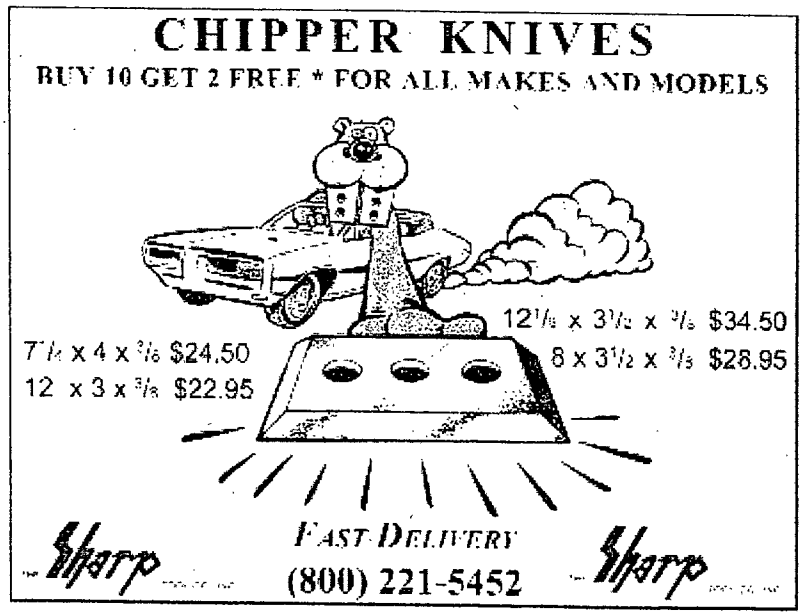
• **Bottom Feed Stop Bar:** Mounted on the leading edge of the feed table, this patent-applied-for system makes it possible for the operator's leg to strike the bar and shut off the feed either intentionally or automatically in an emergency situation. Vermeer feels this will provide a distinct advantage over comparative systems that require the operator to react, pull, or push something in order to stop the infeed mechanism. The new Vermeer system offers two settings for sensitivity to assist in difficult chipping conditions. The "Default" mode is most sensitive and requires the "Bottom Bar" to be depressed a shorter distance before activating the stop switch that controls the rotation of the feed rollers. The less sensitive setting requires the bar to be depressed further before triggering the switch to stop the feed rollers.



Bandit's "last chance pull cables," located in the infeed hopper, actuate the system that reverses the infeed rollers, giving the operator a "last chance" to extricate themselves from the chipper. Bandit makes this device available to other manufacturers to retrofit their machines.

• **Upper Feed Control Bar:** Combined with the "Bottom Feed Stop Bar" is a four-position upper feed control bar with dual stop positions as well as forward/reverse feed positions. Mounted over the feed table, this control bar provides a means for the operator to stop the feed rollers as well as selecting forward or reverse feed operations.

• **Reset/Hold-to-Run Button:** Dual reset/hold-to-run buttons allow the operator to readily reset a trip to the "Bottom Feed Stop Bar" or the upper feed control bar and to temporarily override either bar. By holding the reset button, a limb with wide branches will continue feeding even if it moves either bar to a stop posi-



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tion. When the limb is finished feeding, the upper bar can be easily returned to the forward feed position to continue normal chipping.

Morbark

Morbark's safety features include:

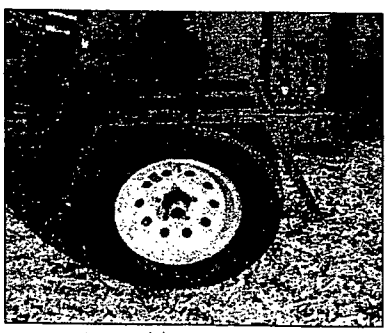
• **Safety switches:** Standard on all models are safety switches on the chipper hoods that will shut down the chipper if the pin that secures the chipper hood is removed during operation. Also, this switch will not allow the engine to start until the hood pin has been installed.

• **Clearance:** Adapting the Z133 requirement for drum-style chippers, all models' infeed chutes provide at least 85 inches of clearance between the pinch point of the feed wheels and the operator's feet.

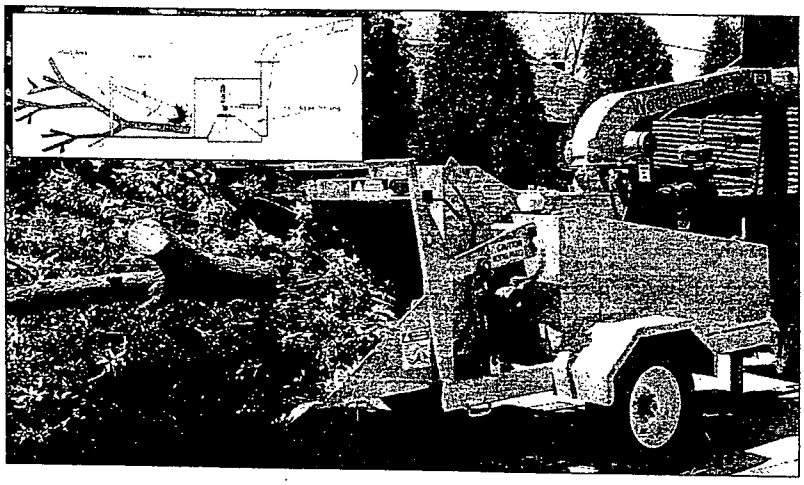
• **Lock pins:** All chippers have a lock pins to be installed to lock the chipper drum or disc when changing knives, and when raising the top feed wheel for maintenance.

• **Safety cords:** All hydraulic fed chippers have two safety cords that hang down in the infeed that an operator can pull on to reverse the feed wheels if he or she is being pulled into the chipper.

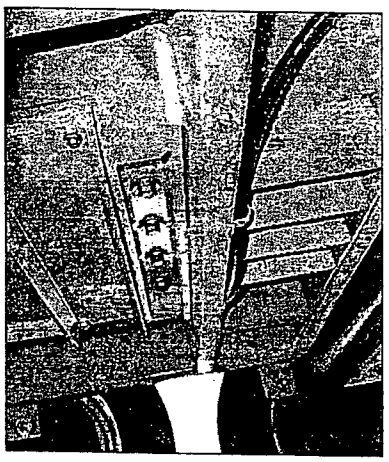
• **Non-slick pads:** Chippers have non-slick pads on all fenders to prevent the operator from slipping when climbing onto the chipper during maintenance.



Morbark's chippers have non-slick pads on all fenders to prevent the operator from slipping when climbing onto the chipper during maintenance.



The hydraulic feed wheel on Woodsman chippers can be raised from either side of the machine.



Woodsman chippers are equipped with a removable access panel in the chipper housing that allows access for changing, turning and adjusting the four-sided anvil.

Woodsman

Adjusting the anvil (or bed knife) in many chippers is a two-person job, with the requirement for one person to climb inside the feed area to gauge the setting. This is a potentially unsafe situation, placing a person inside the feed chamber. Woodsman chippers are equipped with a removable access panel in the chipper housing that allows access for changing, turning and adjusting the four-sided anvil. One person can easily accomplish the task without entering the feed chamber.

A hydraulic feed wheel lift is a feature on many chippers, but with Woodsman, the feed wheel can be raised from either side of the machine. Also, with its single feed-wheel design, firewood length material is much easier to feed. With less effort required to feed short pieces, there is less risk of the operator reaching into the feed system.

Conclusion

The "take-away" from this article is that, to some extent anyway, safety is engineered into brush chippers. Safety features should be an important consideration in your next chipper purchase. And because these features vary considerably from manufacturer to manufacturer, it is left to you to evaluate which feature or collection of features will provide your crews with an optimal safe work environment.

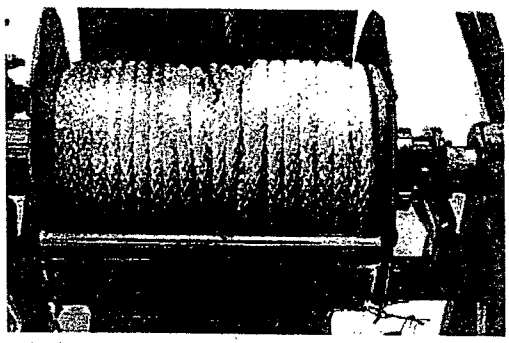
Keep in mind that the most important "device" we can use to stay safe in the face of workplace hazards is the one housed between our ears. Therefore, make your hiring decisions as carefully as you make your purchasing decisions. Invest in employee training and education, and provide appropriate supervision. These actions will reward you over time.

Peter Gerstenberger is senior advisor for safety, compliance & standards at TCIA.

00880

clearly makes sense to put distance between the operator and the feed rollers. The structure that defines this shape serves as a mechanical barrier so the operator cannot touch the feed rollers while standing on the ground. It also helps prevent an operator from being pulled into the feed rollers by a limb. This strategy has been highly successful and has been adopted in various ways by most manufacturers today.

Another feature developed by Vermeer is a bottom feed stop bar strategically located at the end of the feed table, where it is possible for the operator's leg to strike the bar and stop the feed either intentionally or automatically in an emergency situation.



"The feed stop bar is set up so the operator does not have to reach for a safety cable or bar," says Roorda. "The operator's leg will bump the feed bar and disable the feed roller automatically."

This patented feature includes dual sensitivity settings so the operator can reduce the sensitivity of the bar in difficult feeding conditions. This selectable sensitivity feature together with the location and design of the bar are intended to minimize the potential for limbs striking and tripping the bar while also providing an important safety advantage. Along with the bottom feed stop bar, an upper feed control bar now adds another stop position to allow the operator to stop the feed by either pushing or pulling the bar.

"These features are built into every Vermeer chipper," Roorda says.

"We also have a program called Tech Reach in collaboration with Manpower nationally and with other manufacturers for people wanting to learn to be climbers or run chippers," says Roorda. "We do multi-day events that go through various disciplines, including operator safety, from how to hook up and tow your chipper to its safe operation."

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Chipping Away at Chipper Safety

Tree Care Industry, the monthly magazine of the Tree Care Industry Association, September 2008 issue



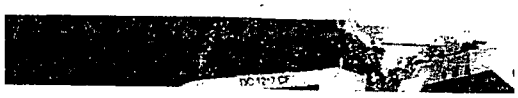
By Rick Howland

The tree care industry can be a dangerous one, but is becoming less so as the days go on, thanks to two things that can work independently or in concert with one another: Safer equipment and better operator training.

The chipper is a perfect example. You might think you recognize all the improvements that have been made in chipper technology over the years, but you are likely to be wrong. Sure, you can click off the major steps in safety and training, but there is some very subtle, very effective engineering that's working on your behalf, thanks in large part to a savvy manufacturing group that wants you and your employees to be efficient in your job and safe enough to, yes - go home to your family each night, but also to come back and buy more, bigger and better machines.

Case in point is Vermeer. According to Todd Roorda, solutions specialist for the environmental business segment at Vermeer Corporation, "In 1985, Vermeer established the first successful configuration of the feed intake for brush chippers that provided a strategic shape and size to help keep operators away from the feed rollers and knives of mechanically fed brush chippers."

This safety strategy is often referred to as "safety distance guarding." Since most brush chippers are hand-fed, it



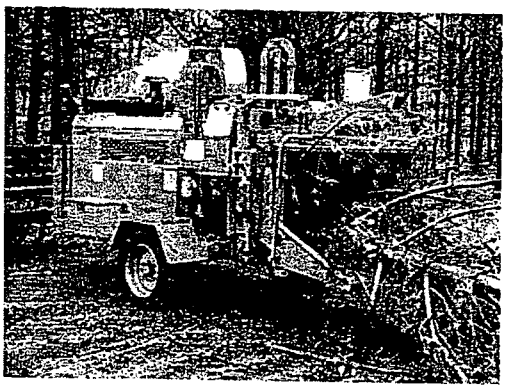


Remark: The weight of the end feed chute on new Vermeer chipper [illegible] helps to lift the feed wheel to the operator's four [illegible] intended to drive it that [illegible] of the left and rear from the business end of the chipper.

The most recent addition to the Vermeer chipper line is the BC2100XL, a 21-inch chipper launched in January 2008. This unit is designed to accept entire trees, so it's popular with contractors doing site prep and land clearing as well as some residential takedowns. "With the 2100, you don't have to spend a lot of time de-limbing a tree. This machine has more pulling power (10,000 pounds) and crushing power (4,500 pounds) than any other chipper we've designed. This increases efficiency enormously," Roorda concludes.

"What we talk about most is physical safety," says Dennis Beam, former president of Woodchuck Chipper Corp. and now sales manager for Altec Environmental Products. "It is part of the company's whole philosophy about being smarter and safer."

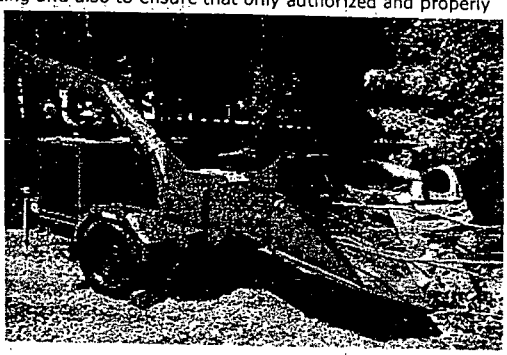
The same is true for Altec's Sentry training program, according to Beam, which offers either computer-based or on-site instruction for every Altec product, leading to user certification on proper equipment usage and injury reduction. (Altec has trademarked its brand statement, "Helping crews work safer and smarter.")



"The panic bar was introduced a couple of years ago at Woodchuck and carried over to Altec products," Beam says. "We think this is the premier safety device for chippers in the industry, and Altec continues to refine and to make the bar more user friendly into its second or third generation." This is the bright green bar set up between the operator and feed system and is standard on all Altec Environmental Products equipment featuring the control feed system. (With self-feed types, Beam says there is no

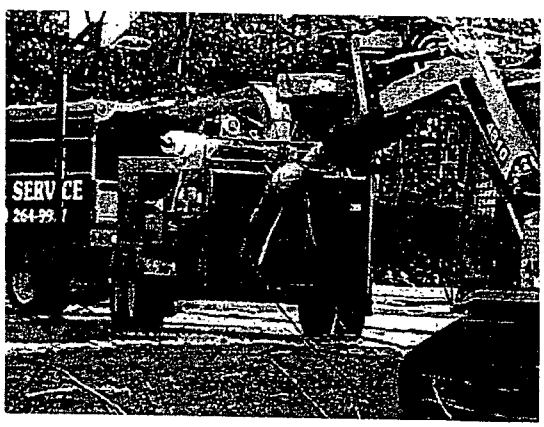
way to incorporate that bar.)

He adds that Altec continues to ensure that all safety guarding is correct on all products to meet all standards, and takes steps to ensure that operators are protected from moving parts while operating the machine or accessing the machine for maintenance.
"We have secured the machine to include padlocks, which slows operator access to ensure that the machine has stopped rotating and also to ensure that only authorized and properly trained personnel have the tools and can access those areas," he says.



The actual configuration of some Altec models is also contributing to safety. Beam notes a growing interest in what is called the curb-feed system, which allows an operator to side-feed and thus avoid feeding from the back of the chipper, an important consideration when the operator's back is facing oncoming traffic in urban areas. The curb feed offered in 12-inch models is set up to allow operators to face rearward, toward oncoming traffic, and removes them from being between the traffic and the machine.

Additionally, on models featuring a winch (standard on larger models), Altec employs not a steel cable, but, rather one made of a material that does not store energy under strain (think a stretched rubber band) with the potential of lashing about if snapped, thus potentially injuring an operator or damaging the chipper. Instead, Beam says, if the line breaks under load, it merely drops to the ground.



"Finally, he says, "There is no substitute for training, and there are warning labels on each machine."

Rob Faber, commercial sales specialist at Morbark, says safety is the most important issue at the company. "Our major safety measures include the length of the infeed chute, some 85 inches from the pinch point of the feed wheel to your feet. This is a general rule intended to ensure that the operator is kept at a safe distance from the business end of the chipper," he notes.

Next, Faber says, there are two safety cables in the infeed chute. "If an operator feels he is being pulled in or getting caught up, there are two hanging cables to pull on that will cause the feed bar to go into reverse."

"We also feature a safety switch on the chipper hood. If you pull the pin that holds the hood in place while the engine is running, it will shut down the machine and will not allow it to restart until the pin is replaced."

Morbark makes eight chipper models with capacities ranging from 6 to 20 inches, and with horsepower ratings from 25 to 325, Faber says.

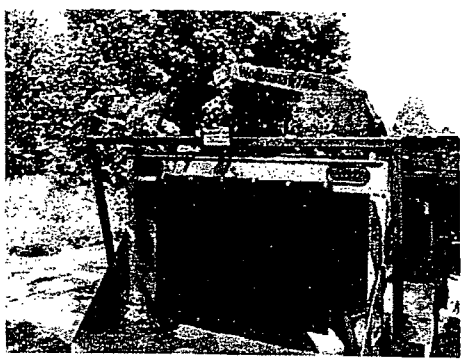
Jerry Morey, president of Bandit industries, says chipper safety is an industry-wide issue. "We would like to thank all the tree care services that have instituted regular chipper safety training programs, and we also applaud the efforts of the industry trade associations that are working hard to make worker safety a top priority."

"At Bandit, we continue to stress proper safety training and operation as the best way to avoid accidents. Above all, always follow ANSI and OSHA standards," says Morey.
"We do our part as well," Morey says, pointing out the safety features on all Bandit chippers. These include guards to cover the hydraulic pump belt drive, chipper drive belts, feed wheel drive couplers and bearing retainer; awooden pusher paddle to help the operator feed small wood debris; safety decals prominently displayed and available in multiple languages (Spanish/English combination now standard); patented mechanical spring lock pin that prevents the disc's hood pin from being removed when the disc is turning. (The disc's hood won't open until the disc has come to a complete stop) and a padlock to prevent unauthorized persons from accessing the disc or drum; patented last-chance pull cable located inside the infeed hopper and used to stop and reverse the feed system; patented fold-down infeed tray cushioning springs, which reduce the effort required to raise and lower the in-feed pan (standard on larger, heavier Bandit chippers, from Model 250XP on up); availability of equipment in two safety colors, Bandit yellow or alert orange; and an electronic limit switch on the disc/drum hood-pin lock-out to prevent the engine from being started without the hood pin in place.



Safety also involves ergonomic design, Morey says, so "look for low-risk positions for any operator, such as low force, low stress operation, no repetitive motion functions required for operation, and easy-to-read gauges."

Chuck Ritz, president of Karl Kuemmerling, maker of the Mitts & Merrill brand chipper, is convinced that the basic technology of a chipper contributes to its safety, and that is why he advises buyers to purchase a drum-style chipper, which he says is unlikely to pull an operator through the cutting area.



"When feed-roll chippers first came out, they were said to be the safest on the market, but it didn't prove out to be that way," opines Kuemmerling. "To my way of thinking, the drum style is safest, although the feed-roll types have their advantages in being able to take in vines and branches."

Safety is a process that needs to be shared with the industry, according to Sal Rizzo, president at Salsco, which he says has been making its chippers with safety bars and emergency stop buttons in the feed-operator area for nearly 20 years.

"Our equipment has been safe right along, and we would not put one on the market that wasn't," says Rizzo. "It doesn't matter who is first with new technology, it matters that all equipment has it. If we

come up with a safety device, I feel strongly that everyone should have access to it. That's why we do not patent ours."

Salsco makes chippers ranging from 3.5 inches to 18 inches, both PTO and engine driven, and manufactures other products for six different industries, Rizzo says, "so safety is a big concern."

New to the chipper market is U.S. Praxis, known for its splitters and stump grinders until the spring of this year.

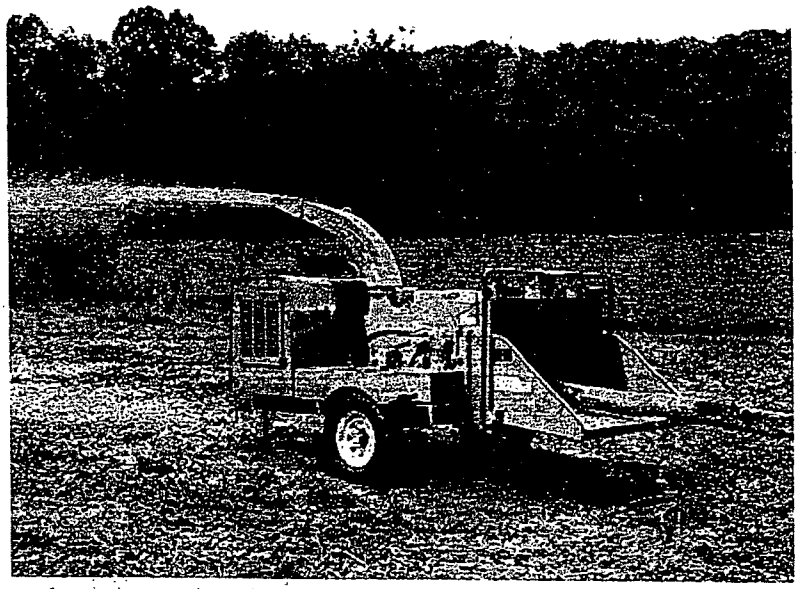
"Building on its success in the log splitter and stump grinder markets, U.S. Praxis recently entered the chipper field with the Praxis Wood Chipper," says Jim Cornelius, company president. "Our goal was to build a wood chipper that was small enough to fit through a standard 36-inch gate but with a large enough chipping capacity to take on 6-inch limbs."



In the past, Cornelius notes, users shied away from gravity-fed chippers due to a tendency for debris to kick back at the person feeding the machine. He calls it "chuck and duck." Praxis overcomes this with a rubberized screen for additional safety.

"Another safety feature is an operator safety switch on the cover of the flywheel," he says, "so that, if the cover is opened, no one can start the engine."

"We take a simplistic outlook," says Bob Engler, president and owner of Woodsman. "We feature a three-sided control bar that protrudes from the structure of the feed hopper, allowing easy access to the control bar. We don't do pull cables and some other features because our view is that we abide by ANSI recommendations, and, second, events happen so quickly that operators don't have much time to think. We think the three-sided control bar is safest and we make it standard on all Woodsman units. That way, it's simple for a quick reaction by an operator or someone standing by."



Bandit's chipper engine will not start when the feed wheel is engaged. The chipper feed wheel system is designed to minimize operator presence at the infeed chute.

Woodsman makes drum style chippers in four models, from 6 inches to 20 inches, and also has a full line of biomass chippers used to make fuel for biomass energy generators.
In addition to exceeding the reach standards (edge of the tray to the pinch point of the feed rollers), Echo Bear Cat features a unique four-position control bar (reverse, forward, neutral and reverse again). This gives the operator two opportunities to throw the hydraulic-feed machines into reverse, thus backing material safely out of the feed area.
According to Joe Dietz, product manager for Echo Bear Car products, "What we do is unique in that the hydraulic-feed models, featuring a reverse on both ends of the control bar. If an operator feels a threat as a branch is drawn in, he can do what's easiest - either pull or push the feed roller control bar and get the feed into reverse to back material out."

Conclusion
Safety is everyone's concern, says Tim Walsh, who has taken a particular interest in chipper safety and has spoken on the subject at TCI EXPO (see sidebar, page 36). As you look at the offerings in today's market, Walsh says, consider that the manufacturers are doing what they can technology-wise, but also doing what they can to help you remember that you, the buyer, and your users need to be trained and aware so your chipper remains the asset it was designed to be.

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EQUIPMENT SPOTLIGHT

Wood Chippers

by Mark Henricks

-View the list of manufacturers at the bottom of the page

Wood chippers are used to reduce dead wood—felled trees, retired utility poles, brush and other green waste. The process is fairly straightforward: wood goes in and chips fly out. But like the machines that create them, not all chips are created equal. Some can be profitable, others merely problematic. As far as chipper manufacturers are concerned, the desired end defines the right chipper for the job.

A chipping chore could entail residential landscaping and tree trimming, forest maintenance, clearance for power lines or land development. Three standard chipper designs are primed for the task. The high-speed rotor chipper — a.k.a. the "chuck and duck" — is a non-hydraulically-fed machine that has lost much of its luster to the safer, hydraulically-fed disc chippers first introduced by Morbark, Inc. in the late 1970s. Drum chippers have come into favor during the last decade.

"The choice depends on the products you're processing," says Greg Millis, governmental sales director for Morbark, which manufactures a range of chippers from the small, trailer-mounted drum-styles to giant, stationary disc chippers. "If I'm a contractor selling clean chips to a paper mill, I wouldn't think about using a drum chipper," he says. "If I'm a big land clearing contractor, though, I wouldn't need a disc chipper."

Disc chippers allow operators to size their chips, often a prerequisite to supplying spec.-happy pulp and paper mills, or landscaping companies that will color the chips for sale as decorative mulch, so-called "yuppie bark." Disc chippers are considerably larger and heavier machines than their counterpart and, as a result, can be less maneuverable and far pricier. The upside is that they are capable of dispensing with the whole tree.

"Disc chippers are basically a Cuisinart on steroids," says Dave Benton, marketing and advertising manager for Peterson. Like Morbark, Peterson offers a line of disc chippers that can be packaged as all-in-one solutions for large-scale tree operations catering to the pulp industry. Rather than waste tree tops, limbs and bark left over from traditional, manual preparation of trees for chipping, disc chippers like the Peterson 5000G Delimber/Debarker/Chipper incorporate various flail-type trimming devices to automatically sheer off and separate bark and other unwanted materials that cause pulp and paper mills to cry foul. The clean stem, or bole, is then fed through the chipper.

"Those smaller limbs and bark, the byproduct that is pushed out of the machine, can then be valuable for use as a 'hog fuel,'" says Benton, referring to chips used for boiler fuel at pulp or biomass plants. With skyrocketing natural gas prices, the industry is seeing a shift back toward utilizing the waste chippers to create a fuel source.

Since chips for boiler fuel need not be free of bark or uniform in size, a drum chipper is equally well suited to the task. "Unfortunately," says Mike Byram, senior director of Vermeer's Environmental Business Segment, "we usually just hear customers say, 'I take it to the landfill.'" To supply bio-fuel and reap a profit, mass quantities of chips are needed. Drum chippers, which typically cater to small-scale landscaping and land-clearing operations, rarely produce sufficient quantities. Still, manufacturers see future growth in this market as fuel prices continue to rise and more landfills invoke bans on dumping wood.

As it is, the drum chipper manufacturers interviewed for this article—Vermeer, Morbark, Bandit and Dynamic—focus more on improving the standard functions of their machines than worrying about the aforementioned fringe benefits, namely chips as fuel or mulch. According to Tom Gross, president of Dynamic Mfg. Corp., "Chippers are primarily used as the first means of breakdown, to take trees cut down from land clearing jobs, yard trimmings, to reduce the volume that may end up in a landfill."

All hand-fed drum chippers function similarly. "To start with," Byram explains, "you have the in-feed table. The material, once it's on the table, is fed into the drum by hydraulic feed rollers. These act to pull the material in as well as to resist self-feeding. The old-style feeds, without rollers, would actually suck that material in. So it's a more controlled process now." The material is then chipped by the blades on the drum, after which a series of paddles accelerate the chips to blast them out the chute.

On contract jobs, where time is money, productivity and chipping capacity are major concerns. Dynamic Mfg. Corp. has developed and patented a unique Cone-Head drum design that orients material to its staggered knife system for more efficient cuts. "With a 12 inch log at 250 horsepower, a traditional drum machine might only chip a foot to a foot and a half before the feed system stops," says Gross. "With the Cone-Head, our chippers can chip two to two and a half feet."

As the hydraulic feed system is the heart of a chipper's innards, it is also a focal point for innovations. Vermeer is another manufacturer that has reinterpreted certain standard chipper features. "Most chippers have some sort of feed system, based on engine rpm, that controls the feed speed," says Byram. "With our Smart Feed control system, if a material won't go in, the machine will back it up different distances each time, three times, to get the material to rotate and go back in." This helps take the operator running the top bar out of the equation.

Reducing manual-labor costs and protecting chipper operators are not merely

secondary goals to manufacturing efficient, high-capacity machines durable enough to stand both the rigors of their inherent engine vibrations and the rough terrain they are often pulled through. Horror stories abound of chipper operators being caught up in tree limps and dragged into the blades, to lose a pinky or, worse, a head. Safety, not surprisingly, is of paramount concern to manufacturers.

While all chipper designs incorporate some sort of emergency shut-down lever, Vermeer has redesigned and relocated its stop bar so that an operator who is being inadvertently dragged onto an in-feed table will automatically trip the bar, rather than have to actively grasp for it to shut down the chipper's feed system.

Such dire situations are rare, but buyers are nonetheless wise to evaluate the safety features just as they would productivity, quality and durability and, lest we forget, its maintenance needs. Like all heavy machinery, chippers will eventually need servicing. As downtime equals money, users must ensure that a dealer network is close by.

Of course, preventative maintenance—checking fluids, cleaning filters, maintaining sharp knives, greasing moving parts—can reduce downtime considerably. A machine is only as good as the person operating it.

Manufacturers		
Company Name	**Contact Person**	**Phone**
Bandit Industries, Inc.	Cory Gross	800-952-0178
Dynamic Mfg. Corp.	Tom Gross	989-644-8109
Morbark, Inc.	Greg Millis	800-831-0042
Roto-Chopper, Inc.	Monte Hight	320-548-3586
Vermeer Mfg. Co.	Mike Byram	641-621-8029
Woodchuck Chipper Corp.	Dennis Beam, III	800-269-5188

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Safety Information

Morbark has done everything imaginable to design the safest machines possible. However, machine safety depends on the operator and how well operators follow the Morbark safety guidelines provided in the owner's manual. The following information highlights the safety procedures recommended by Morbark for all our heavy duty, hand-fed brush chippers.

The information is divided into four safety categories: 1) Proper Clothing and Protective Equipment 2) Pre Start-Up Procedures 3) Chipper Operation Safety and 4) Chipper Maintenance and Care Safety.

Proper Clothing and Protective Equipment: Every operator should wear proper clothing and protective equipment on the job.

- Clothing should be close fitting and tucked in. Operator's should not wear loose fitting clothing like scarves and untucked or unbuttoned shirts and jackets, and pants with cuffs which could get caught on brush while they're chipping.
- A hard hat and ear protection are required.
- Eye protection is also required. All eye protection mush be OSHA approved and may consist of glasses, goggles or a flip down visor that may be plastic or mesh.
- Operators must wear a sturdy pair of work pants and a good pair of hard-toe work boots with non-slip soles.

MMWR™
Morbidity and Mortality Weekly Report
Weekly
December 10, 2004 / Vol. 53 / No. 48

Fall-Related Injuries During the Holiday Season — United States, 2000–2003

Although fall-related injuries occur throughout the year (*1*), few studies have analyzed seasonal patterns (*2–4*), and none have examined the extent of such injuries associated with holiday decorating. To characterize nonfatal fall injuries associated with decorating or related activities, CDC analyzed data from the National Electronic Injury Surveillance System All Injury Program (NEISS-AIP) for three winter holiday seasons. This report summarizes the results of that analysis, which indicated that, during 2000–2003, an estimated 17,465 persons were treated in U.S. hospital emergency departments (EDs) for holiday-decorating–related falls. Approximately 62% of those injured were aged 20–49 years; approximately 43% of injuries were caused by falls from ladders; and males were 40% more likely than females to be injured. Prevention strategies should focus on raising awareness about falls and promoting safety practices during the holiday season.

For this analysis, the holiday season was defined as November 1–January 31, when decorating or related activities (e.g., stringing and removing outdoor lights) usually occur. A fall-related injury was defined as one received when a person descended because of the force of gravity and struck a surface at the same or lower level. A case was defined as an unintentional fall-related injury that occurred to a person during the holiday season and included a product description (e.g., holiday lights) or a brief narrative in the NEISS-AIP database that listed decorating or a related activity as contributing to the injury.

To characterize these injuries, NEISS-AIP data were analyzed for three holiday seasons combined (i.e., November 1, 2000–January 31, 2001; November 1, 2001–January 31, 2002; and November 1, 2002–January 31, 2003). NEISS-AIP, operated by the Consumer Product Safety Commission, collects data about initial visits for all types and causes of injuries treated in U.S. EDs. These data are drawn from a nationally representative subsample of 66 of 100 NEISS-AIP hospitals selected as a stratified probability sample of hospitals in the United States (*5*). Data are collected from medical records, and the most severe injury is recorded for each case. Data for each case include a two-line narrative about information regarding the circumstances of the injury.

Data were weighted by the inverse probability of selection and summed to produce national estimates. Confidence intervals (CIs) were calculated by using a direct variance estimation procedure that accounted for the sample weights and complex sample design. Denominators for rates were calculated by summing the proportional fraction of the population for each year, based on U.S. Census population estimates (*6*).

During 2000–2003, a total of 225 fall-related injuries that occurred to persons treated in participating EDs were attributed to holiday decorating or related activities, yielding a weighted national estimate of 17,465 (95% CI = 12,751–22,179) injuries, an average of 5,822 injuries per season. The overall injury rate was 8.1 per 100,000 population (CI = 5.9–10.3). The majority of injuries (62%) occurred to persons aged 20–49 years. Persons aged >49 years sustained 24%, and persons aged 0–19 years sustained 15% of fall-related injuries.

Males sustained more injuries than females (58% versus 42%, respectively), although the rates for males (9.6) and females (6.7) did not differ significantly (relative rate [RR] = 1.4; CI = 0.8–2.1) (Table). The majority of falls were from

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DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL AND PREVENTION

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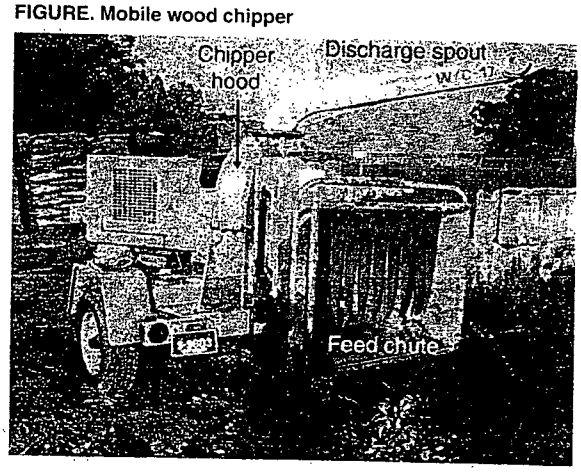
Fatal and Nonfatal Occupational Injuries Involving Wood Chippers — United States, 1992–2002

Tree damage from storms and routine tree-trimming operations prompt the need for disposing of branches and brush. Mobile wood chippers (Figure) shred branches and tree trimmings into mulch. Branches are fed into a chute, in which rotating blades macerate the wood. Mobile chippers pose potential dangers to operators, who can become caught in the feed mechanism and pulled into the rotating chipper knives or struck by the hood of the machine while it is being opened or closed with the knives still rotating. This report summarizes data describing fatal and nonfatal injuries related to occupational wood chipper use, which indicate that those working with mobile wood chippers are at risk for serious injury and death, but that these injuries can be prevented through proper training, machine maintenance, and the use of personal protective equipment.

To describe fatal injuries associated with wood chippers, CDC analyzed 11 years of data from the Bureau of Labor Statistics (BLS) Census of Fatal Occupational Injuries (CFOI) for 1992–2002 (the most current data available to CDC)*. Cases were selected if the primary or secondary source of injury was a chipper (source code 3231). After a review of all narrative descriptions, nonmobile chippers (e.g., those used as stationary equipment in saw mills) were removed from the analysis of fatal injuries. Costs were calculated by using the cost-of-illness approach (*1*). To assess nonfatal injuries, CDC reviewed 10 years of data reported by the BLS Survey of Occupational Injuries and Illnesses for 1992–2001 by using the same source code†. This data set captures nonfatal cases involving days away from work. For nonfatal injuries, narrative case descriptions were not available for review; therefore, removing cases involving nonmobile chippers was not possible.

* Using death certificates, worker's compensation reports, state and federal agency records, and other supporting documents, CFOI collects data on all fatal occupational injuries in the 50 states and the District of Columbia to determine worker demographics and the circumstances and causes of fatalities. CFOI data files provided to CDC by BLS do not include New York City.

FIGURE. Mobile wood chipper



Fatal Cases Involving Mobile Wood Chippers

During 1992–2002, a total of 31 occupational injury deaths were attributable to mobile chippers. All decedents were male; mean age at death was 35 years (range: <20–60 years). Of these deaths, 12 (39%) occurred among persons aged 25–34 years. Seventeen (55%) occurred in the agriculture, forestry, and fishing industry, and seven (23%) occurred in the manufacturing industry. Twenty-one (68%) were the result of being caught or compressed by the chipper, and nine (29%) were the result of being struck by the machine or a machine part. Thirteen (42%) of the fatally injured workers were groundskeepers, and five (16%) were machine operators, assemblers, and inspectors. The remaining were classified as managers, forest conservation specialists, farm workers, carpenters, cutters/welders, miscellaneous machine operators, and construction and nonconstruction laborers. Approximately one third of the events occurred in July or August. Of 26 cases among persons for whom ethnicity was known, seven (27%) were among Hispanics. Societal costs of all chipper-related fatalities (primary source code 3231) for 1992–2001 are estimated at $28.5 million in 2003 dollars (CDC, unpublished data, 2004§).

Nonfatal Cases Involving Mobile and Stationary Wood Chippers

During 1992–2001, an estimated 2,042 injuries resulted from working with chippers, an average of 204 per year. Of these injuries, 47% occurred among workers aged 25–34 years. In 1,224 (60%) of the workers, the injuries were to an upper extremity. During 1992–1996, an estimated 155 amputations

† The Survey of Occupational Injuries and Illnesses is a federal/state program in which reports from employers from their OSHA-reportable injuries are collected annually from nearly 176,000 private-industry establishments and processed by state agencies cooperating with BLS, and national estimates are made. Government employees, private household workers, the self-employed, and farms with fewer that 11 employees are excluded. Information about nonfatal cases involving days away from work during 1992–2001 is available at http://www.bls.gov/iif/home.htm.

§ Data are available by request at e-mail, egb6@cdc.gov.

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caused by injuries from chippers occurred. In approximately one quarter of the cases, the injured person missed >30 days from work. Sixteen percent of persons injured had worked <3 months at the job at the time of injury; another 18% had worked 3–11 months.

Reported by: *TW Struttmann, Div of Safety Research, National Institute for Occupational Safety and Health, CDC.*

Editorial Note: The primary risks associated with use of wood chippers include being caught in the rotating knives of the machine and being struck by flying objects (e.g., the chipper hood, which can fly off if it contacts the rotating blades). Use of mobile wood chippers might increase after storm damage, thus exposing more persons to these hazards. In addition, chippers are available from equipment rental companies and can be rented and used by homeowners and others.

Employers, workers, and others who use wood chippers can reduce their risk for injury. Personal protective equipment recommended during chipper operations includes hard hat, eye protection, hearing protection, safety boots, and close-fitting outer clothing (*2*). Worker training should include instruction in 1) the correct operation of safety devices and controls consistent with the recommendations of the manufacturer, 2) the need to keep hands and feet away from the feed chute, 3) proper procedures for feeding brush and limbs into the feed chute, and 4) standing to the side in reach of the emergency shut-off when feeding branches. A long branch should be used as a push stick to feed shorter material into the chipper. Small material such as twigs and leaves should be put directly into the transport container (e.g., dump truck) instead of into the chipper. The area around the chipper should be kept clear to reduce tripping hazards. Equipment rental companies should provide training or ensure that renters receive safe-operating instructions from the manufacturer.

To protect users from being struck by flying hoods, chippers should be thoroughly inspected each day before start-up. The hood should completely cover the chipper knives, and workers should ensure that knives come to a complete stop before opening the hood. Persons aged <18 years should be prohibited from operating chippers (*3*).

The number of chipper-related deaths among Hispanic workers during 1992–2002 was consistent with the increase in total occupational deaths among Hispanic workers during that period. Deaths among Hispanic workers accounted for 8.6% of all occupational fatalities in 1992 and 15.2% in 2002 (*4*). The growth in the Hispanic labor force is projected to be 17% during 2004–2010, whereas the total labor force is estimated to increase only 7% (*5*).

After Hurricane Charley, the report, *Injury Associated with Working Near or Operating Wood Chippers* (*6*), which summarizes hazards and prevention recommendations, was made available to all extension agents in Florida through the University of Florida Extension Service (C. Lehtola, Department of Agriculture and Biological Engineering, University of Florida, personal communication, 2004). The report is available at http://www.cdc.gov/niosh/hid8.html; a Spanish translation is available at http://www.cdc.gov/spanish/niosh/docs/99-145sp.html.

The findings in this report are subject to at least five limitations. First, because chippers are used in multiple industries and occupations, the number of workers exposed could not be determined; therefore, rates and relative risk could not be calculated. Second, CFOI cases could have been coded to sources other than 3231. Third, nonfatal injury estimates are based on a sample of employer-reported injuries and might underestimate the number of injuries caused by chippers. Farms employing fewer than 11 persons and self-employed, government, and household workers were excluded from the survey. Fourth, removing stationary chippers from the data on nonfatal cases was not possible. Finally, the data presented in this report do not include injuries and deaths that might have occurred in nonwork settings.

Tree and branch removal is a necessary post-storm task. Deaths and injuries involving mobile chippers can be prevented through worker training, machine maintenance, and the use of personal protective equipment.

References

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Fatal Cases Involving Wood Chippers

- During 1992-2002, a total of 31 occupational injury deaths were attributed to wood chippers.
- Twenty-one (68%) were the result of being caught or compressed by the chipper.
- Nine (29%) were the result of being struck by the machine or a machine part.
- All victims were male.

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Nonfatal Cases Involving Mobile And Stationary Wood Chippers

- During 1992-2001, an estimated 2,042 injuries resulted from working with chippers, an average of 204 per year.
- 47% occurred among workers aged 25-34 years.



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Wood chippers get sophisticated

Product Design & Development; 4/1/2006; Vermillion, Len

A wood chipper might not seem like that most sophisticated type of equipment. These outdoor power machines generally perform basic functions. Their main task is simply to clear brush and to turn vegetation into mulch. But handling shrubbery, branches, and small trees requires more sophisticated components than one might think.

One of the largest manufacturers of wood chippers is Rayco Manufacturing Inc. The Wooster, OH-based company manufactures a variety of wood chipper models, including the recently released 80 HP RC-12. The company has a growing of environmental equipment ranging from the 25 HP RC 6C model to the heavy-duty 225 HP RC 20xp. With all of its equipment, Rayco has worked to offer enhancements that will give users better machine performance, greater safety, fuel savings, and future operation upgrades.

In order to accomplish its improvement goals, Rayco sought to use microelectronics in its new designs. To help, the company turned to HED Inc., which provided a microprocessor-based electronic module to coordinate both engine functions along with that of the feed/cutting system. Called the CL-410, the module is part of HED's CANLink family of modules.

Rayco chippers grind wood using "knives" attached to rotors. These parts are ground to finish dimensions with a 1/1,000-in. tolerance. Rotating at high speeds of over 2,000 rpm, the machine takes in shrubs, branches, and trunks at a rate just under 150 ft/min.

A single CL-410 module monitors and controls operation of the throttle and the chipper's feed mechanism. Various clutch-engagement and fuel-saver parameters trigger the module's control of the engine throttle. Using fault codes from the ECU on machines with engines with more than 100 hp, the system can perform a machine shutdown if the feed mechanism becomes jammed. Rayco wanted to have this capability as it developed its product line.

Upgraded Electrical System

Thinking ahead, Rayco knew it would be eventually moving into Tier II engines, which would call for the higher amperage outputs this module handles. The CL-410 module offers protected input/output circuitry that can withstand spikes and shorts in the wiring.

The module has more than enough connector pins to meet needs of the wood chipper functions that include cutting speed, fuel controls, the braking system, and indicator lights. Originally developed for Rayco's stump grinder line, the CL-410 was found to be a suitable fit for the wood chippers.

For these relatively compact machines, the CANLink modules open up space within the chassis to do more functions. The module replaces the bulky switches, wires, relays, and fuses that would make up a standard electrical system. Driven by software, the CL-410, which is about the size of a paperback book, has the versatility to handle all the functions performed by standard components.

Along with cutting down on the cost of a huge parts inventory for individual machines, the CL-410 can be set up to monitor and control operations for seven machines with just one board. Yet, the module has the versatility to handle not only current functions but also other features that can be devised by Rayco engineers.

According to Bruce Chapman, manager of product engineering for Rayco, using the one module, "resulted in up-front savings and for everyday production we can purchase and stock one module to program as necessary."

"Inventory control loves this arrangement as the stock becomes flexible and can be converted as needed for any production schedule shift," he continues.

Added Abilities

The module give Rayco technicians the ability to program machine functions on the production floor from a laptop, using a set of algorithms developed by HED for each machine. These algorithms take into account the characteristics of each chipper model--engine size, feed rates, tooth count, blade size, rpm, and other factors--so that the product can be tuned before it leaves the factory.

HED provided Rayco with the Visual Basic/Windows package so technicians can quickly select parameters for the machine in which the controller will be installed. Chapman says that diagnostic LEDs on the module let the production personnel easily and reliably verify functions of switches, actuators, and wiring on the machine.

The same capability to program the modules within the Rayco manufacturing facility enables service personnel to diagnose any problems in the field using a laptop. This software based system also enables Rayco to develop new features than can be added to existing equipment in the field by just supplying the software patch.

The module has the base software code and Rayco technicians can do the rest in just a few minutes. Rather than doing complicated C programming or ladder logic, the user simply points and clicks to the type of machine they want.

One of the benefits of CAN technology is the ability to do datalogging and load control, as well as safety interlocks and system fault code shutdowns. The load control program can optimize performance of the engine by counting the rpm of the teeth on the feed wheel as the machine feed rate slows down. On an electronically controlled engine with an electronically controlled throttle, the module will control the engine based on the feed. If the operator leaves the feed in neutral for a determined amount of time the module will throttle the engine down to save fuel.

Interlocks programmed into machine operation protect both the machine and the people around it. With a wood chipper, the more an operator can anticipate its operation the better for safety in a variety of ways. For example, the sequence dictates that the feed does not start up until the engine does to prevent unintended movements. That is important when crews use the chippers because someone can go on break in the middle of an infeed and when everyone gets back to work another worker might start up the chipper. If this chipper was not set up with the interlock the risk exists of the machine starts up and shrubbery suddenly starts feeding in. The feed has to be turned on separately when work resumes.

For future development, Rayco is planning to use the datalogging function to record machine parameters for their own service diagnostics and to provide owners with data on how their employees are running their machines. This type of information will be useful to rental yards in tracking how their customers are using, or abusing, equipment. GPS and wireless capabilities also give owners the ability to track and update their equipment.

NEXT STEP

More information on HED Inc., 1715A Innovation Way, Hartford, WI 53029, is available at www.hedonline.com or by calling 800-398-2224.

MICROELECTRONICS COME OF AGE

Microelectronics have been around for nearly a half-century. What was the early integration of control circuits like? It all started in the 1950s when an engineer named Jack Kilby, working at Texas Instruments, dreamed up the idea of an "integrated circuit."

By the end of the decade, Kilby had developed several examples of these circuits. He connected components by hand-soldered wires and isolated them by using diodes as resistors.

Meanwhile, in 1958, Jean Hoerni of Fairchild Semiconductor invented a technique for diffusing silicon to build planar transistors. But it was Robert Noyce, a co-founder of Fairchild that is credited with the first true integrated circuit. He used a planar transistor, back-to-back pn junctions for isolation, diode-isolated silicon resistors, and Si[O.sub.2] insulation with evaporated metal wiring on top.

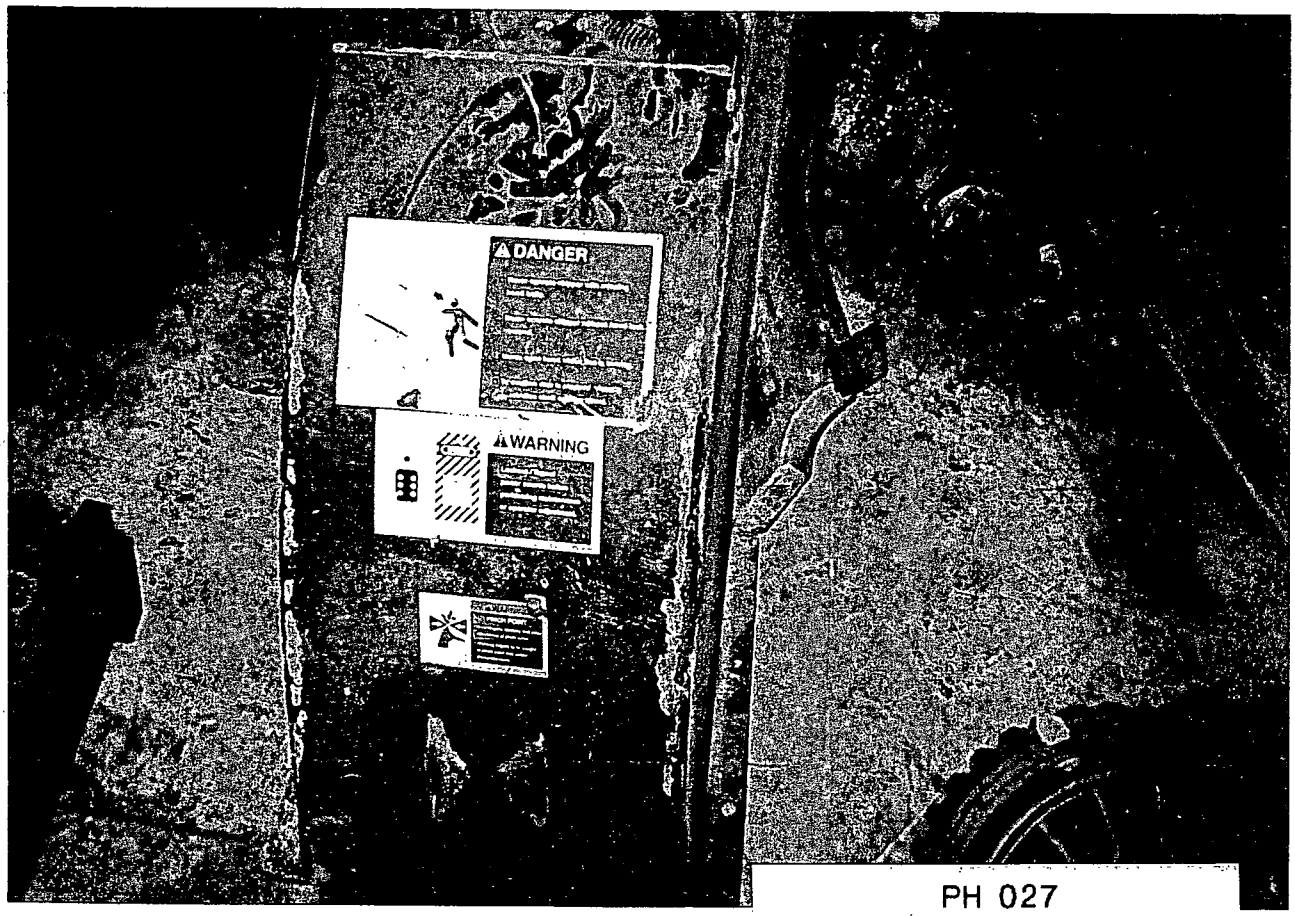
In 1961 Texas Instruments and Fairchild introduced the first logic IC and by the mid-1960s densities and yields were improved. In 1967, Fairchild marketed the first semi-customed chip.

Microelectronics really took off in 1971 when Intel debut the first microprocessor, designed by Ted Heft. It never captured much interest in the market and was soon eclipsed by more capable units.

Starting in 1972, a microprocessor that was able to control a CPU was finally introduced. Since then, there has been exponential growth in microelectronics and today, microelectronics play a big part in controlling a vat array of applications.

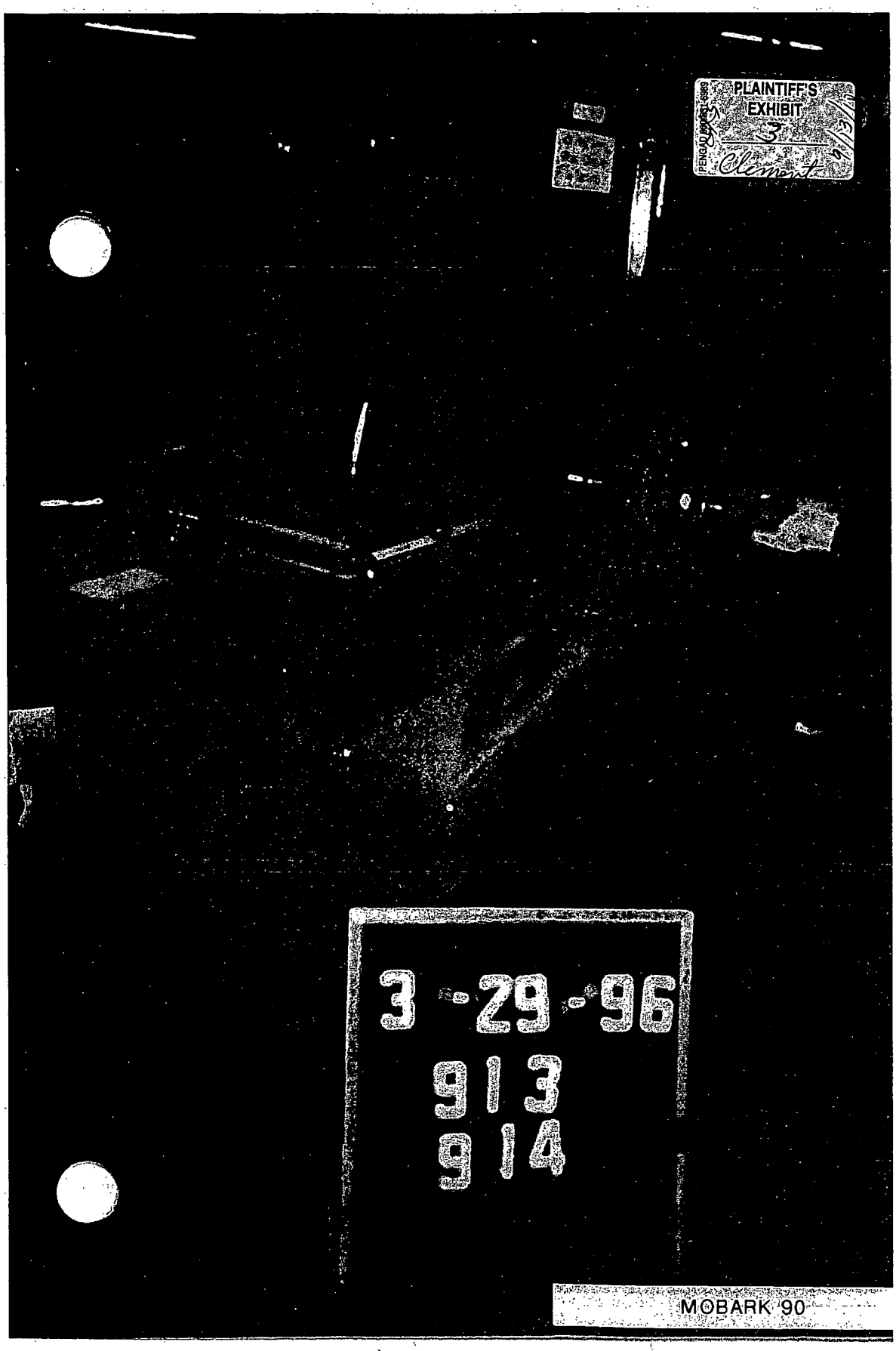
Sitemap, Chippers, Wood Chipper, Brush Chipper, Tree Chippers, Stump Grinders, Stump Cutters, Morbark, Rayco, Vermeer, Woodsman, Woodchuck, Wood/Chuck, Bandit, Conehead, Super Junior, Super 50, RG 50, Super RG 50, Brush Bandit, Bandit Chipper, Bandit Industries, Bandit Stump Grinder, Bandit Stump Cutter, Bandit Beast, Vermeer Chipper, Vermeer Stump Grinders, Vermeer Stump Cutter, Woodsman Chippers, Woodchuck Chipper, Carlton, Carlton Chippers, Carlton Stump Grinder, Carlton Stump Cutters, Cone head, Cone-head, Dynamic Mfg, Dynamic Manufacturing, Conehead Chippers, Cone head Chipper, Cone-head Chipper, Knifesource, Simons, Arborwear, Fecon, Palfinger, Prentice, Petersen, Beaver Squeezer, Mobark, Multi-tip, Sandvik, Duradisk, Greenteeth, Skytrim, Jarraff, WHO, Duratech, Haybuster, Tub Grinder, Horizontal Grinder, Smartgrapple, Chipper Safety, Chipper knives, Replacement chipper blades, McCulloch, Dr Chipper, Troybuilt, Hud-son, Hudson Chippers, Bearcat Chippers, Bear Cat Chipper, Hand Fed Chipper, Brush Chipper, Brush Shredder, Feed Hooper, chipper shredders, Hydraulic Feed Chipper, PTO Chipper, PTO Chipper Shredder

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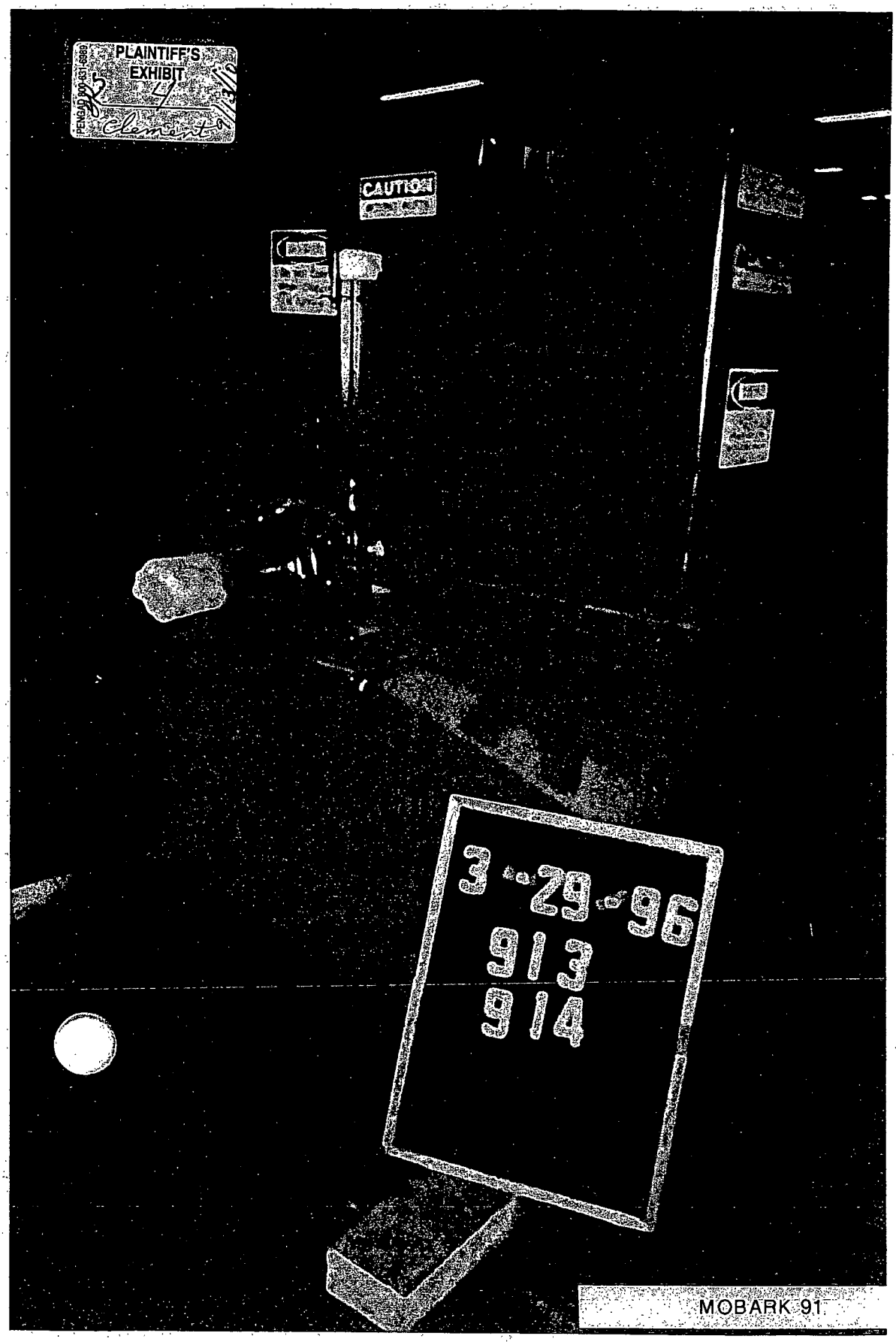


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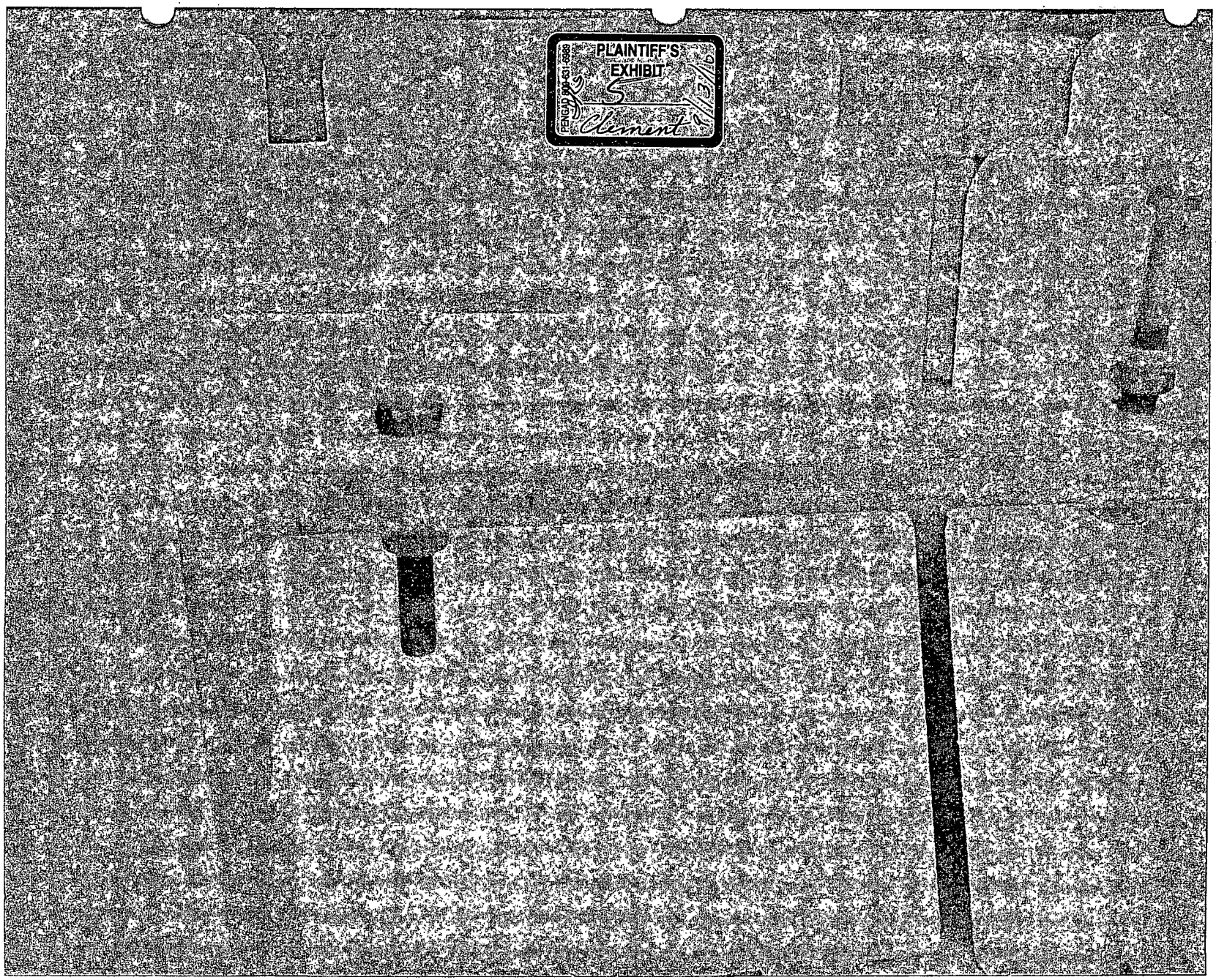


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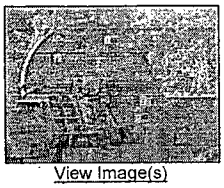
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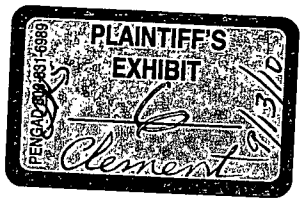
Precision 84" 6 Knife Chipper



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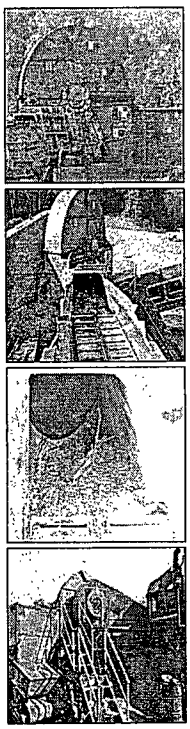
Year: **N/A**
Manufacturer: **Precision**
Model:
Item Name: **84" 6 Knife Chipper**
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Price: **Contact Seller For Price**
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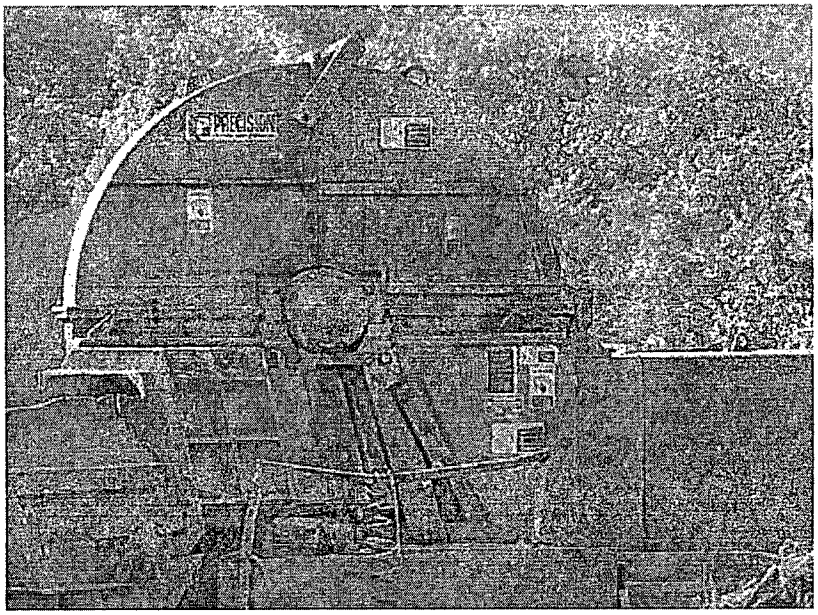
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Description:

PRECISION 84" Chipper - 6 knife; left hand, rear discharge machine with 8" thick disk. This machine will be replaced with a larger chipper in September 2008. Clutch, sheave and diesel motor not included. Item # 39099. Kentucky.





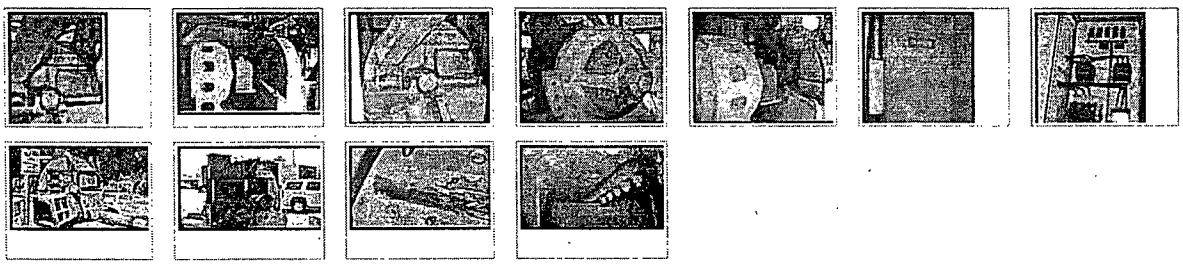
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Phone: 706-324-2604
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PRECISION 84" Chipper



Item #: 12526

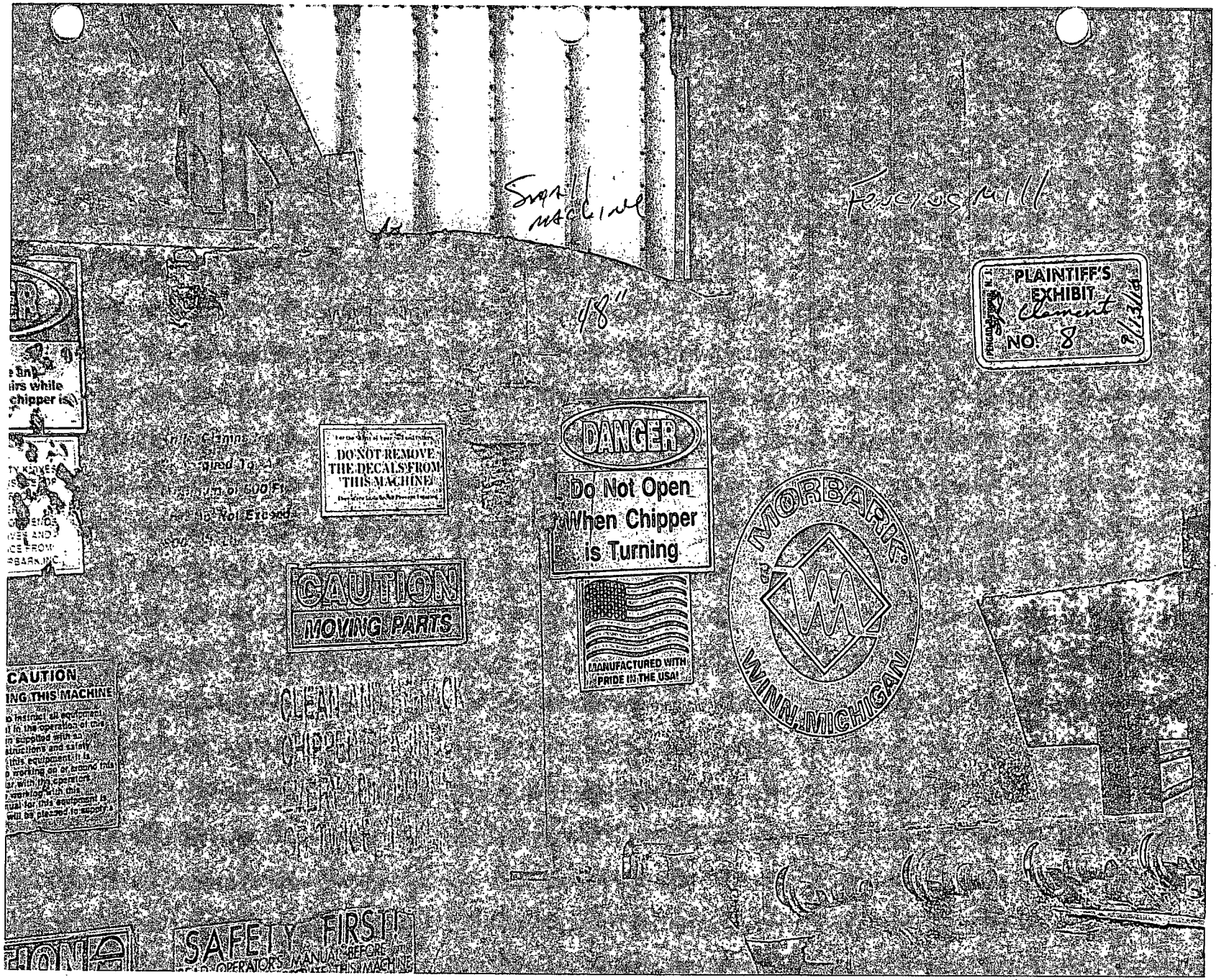
Manufacturer: Precision

Description: PRECISION 84" Chipper - 1989 left hand, top discharge chipper with 84" six knife disk. Accepts logs up to 26" in diameter. Item# 12526.

Request Info

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Snap machine
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MANUFACTURED WITH PRIDE IN THE USA!
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WINN, MICHIGAN
CAUTION
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State of South Carolina County of Clarendon	In the Court of Common Pleas
Andreal Holland by his Guardian Ad Litem Peggy Knox, Plaintiff, vs. Morbark, Inc., Precision Husky Corporation, A & K Mulch, LLC, and Watford Industry, Inc., Defendants.	C.A. No. 2008-CP-14-00461 Deposition of ROGER E. DAVIS, P.E., C.F.E.I August 31, 2010

Deposition on oral examination of ROGER E. DAVIS, P.E., C.F.E.I., reported by Mary W. Hoskins, RPR and Notary Public in and for the State of South Carolina; said deposition taken pursuant to notice of deposition, by agreement and in accordance with South Carolina Rules of Civil Procedure, at the law offices of Turner, Padget, Graham & Laney, P.A., 1901 Main Street, 17th Floor, Columbia, South Carolina, on the 31st day of August, 2010, commencing at the hour of 10:05 a.m.

This deposition is taken in accordance with the South Carolina Rules of Civil Procedure.

It is agreed and stipulated by the deponent and respective counsel that the reading and signing of the deposition by the deponent is expressly not waived.

Whereupon:

Roger E. Davis, P.E., C.F.E.I., being duly sworn and cautioned to speak the truth, the whole truth and nothing but the truth, testifies as follows:

EXAMINATION

BY MR. OTT:

Q. Tell us your full name, please.

A. Roger E. Davis.

Q. Mr. Davis, we've met before. My name is Curtis Ott. I represent Morbark in the lawsuit that's been brought against them by Mr. Holland. We're here today to take your deposition because you have been identified as an expert witness in this case.

Am I correct in assuming you've given multiple depositions in the past?

A. I have.

Q. And so you know the usual ground rules of what we're going to be doing today?

A. I do.

Q. One thing that our Supreme Court requires us to tell all witnesses is now that the deposition has begun, if you have any questions about anything that I ask of you during the deposition, then you need to direct your questions towards me rather than Mr. Jonas; do you understand that?

A. I understand.

Q. What is your occupation?

A. I am a mechanical engineer. My current practice is in forensic engineering.

Q. What does it mean to be a forensic engineer?

A. Forensic engineering in my case is the application of mechanical engineering principles to the investigation of incidents and accidents to determine cause.

Q. And are those investigations almost entirely with litigation in mind?

A. Well, they certainly can ultimately go to litigation, but a lot of the cases that I work on are simply insurance matters that don't

reach the point of litigation.

Q. But the point that you get involved, someone is contemplating litigation; correct?

A. Correct.

Q. What percentage of your work now is devoted to forensic engineering?

A. A hundred percent.

Q. How long has that been true?

A. Let's see. I have worked for the firm for 12 years. Part of that time was part-time. I had another business I was running. I would say full-time probably about five years.

Q. And are you telling me that during that entire five years that 100 percent of the work you've done is devoted to forensic engineering?

A. Yes.

Q. Since you started with The Warren Group 12 years ago, has all the work that you've performed for The Warren Group been forensic engineering?

A. Yes.

Q. In other words, you've never designed a machine or done any other type of mechanical

engineering work that other mechanical engineers do; all yours has to do with litigation or potential litigation?

A. The work for The Warren Group, that's correct.

Q. What is your proposed area or areas of expertise for this lawsuit?

A. Of course, I'm a mechanical engineer, but I have expertise in heavy machinery. I do a lot of machine guarding investigations.

Q. Let me break it down and make sure I understand. So your background, obviously, is mechanical engineering, and you're going to apply that expertise to this case; correct?

A. Yes.

Q. You said you also have experience with heavy machinery?

A. Yes.

Q. In what sense?

A. Well, of course, I have worked for an industry that utilized heavy machinery. I have also worked in a firm that utilized construction equipment. I have actually been engaged as a mechanic on heavy equipment in the past.

to figure out how to turn that off.

(Brief recess.)

MR. OTT CONTINUING:

Q. What additional discussion did you and Mr. Jonas have this morning concerning the OSHA regulation?

A. We discussed the fact that I felt there was a violation of the OSHA regulation.

Q. By whom?

A. By -- well, of course, OSHA applies to the employer. The employer is responsible for compliance with the OSHA regulations, so the employer attempts to do that when he buys equipment by buying equipment that complies with OSHA regulations. In this case I felt that the equipment as designed and constructed did not allow the employer to comply with the regulation.

Q. Morbark can't in the manufacture and design of equipment violate OSHA, can it?

A. Morbark in this instance is not the employer, so the regulation is not directly applicable to Morbark.

Q. In this context, Morbark cannot violate OSHA; correct?

A. I would agree with that.

Q. If there was a violation by OSHA, it would be a violation by A & K Mulch?

A. I would agree with that.

Q. When were you first contacted about Mr. Holland?

A. On July 17, 2006.

Q. Who contacted you?

A. Paula Dyches, Southeastern Claims Services.

Q. Who is Ms. Dyches?

A. Who is she?

Q. Yes.

A. She's an employee of Southeastern Claims Services who insures J. C. Witherspoon and, I guess, his various companies. When I say J. C. Witherspoon, I don't mean him personally. I mean J. C. Witherspoon, Inc., and perhaps some affiliated companies.

Q. What is Ms. Dyches' position with Southeastern Claims Services?

A. I don't know.

Q. Is she an adjuster; is she the president? Why was she the one who contacted you?

Q. So whether they're the third-party administrator or the actual insurer, you still understood Ms. Dyches to be calling you on behalf of whoever was providing workers' compensation insurance to A & K Mulch?

A. Correct.

Q. And they were calling you to pursue potential what's called subrogation interests?

A. Correct. That's correct.

Q. Tell me your understanding of that.

A. Of?

Q. Subrogation interests.

A. Subrogation? Subrogation is a situation in which the insurer seeks to get reimbursement from a responsible party for an incident where there's an injury; reimbursement for all or part of their payout.

Q. And did you understand that Ms. Dyches was calling you to investigate whether there was a potential for recovery from someone other than A & K Mulch for Mr. Holland's accident?

A. Well, my assignment was to determine the cause of the incident.

Q. But my question is: Did you

company in North Carolina?

A. It did have safety decals on it, yes.

Q. Including a warning not to remove any of those decals or stickers?

A. Yes.

Q. Will you agree that most, if not all, the decals and stickers that were originally affixed to the machine when it left Morbark's hand had, in fact, been removed before the accident?

A. I did not compare the photographs. They may have been.

Q. You've just not researched that issue?

A. Correct.

Q. So you have no opinion or comment on it one way or the other?

A. On the -- no. My opinion has nothing really to do with the warnings. It's my opinion that the warnings are not adequate -- an adequate response to the hazard that exists there, so I have not placed any focus on the warnings.

Q. Will you agree that Morbark provided an operator's manual when it originally sold

Q. Will you agree, Mr. Davis, that if Mr. Holland had, in fact, followed A & K Mulch's procedures for changing the knives on this chipper that it would be impossible for the accident to happen as Mr. Holland alleges it did?

MR. JONAS: Object to the form.

A. If he followed the procedure -- the verbal, as far as I can tell, verbal procedure that he was given, the training that he was given, and he complied with that procedure and did not make any attempt to open the hood until he somehow verified that the equipment had stopped rotating, it would not have happened.

MR. OTT CONTINUING:

Q. Been impossible to happen?

A. Yes.

Q. And would you also agree that if Mr. Holland had followed the chipper's procedures for changing the knives on the machine as it came from the manufacturer and as spelled out in the operator's manual that it would be impossible for the accident to happen as Mr. Holland alleges it did?

A. Yes. Had he complied with the

MR. OTT CONTINUING:

Q. Comparing the accident date --

A. Right.

Q. -- to when it left our hands.

A. Well, in that the bolts apparently were not installed on the hood, that would not be a step that he would need to take to open the hood.

Q. And apparently those bolts had been missing for some period of time?

MR. JONAS: Object to the form.

A. I don't know.

MR. OTT CONTINUING:

Q. Do you know if those bolts were ever removed by A & K Mulch employees?

A. I do not know.

Q. But you have no evidence or reason to disagree that when this machine left Morbark's facility in 1996 that to access the hood, you had to undo those six bolts?

A. That appears to be the case from the photographs. There were bolts that were evident in the photograph. There are no bolts mentioned in the manual that I could find.

Q. That you could find?

A. Correct.

Q. So if Morbark found them and pointed them out, you don't have any reason to disagree with that?

MR. JONAS: Object to form.

A. If they can point it out to me, I'd be glad to look at it.

MR. OTT CONTINUING:

Q. Do you know how long it takes to undo those six bolts?

A. It doesn't take very long to undo six bolts. Probably a minute or two.

Q. Have you ever done it?

A. Have I ever loosened six bolts?

Q. On a Morbark chipper.

A. No.

Q. Do you know how long it takes to loosen those six bolts?

A. I've never done it, so I can't -- and had I done it, I wouldn't have timed it.

Q. What size fan blades were on the chipper at the time of the accident?

A. I don't know.

Q. Who manufactured those blades?

A. I don't know, but I know that Morbark

had a preferred vendor for that, that they mentioned in their manual. I don't know whether these particular fan blades were from that vendor or not.

Q. How much clearance between the fan blades on the chipper at the time of the accident was there between the blades and the hood?

A. I measured about a half-inch or less.

Q. So you cannot dispute that the fan blades attached with the chipper are different than the ones that were on the machine at the time it left Morbark's hands?

A. I have no reason to believe that they were different.

Q. And you also don't have any reason to believe that they're the same?

A. Well, I have a drawing dated 1992, which predates the manufacture of this machine, showing a box fan blade. I also have the purchase documentation from when the machine was originally sold to the firm in Goldsboro indicating that it was equipped with box-type blades. I don't know whether it's the same

blade or not, but --

Q. And you don't know who manufactured the blades that were on the machine at the time of the accident?

A. Correct.

Q. What size were the fan blades on the chipper when it left Morbark's hands?

A. I don't know.

Q. How much clearance --

A. Well, I'm sorry. I do have a drawing, but I didn't see the machine when it left Morbark's hands, so I can't verify whether it was built to that standard or the specifications in that drawing or not.

Q. Do you have any reason to believe that they weren't built to the specifications and drawings?

A. I would assume that they were.

Q. Okay. Do you know how much clearance there was between the original fan blades and the hood at the time it left Morbark's facility?

A. I have no way of knowing that.

Q. Are you aware, in fact, that the fan blades on the machine at the time of the

accident were larger than the fan blades attached when the chipper left Morbark's hands?

A. No.

Q. Are you aware that the clearance between the fan blades on the machine at the time of the accident was smaller than the clearance with the fan blades on the machine at the time it left Morbark's hands?

A. I don't know that.

Q. Would you agree that if those facts are indeed true that the potential for a fan blade to strike the hood was greater for the machine at the time of the accident than when it left Morbark's hands?

A. Well, of course, the smaller the clearance, the more likelihood that it's going to occur, but my understanding is that this machine was built with a wider disc than they normally provide. Unless they made some accommodation for increasing that clearance, I believe that the clearance on this machine and one other that they built would have been smaller than what they routinely built.

Q. But you don't know because you never investigated that?

A. I don't know that. That's my --

Q. Speculation and conjecture?

A. Okay.

Q. Agreed?

A. Based on my review of the technical documents, yes.

Q. Because you're learning for the first time today that Morbark didn't even manufacture the blades that were on the machine --

MR. JONAS: Object to the form of the question.

MR. OTT CONTINUING:

Q. -- at the time of the accident; correct?

A. I believe they farm that out to a vendor, yes. They have a company --

Q. They're not Morbark's blades, Mr. Davis.

A. Okay.

Q. Did you know that before I just told you?

MR. JONAS: Object to the form of the question.

A. Well, the drawing indicates that they have a vendor, I believe, that makes those for

them.

MR. OTT CONTINUING:

Q. Mr. Davis, this is just a real simple question. Are you learning for the first time today that the blades on the machine at the time of the accident were not manufactured by Morbark or one of its vendors?

A. I believe I knew that before today.

Q. When did you learn that?

A. I think I had that discussion with Mr. Jonas in the past few days.

Q. Okay. Do you think that has any bearing upon your opinions in this case?

A. No.

Q. What if it greatly diminishes the likelihood that this hood would ever come into contact with the fan blades as originally designed, doesn't that directly bear upon your opinions in this case?

A. Well, of course, if you have a smaller clearance, you have more likelihood that there's going to be interference between a rotating member and the hood. Of course, that is true. However, for this machine to function, there has to be a fairly tight

clearance to provide the airflow that you're looking to generate with the fan, so there had to have been a fairly tight clearance as originally constructed for it to function properly.

Q. Is it your understanding that this machine operates to discharge the material chopped up by airflow?

A. Well, certainly airflow is one component of it. The blades throw the material, and the fan blades generate a pneumatic airflow through the discharge duct.

Q. Are you aware of any other accidents on a stationary chipper machine manufactured by any company in the world where someone attempting to change the cutting knives was injured when he or she opened the hood before the disc had stopped moving?

A. I believe some of my research indicates that has occurred in the past, yes.

Q. Okay. On stationary wood chippers?

A. Let me look at it and see what it says specifically.

Q. Do what you need to do. I want to make sure you understand my question.

Q. Mr. Davis, are you aware of any engineering standards that were applicable to the machine at the time of manufacture?

A. There are no specific ANSI standards or other nationally recognized safety standards for this kind of machine that I could find.

Q. I want to make sure we're talking in the right time frame. So are you aware of any engineering standards or any standards at all that were applicable to the chipper at the time of manufacture and distribution in 1996?

A. No.

Q. Are you aware of any particular engineering standards or the like that are directly applicable to a stationary wood chipper even today?

A. No, I'm not.

Q. The OSHA standard that you referenced as being in your file materials, can you put your hands on that regulation or standard?

A. I can. I have it.

Q. What's the name of it?

A. It's CFR 29.1910 -- I'm sorry. 29 CFR 1910.212(a)(2) is the section that I referred to.

Q. What does that standard say?

A. Well, it's a regulation that applies to all machines. It's commonly called general duty clause. It specifically references machine guarding. Subparagraph two is general requirements for machine guards. It says in part, "The guard shall be such that it does not offer an accident hazard in itself."

Q. I want to make sure I understand. The guard itself should not pose an accident hazard?

A. Correct.

Q. And you think upon further review and what you've told Mr. Jonas this morning that A & K Mulch violated this regulation?

A. I think this machine does not comply with that regulation.

Q. And how does this machine as originally designed not comply with that regulation?

A. Well, the guard, and we're talking about the hood now as a guard over the rotating member of that machine, that does pose the hazard. That guard is designed and built in such a way that it can be opened while the

machine is rotating, and when it's opened, there is a likelihood that it can be struck by the rotating member and, as a result, strike the employee.

Q. Well, the hazard is the rotating disc; correct?

A. Correct.

Q. The hood itself is not the hazard, is it?

A. Well, the hood becomes the hazard when it is not --

Q. I understand. Go ahead and finish your answer.

A. Are you ready for me to finish?

Q. Yeah, I am.

A. The hood becomes a hazard when it's struck by the rotating disc and is thus propelled into the worker.

Q. The hood itself doesn't pose a hazard except for a hazard acted upon it; correct?

A. Well, the hood becomes a hazard because it's a moving object at that time.

Q. Only moving because a hazard strikes it?

A. Correct.

Q. If the original hazard of the moving disc isn't available, then the hood is not a hazard; correct?

A. I would agree.

Q. All right. And likewise, if you can develop a procedure to make sure that the employees follow it, then the hood isn't opened while the hazard is hazardous?

A. Correct. I would agree that if you could find that perfect employee who always followed procedures you wouldn't need -- actually wouldn't need a guard. But procedures are not adequate to protect an employee from a hazard, nor are warnings.

Q. But you're not aware of any other person in the entire world during the life of all stationary wood chippers who has ever experienced an injury while trying to open up the hood of a stationary chipper before letting the disc stop running?

A. Correct.

Q. Are there any other OSHA regulations that you feel are applicable to this case or machine?

A. No. That's the only one that I came

up with.

Q. What's the date of that OSHA regulation?

A. Sometime in the 1970s. I don't have a specific date, but it was adopted soon after the law was passed sometime in the '70s. It was in effect at the time of the incident and at the time the machine was manufactured.

Q. What does the ANSI standard Z-133.1 have to do with this lawsuit, if anything?

A. I haven't cited it in my report nor in my opinions.

Q. It's in your file.

A. It's in my file simply because it's a document that deals with related kinds of equipment. I pulled it in part because I thought the question might come up about standards for equipment. That's the only -- that's the closest thing I could find for a standard for related equipment, not this specific equipment.

Q. Do you have any opinions that Morbark's design of this chipper violated an ANSI standard?

A. No. There was no ANSI standard that

applies to this stationary chipper.

Q. What does that ANSI standard say for brush chippers?

A. There are seven paragraphs. It says in part, "Access panels for maintenance and adjustments shall be closed and secured prior to operation of brush chippers."

Then it has some paragraphs that deal with infeed, which is not particularly relevant to this case. We can go through those if you like, but -- and this deals with mobile chippers, so it talks about towing and some of those types of things, the need to wear eye protection. So there's really not very much.

Q. The first paragraph, wouldn't you agree that Morbark's stationary chipper complies with that even if it were applicable to stationary chippers?

A. I agree that their warnings indicate that the hood should be closed while the machine is rotating.

Q. And the other remaining paragraphs of that standard concern characteristics of a mobile brush chipper that are not present with a stationary chipper; correct?

A. Correct.

Q. In your research, have you come up with any other standards, regulations, or the like that you believe Morbark's stationary chipper is required to adhere to?

A. No.

Q. Did Morbark's chipper, stationary chipper in 1996 comply with industry custom?

A. I believe their chipper was similar in design and construction to other chippers on the market at that time and, in fact, still on the market today.

Q. So will you agree that the chipper in 1996 as designed was compliant with industry custom?

A. I agree that it was similar to industry custom. There's no compliance body that, you know, regulates that, but it is similar to what other manufacturers built at that time and today.

Q. So you will agree that you don't have any opinion that Morbark failed to comply with industry custom at the time of manufacture?

A. No.

Q. You would agree with that statement?

A. I agree they complied with what was commonly done in the industry at that time, yes. Having said that, there are other manufacturers that use different means of attachment of the hood, but even so, it's not sufficient in my opinion to comply with a standard of safety that should be used.

Q. Are you aware of any chipper manufacturer that utilized an interlock such as what you opine should have been used on the hood of a stationary wood chipper back in 1996?

A. No, not aware of any.

Q. Are you aware of any chipper manufacturer today that utilizes an interlock on the hood of a stationary wood chipper?

A. I need to look at some of my research material. Just give me just a minute -- a few minutes. I've identified two manufacturers at least that provide a safety mechanism such that the hood will not be opened during operation, but that appears to be limited to brush chippers.

Q. Okay. So real specific with my question. Are you aware of any chipper manufacturer that utilizes an interlock on the

hood or access door of a stationary wood chipper?

A. No, I'm not.

Q. And you've researched that issue; correct?

A. I have.

Q. And you've tried to go out and find if anyone in the industry has ever adopted the design that you, Mr. Davis, opine should have been adopted?

A. Correct.

Q. And you've not been able to find anyone?

A. Correct.

Q. Is there anything else about the photographs or information you have in your file about other competitors' designs of stationary wood chippers that are applicable to your opinions today?

A. The Precision Husky chipper uses a different mechanism to latch the hood. Had that design been employed in this case, there's a chance -- I can't know for sure because I don't know at what point in the opening of the hood that it struck the rotating member, but

there's a chance that this would have been avoided with that design of latching mechanism.

Q. When did Precision Husky first start utilizing that latching mechanism?

A. I don't know.

Q. Before or after 1996?

A. I don't know.

Q. How is that latching mechanism different than Morbark's original design?

A. Well, let me -- I think the best way to explain that is to show you a picture of it. I think this might be the best representation to show you. In this photograph this chipper has a rotating bar with "T" handle screws that clamp against the rotating member holding it in place. If you back these screws off, you still must move this member out of place to rotate the hood. So it's kind of a two-step process.

Q. But if you undo those "Ts," for lack of a better word, then you still have to open the chipper door?

A. The hood?

Q. Well, the hood, right.

A. Right. Correct.

Q. So I don't see how that would have --

A. Well, I'm just saying that --

Q. -- prevented Mr. Holland's injury.

A. Well, once you release those screws, the hood then becomes not fixed to the base machine. It's free to wobble with the vibration or whatever, and it could at that point strike the rotating member, and it would not be able to open if you had not yet moved the bar that the "T" is threaded into.

Q. If you're consistent with your criticism of the design of these machines, you would still say that Precision Husky's design is defective because it fails to incorporate an interlock; correct?

A. I would, yes.

Q. Mr. Holland's accident could have happened on that Precision Husky design just as he alleges it happened on the Morbark machine?

MR. JONAS: Object to the form.

A. I would agree.

MR. OTT CONTINUING:

Q. Is there anything else -- and I'm just trying to short-circuit this. I can go through and ask about every design and every

photograph you have of other competitors' machines, but I'm just trying to narrow this down. Is there anything else relevant about the materials that you've gathered in your file concerning other designs as it bears particularly on your opinion in this case?

A. With respect to stationary machines, that's your question?

Q. Yes.

A. No. I do have other material related to brush chippers, mowing machines that that design could have been employed that would have minimized the risk of this injury.

Q. But that's a different machine?

A. A different machine, correct. A different machine, but the same hazard.

Q. So if I take your opinions in this case to their logical conclusion, Mr. Davis, every stationary wood chipper designed by every manufacturer of every wood chipper from the date the first chipper was ever manufactured to the present is defective?

A. I would agree.

Q. Are you aware of any other person in the history of the world who has come to such a

conclusion besides you?

A. I don't know of anybody else who has examined the question, so I don't know the answer to that.

Q. Are you aware of --

A. Well, as a matter of fact, I am aware of one other person.

Q. Mr. Jonas?

A. No.

Q. Who?

A. He doesn't get to give you his professional opinion, I don't think.

I have a coworker who had a case involving -- not a stationary chipper, but a brush chipper with a similar hazard with a similar injury who reached the same conclusions that I did in this case.

Q. Again, about mobile brush chippers which are different machines with different regulations. So as to stationary wood chippers, are you aware of any other person in the history of the world who has reached the same opinion as you?

A. No. I'm proud to be the first that I know of.

Q. On the top of page three, there's 11 enumerated paragraphs constituting additional facts and observations?

A. Correct.

Q. Who provided this information?

A. This was information I gathered during my investigation. It came from various sources. For example, I'd say number one, that information was obtained from Mr. Woods. Some of the information was based on my own observations.

Q. Jumping to page four, there's a statement at the last sentence, "An operator will not likely be able to judge when the momentum of the rotating disc has dissipated enough that contact of the hood by the blades will present no serious risk."

A. I'm sorry. Which paragraph was that?

Q. It's the last sentence carrying over to page five.

A. Oh, okay.

Q. If the operator looks where he's instructed both by the operator manual and where A & K instructed its employees to look,

why won't the operator be able to determine whether the disc is moving or not?

A. Well, if he -- obviously if he looked at the sheaves and the shaft he would, but those are somewhat obscured by the solid guard on this particular machine.

Q. Were you aware that there are actually other places that you can look to determine whether the disc is moving on this machine and the sheave?

A. But there again, that goes to procedure. You can't rely on employees to follow procedures a hundred percent of the time, and for that reason it's incumbent upon an employer -- or a manufacturer to safeguard a machine to the extent it's feasible to protect that employee.

Q. Taking that to its just absolute logical conclusion, should auto manufacturers design a car door that can't open while the vehicle is moving down the highway because it's feasible that someone could open the door and jump out?

MR. JONAS: Object to the form.

A. Well, to some extent they do that,

but there are some tests you have to look at in making those determinations. It has to be economically and technologically feasible to do so, and it has to be something that does not affect the utility of the equipment in this case.

MR. OTT CONTINUING:

Q. And you've not done those analyses, have you?

A. I'm sorry, I haven't done what?

Q. You haven't done those analyses about feasibility, have you?

A. Yes, I have thought about how an interlock could be placed on this machine and concluded based on my research that it's feasible to do. It's been done on other kinds of equipment. The components are readily available on the market to do so, and there's no reason it can't be done in this case.

Q. Have you done a feasibility study on a stationary wood chipper regarding an interlock?

A. To the extent I just mentioned I have, yes.

Q. All you've done is pull research; is

that right?

A. And I thought about how it might be done.

Q. Have you prepared a design?

A. No. I have not drawn anything if that's what you're saying.

Q. You have actually not done a feasibility study, have you, to assess costs, application in the environment --

A. No, I have not.

Q. -- and all that type of stuff, have you?

A. I have not put anything in writing to do that.

Q. You haven't done it?

A. Correct -- well, I've thought about how it might be done and describe it in my report, but I have not conducted and written a separate document called a feasibility study.

Q. And you're not aware of anyone else who has?

A. No, I'm not.

Q. And you've not prepared a design?

A. I have not.

Q. I want to make sure I understand the

sentence at the top of the report on page five to the effect that the manufacturer failed to provide a safeguard to protect the operator from the hazard.

A. Yes.

Q. Well, you might disagree with whether the safeguard was effective or not, but certainly they provided a system where if followed by the employer, he would not -- excuse me -- by the employee he would not have been injured if he had followed that protocol; correct?

A. Well, the hazard in this case is the hood itself, which is intended to be a guard, but which if not properly secured and interlocked can become a hazard of its own. That's the hazard I'm referring to.

Q. I understand that. But you said they failed to provide a safeguard. The safeguard was the system established and procedure established both by the manufacturer and the employer, which if followed made this accident impossible; correct?

A. Yes. The manufacturer did provide a guard over the rotating member. He provided a

procedure and warnings which if followed would have prevented this injury, but it's my opinion that the warnings and procedures are not adequate to protect an employee from a significant hazard.

Q. And I understand that, but it's not accurate to say they failed a provide a safeguard?

A. Well, I think it is. Why are you -- I think you're failing to distinguish the hazard that I've identified as being the guard itself.

Q. I guess we're just going to have a difference of opinion about that.

A. Well, I get to have the opinions I believe.

Q. Do you have any criticism of the warning label on the machine at the time of the accident?

MR. JONAS: Object to the form.

A. I'm not a warnings expert. I really would defer to Dr. Clement on the adequacy of the warning statement.

MR. OTT CONTINUING:

Q. Do you have any opinion concerning

the adequacy of the warning on the machine at the time of the accident?

A. I'm not going to comment on that. I'm not a warnings expert.

Q. Do you have an opinion; yes or no?

A. Yes, I do.

Q. What is your opinion?

A. I said I'm not going to comment on it. I'm not a warnings expert.

Q. Well, that sounds like you don't have an opinion.

A. Well, you're not a warnings expert either, but you probably have an opinion.

Q. I'm looking at your report. "The warning, however, fails to convey that serious injury or death could result from the hazard"; do you see that in your report?

A. I do.

Q. Do you have an opinion on that topic, Mr. Davis?

A. I believe what I said is my opinion.

Q. Look at the design that was on -- or the label that was on the machine at the time of the accident for me. Can you find that in your materials?

A. Okay.

Q. Is the red danger sign at the top of that label significant?

A. It is.

Q. Is that compliant with OSHA regulations regarding warning symbols and labels?

A. Yes.

Q. What is that danger sign as defined by OSHA intended to convey?

A. High risk of serious injury or death.

Q. Is there anything confusing about never operate chipper with missing hood bolts?

A. No.

Q. Is there anything confusing about never operate chipper without hood lock secured?

A. No.

Q. Is there anything confusing about never open hood while disc is turning?

A. No.

Q. Is there anything confusing about to confirm disc has stopped, visually check disc shaft or drive wheel?

A. No.

Q. Is there any doubt that the diagram shows the potential for movement of the hood if the disc is still moving?

A. No. I understand that completely.

Q. In fact, doesn't this diagram warn the operator against exactly what happened to Mr. Holland?

A. It does.

Q. So how does this warning fail to convey that serious injury or death could result from the hazard?

A. Well, you know, it's my opinion that warnings are not adequate to protect the employee in the first place if there is a feasible means of safeguarding.

Q. I understand that, but that's a question I didn't ask you.

A. All right.

Q. How does this warning label fail to convey that serious injury or death could result from the hazard?

A. Well, it doesn't say anything about the type injury that you might get.

Q. What should it say then?

A. Sorry?

Q. What should it say?

MR. JONAS: Object to the form.

A. You know, I've seen warning signs that say serious risk of injury or death spelled out in writing. I'm not a warnings expert. You know, that's about as far down that road as I would like to go. I'm, you know --

MR. OTT CONTINUING:

Q. I just find it odd that you're saying that now given that you put this criticism and opinion in your report.

A. Well, I stand by the report.

Q. And I'm asking you, how does this warning labeling fail to convey that serious injury or death could result from the hazard?

A. Well, we know that Mr. Holland never read the manual. We know that it's foreseeable that an employee is not going to read the manual. If you don't read the manual, you might not understand the significance of the danger symbol on here.

It just seems to me with a hazard as significant as that one is that it would be a simple matter to describe the serious nature of

the injury that could result.

Q. So what else should it say?

A. I would say something like, Serious hazard of injury or death.

Q. Isn't that what danger means according to OSHA?

A. If you read the manual, you might get that, but I don't believe Mr. Holland read the manual.

Q. Don't you think that that diagram is showing somebody getting hurt in the head?

MR. JONAS: Object to the form.

A. Yes, it does.

MR. OTT CONTINUING:

Q. All right. Any other way that you think that this label fails to convey that serious injury or death could result from the hazard?

A. Just what I described.

Q. For the record, will you agree with me that we're referring to what's been Bates labeled PH 3?

A. Yes. This is a warning label from a different manufacturer that I understand was affixed to this machine.

Q. From Precision Husky; right?

A. Correct.

Q. Affixed to this machine in not one, not two, but three separate places at the time of the accident?

A. I'm not sure how many places, but it was certainly in a conspicuous place on the hood.

Q. If you're an operator as frequently as Mr. Holland was of this machine, there's no doubt he saw this before the accident; correct?

A. I would anticipate that he saw it. I cannot attest to the understanding that Mr. Holland might have had. I understand he had some difficulties with reading, so I don't know.

Q. Is that a manufacturer issue, or is that an employer issue?

A. That's an employer issue.

Q. Because manufacturers are allowed to rely upon what are called sophisticated users and learned intermediaries to pass along the requirements of machine operation to the employees; right?

A. I would think that would be correct,

yes.

Q. So if Mr. Holland had some problem with reading or understanding, then that's a problem that should be addressed to A & K Mulch; right?

MR. JONAS: Object to the form.

A. Yes. I think they should have addressed that issue.

MR. OTT CONTINUING:

Q. Because Morbark having manufactured this machine in 1996 and sold it to someone other than A & K Mulch doesn't even know A & K Mulch has this machine at the time of the accident, do they?

A. That's correct.

Q. The last page of your conclusions, No. 6, were there other causes of Mr. Holland's injury?

A. There were other factors that -- but not machine related that were probably contributing factors to this injury.

Q. What other factors?

A. Well, we talked about his ability to comprehend written instructions, but that was not the focus of my investigation.

Q. Why do you think his ability to comprehend written instructions had anything to do with this accident?

A. Well, we just talked at length about the warning that is a written warning. If he had little ability to understand written language, I would think he would have trouble with that warning.

Q. Do you know that for a fact --

A. No.

Q. -- that he couldn't understand this written warning?

A. No, I don't know that.

Q. You're just surmising?

A. Yes.

Q. In fact, I thought we had established at the beginning of your deposition that Mr. Holland completely understood the procedure related to making sure the disc stopped before touching that machine?

MR. JONAS: Object to the form.

A. I think he was trained that way, yes.

MR. OTT CONTINUING:

Q. He had been warned against doing

exactly what he did on the day of the accident?

MR. JONAS: Object to the form.

A. I understand that to be the case.

MR. OTT CONTINUING:

Q. So he understood what the procedure was and how to operate this machine?

MR. JONAS: Object to the form.

A. Okay.

MR. OTT CONTINUING:

Q. You would agree with that?

A. I agree that he had been told at some point. I can't render any opinion about his ability to retain that information or act on it. That was not my focus.

Q. What other factors had to do with how this accident happened?

A. I don't know of any other factors.

Q. How about his disregard and disobeying of the procedures?

A. Well, my focus is the equipment, not the person.

Q. I understand what your focus is, but you're saying it is a cause. I want to know all other causes.

A. I did not investigate his ability to

comprehend.

Q. Did you investigate his violation of A & K Mulch procedures for operating the chipper?

A. My understanding and it was obvious that he did violate those procedures, yes.

Q. Did you investigate his violation of the procedures established in the Morbark operator's manual as it related to how this accident happened?

A. It was obvious that he did violate that.

Q. Any other causes or factors besides what we just discussed --

A. No.

Q. -- that had a bearing on Mr. Holland's accident?

A. No.

Q. How about the absence of a coemployee at the time he opened the hood?

A. That wouldn't have protected him from this hazard.

Q. How is that?

A. Well, he was standing in the path of a moving object. A coemployee unless he jumped

between the two -- unless he jumped between him and the moving object would not have prevented his injury.

Q. The coemployee is supposed to be there when the hood is being opened; correct?

A. Not that I'm aware of. The procedure calls for two people to install the blades, but I see no reference to two people being present when the hood is being opened.

Q. Has your opinion in this case been subjected to peer reviews?

A. It has.

Q. How?

A. We have all our reports peer reviewed in-house.

Q. Outside of your company, has it been subjected to peer review?

A. No.

Q. Is there any way to determine the error rate inherent in your opinions?

A. Inherent in what?

Q. Your opinions.

A. No. I guess taking it to trial would be the only way.

Q. Do any of your jobs before starting

testimony to go from?

A. I brought two copies. I gave one to you and one to him. I didn't keep a copy, but I can get this one.

Q. Is Exhibit No. 5 the summary of your testifying experiences for the past four years?

A. Did you mark it Exhibit 5? I don't have that.

Q. (Shows document.)

A. Yes, it is. I didn't realize you had marked it. I'm sorry.

Q. Have you ever been qualified as an expert witness --

A. I have.

Q. -- in these cases?

A. Yes.

Q. In what areas?

A. Mechanical engineering and I think in one case even in civil engineering and in safety management.

Q. Have you ever been found not qualified by a court to offer expert testimony or opinions?

A. No.

Q. You've never been excluded?

A. No.

Q. Have any of your opinions ever been excluded?

A. No.

Q. Have you ever been retained to work on any other case involving a wood chipper machine?

A. I don't believe so.

Q. What percentage of your work as a forensic engineer involves personal injury claims or litigation?

A. I always have to get a clarification of that. Do you mean cases that have actually gone to trial versus just cases I investigated?

Q. All your forensic engineering work, how much of it is devoted to personal injury work?

A. I don't know. Maybe 30 percent perhaps. I don't really know. I don't know.

Q. What percentage of your work as consultant in those type cases is on behalf of the person claiming to be injured?

A. I think it's listed on the list that I gave you. More than half; probably maybe as

much as 80 percent on behalf of the plaintiff.

Q. Have you ever been hired by a defendant in a lawsuit alleging a machine or other product was defective?

A. Alleging machinery was defective?

Q. Right.

A. Yes, I have.

Q. Where you were hired by the manufacturer?

A. Yes.

Q. How many times?

A. Well, there's one on this list that I'm aware of.

Q. What case is that?

A. Let me find it. The case I'm thinking about is not on here. I don't know if it's older than four years old or whether it maybe never went to deposition, I'm not sure, but I was hired by a company that manufactures farm equipment; actually a company from Ireland in a case that occurred in Maine involving a baling machine.

Q. Who hired you?

A. The attorney representing the manufacturer.

Q. What was the name of the manufacturer?

A. I can't recall. I can provide that to you, but I don't recall.

Q. You said the case was pending in the state of Maine?

A. Yes.

Q. Can you think of any other cases where you were hired by the manufacturer of a product in a product liability case?

A. No. I don't know of any others.

Q. Have you done that on many occasions on behalf of the person alleging to be injured?

A. Yes. I have worked for the plaintiff on several cases involving product defects.

Q. What other types of products have you claimed to be defective based on your work as a forensic engineer?

A. We can look down the list for a start. An industrial robot, material handling robot in the case of Wendy Warren on the second page; a forklift in the case of Cynthia Morris; a log loader in the next case on the list, Jenkins versus ROTOBEC; a conveyer in the Lloyd Madden versus Michelin case; a rotary grinder

in the John Steuer versus Black & Decker case. I'm sorry. I confused two cases.

The first one I mentioned is actually Janine Baker versus Egemin Automotive. That's the industrial robot case. The other one that I mentioned is a wrapping machine. I worked on the defense side of a case involving Paul Bell and Mary Ann Bell versus Ford Motor Company and Discount Tire of Irmo.

Q. Who hired you in that case?

A. The attorney representing Discount Tire.

Q. What were the nature of your opinions in that case?

A. It never -- the case never proceeded very far. Some of the evidence was lost. It was the case of a filler neck for a gas tank that was apparently lost in the incident.

Q. So you never rendered an opinion?

A. My opinion was I could not conclude the cause of that incident because of the lack of evidence. I can't recall exactly, but there was really little evidence to look at.

Q. Any other cases where you were retained to evaluate a product and determined

it was defective?

A. Yes. The case Margaret Seagraves versus Walmart Stores, that involved a chair that collapsed and resulted in her death. That was a metallurgical issue.

Judith Klein versus Travelers was a case involving a punch press; the control system of which I concluded was defective.

Q. All those products that you've just provided from the industrial robot down to the punch press control system, those are all listed in Exhibit No. 5?

A. They are, yes.

Q. Do you remember any other products that you've determined in your career to be defective that aren't listed in here?

A. Not off the top of my head. I'm sure there are some, but none come to mind.

Q. Am I correct that the organization of Exhibit No. 5, the ones where you've actually testified at trial will including a line called "Trial Date"?

A. Yes.

Q. (Indicating.)

A. Yes.

Q. And all the others would just be a deposition that you've given?

A. Correct.

Q. Do you keep copies of your depositions?

A. I do.

Q. How many do you think you have?

A. Well, I've got all those. That should be all of them.

MR. OTT: Wildcat.

THE DEPONENT: I'm not sure what that means.

MR. OTT: I say that when I get the transcript back, my paralegal can go back and look at the word "wildcat" and know what she needs to follow up on.

THE DEPONENT: I've got you.

MR. OTT CONTINUING:

Q. Have you ever been asked to investigate an accident and determined that the product you were asked to investigate was not defective?

A. Yes.

Q. How many times?

A. I really don't know, but every time

that I've reached that opinion that's what I've stated. I know that's not a good answer, but --

Just most recently I had a case involving a conveyer system that I -- that caused an injury that was defective in my opinion, but it was not defective because of what the manufacturer did. It was defective because the installer and the owner of the equipment failed to install the interlock on that equipment.

Q. Can you think of any other cases where you've investigated an accident and determined the product wasn't defective?

A. Yes.

Q. What else?

A. I investigated a case in Alabama at a defense contractor's plant. They built rocket motors, and a worker was killed in a confined space situation where the allegation was the compressor was at fault, and I found the compressor was not at fault.

Q. Do you have any experience with machine safeguarding aside from your forensic engineering work with The Warren Group?

A. No.

THE DEPONENT: Could I take a quick break for the restroom?

MR. OTT: Absolutely. We're almost done.

(Brief recess.)

MR. OTT CONTINUING:

Q. You mentioned that Ms. Dyches had hired you on a number of other occasions. How many times has she retained your services to investigate an accident?

A. I don't really know. I would say maybe -- just guessing, probably half a dozen times.

Q. Over what period of time?

A. Probably eight years.

Q. Does anyone else at Southeastern Claims Service send you work besides Ms. Dyches?

A. Yes.

Q. Who else?

A. I don't remember. I'm not even sure she's still there, to tell you the truth. I think she might be. But I have dealt with other people there on occasion. I just don't

A. I don't remember, no.

MR. OTT: Mr. Davis, that's all the questions I have for you. I appreciate your time.

THE DEPONENT: All right, sir.

MR. JONAS: I've got a few, Roger.

BY MR. JONAS:

Q. Mr. Davis, would you briefly go through your education history, starting with high school.

A. Well, I graduated from high school locally here at Brookland-Cayce in 1963. I entered the University of South Carolina that year; pursued a Bachelor of Science in mechanical engineering, which I got that degree in 1968.

I went to school after I started to work. I went to school part-time to pursue a Master's in Business Administration, and I believe I got that degree in '75, I think.

Q. And that would be an undergraduate degree in business administration?

A. A graduate, MBA.

Q. MBA. All right.

Beginning with your graduation in

1968 with your engineering degree, what is the history of your employment? I've heard some of it, but just to get some relevant dates on it.

A. Well, the first job out of college I took was with the Department of Navy. I worked at the Charleston Naval Shipyard in the nuclear power program. Their function there was to refurbish nuclear submarines.

I worked there for less than a year and went into the Air National Guard and was trained as a nondestructive inspection technician; served on active duty for a period of time briefly. Then I went to work for The Torrington Company. I worked there for two years as a manufacturing engineer. After that I --

Q. Give me a date when you left Torrington.

A. 1973.

Q. All right.

A. I went to work for the Department of Health and Environmental Control. I left there in 1985. I was there for 12 years.

Q. I think you indicated you had -- something about your background there. You

were working in what area?

A. Water, sewer, landfills, environmental areas.

Q. All right.

A. Following that I went to work for what because Laidlaw Environmental Services. At the time I went to work there it was called SCA Services. But I worked for Laidlaw for 12 years. Left Laidlaw in 1995 and went into partnership with a couple of guys doing some land developing. I continued with that business through -- let's see. About -- I don't know -- four years ago maybe, 2006 perhaps when I sold out my interest in that business.

During that time I was working part-time for The Warren Group initially, and I went full-time -- I don't know -- maybe four or five years ago.

Q. All right. As an engineer, what certifications do you have?

A. Well, I'm a licensed professional engineer in, I think, about five states now.

Q. All right.

A. I hold a national certification,

NCEES, National Council --

Q. What states are those?

A. North Carolina, South Carolina, Georgia, Alabama, Mississippi.

Q. Okay. With that national certification, is there a method by which you can obtain your PE regular certification in each of these states without being repeatedly tested?

A. Yes. Most states have a reciprocity agreement, although some states require you to take a limited test for things like ethics, that type thing, but for the most part it's a reciprocal arrangement.

Q. Where was the first state that you earned your PE?

A. South Carolina.

Q. What year was that?

A. 1973.

Q. As a professional engineer, what is the -- what obligation do you have to stay current in your field?

A. Well, there's continuing education requirements. You have to take -- I think it's 30 hours every two years in coursework that

relates to your field of endeavor.

Q. Just by way of completing this, after 1973 when you earned your PE in South Carolina, what were the order in which you then applied for and received certification in each of these other states?

A. I think North Carolina was the next state, and I don't recall, but probably Georgia would be next; then Alabama and Mississippi.

Q. And was there a reason that you applied for your PE in these states other than South Carolina?

A. Well, yes. Obviously, I do some work in those states, and some state courts require that if you do work in their states as an engineer that you have to be licensed in that specific state. That's not true everywhere, but in some states it is.

Q. All right. And do you hold any other positions within your professional community? Do you participate in any professional groups or organizations?

A. Not currently, no.

Q. As an engineer at The Warren Group, what has the scope of your work there been?

You've gone through some very specific examples, and I won't ask you to repeat those, but generally.

A. Well, generally -- well, of course, I'm a mechanical engineer, and the work is related to that, but my focus has been machine safeguarding, material handling; things like conveyors and cranes and things of that type, forklifts. But I have worked other cases.

I'm actually certified as a fire and explosion investigator, and I've done some work in that field, but it's not my preferred line of work, so I stay away from that as much as I can.

Q. The Warren Group, what is its range of capability, or how does it promote itself as relevant?

A. Well, we have a number of engineers, most of which are mechanical engineers. Dr. Warren, of course, is a Ph.D. mechanical engineer. We have one other Ph.D. mechanical engineer. We have several other mechanical engineers. We also have a Ph.D. electrical engineer, and we have a bachelor's level civil engineer.

Q. All right. And the facilities there, you maintain your office there and laboratories?

A. We do.

Q. All right. Now, you mentioned that you worked there part-time for some years before beginning full-time four years ago. What type of part-time activity did you have?

A. The same thing. I just had a fewer number of cases per year.

Q. All right. And moving to a full-time schedule, has it changed any in the way you support yourself or the scope of what you're doing, or are you simply doing more cases?

A. Doing more cases.

Q. And you mentioned this peer review within your organization. How is that conducted?

A. Well, I probably should mention that when a case comes in we qualify it. We try to -- that is, the management tries to assign the case based on capability, so the case is assigned to a person with, you know, the right credentials.

The peer review process is one

wherein when a report is completed, as I've done in this case, before it's finalized, we have another engineer on staff, in addition to an administrative review, but an engineer who reviews the report and provides any comments he wishes to make.

Q. Is that a process that's been ongoing for the 12 years you've been there or --

A. Yes, it has been.

Q. This other engineer that's available to comment on the reports, is that a position held by just one person?

A. No, that's not.

Q. How is that --

A. The entire staff shares in that function.

Q. All right. So if we were to consider the initial report at least, the 2006 report in this case, that was reviewed by Dr. Warren?

A. I don't know who reviewed it in this case. I might be able to determine that looking back at time records, but I don't know off the top of my head.

Q. All right. I think I understood that there were no comments to your report, but I

want to be certain of that. So your report after having been reviewed, are you aware of any comments that were made?

A. No.

Q. All right. At the time that you were assigned this case in 2006, do you know -- if I recall the date of accident is June the 1st of 2006, and if I followed your testimony, it was not until July the 17th that you had an opportunity to find out about this and the assignment was made then.

A. That is correct.

Q. And that was administratively through your office, if I follow. Ms. Dyches was the representative, but someone at Warren Engineers or Warren Group took the initial contact information?

A. Correct.

Q. How is that normally done?

A. It's normally done by either an admin person taking the call, screening it to determine what it is. She may then have either the president of the firm or -- or she may discuss it with one of the staff engineers to see if it's a case they're comfortable with

Q. All right. Did you make arrangements with them before you went to interview anybody in particular?

A. I contacted Mr. Woods, as I recall, to arrange the inspection, and he was there for discussion with me about the incident.

Q. All right. So Woodrow Woods was your contact person before and after you got there?

A. Yes.

Q. All right. Anyone else that you spoke with while you were there?

A. Not that I recall.

Q. All right. So in terms of other employees, Levain Brown, Rob Roseboom, I guess it is, did you speak with anyone or ask to speak with anyone else?

A. Not that I recall.

Q. All right. And how did Mr. Woods conduct your investigation; how did he assist you in that?

A. Well, he gave me access to the machine. He described what he knew of the incident. He seemed very forthcoming in telling me what he thought happened.

Q. All right. And you took your camera

with you, and you produced a number of photographs. Were those taken on the occasion of this one visit?

A. Yes.

Q. Did you go to the places that you felt like needed to be looked at?

A. Yes.

Q. All right. So after talking with Mr. Woods, did he essentially accompany you throughout your investigation and walk along with you?

A. I believe so.

Q. All right.

A. Someone took me, for example, to the location where the damaged hood was. I'm not sure if it was Mr. Woods or whether he sent someone else, but I didn't go unaccompanied.

Q. All right. And one of the photographs shows Mr. Woods with a hammer in his hand apparently removing the pins from the machine that you looked at on July 26th. Do you recall that photograph?

A. I do recall such a photograph, but it's not one that I took. It was provided to me later.

inspection.

Q. Did you find out where the controls for both the vibrating conveyor and the wood chipper were located?

A. Yeah. They were just inside the building near the chipper.

Q. Okay. They were separate controls, I understand?

A. Yes, that's correct.

Q. All right. And was it Mr. Woods or someone else that was operating the machine and giving you the opportunity to time the rundown?

A. I can't recall, but I think it was Mr. Woods.

Q. Okay. And if I follow, you made a calculation of the run-down time. What was it?

A. Fourteen minutes.

Q. Okay. Fourteen minutes. That was in a condition -- I think Mr. Woods called it freewheeling -- without anything being fed to the machine?

A. That's correct.

Q. Do you know the run-down time, whether it's more or less than that 14 minutes, if the machine is being fed product?

A. It would be less.

Q. During your tour of the sawmill, did you look inside any of the buildings?

A. Inside the buildings?

Q. Yes.

A. Well, actually, I was in the building where the mill was, where the electrical panels for these machines were located.

Q. All right. That would be with something -- I'll just refer to for my question, refer to this large mill. What operation was going on in there, if you know?

A. You know, I can't recall specifically, but they saw timber to make either lumber or fence posts out of it. Some of the material is waste material which they make chips out of.

Q. All right. And behind the large mill apparently is another building that is sometimes called a fence mill or a small mill; did you look in there at all?

A. You know, I don't recall that I did, but I was aware that there was a fence operation on site.

Q. All right. How long were you there

recollection was that he was at some distance away and had to be summoned.

Q. All right. Did you ask Mr. Woods whether or not he inspected the damage to the hood and the machine after the accident?

A. I'm not sure if I asked him if he inspected it, but he showed it to me, so I know that he was familiar with the damage.

Q. All right. Well, and specifically, did Mr. Woods recall or recount to you that he had inspected the damage to the hood and that he also found the pins to the hood that were not damaged, but that a fan blade had been damaged on the machine?

MR. OTT: Objection to form.

MR. JONAS CONTINUING:

Q. Is that consistent with what he said to you?

MR. OTT: Objection to form.

A. I believe that it is.

MR. JONAS CONTINUING:

Q. Now, did he also indicate to you whether or not there were any other witnesses to the accident?

A. My recollection was there were no

witnesses.

Q. Did he discuss with you what has been referred to as the procedure for shutting down the chipper machine at the end of the day?

A. I think we did talk about that, yes.

Q. All right. And you had testified earlier that there was a separate control for the chipper and the vibrating conveyer that fed the chipper. Did you understand that the procedure, based on your conversation with Mr. Woods, that the procedure was to turn off the chipper first?

A. I can't recall specifically whether he said that or not, but I know now that he takes that position, but I don't know if I knew it at that time or learned it at some later time.

Q. All right. Based on what you do know of the operation of the machine and the conveyer and the type of material being fed into it, if the vibrating conveyer continued to feed the machine after the chipper power was turned off and product was fed into the chipper, I think you've testified that it would slow the operation of the chipper?

A. It would.

Q. All right. And if excess material would be fed to it, that is, a lot of material that would normally be fed while the machine was operating and powered, what would be the effect of continuing to feed that machine after the power had turned off?

A. Talking about feeding at a high rate after the power is turned off?

Q. Feeding substantial material.

A. Well, the more material you feed into it after the power is turned off, the quicker it's going to come to a stop. You're dissipating that energy through the chipping process.

Q. Now, did Mr. Woods ever indicate to you that in his experience that it was not possible to see whether the disc is actually turning while the operator is in the position to remove the cotter keys from the pins?

A. You know, I don't know if that was my own observation or whether he pointed it out, but clearly there's a solid metal guard over the drive mechanism that limits somewhat the ability to see what's going on with the

chipper, and I'm also aware that Andreal apparently has stated that he either threw a stick in or put a branch in to try to make that determination, so he apparently did not routinely make that determination based on movement of the shaft or the sheave.

Q. One of the questions that's been referred to by counsel a number of occasions is the procedure that was being followed at A & K Mulch to change the chipper knives, and I think we referred to it any number of ways, but do you know what Mr. Woods claimed to be the procedure, whether there was, in fact, any formal procedure to change those chipper knives at all?

A. Well, from his deposition he said there was no formal procedure.

Q. But as I understand, Mr. Woods and Mr. Wright and Mr. Frierson were very experienced sawmill employees.

A. What are those names again? Woods and --

Q. Frierson, Leroy Frierson, and David Wright.

A. I know that Mr. Woods certainly was.

the disc to keep it from turning while you're working on it. So my understanding was that two people are sometimes, at least sometimes used for that routine.

MR. JONAS CONTINUING:

Q. So to actually get the wrench on the knives and to replace the knives would at least on this 58-inch chipper require two people?

A. Yes, that's my understanding.

Q. Regarding the decals that were on the machine, did Mr. Woods indicate to you when you interviewed him that there were numerous decals on the 58 machine when it was installed, that he and Mr. Witherspoon put more decals on the machine after it was installed showing someone getting hit in the head?

A. Let me look at my notes. I don't recall that specific conversation on that day. I think he showed me the machine, and I recall asking him if it had been modified in any way, and the response was no, it had not been modified, but I'm not sure if that would cover putting a decal on it or not.

Q. All right. But you've been provided a summary that claims that Mr. Woods said such

a thing in his deposition at pages 41 and 42 -- or I'm sorry -- 38 through 40, 63, and 135.

I mean, if that's actually accurate, then the decals weren't on the machine, these hit in the head decals, when it arrived?

MR. OTT: Objection to form.

A. I thought you were asking me about the time of my inspection, but yes, I do understand that from the deposition.

MR. JONAS CONTINUING:

Q. All right. Now, one of the -- I wanted to get a little more about your -- a few of your experiences with machines and looking at and inspecting various machines. You said you didn't have occasion previously to look at wood chippers, but does that include forest products, processing machines, I mean, as a general category?

MR. OTT: Objection to form.

A. No. I have worked cases involving other forest products machinery.

MR. JONAS CONTINUING:

Q. And I think I picked up that some of those things involved a log loader; was that one of those types of equipment?

A. Yes.

Q. All right. What type of -- who was the manufacturer, if you know, of that?

A. Rotobec, R-O-T-O-B-E-C.

Q. And what type of equipment was it?

A. It was a loader, a truck-mounted loader; articulated boom loader with a grapple that picks logs up and loads them on the vehicle that it's affixed to.

Q. So in researching that, did you have to investigate similar engineering considerations and standards, these OSHA specifications we've generally referred to?

MR. OTT: Objection; form.

A. I did.

MR. JONAS CONTINUING:

Q. And were the same general standards applicable in that case as you've referred to in this case?

MR. OTT: Objection to form.

A. Well, the general, yeah, the general duty clause is applicable to any case involving machinery. There were some OSHA standards that I found and -- not in the U. S., but in British Columbia that were specific to the log loaders