FILE NAME: AMMCO (AMC)

DATE: 2012 July 5

DOC#: AMC021

DOCUMENT DESCRIPTION: Legal - Plaintiff's Statement of Facts and Related Exhibits in Opposition to Hennessy Industries Motion for Summary Judgment

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July 5, 2012

Via U.S. Mail

Dr. Barry Castleman
P.O. Box 188
Garrett Park, MD 20896

Re: Geraldine Lepore vs. ACandS, Inc., et al
San Francisco Superior Court Case No. CGC-09-275411

Dear Dr. Castleman:

Enclosed is a copy of Plaintiffs' Separate Statement of Facts and Related exhibits in Opposition to Hennessy Industries Motion for Summary Judgment, for your review in this case. I am also providing you with a copy of our most recent service list for this matter.

Please give me a call if you have any questions or would like to discuss. Thank you for taking a look at these materials and for working with us on this case.

Very truly yours,

HAROWITZ & TIGERMAN

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SMT/ka

Aamco → actually AMMCO

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SUPERIOR COURT OF CALIFORNIA

COUNTY OF SAN FRANCISCO – UNLIMITED JURISDICTION

GERALDINE BIERNER LEPORE, Individually and as Successor-in-Interest to GENE LEPORE, Decedent; KRISTIN MARIE REINHOLZ; MICHAEL JAMES LEPORE; and DOES ONE through TEN, inclusive,

Plaintiffs,

vs.

AC AND S, INC., et al.,

Defendants.

Case No.: CGC-09-275411

PLAINTIFFS' STATEMENT OF UNDISPUTED MATERIAL FACTS IN SUPPORT OF PLAINTIFFS' OPPOSITION TO DEFENDANT HENNESSY INDUSTRIES, INC.'S MOTION FOR SUMMARY JUDGMENT / ADUJICATION

Date: January 25, 2012
Time: 9:30 a.m.
Dept.: 503
Judge: Hon. Teri L. Jackson

Complaint filed: November 19, 2009
Trial Date: May 21, 2011

UNDISPUTED MATERIAL FACTS:	SUPPORTING EVIDENCE:
12. AMMCO, or "Automotive Maintenance Machinery Company" was founded in 1923. Hennessy purchased AMMCO in 1987.	See Deposition of Craig Mountz, taken in the matter of *Ornstein v. Alfa Laval* on September 17, 2008, pp. 6:7-7:13, and attached to the Mattis Dec as **Exhibit E**.
13. AMMCO sold its first grinding machine in 1949 (before obtaining patents). Although there were various model numbers and design changes, the grinders were virtually "all the same machine" and designed specifically for one purpose – to sand-off or abrade some part of the friction material on a drum shoe so that it would fit a newly turned drum.	See **Exhibit E**, pp. 15:7-16:12.
14. In 1953, AMMCO filed its first application to the United States Patent Office for the brake grinding machine. Subsequent applications were filed with the U.S. Patent Office in 1955 and 1958 and incorporated various design changes to the grinder, including the addition of a handle which allowed users to move the brake shoe up and down, as well as back	See **Exhibit E**, pp.7:14-17; 10:8-11:25; 12:15-13:3; and Exhibits 2 and 3 thereto.

UNDISPUTED MATERIAL FACTS:	SUPPORTING EVIDENCE:
and forth when grinding the lining of the brake shoe. The applications AMMCO submitted to the United States Patent Office state that its brake grinders were specifically and expressly designed for the purpose of grinding brakes.	
15. This stated purpose was reiterated by its designated corporate representative, Craig Mountz. According to Mr. Mountz, the purpose of the AMMCO arc grinding machine is to alter the dimensions of the drum brake shoes that has lined material on their outside "so as to make them match the drum."	See **Exhibit E**, pp. 12:15-13:3.
16. As far back as 1949, AMMCO knew that its arc grinding machine created dust when it was operated as designed and intended.	See **Exhibit E**, pp. 16:13-17:9.
17. Plaintiffs' Certified Industrial Hygienist, William Ewing, has 29 years of experience in the field of industrial hygiene, with emphasis on the detection, evaluation, and control of asbestos. In the course of his work he has personally performed industrial hygiene investigations in connection with brake inspection and replacement of brake linings. As part of his work, he has had occasion to visit shops that performed brake work and examined the brake materials used in brake systems. He has also observed experienced brake/automotive mechanics perform brake servicing and brake lining replacements of vehicles with drum brakes. During the course of his work, he has spoken with persons who performed brake maintenance at various times throughout the 1960s through the 1980s. He has also read many depositions of persons who performed brake maintenance work on drum brakes. He has reviewed safety and industrial hygiene literature regarding automotive brakes and the asbestos in those brakes.	See Declaration of William Ewing, dated January 27, 2010, in the matter of *Palmer v. AC&S*, at ¶¶ 1-3, 5-7, which is attached to the Mattis Dec. as **Exhibit H**.

UNDISPUTED MATERIAL FACTS:	SUPPORTING EVIDENCE:
During the last 20 years, he has spent hundreds of professional hours in relation to the asbestos hazards associated with vehicular friction products, including specifically drum brakes and brake linings for drum brakes.	
18. Virtually all brake linings used on American made vehicles prior to 1980, contained asbestos. There is no reliable information that non-asbestos brakes for drum brakes were commercially available for general or ordinary use prior to 1980 on automobiles or trucks.	See **Exhibit H.**
19. AMMCO itself knew from the 1960s, that brake linings were made, at least in part, out of asbestos.	See Deposition of Craig Mountz taken on June 26, 2007, in the matter of *Himmelfarb v. Arvin Industries*, at p. 57:8-14, attached to the Mattis Dec. as **Exhibit F.** See also **Exhibit E,** at p. 35:1-25, pp. 36:15-37:3.
20. Even as late as 1975, AMMCO admitted that it knew that brake linings were still being made with asbestos.	See Deposition of Craig Mountz taken on June 26, 2007, in the matter of *Himmelfarb v. Arvin Industries*, at p. 57:8-14, attached to the Mattis Dec. as **Exhibit F.** See also **Exhibit E,** at p. 35:1-25, pp. 36:15-37:3.
21. Each AMMCO grinding machine came equipped with a dust collection mechanism. The dust collection mechanism on the AMMCO grinding machine was designed "to collect the dust" from the brake shoe being abraded. The dust collection system which consisted of a cloth bag (i.e. porous material) that "was basically clamped to the machine." In 1973, AMMCO developed a new dust collection system known as the Model 8925, which was sold as part of its brake grinders.	See **Exhibit E,** p. 16:8-12; pp. 23:1-16, 25:5-26:14; 53:19-56:16; 61:18-62:17.
22. In response to the 1972 Occupational and Safety Health Administration (OSHA) regulations regarding asbestos, AMMCO put its first asbestos warning on its brake grinders in 1973. The warning stated that the dust in the collection system	See **Exhibit F,** pp. 60:1-62:21; See also, **Exhibit E,** pp. 61:18-62:17;80:4-82:1.

UNDISPUTED MATERIAL FACTS:	SUPPORTING EVIDENCE:
contained asbestos and should be disposed of properly, but it did not warn the user to wear respiratory or breathing protection when using the machine.	
23. Despite providing inadequate warnings in 1973, AMMCO made no effort to contact prior customers who had purchased brake grinders with the earlier dust-bag collection system to warn them that the dust contained asbestos. Nor was there an effort by AMMCO to contact prior customers to let them know that a more efficient dust collection system was available for their brake grinder.	See **Exhibit E**, pp. 62:18-64:7; 80:4-82:6; 85:25-86:15.
24. Also in response to the 1972 OSHA regulations regarding asbestos, AMMCO conducted testing on its brake grinding machine. The testing confirmed that workers were exposed to asbestos while operating AMMCO's brake grinding machines.	See **Exhibit E**, p. 37:14-22; p. 39:5-40:19.
25. In March and December of 1973, AMMCO filed patent applications for its Dust Collector. These applications acknowledged the "serious need for an efficient dust collector for use with grinding and other industrial machinery which produce or handle fine particulate material." The Application further stated that existing dust collection systems were deficient because "[w]ith certain types of dust the bag surface becomes coated with an almost solid cake which, long before the bag or associated container is filled with dust, decreases the efficiency of the dust collector system to the point where **the fine particulates are not collected but are transmitted to the surroundings creating a definite health hazard.**" AMMCO's December 1973, Patent application reiterated that "[d]ust generated by grinders and other material removal machinery **is a potential hazard to the machinery operators** and other persons in the same general location."	See **Exhibit E**, pp. 26:16-27:12 and Exhibit 6 thereto, p. 2; and pp. 31:5-33:2.

UNDISPUTED MATERIAL FACTS:	SUPPORTING EVIDENCE:
26. In January 1978, AMMCO commissioned an industrial hygiene study relating to asbestos exposure from the use of its brake grinding machines. The report issued from the study showed that measureable asbestos fibers were released during the grinding work. The samples from this study revealed that the use of the AMMCO brake grinding machines released asbestos dust into the air, including samples taken in the middle of the shop, some fifteen feet away from the brake grinder. A test was attempted with the dust collection system disconnected from AMMCO's grinding machine. According to the report, the test had to be terminated when "it became apparent that large amounts of dust and fibers would accumulate in the air when the shoe grinding is done" without the bag.	See **Exhibit F**, pp. 106:3-107:17, and Exhibit 18 thereto at p. 4.
27. The "Discussion" section of the January 1978 report further notes that "**during destruction of brake shoe linings . . . significant fiber concentrations were generated in the operator's breathing zone, as well as in the general area.**"	See **Exhibit E**, pp. 76:6-80:1 and see also Exhibit F, at pp. 106:3-107:17 and Exhibit 18 thereto.
28. In July 1978, AMMCO commissioned another industrial hygiene study. According to the report, "the purpose of the survey and report was to review the product liability exposures" associated with the AMMCO brake grinder. The report acknowledged that "[t]he major product liability exposure associated with the use or misuse of the . . . brake shoe grinders . . . is the potential of personnel operating these machines **to inhale asbestos fibers present in the environment** as a result of brake grinding . . . operation." The July 1978 Product Safety Survey further noted that "[t]he primary product liability exposure associated with the brake shoes grinders is the fact that **brake lining material is normally fabricated from an asbestos**	See **Exhibit E**, pp. 82:7-85:24 and Exhibit 10 thereto.

UNDISPUTED MATERIAL FACTS:	SUPPORTING EVIDENCE:
compound, and during the grinding operation there is a possibility of introducing asbestos fibers into the air. The operator operating the equipment could conceivably breathe these fibers."	
29. In October 1986, AMMCO commissioned its final industrial hygiene study. The report showed that **"permissible exposure limits" were exceeded during all grinding operations.** In some instances, permissible exposure limits were exceeded by **240 percent.** The report recommended that further engineering controls be investigated "since all exposures during grinding operations were found to be in excess of the new OSHA Permissible Exposure Limit." The report further recommended that, until engineering and/or administrative controls can reduce excessive employee exposure to asbestos, employees should be issued and required to wear NIOSH/MSHA approved respirators.	See **Exhibit E**, pp. 87:24-91:2.
30. After receiving the 1986 testing results, AMMCO stopped selling its brake grinding machines in the United States. AMMCO continued to sell them outside the United States. Those sold outside the U.S. after 1986 had a warning label which warned the operator not to grind asbestos brakes. The warning labels placed on the AMMCO brake grinding machines sold outside of the U.S. were never placed on any of the machines sold in the U.S.	See **Exhibit E**, pp. 92:23-93:4; pp. 93:23-94:8.

UNDISPUTED MATERIAL FACTS:	SUPPORTING EVIDENCE:
31. AMMCO never revealed to its customers the testing results for asbestos exposure when using its grinding machine. Nor did AMMCO at any time warn the operators of its brake grinding machine to use respiratory or breathing protection when using the machine.	See Deposition of Craig Mountz taken on January 25, 2011, in the matter of *Graham v. Big A Auto Parts* at p. 110:7-23, attached to the Mattis Dec. as **Exhibit G**.

Dated: January 11, 2012

HAROWITZ & TIGERMAN, LLP

MIA MATTIS
Attorneys for Plaintiffs

EXHIBIT E

SUPERIOR COURT OF THE STATE OF CALIFORNIA
FOR THE COUNTY OF LOS ANGELES

HOWARD ORNSTEIN and ROSELYN ORNSTEIN,	)	
Plaintiffs,	)	
vs.	)	CASE NO. BC388810
ALFA LAVAL, INC., et al.,	)	
Defendants.	)	

****

ORAL AND VIDEOTAPED DEPOSITION OF

CRAIG MOUNTZ

September 17, 2008

****

ORAL AND VIDEOTAPED DEPOSITION OF CRAIG MOUNTZ, produced as a witness at the instance of the Plaintiffs, and duly sworn, was taken in the above-styled and numbered cause on the 17th of September, 2008, from 12:47 p.m. to 2:58 p.m., before LISA C. HOBBS, Court Reporter in and for the State of Tennessee, reported by machine shorthand, at 1616 Westgate Circle, Brentwood, Tennessee, pursuant to the California Rules of Civil Procedure and the provisions stated on the record or attached hereto.

HG LITIGATION
2501 Oak Lawn Avenue
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DIRECT EXAMINATION BY MR. GEORGE:
Q. Good afternoon, Mr. Mountz. How are you?
A. Fine. How about you?
Q. Good. Can you introduce yourself to the Ladies and Gentlemen of the Jury.
A. My name is Craig Mountz. I'm a design engineer for Hennessy Industries.
Q. And, sir, have you had an opportunity to review what we'll mark as Exhibit 1 to your deposition, which is a notice to take the deposition of the person most knowledgeable at Hennessy Industries with regard to a number of enumerated areas?
A. Yes, I have.
(Notice of deposition marked Exhibit 1, and filed as a part of this deposition.)
BY MR. GEORGE:
Q. Okay. And, although, this deposition notice was sent to Hennessy, you would agree that Ammco is a entity that was later purchased by Hennessy; correct?
A. Yes.
Q. And you, in fact, are the person

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most knowledgeable at Ammco with regard to the enumerated areas of testimony; is that accurate?
MR. BODELL: Objection, assumes facts not in evidence.
BY MR. GEORGE:
Q. Is that is accurate?
A. Yes.
Q. Okay. Now, Ammco stands for Automotive Maintenance Machinery Company; correct?
A. Correct.
Q. It's a company that was founded in 1923?
A. Sounds correct.
Q. All right. And around 1950, Ammco developed some technology to produce a machine that would arc brakes; correct?
A. Yes.
Q. And we talk about arcing brakes, what we're talking about is in that time frame, in the 1950's and continuing, most of the stopping mechanisms on cars were what we call drum brakes; correct?
A. Correct.
Q. And a drum brake is a half round metal shoe that has a lining attached to it, and

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the two half rounds are incorporated inside a drum, and then when the pedal is applied, those half rounds move outward, and that lining surface is what rubs against the drum to stop the car; correct?
A. Correct.
Q. Over the course of time, that process of stopping the car creates heat and pressure within the material that's on the lining of the shoe; correct?
A. Correct.
Q. And that heat and pressure allows parts of the shoe to get removed from the lining, parts of the lining, and, in fact, cause what they call scoring of the drum; is that accurate?
MR. BODELL: Objection, vague and ambiguous, compound, assumes facts, incomplete hypothetical.
BY MR. GEORGE:
Q. Is that accurate?
A. Well, usually, the scoring of the drum would occur when too much of the friction material would wear away.
Q. Okay. And scoring is a process by which the internal surface of the drum is

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scratched and the metal is removed.
A. Correct.
Q. And that scoring has an impact on the efficiency of the drum brakes to operate; correct?
A. It can have.
Q. And one of the remedies for that was to what they call turn the drum; correct?
A. Correct.
Q. And in turning the drum, you have a lathe machine called a brake lathe where the metal drum is mounted, and a cutting tool is inserted inside the drum, and a small portion of the inner part of the drum is removed; correct?
A. Correct.
Q. And that makes it a smooth surface for better braking purposes; correct?
A. Correct.
Q. That also alters the diameter of the drum surface; correct?
A. Yes.
Q. And once that is altered, a pair of brake shoes taken out of the box wouldn't necessarily fit within the drum and cover all the surfaces of the drum for efficient stopping; is

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that accurate?
A. Yes.
Q. And so one of the remedies for that is to change the diameter of the half round brakes so in fact they meet the inner dimensions of the newly turned drum; correct?
A. Correct.
Q. And in 1953, Ammco submitted a patent for a machine that would take these half rounds and alter their diameter; correct?
A. Yes.
Q. And they called those half rounds arcuates, is that how you would call it, arcuate segments?
A. I'm not familiar with that term.
Q. Okay. The device that was offered for a patent in 1953, you would clamp the half round brake with the friction material exposed, and you would turn it in such a way that it would rub against an abrasive surface that would remove a small portion of that brake and change its outer diameter; correct?
A. Yes.
Q. And, in fact, Ammco submitted another patent in January of 1958 for a machine

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that did the same thing, but it had a handle that allowed you to actually -- well, let me remove that. Start over again.
Let me show you what I'll mark as Exhibit Number 2, and ask if you've seen that before, which is a 1955 patent for a brake grinding device that was submitted by researchers at Ammco. Have you seen that before?
A. I don't believe I've seen this particular patent.
(Patent dated 8/23/55 marked Exhibit 2, and filed as a part of this deposition.)
BY MR. GEORGE:
Q. And looking at the diagram that accompanies the patent, is that a diagram which is familiar to you as to what the Ammco arc grinding machine looks like?
A. Yes.
Q. Okay. And in 1958, I'll ask if you've seen this before. We'll mark this as Exhibit 3.
(Patent dated 1/21/58 marked Exhibit 3, and filed as a part of this deposition.)

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BY MR. GEORGE:
Q. There was a subsequent patent applied for by researchers at Ammco, but at this point they now have the handle being able to be moved up and down, as well as back and forth. Is that accurate from what that --
A. Just by looking at the picture, that's what it looks like.
Q. Is that how the Ammco arc grinding machines worked --
A. Yes.
Q. -- with the movable handle in both directions?
A. I believe so.
Q. Okay. So in those patents, the application indicates that the very purpose of the machine is to dress down lined automotive brake shoes. Do you understand what the term dress down means?
A. I believe they're just saying to remove materials in those areas so as to make them match the drum.
Q. So would you agree with me that the very purpose of creating this machine was to alter the dimensions of brake shoes that had, that were

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drum brake shoes that had lined material on their outside?
A. Yes.
Q. Now, you've been offered here today as the person most knowledgeable with regard to Hennessy Industries, Inc. And you understand that in that capacity, you speak as if you are Hennessy Industries, Inc.; correct?
A. Correct.
Q. Okay. And what you say, you understand will bind the company because they're offering you as the person who knows the most about the subject matters we're about to discuss. Do you understand that?
A. Yes.
Q. Okay. Now, some of the areas that I intend to cover would include those that are outlined in the deposition notice, which I have right here, which it would include the Defendant's knowledge of the hazards of asbestos; the corporate structure of the Defendant; any efforts the Defendant made to ensure the safety of its products; the Defendant's knowledge with regard to what was placed in its sales publication and instructional material; the Defendant's efforts to

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evaluate the amount of asbestos dust released during the normal operation of its machinery; and Defendant's membership in any industry or trade organizations.

Are those areas that you have information with regard to both Hennessy and Ammco?

A. Most of those.

Q. Which ones do you not have any information about?

A. I believe you had one question in there about the financial, financials of the company.

Q. Okay. That would be the question that asks with regard to the financial worth of the Defendant, including profits and losses.

A. Correct.

Q. Is there any other of the areas, and there were 25 areas illuminated in the --

MR. BODELL: 26.

MR. GEORGE: No, only 25, because number 26 is all facts known or learned by the Defendant.

Q. Of the 25 areas, is that the only one that you don't currently posses any

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information with regards?

A. There are a couple that there just is no information.

Q. And we'll cover that as we go along.

A. Okay.

Q. The first thing I want to talk about is do you know when Ammco sold its first brake grinding device?

A. Approximately, 1949.

Q. Okay. So they had a brake grinding device prior to the patents that I showed you in 1953, '55 and '58.

A. Yes.

Q. Okay. And have you seen any diagrams of that?

A. It's virtually the same machine. It was just called a 2000.

Q. Okay. And how did it differ from the subsequent design changes, the -- as I understand it, there's an 800, an 8000, an 880, an 890, and I think there was a 7, 7 something, 720.

A. They're basically all the same machine. The difference is just in how the brake shoes held due to the different styles of brakes

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at that time.

Q. And each of those machines were designed specifically for one purpose, and that purpose was to sand off or abrade some part of the friction material on a drum brake so that it would fit a newly turned drum; correct?

A. Yes.

Q. Did each of those, were each of those machines designed with some type of mechanism to collect the dust that was generated from this process?

A. Yes.

Q. And so you would agree with me as far as back as 1949, Ammco knew that when you put a brake shoe that had a friction surface on it into their device, it was going to generate some level of dust?

MR. BODELL: Objection, incomplete hypothetical. You can answer.

THE WITNESS: Yes, it was to collect the dust.

BY MR. GEORGE:

Q. I understood that when you operate the machine the way it's supposed to be operated, the very purpose of it would generate dust;

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correct?

A. Correct.

MR. BODELL: Objection, argumentative.

BY MR. GEORGE:

Q. Because the dust is what's coming off when you apply the abrasive material to the surface of the brake; correct?

A. Correct.

Q. Now, when did you first become aware that brakes in the United States were composed in part of asbestos?

A. I have no idea when -- what point in time that was.

Q. Let me ask you this: When did you first become aware that brakes no longer contained asbestos?

A. I'm not so sure that they don't still have brakes that contain asbestos.

Q. And do you have any means of determining or know of any means of determining whether a drum brake either did or did not contain asbestos?

MR. BODELL: Objection, vague and ambiguous, incomplete hypothetical.

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sell it, but they sold it overseas; correct?
A. Correct.
Q. Okay. So most of my questions are going to be aimed at Ammco, because that's the entity that manufactured and sold the equipment during the time frame that my client was exposed to asbestos.
Let me ask you this: Did you have an opportunity to review Mr. Ornstein's deposition?
A. No.
Q. Okay. Do you have any knowledge about what Mr. Ornstein testified about?
A. No.
Q. Okay. And so you have no opinion about whether what Mr. Ornstein articulated with regard to his use of an Ammco brake grinder was proper or improper; correct?
A. What was the question?
Q. You don't have any knowledge one way or another about whether he correctly identified a piece of Ammco equipment, or if he did properly identify it, he used it the way it was intended to be used.
A. No, I have no idea.

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Q. Okay. What I want you to do is to look at the patent that is dated April, 1975. Now, that's two years after you say that the 29 -- I'm sorry, the 8925 system was marketed by Ammco; correct?
A. Correct.
Q. I want you to compare it with what we'll mark as exhibit -- well, we're going mark that as Exhibit 4, so we'll mark this as Exhibit 5, which is the dust collection system, Model 8925, which is dated 1986 from copyright materials, which I assume there's some sort of promotional literature with regard to that device; correct?
A. This is part of the instruction sheet that goes with the system.
MR. GEORGE: Okay. If we can go off for just a second.
VIDEOGRAPHER: We're off the record. It's 1:11 p.m.
(Patent dated 4/15/75 marked Exhibit 4, and filed as a part of this deposition.)
(Part of instruction sheet for Model 8925 marked Exhibit 5, and filed as a part

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of this deposition.)
(Off record.)
VIDEOGRAPHER: We're on the record. It's 1:12 p.m.
BY MR. GEORGE:
Q. Mr. Mountz, did you have an opportunity to review those two documents?
A. Just quickly, yes.
Q. Okay. Now, would you agree with me that the patent that was sought in 1975, one of the reasons for seeking the patent was a serious problem with the prior art type of dust collector?
MR. BODELL: Objection, calls for expert opinion, assumes facts not in evidence, incomplete hypothetical, vague and ambiguous.
BY MR. GEORGE:
Q. Would you agree that in applying for the patent, and just so we're clear, one of the assignees of the patent was Ammco Tools, Inc.; correct?
A. Correct.
Q. Now, do you know who Wallace Mitchell was?
A. Yes.
Q. Was he an employee of Ammco?

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A. Yes.
Q. Was he one of their engineers?
A. He wasn't at the same facility that we were in. I'm not sure what his title was.
Q. Now, this is dated April, 1975, and you joined Ammco in 1975; correct?
A. Correct.
Q. Were you aware at the time you joined them or shortly thereafter that they had applied for a patent on a dust collection system?
A. Not right at that time.
Q. Okay. Would you agree that one of -- the prior, before the development of the 8925 system, the dust collection device on all of the Ammco brake grinders was, in essence, a cloth bag?
MR. BODELL: Objection.
THE WITNESS: It was a --
MR. BODELL: Assumes facts. Vague and ambiguous. Sorry.
THE WITNESS: They all did have a collection bag.
BY MR. GEORGE:
Q. And it was just a cloth bag; correct?

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A. I'm not certain as to the actual material.
Q. Okay. But you know it wasn't plastic.
A. Correct.
Q. It was some type of porous material.
A. Yes.
Q. And it was -- how was it attached to the actual brake grinding device?
MR. BODELL: Objection, vague and ambiguous.
THE WITNESS: It was basically clamped to the machine.
BY MR. GEORGE:
Q. Okay. And there is, let's see, I'm trying to see if there is, it doesn't look like there's a description of it. But there is basically, just so the Jury understands the machine that we're talking about, the arc grinder -- when I use the term arc grinder and brake shoe grinder are essentially the same terminology; correct?
A. Correct.
Q. And I'm going to show you what

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we'll mark as Exhibit 7, which is the operating and service instructions for the -- from 1985, for various models of Ammco brake shoe grinders, and ask you if that is similar to the types of devices that Ammco has made since the late 1940's?
A. Correct.
(Patent dated 12/10/74 marked Exhibit 6, and filed as a part of this deposition.)
(Operating and Service instructions marked Exhibit 7, and filed as a part of this deposition.)
BY MR. GEORGE:
Q. Okay. And if you can hold that up so the camera can pan in on that.
Can you capture that for me, please?
All right. I'm going to ask you to do something really difficult. But if you can explain to the Ladies and Gentlemen of the Jury how this machine works.
MR. BODELL: Objection, calls for a narrative.
BY MR. GEORGE:
Q. Well, let me explain it, and you

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can just tell me if I'm accurate or not. Right here is, inside this, which says Ammco, inside there is a four inch in diameter pillar that has a piece of heavy abrasive material clamped on to it; correct?
A. Correct.
Q. And it's not -- it's a heavier material than sandpaper.
A. Yes, it has heavy backing.
Q. Because you want it to last a fairly long time since that's the major device used to remove the surface of the brake.
A. Correct.
Q. The brake itself would be clamped here and there would be an opening where this pillar is which has that heavy sandpaper spinning in more than 3,000 rpm.
A. About 3,000, yes.
Q. Okay. And what you do is you take this handle, and with this handle, you can move it back and forth and it would rub across the surface of that sandpaper which would remove small portions of the brake.
A. Correct.
Q. Now, where on that would the bag be

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placed?
A. Let's see here in the picture. It would actually be on the -- coming out the end.
Q. Okay. And there's some type of hole?
A. Yes.
Q. And the speed of the sandpaper spinning would create some type of suction that would allow the material to go into the bag; correct?
A. Actually, there's a fan hooked to the bottom of the motor that drew the dust particles out and forced them into the bag.
Q. Now, this one is dated 1985. Prior to 1977, there would actually be a hole in the top up here; correct?
A. I don't believe so.
Q. Well, isn't that why they developed the anchor plug?
A. That goes in the part inside this case that turns.
Q. Okay. So there was a hole on the top of the cylinder that held the sandpaper?
A. Correct.
Q. And that allowed for some dust to

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escape.
MR. BODELL: Objection, calls for expert opinion, vague and ambiguous.
THE WITNESS: It actually didn't escape. It just built up in there, so we made that plug to force the dust particles down.
BY MR. GEORGE:
Q. And it would certainly have made a better vacuum, and you are an engineer; correct, or at least --
A. Yes.
Q. -- you got a degree in engineering.
A. Yes.
Q. That having the plug on there created a better vacuum for collecting the dust than having the cylinder be open-ended.
MR. BODELL: Objection, calls for expert opinion, assumes facts not in evidence, incomplete hypothetical, vague and ambiguous.
THE WITNESS: There wasn't much of that cylinder that was open, but that plug closed off when it was.
BY MR. GEORGE:
Q. And would that effect be to have a better suction device?

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MR. BODELL: Same objections.
THE WITNESS: That helped draw the dust down, yeah.
BY MR. GEORGE:
Q. Now, I'm not asking a lay person about this. Part of your job at Ammco was to work on the design of machinery like the brake shoe grinder; correct?
A. Yes.
Q. Okay. Now, what difference is there, if any, between what we've marked as Exhibit 4, wherever it went, yeah, and -- let me strike that and start over.
In 1975, when Wallace Mitchell applied for this patent, he wrote that a serious problem with this prior arc type of dust collector is that when the bag becomes filled with dust, and/or the pores thereof become clogged with the dust particles, there is insufficient suction to remove the dust being produced, and the motor of the dust collector becomes overloaded.
Is that a problem that you were aware of when you joined Ammco back in 1975?
A. No, I did not work on them right away.

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Q. Okay. But do you understand that that was a problem that needed to be addressed at some point in time by the engineers at Ammco?
A. Yes, later on.
Q. And the problem they're describing is because of the porous nature of the bag collecting dust, once it got clogged up, it wouldn't effectively collect the dust. Is that what he's basically saying?
MR. BODELL: Objection, assumes facts not in evidence, calls for speculation, calls for expert opinion, vague and ambiguous.
THE WITNESS: The instructions always told the operators to not let the bag get full, and once it got to a certain state, to empty it. Because people didn't maintain their equipment, I think that's what Mr. Mitchell is referring to.
BY MR. GEORGE:
Q. Well, he also says, does he not, that, moreover, the dust particles are blown into the atmosphere. In fact, because of the inherent danger to persons using this type of equipment, there are many localities which have banned the use of brake shoe grinding machinery. Did you

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read that in the patent?
A. I saw that, yes.
Q. And when they talk about the danger to the people in the environment, they're talking about the fact that the brakes were composed of asbestos and that the arc grinding machine would release asbestos into the environment; is that accurate?
MR. BODELL: Objection, calls for speculation, vague and ambiguous, argumentative, calls for expert opinion.
THE WITNESS: Can you say that question again, please.
BY MR. GEORGE:
Q. Sure. From reading that sentence, would you agree with me that the danger they're talking about to people in the vicinity is the fact that it would create airborne asbestos fibers?
MR. BODELL: Same objections. Calls for speculation.
THE WITNESS: I'm sorry. Can we try that one more time?
BY MR. GEORGE:
Q. Sure. He says in here that: In

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fact, because of the inherent danger to the persons using this type of equipment, there are many localities which have banned the use of brake shoe grinding machinery, which incorporates that prior art type of dust collector. And by danger to the operator, he's talking about the fact that they might breathe asbestos dust; correct?

MR. BODELL: Same objections.

THE WITNESS: I'm not sure exactly what Mr. Mitchell had to say there, but through our testing, we always found that when you maintained the equipment the way we specified it, the dangers of asbestos were below the levels that OSHA had always set.

BY MR. GEORGE:

Q. Now, can you think of any other interpretation of that language than the fact that they're speaking about the introduction of asbestos fibers into the environment?

MR. BODELL: Objection, argumentative, calls for speculation, calls for expert opinion, vague and ambiguous.

THE WITNESS: That would be my guess.

BY MR. GEORGE:

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Q. The machine only has one function; correct?

A. Correct.

Q. And that function is to remove the surface of brake shoes?

A. Correct.

MR. BODELL: Objection, argumentative, asked and answered.

BY MR. GEORGE:

Q. Those brake shoes were composed as much as 50 percent asbestos; correct?

MR. BODELL: Objection, assumes facts not in evidence, calls for expert opinion, argumentative.

THE WITNESS: Yeah, I don't know what percentage.

BY MR. GEORGE:

Q. But you knew when you started with Ammco in 1975 that brake shoes contained asbestos; correct?

MR. BODELL: Objection, misstates testimony, assumes facts not in evidence, calls for expert opinion.

THE WITNESS: Yes, at some point in time I knew that.

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BY MR. GEORGE:

Q. Okay. In fact, you knew it when you started working for Ammco.

MR. BODELL: Same objections.

THE WITNESS: Probably, but I'm not sure.

MR. GEORGE: Well, let's go off for just a second.

VIDEOGRAPHER: We're off the record. It's 1:26 p.m.

(Off record.)

VIDEOGRAPHER: We're on the record. It's 1:27 p.m.

BY MR. GEORGE:

Q. Mr. Mountz, do you recall being deposed in the case of Saul Himmelfarb versus Arvin Industries, June 26th, 2007 in Bridgeport, Connecticut?

A. Yes.

Q. Okay. I want to show you page 57 of that deposition where you were asked: Question: When you joined Ammco in 1975, were you aware at that time yourself that brake linings were made still in part out of asbestos. And your response was: Yes.

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Is that an accurate rendition of your testimony?

A. Yes.

Q. Okay. Now, you mentioned testing, and I'm going to address that in just a second. One of the areas that we sought information regarding somebody who's most knowledgeable is with regard to the hazards of asbestos, and when Ammco knew that asbestos could cause disease. Am I accurate in saying that you have, since you didn't start with the company until 1975, you have no knowledge prior to 1975 of what Ammco did?

A. That's correct.

Q. What you do know is that in 1972, the United States Government passed certain regulations regarding asbestos under a new entity called the Occupational and Safety Health Administration; correct, OSHA?

A. Correct.

Q. In response to the legislation, Ammco did perform some testing; correct?

A. Yes.

Q. Now, do you know whether or not Ammco was a member of the National Safety Council?

A. I do not know that.

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Q. Okay. Do you know whether any member of Ammco was, Ammco, A-m-m-c-o, was a member of the American Society of Engineers?
A. There may have been some individual people.
Q. Do you know how far back those memberships go?
A. No.
Q. Did you ever ask anybody that worked for Ammco if they were members of any of those organizations?
A. I did not ask them.
Q. Would you agree with me that at least as of 1972, individuals at Ammco knew that over-exposure to asbestos could relate in disease?
A. Yes.
Q. Okay. And they knew at least as of 1972 that those diseases could be fatal.
A. Per the OSHA document that came out, yes.
Q. And, in fact, in the OSHA document, did it not indicate that asbestos could contribute to the development of cancer?
A. I believe so.
Q. So as of 1972, Ammco was aware that

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if you were exposed to too much asbestos, you could get cancer and you could die. Is that accurate?
A. I believe so.
Q. Okay. Now, the first study that I'm aware of that was conducted by, or at least say at the request of Ammco was a study that is dated January 30, 1973, but was transmitted to Ammco on February 7th, 1973. And you're aware of this document; correct?
A. Yes.
Q. Okay. We'll make that Exhibit 8, I believe.
(Study dated 1/30/73 marked Exhibit 8, and filed as a part of this deposition.)
BY MR. GEORGE:
Q. And other than the correspondence letter, which is from a David Giolello, Environmental Consultant for National Loss Control Service Corporation, to a Mr. Leonard Morrison at Ammco Tool Company, and the actual report itself, are you aware of any other correspondence that deals with these tests or their results?
A. With the test on that particular date?

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Q. Correct, with what's been reported as a test that was taken place on January 30, 1973.
A. No. Just the test results.
Q. Okay. So in looking at the files for Ammco, the only thing you have with regard to this test is the letter transmitting the results, and the results themselves; correct?
A. I believe so.
Q. Okay. Do you know what, if anything, Ammco did upon receiving the results in February of 1973?
A. Your question was, again?
Q. Do you know if they did anything in response to receiving those results?
A. The results showed that the machine passed the standards. Somewhere in that time was when they started -- when they came up with the 8925 collection system.
Q. Somewhere after January 30, 1973?
A. I'm not sure what the -- I'm not sure when they, exactly when they started the development of the 8925.
Q. Well, let me ask you this: Would you agree with me that the earliest manual, sales

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manual or instruction manual you can find with regard to the Ammco brake grinders is 1969; correct?
A. The earliest were the ones that we produced today.
Q. Okay. And this one from 1969. This one is from 1971; correct? And this one, you can tell me what it is because I can't read the date.
A. Yeah, I can't either. 70 something, I'm not sure.
Q. Would you agree with me that nowhere in any of those manuals do they disclose the fact that exposure to asbestos can result in disease?
A. This one is prior to the OSHA regulations.
Q. I understand. You would agree with me that none of those three instruction manuals with regard to the Ammco brake grinding device discloses the fact that exposure to asbestos can result in disease.
A. This one is basically a step-by-step, how-to guide that refers you back to the instruction manual on the machine.

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Q. **But nothing in that how-to guide discusses asbestos dust at all; correct?**
A. Correct.
Q. **The first test that was done in January of 1973 was done with a cloth bag to collect the dust; correct?**
A. Correct.
Q. **Okay. And what that showed was that the amount of dust generated would depend in part on the size of the bag that was attached to the machine. Would you agree with that?**
MR. BODELL: Objection, calls for expert opinion, assumes facts.
BY MR. GEORGE:
Q. **Well, if you compare -- well, I'll let you answer the first question, then I'll follow up. Let me withdraw the question and ask it this way: As an engineer, would you agree with me that the size of your dust collection device would affect the amount of dust that is generated?**
MR. BODELL: Vague and ambiguous, incomplete hypothetical, calls for expert opinion, assumes facts.
THE WITNESS: Per this report, the difference between the large and the small bag, I

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don't know if they were in any way -- in any other way different, other than just the --
BY MR. GEORGE:
Q. **How much was the dust generated using the large bag with a breathing zone sample?**
MR. BODELL: I'm sorry, can I have that question read back?
MR. GEORGE: I'll just rephrase it.
MR. BODELL: Thank you.
BY MR. GEORGE:
Q. **How much dust was generated when the test was performed from the breathing zone using a large bag collection device?**
MR. BODELL: Objection, calls for expert opinion.
BY MR. GEORGE:
Q. **Okay. Let me withdraw and ask it this way. Aren't I correct that the researchers hired by Ammco found 2.2 fibers per cc generated from the use of the Ammco device when a large collection device was attached to the machine; is that correct?**
MR. BODELL: Argumentative, vague and ambiguous, calls for expert opinion, assumes facts.

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THE WITNESS: Actually not. This report shows fibers per milliliter, not cc, but.
BY MR. GEORGE:
Q. **Would you agree with me that a cc is the same measure as a milliliter?**
MR. BODELL: Same objections.
THE WITNESS: I'm just looking at the report. That's not what the report says.
BY MR. GEORGE:
Q. **Okay. But you are familiar with the fact that a cubic centimeter and a milliliter are exactly the same measurement; are you not?**
A. I'm just looking at the report.
Q. **Okay. But they did find, did they not, 2.2 fibers per milliliter even though they had a collection bag attached to the machine?**
MR. BODELL: Same objections.
THE WITNESS: Yes.
BY MR. GEORGE:
Q. **Okay. And when they downsized the bag, when they used a smaller bag, they generated 3.6 fibers per milliliter; correct?**
MR. BODELL: Same objections.
THE WITNESS: That's what the report says, yes.

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BY MR. GEORGE:
Q. **And, in fact, they found that as the bag filled up, the more dust was introduced into the environment; correct?**
MR. BODELL: Same objections.
THE WITNESS: Correct.
BY MR. GEORGE:
Q. **When the bag, the large bag was only half full, they found 5.1 fibers per liter; correct, which was almost twice as much as they found when they started with the new bag?**
MR. BODELL: Same objection.
THE WITNESS: Correct.
BY MR. GEORGE:
Q. **And they also found, which makes sense, that the more brake shoes you grind, the more dust you're going to generate.**
MR. BODELL: Same objection.
BY MR. GEORGE:
Q. **Correct?**
MR. BODELL: Incomplete hypothetical.
BY MR. GEORGE:
Q. **Let me ask you this way: In the first sample, they ground four brake shoes and**

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found 2.2 fibers per milliliter. In the third one, they ground 16 shoes and they found 3.26 fibers per milliliter; correct?
A. Correct.
Q. That would be an indication that the more shoes you grind, the more dust you're going to generate, despite having a collection device.
MR. BODELL: Incomplete hypothetical, assumes facts not in evidence, calls for expert opinion, vague and ambiguous.
THE WITNESS: That's what this researcher found on this report.
BY MR. GEORGE:
Q. Okay. They also found, they took a breathing zone sample of a -- with a prototype dust collector and found 9.4 fibers per milliliter. Do you know what that prototype was?
A. No, I do not.
Q. You haven't seen any documentation that explained what prototype they were testing there?
A. No.
Q. Would you agree that the operation of this machine generates more dust in the

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environment than is measured simply in the breathing zone of the person doing the work?
MR. BODELL: Objection, calls for expert opinion, incomplete hypothetical, vague and ambiguous.
THE WITNESS: Can you say that again?
BY MR. GEORGE:
Q. Sure. The operation of this machine generates more dust in the environment than what is measured simply around the breathing zone of the person doing the work.
MR. BODELL: Same objections.
THE WITNESS: I believe that's what is stated in the results.
BY MR. GEORGE:
Q. In fact, when they took a measurement one inch from where the -- from the machine, they found 15.2 fibers per milliliter; correct?
A. Correct.
Q. And they did another one where they took it one inch from the bag on the large bag, and they found 50.2 fibers per milliliter; correct?

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MR. BODELL: Calls for expert opinion, assumes facts.
THE WITNESS: That appears to be what the report says.
BY MR. GEORGE:
Q. And they generated that 50 fibers per milliliter while grinding for only three minutes; correct?
MR. BODELL: Same objections.
THE WITNESS: Yes, that's what the report shows.
BY MR. GEORGE:
Q. You would agree with me that the -- let me ask you this, do you know what the current OSHA limit is?
A. No, I don't.
Q. Okay. You're not aware of what the current permissible exposure limit is?
A. No.
Q. I want you to assume that the current permissible exposure limit is 0.1 fibers per cc. How much did they generate in just taking a sample in the middle of the room after the grinding work had been done?
MR. BODELL: Calls for expert

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opinion, assumes facts, incomplete hypothetical, vague and ambiguous, outside the scope of the deposition.
THE WITNESS: This report shows at the time when the OSHA limit was nowhere near that. It shows .7.
BY MR. GEORGE:
Q. Okay. 0.7 fibers per milliliter generated after -- or the sample was obtained after the grinding had been completed, and the sample was taken from the middle of the room; correct?
MR. BODELL: Same objections.
BY MR. GEORGE:
Q. Is that correct?
A. That's what it says. But at the time, that was still within the OSHA limits.
MR. GEORGE: I move to strike everything after that was correct as nonresponsive.
Q. Now, Ammco hired the National Loss Control Service Corporation six months later to perform another test; correct?
A. Yes.
Q. Do you know why they wanted to have

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another test done six months after they just had one completed?
A. I believe that was the one on the new 8925 dust collector.
Q. Now, other than this study, which mentions the fact that it's done in conjunction with the Ammco Model 8925 Disposable Bag Dust Collection System, do you have any other documents that show that this dust collection system was actually being marketed in June of 1973 or later that year? Do you understand my question?
A. Yes, I believe we have something with that date on it.
Q. Do you have another document that shows that this was in the market place in 1973?
A. I believe there's another document on the 8925 that had the date on it.
Q. Well, that one has a date on it, and that's in 1986; correct?
A. That's just when this was printed.
Q. Well, here's another one about it. Do you see any date in there that shows 1973? I guess what you're referring to would probably be this. Is that what you're referring to?
A. Yes.

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Q. Okay. Now, do you know where that came from?
A. I believe there's another sheet to this.
Q. Now, it was part of an evaluation that was done in 1978; correct, that's one of the attachments?
A. Well, it was on the machine also in '78, but it was --
Q. I understand.
A. -- it was sold in '73.
Q. But do you know where that document dated, presumably, 1973 came from?
A. Yes, like I said, there's, here, that goes with it.
Q. I understand. And all of this are illustrations that go to a document dated 1978.
A. Okay.
MR. BODELL: Assumes facts.
BY MR. GEORGE:
Q. And what I'm asking you is where is the document that was generated in 1973?
MR. BODELL: Argumentative.
THE WITNESS: This is the document. This is the instructions that went with the

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machine.
BY MR. GEORGE:
Q. Well, how do I know that?
A. The rest of it's in there.
Q. How do I know that?
A. Because I'm telling you that.
Q. Well, I understand that. But on here, it says, it says illustration 10.
A. Okay.
Q. So that means that this itself is not an original; correct?
A. Correct.
Q. Okay. Where is the original of this document?
A. I have no idea where the original is.
Q. Can you show me where this -- where did this go, who got it?
MR. BODELL: Objection, vague, compound, argumentative.
BY MR. GEORGE:
Q. Well, let me withdraw and ask it this way: The only information that you have that this was generated in 1973 is on the bottom here, there's something that has a series of numbers,

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the last two digits are 73; correct?
MR. BODELL: Assumes facts not in evidence, argumentative, asked and answered.
THE WITNESS: This went with every machine starting in 1973. It went with the product. It was in our sales catalogs --
BY MR. GEORGE:
Q. Okay.
A. -- and advertisements.
Q. If that's true, you've produced to me documents from 1969 and 1971. Where is the document from 1973 that corresponds to this attachment to a 1978 document?
MR.BODELL: Argumentative, assumes facts, asked and answered.
THE WITNESS: Yeah, I'm sorry. I don't understand what you're asking.
BY MR. GEORGE:
Q. In your review of the Ammco documents, did you come across a Model 8925 instruction sheet that was in use in 1973?
A. Yes.
Q. Okay. Where is it?
A. That's the copy of it.
Q. But this a copy that was attached

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to a document in 1978. What I want to know is what evidence do you have that shows that this system was attached to an arc grinder in 1973?
MR. BODELL: Other than his testimony, his repeated testimony?
BY MR. GEORGE:
Q. Well, did you actually see a arc grinder with that attachment in 1973? You couldn't have because you didn't start until 1975; correct?
MR. BODELL: Objection, argumentative, argumentative.
BY MR. GEORGE:
Q. You didn't start until 1975; correct?
A. Correct.
Q. So you have no personal information that this system was available for sale in 1973; correct?
A. By the engineering drawings and the bill of materials, that was available in 1973.
Q. Okay. Where are the engineer drawings?
A. I don't have them.
Q. Okay. Are they available?

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A. Yes, they're in storage.
Q. Okay. I would ask that they be produced. What is the bill of materials?
A. It's just a list of every nut, bolt, screw, carton, instruction sheet, decal that goes with the machine.
Q. And do you have a bill of material dated 1973 that indicates that the Model 8925 was for sale in 1973?
MR. GEORGE: And I'm sorry, is it build of, is that what we're saying?
THE WITNESS: BOM, bill of material.
MR. BODELL: Oh, bill. Okay.
MR. GEORGE: Bill of material.
Q. Do you have a bill of material from 1973 that shows that the Model 8925 dust collection system was available?
A. Yes.
Q. Okay. I'd ask that be produced, as well. You would agree with me that – can you tell me the first sale by date? We know that in January of '73 it wasn't being used because at least it wasn't being tested; correct?
MR. BODELL: Objection, assumes

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facts.
THE WITNESS: As far as I can tell.
BY MR. GEORGE:
Q. Okay. And your interpretation of this is it wasn't available or you would have tested it in January of '73.
MR. BODELL: Assumes facts –
THE WITNESS: Correct.
MR. BODELL: – misstates testimony.
BY MR. GEORGE:
Q. Well, in fact, your testimony was the reason why they redid this in June of '73 is now this dust collection system was available; correct?
A. That's correct.
Q. And my question is, although, you tested it, do we know whether it was commercially available, or was this a test done to determine whether to put it on the market or not? Do you know the answer to that?
A. I don't know the objective.
Q. Can you tell me when the first Model 8925 was sold?
A. Not exactly.

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Q. Okay. At the time it was developed for sale, it was sold as a separate unit; correct?
A. Yes.
Q. Okay. It was not, if you bought an arc grinder, it didn't come with an 8925 attachment. You had to actually purchase it separately.
MR. BODELL: Objection, vague as to the time.
THE WITNESS: I do not know the date when it became standard equipment.
BY MR. GEORGE:
Q. Okay. Do you have any estimate of when that was?
A. I believe it was '73 when it was also offered as the option.
Q. But you don't have anything to substantiate that; correct?
A. No.
Q. Okay. And you're also not aware of any efforts by Ammco to notify purchasers that had already bought a brake grinding machine with the cloth bag attachment that the 8925 was available; correct?
A. I do not know that.

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Q. And we do know at least from the patent that one of the reasons why they're developing the 8925 was because of the problem with the bag collection system being overcome by fibers; correct?
MR. BODELL: Assumes facts not in evidence, calls for expert opinion, misstates testimony, vague and ambiguous.
BY MR. GEORGE:
Q. Is that correct?
A. Could you repeat the question, please.
Q. Sure. Let me do it this way. In looking at what we had marked as Exhibit 4, which is the patent application of April 15, 1975 by Wallace Mitchell, do you see any difference between that device that a patent was being sought in April of 1975 and the device that's being, one, depicted in the brochure that you say is from 1973 or even the brochure from 1986?
MR. BODELL: Objection, compound, assumes facts not in evidence, calls for expert opinion.
THE WITNESS: Appears to be the same device that was created in 1973.

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BY MR. GEORGE:
Q. 1975.
A. No, the patent states it was filed in 1973. It was awarded in 1975.
Q. Okay. So it was filed in December of 1973?
A. Yes, it was already created by then.
Q. Okay. And to your knowledge, and I only want to go by the knowledge you've gained as an Ammco representative, have you talked to anybody and gained any knowledge of whether they sold the machine prior to getting the patent?
A. I do not know that for a fact.
Q. Okay. But we do know that one of the reasons why they developed the system, which the picture of which on April 15th, 1975 is substantially similar to the picture depicted on Exhibit 5; correct?
MR. BODELL: Objection, assumes facts; calls for expert opinion, vague and ambiguous.
THE WITNESS: It appears to be the same unit.
BY MR. GEORGE:

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Q. Okay. We know one of the reasons, according to the patent, that they developed this is because they were concerned about the cloth bags being clogged with debris from the collection system; correct?
MR. BODELL: Assumes facts not in evidence, calls for speculation, calls for expert opinion, incomplete hypothetical.
THE WITNESS: Sorry, I forgot the question.
BY MR. GEORGE:
Q. We know the reason why they developed the 8925 is because of the perceived danger to persons using the prior type of equipment, the cloth bag; correct?
MR. BODELL: Same objections.
THE WITNESS: That's what -- that's how the patent is written, yes.
BY MR. GEORGE:
Q. Now, this system had a plastic bag that went over the cloth bag; correct?
MR. BODELL: Objection, vague and ambiguous.
THE WITNESS: No.
BY MR. GEORGE:

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Q. I thought it had a disposable plastic covering that went over the bag and then you could throw it away.
A. No. Actually, the particles are routed down into the plastic bag.
Q. Okay. And would you agree with me that plastic is a more impervious material than cloth --
MR. BODELL: Objection.
BY MR. GEORGE:
Q. -- when it comes to particulate matter?
MR. BODELL: Objection, assumes facts not in evidence, calls for expert opinion, incomplete hypothetical, vague and ambiguous.
THE WITNESS: Yes, these were.
BY MR. GEORGE:
Q. And would you agree with me that prior to the development of the 8925, Ammco gave no information to its customers about how to dispose of the contents of the cloth bag?
MR. BODELL: Assumes facts not in evidence, vague and ambiguous.
THE WITNESS: I do not know that.
BY MR. GEORGE:

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Q. Okay. You haven't found any information where Ammco told its customers how to dispose of the debris that collected in the cloth bag that was the collection system prior to the 8925; correct?
MR. BODELL: Same objections.
THE WITNESS: I do not know that.
BY MR. GEORGE:
Q. Now, the 8925, the plastic bag actually had a red warning on it with regard to how to dispose of the material; correct?
A. Actually, the bag was red and it had, I believe, all the instructions were in yellow.
Q. Okay. But it said something about, caution, contains asbestos, dispose of properly --
A. Yes.
Q. -- in essence. And to your knowledge, that information was not communicated to any of the purchasers of the prior -- of the brake grinders containing the cloth bag disposable system; correct?
MR. BODELL: Vague and ambiguous, assumes facts.
THE WITNESS: Other than our sales

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people going into those places and trying to sell the new collector, I don't know of anything other than that.
BY MR. GEORGE:
Q. And you have no sales records, correct, in your historical documents.
A. Correct.
Q. You don't have any document that shows what efforts the sales people made to contact purchasers of the prior incarnations of the brake grinding system, the ones with the cloth bags; correct?
A. I don't know of any information.
Q. You don't have any directives from anybody at Ammco that instructed the sales force to go back and contact prior customers to tell them that we have a more efficient dust collecting system; correct?
A. Sales may have, but I don't have any -- I don't know of any information.
Q. Well, have you had the opportunity to look at all of the documents that are currently available for Ammco?
A. Everything that I know of.
Q. Okay. There's no cash of sales

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documents somewhere that you haven't seen; is that accurate?
A. I haven't looked at any sales documents.
Q. Okay. But have you asked anybody if such directives exist?
A. I don't know that.
Q. Okay. Now, even with, and we'll mark this as Exhibit 9, and by this, I mean the June 5th, 1973 asbestos survey.
(6/5/73 Asbestos Survey marked Exhibit 9, and filed as a part of this deposition.)
BY MR. GEORGE:
Q. And this is a document you're aware of; correct, that you've seen before?
A. Yes.
Q. This is a better copy than the one that you-all provided to me. Even with this improved collection system, when they braked eight shoes with the door open, they still generated 3.6 fibers per milliliter; correct?
MR. BODELL: Objection, assumes facts, calls for expert opinion, vague and ambiguous. The document speaks for itself.

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BY MR. GEORGE:
Q. This isn't the first time you've read this document; is it?
MR. BODELL: Objection, argumentative.
MR. GEORGE: It's not argumentative. It's a question.
Q. Is this the first time you've read this document?
A. No.
Q. Okay.
A. But there are multiples. I just want to make sure I'm reading the right one.
Q. Well, I'm correct that in this document dated June 5th, 1973, the researchers hired by Ammco found 3.6 fibers per milliliter generated when the operator ground eight brake shoes.
MR. BODELL: Objection, calls for expert opinion.
THE WITNESS: That's what the report says, yes.
BY MR. GEORGE:
Q. And that's even with the overhead doors open in the garage.

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MR. BODELL: Same objection.
THE WITNESS: That's what the line says, yes.
BY MR. GEORGE:
Q. And eight brake shoes would be four wheels, correct, because there's two shoes to a wheel?
A. Correct.
Q. Okay. So in a car that had four drum brakes, four wheel drum brakes, that 3.6 fibers per milliliter would be generated as a result of a single car brake replacement.
A. Yes.
Q. Okay. Now, that level is the same level that was generated in the test six months earlier when they used the small bag and did four brake shoes; correct?
MR. BODELL: Objection, calls for expert opinion, incomplete hypothetical, assumes facts, vague and ambiguous.
THE WITNESS: That's what it appears.
BY MR. GEORGE:
Q. Okay. So it was a little more efficient because in this one they ground four.

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In that one, they ground eight; correct?
A. Correct.
Q. With respect to the large bag, this was a little bit more than what they got when they ground 16 shoes; correct?
MR. BODELL: Same objections.
THE WITNESS: Correct.
BY MR. GEORGE:
Q. Now, attached to this is some notes. Do you know why these notes have a consecutive Bates stamp with the test? By that, I mean, just to clarify for the record, the test itself is Bates stamped 34, 35, 36, and what's Bates stamped as 37 is some notes generated by Ray Stone. Do you know why they are attached?
A. Well, these are the samples that were taken from the test, and it looks like it's just a list of the samples to the industrial hygienist in the laboratory.
Q. And do you know who Ray Stone is?
A. No.
Q. Do you know why he wrote expect very low results?
A. No.
Q. Do you know if that's his

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conclusion or whether somebody told him that?
A. I don't know.
Q. From the context of the other ones, it says please call as soon as finished. Presumes that this deals with some type of conversation; would you agree?
MR. BODELL: Objection, calls for speculation, vague and ambiguous.
THE WITNESS: Well, I'm not sure who Ray Stone is, so I'm not sure who it – it says it's to the laboratory.
BY MR. GEORGE:
Q. But you have no personal knowledge.
A. No.
MR. BODELL: Counsel, can we take a restroom break?
MR. GEORGE: Sure.
VIDEOGRAPHER: We're off the record. It's 2:10 p.m.
(A break was held.)
VIDEOGRAPHER: We're on the record. It's 2:16 p.m.
BY MR. GEORGE:
Q. At any time after 1973, June, did Ammco ever reveal to its customers that the arcing

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of the brake shoes could generate as much as five fibers per cc or per cubic millimeter, milliliter?
A. I don't know that.
Q. Do you know if Ammco ever divulged to any of its customers the results of the tests that were conducted in January of '73 and June of 1973?
A. I don't know that either.
Q. Okay. Now, to your knowledge, are the three pages Bates stamped 35 – 34, 35 and 36 the totality of the June, 1973 dust sampling?
A. I'm not sure.
Q. Okay. Well, do you know if Ammco ever tested how much dust was generated, not just in the breathing zone of the worker, but coming off the machine itself like it had done in January of '73?
MR. BODELL: Objection, vague and ambiguous.
THE WITNESS: I'm sorry, what were you asking again?
BY MR. GEORGE:
Q. I'm asking if Ammco ever tested the brake grinder with this 8925 collection device, if they ever tested that near where the device was to

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bunched in spots around the outer rim of the metal collecting device. Is that what it says up here?
A. Yes, um-hum.
Q. That process of the bunching of the bag is not something that was unknown to Ammco as a occurrence among its customers. Is that accurate?
MR. BODELL: Objection –
THE WITNESS: It was –
MR. BODELL: – vague and ambiguous.
THE WITNESS: I don't know if it was known to the customers or not.
BY MR. GEORGE:
Q. No? Was it known to Ammco that on occasion the inner bag could, if it was oversized, it could result in being bunched in spots around the outer rim of the metal collection drum, and as a result, small gaps would be present where the rubber gasket and the drum were fastened to the fabric bag?
A. Yes, that's why they changed the bag size.
Q. And can we go off for just a second?

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VIDEOGRAPHER: We're off the record. It's 2:27 p.m.
(Off record.)
VIDEOGRAPHER: We're on the record. It's 2:28 p.m.
BY MR. GEORGE:
Q. Do you know of any sales literature or instruction materials that informs the purchasers of the Ammco brake grinder that having this occurrence, having the bag bunch up, means that it's poorly maintained?
A. The instructions may say to make sure that it's not, but I don't know that exact statement.
Q. Okay. Do you know of any instructions prior to 1978 that told the operator of the brake grinder to empty the bag if it was more than half full?
A. 1978?
Q. Correct.
A. I don't know that answer.
Q. Okay. We do know from the 1973 test that the fuller the bag is, the more dust that's going to escape from the system; correct?
MR. BODELL: Objection, incomplete

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hypothetical, vague and ambiguous, calls for expert opinion, assumes facts.
THE WITNESS: I believe the test showed that with the bags.
BY MR. GEORGE:
Q. Okay. And we know from this test in 1978 that the difference between a poorly-maintained collection system, and a well-maintained one is the well-maintained one they put a brand new bag on, and the other one was half full; correct?
MR. BODELL: Same objections.
THE WITNESS: That's what the report says.
BY MR. GEORGE:
Q. Okay. So the results they're comparing-is comparing it with a half full bag with a clean new bag, and the total amount of grinding that was done in these tests is essentially eight shoes per machine. They had one with a half full bag, and one with a new bag, and they did ground eight shoes on each machine; correct?
MR. BODELL: Same objections.
THE WITNESS: Well, in this

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instance, they did 16 grindings.
BY MR. GEORGE:
Q. They did 16 grindings, but they did them on eight shoes.
A. Well, they're saying they only used eight shoes, but they made 16 simulations of grindings.
Q. No, they made 16 passes. You don't grind – when you're using an arc grinding machine, you don't cut off all you need with one pass; isn't that accurate?
A. Most of the time.
Q. Most of the time you've got to go a few times. You're trying to catch the high spots and widened that diameter, so you would go more than once to make that happen. Have you ever used one of these machines?
A. Yes.
Q. Okay Did you do everything you needed to have done with one pass?
A. No, but I don't think that's what they're saying there.
Q. Okay. Now, they did attempt to measure how much dust was generated if you took the bag off of the machine; correct?

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A. Yes.
Q. And they had to abandon that test because large amount of dust and fibers would accumulate in the air when the shoe grinding was done without the bag.
MR. BODELL: Same objections.
THE WITNESS: I have no idea why they tried that, but that's what the report said.
BY MR. GEORGE:
Q. Okay. Have you ever interviewed any of the customers that bought your brake grinding systems?
A. No.
Q. Okay. So you don't know whether they operated with the bag or not; correct?
A. Correct.
Q. And if you did operate it without the bag, there's no doubt that excessive airborne asbestos fiber levels can be generated in the absence of the dust collections system; correct?
MR. BODELL: Same objections.
THE WITNESS: That's what the test said, yes.
BY MR. GEORGE:
Q. Okay. And even if you have it, if

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you ground two shoes twice on a machine that has a half full bag, you can generate, and this is with the 8925 dust collection system, you can generate as much as 2.6 fibers per milliliter; correct?
MR. BODELL: Same objections.
THE WITNESS: On a poorly-maintained machine, that's what the report says.
BY MR. GEORGE:
Q. And that poorly-maintained machine being one that had a half full bag, that would exceed at the time the OSHA allowable limit of two fibers; correct?
MR. BODELL: Same objections.
THE WITNESS: That's what the report says.
BY MR. GEORGE:
Q. And it certainly would exceed the NIOSH proposed limits of .5 fibers per cc; correct?
MR. BODELL: Same objections.
THE WITNESS: Well, of the proposed limit, but it wasn't the limit at the time.
BY MR. GEORGE:
Q. But it exceeded the allowable limit

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at the time.
MR. BODELL: Same objections.
BY MR. GEORGE:
Q. Do you know -- well, let me ask you this. You're aware that at some point in time, Ammco put a sticker on the top of the pillar where the spinning sandpaper was to inform the operator that asbestos dust could be generated; correct?
A. Yes.
Q. But you don't know exactly when that occurred; is that also correct?
A. I believe that was 1973, also.
Q. But you have testified previously, have you not, that you don't know what the year that that warning took place?
A. I say I believe it's '73.
Q. Okay. Well, let me show you your testimony from -- do you recall testifying in a case in Texas entitled Lee Bracket versus Bondex International, May 20, 2003?
A. Yes.
Q. Let me show you your testimony. And you were asked this question, and you were shown an exhibit, and the question was: And this says just for purposes of identification on the

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top, warning asbestos fiber dust, the dust collection system on this machine, yada, yada, yada, and then the instruction book. What machine did this appear on? Answer: It appeared on the top of the housing on the shoe grinder itself.
Question: What year was the release year that this one appeared? Answer: I'm not sure about that one. Okay. Can you give me the earliest year that it would have appeared? Answer: I know it was during the seventies for sure. Question: It was during the seventies? Answer: I don't know when the first time was, but I know it was there in the seventies.
That was your testimony in 2003; correct?
A. Yes.
Q. So you would agree with me you don't know what year in the 1970's such a sticker would have appeared on the arc grinding machine.
A. Not the exact day, no.
Q. And you don't know if they ever made those stickers available and mailed them out to the customers that purchased an arc grinding machine prior to the time that they put those stickers on the top of the machine; correct?

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A. I do not know that.
Q. You're also aware that at some point in time, Ammco put a metal plate on the base of the machine; correct, that indicated that use of the machine could generate asbestos dust?
A. I'm not aware of that.
Q. Okay. Now, in the last test – well, before I get to that, six months after the test we've just looked at from January of 1978, so five months, Ammco contacted National Loss Control Service Corporation again; correct?
A. Yes.
Q. And Mr. Hampton was Ammco's project engineering manager; correct?
A. Yes.
Q. Now, he had a discussion with Mr. Ziemba, the manager of product safety services; correct?
A. Well –
Q. Well, that's what the –
A. – per that letter, yes.
Q. – subject of the letter was. And what they were discussing is that National Loss Control Service Corporation conduct a product liability study for certain models of the Ammco

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brake grinder; correct?
A. Yes.
Q. And the product liability study is essentially they wanted to develop some information that they could use to defend themselves in lawsuits; you agree?
MR. BODELL: Objection, calls for speculation, assumes facts, vague and ambiguous, argumentative.
THE WITNESS: I'm not sure what exactly prompted Mr. Hampton to request that.
BY MR. GEORGE:
Q. So you've seen no correspondence with regard to this product liability study other than the study itself, and this letter of May 3rd, 1978; is that accurate?
A. I believe so.
Q. Now, on page two of the study, under general conclusions, it says: This can greatly assist in Ammco's defense should there be allegations of product defects related to a failure to warn.
As Ammco, would you agree that that's a reference to the fact that they were anticipating that operators of their system were

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going to sue them for exposure to asbestos generated from the use of their machines?
MR. BODELL: Objection, calls for speculation, incomplete hypothetical.
THE WITNESS: I can't say for sure that's what –
BY MR. GEORGE:
Q. Well, when they started off the general conclusions, they say the major product liability exposure associated with the use or misuse of Models Number 880, 890, or 8000 brake shoe grinders and the Model 1250 brake assembly washer is the potential of personnel operating these machines to inhale asbestos fibers present in the environment as a result of brake grinding or brake washing operation. Did I read that correctly?
A. Yes.
Q. Okay. And what is your understanding of product liability exposure?
MR. BODELL: Same objection, argumentative.
THE WITNESS: Can you restate the question, please.
BY MR. GEORGE:

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Q. Sure. What is your understanding when they talk about major product liability exposures? Would you agree that they're talking about potential lawsuits?
MR. BODELL: Same objections.
THE WITNESS: That's what it appears to sound like.
BY MR. GEORGE:
Q. Okay. And, in fact, with regard to the brake grinder itself, they say the primary product liability exposure associated with the brake shoe grinders is the fact that brake lining material is normally fabricated from an asbestos compound, and during the grinding operation, there is a possibility of introducing asbestos fibers into the air. Did I read that accurately?
A. Yes.
Q. Okay. Now, this is a document that you know came from the files of Ammco; correct?
A. Yes.
Q. Okay. And it's a document you've read before and, in fact, it's a document that I believe you produced today; correct?
A. Yes.
Q. Okay. Now, one of the other things

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that they talk about is the new dust collection system was initially marketed for retrofitting on existing machines, but is now standard equipment on all brake grinders. The old version of the dust collecting system consisted of a fabric bag which had to be emptied by the machine operator when it was filled to a certain level and then reinstalled on the machine.

That's what they wrote; correct?

A. Yes.

Q. Now, you don't know what efforts were made to contact prior purchasers of systems with the cloth bags to make the retrofit available; correct?

A. Correct.

Q. Okay. Now, we talked earlier about the poorly-maintained machine. Do you recall that discussion?

A. Yes.

Q. In here under engineering, it says that Ammco has recently instituted some changes to the new dust collection system on the brake shoe grinders. The plastic dust collection bag has been decreased in size. Originally, a standard size plastic bag was utilized, but this bag was

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too large, and the installation of the oversized bag could result in a bunching of the plastic bag around the outer rim of the metal collection drum. This could result in small gaps around the rubber gasket where the drum is fastened to the underside of the collection system's fabric bag resulting in emissions of asbestos fibers during the operation of the machine. Did I read that correctly?

A. Yes.

Q. Now, do you know when Ammco switched from the large standard size plastic bag to the smaller version?

A. No, I don't.

Q. We do know from the tests that were conducted six months earlier that the better fitting bag on the well-maintained machine resulted in less dust than the poorly-maintained, ill-fitting bag; correct?

MR. BODELL: Objection, vague and ambiguous, calls for expert opinion.

THE WITNESS: Per the statements in the report.

BY MR. GEORGE:

Q. And the final test was done in 1986; correct?

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A. Yes.

Q. Well, okay. I say the final test. Do you know of any other tests that were conducted after 1986?

A. No.

Q. Do you have any knowledge of who retained the services of Francis Weir, Glenn Tolar and LeAnne Meraz to finance a study that appeared in Applied Occupational Environmental Medicine in 2001?

A. I don't know who initiated that.

Q. Have you seen any correspondence or anything within Hennessy or Ammco's files that discusses the financing or communications between the authors and those companies?

A. No.

Q. You are aware from the study itself that they say the work reported in this document was supported in part by a grant from Hennessy Industries, Inc. You're aware of that; correct?

A. I read that.

Q. You haven't seen anywhere where that support is documented?

A. No.

Q. Do you who Glenn Tolar is?

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A. I don't believe so.

Q. During any of the evaluations that were performed by National Loss Control Service Corporation, were any photographs taken?

A. I've never seen any. I don't know.

Q. Now, in 1986 because OSHA reduced by tenfold its allowable asbestos exposure level, Ammco requested another evaluation from National Loss; correct?

A. Correct.

Q. And in that evaluation, they found that the grinding of shoes even with the dust collection system was 240 percent of the new permissible exposure limit; correct?

MR. BODELL: Objection, calls for expert opinion.

THE WITNESS: For the – let's see, per the report, that one test, yes.

BY MR. GEORGE:

Q. Okay. That's the only test where they just ground brake shoes.

A. Okay.

Q. Okay. And the other test had no grinding, no grinding background sample bag with a collection system. When they tested the grinding

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of the shoes only, they found that it exceeded the permissible exposure limit by 240 percent; correct?
MR. BODELL: Calls for expert opinion.
THE WITNESS: That's true.
BY MR. GEORGE:
Q. In fact, they told you, Ammco, that further engineering controls should be investigated for the Ammco grinder 8000 since all exposures during grinding operations were found to be in excess of the new OSHA permissible exposure limit. That's what they told you; correct?
A. Correct.
Q. And that Ammco grinder 8000 is essentially the same machine that all of the arc grinders were since the late 1940's?
MR. BODELL: Objection, misstates testimony, calls for expert opinion, vague and ambiguous.
THE WITNESS: Other than the collection system.
BY MR. GEORGE:
Q. Right. Which is, and that collection system existed some time in the

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seventies forward.
A. Correct.
Q. And they informed you that because the exposure for brake jobs were found to be in excess of the current limits, further requirements such as providing protective clothing to the operators, as well as including them in a medical surveillance program would be necessary. That's what they told you; correct?
A. That's what the report says.
Q. In fact, what they found is when they ground one set of shoes, now when they're talking about a set in 1986, most of the cars in that era only had rear drum brakes; correct?
A. I don't know exact percentage, but.
Q. So when they say four total shoes, they're only talking about two wheels.
A. Correct.
Q. And in doing those two wheels, they found a fiber concentration of 2.8 fibers per cc; correct?
MR. BODELL: Objection, calls for expert opinion.
THE WITNESS: That's what the report says, yes.

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BY MR. GEORGE:
Q. And, in fact, that's very close to, and, actually, a little higher than the amount of dust that was generated back in January of 1973 when they used a large bag and did four brake shoes.
MR. BODELL: Objection, calls for expert opinion, assumes facts, incomplete hypothetical, vague and ambiguous.
THE WITNESS: Yes, that's true.
BY MR. GEORGE:
Q. Okay. So back in 1973 when they used a large bag with a standard neck, breathing zone study, they found 2.2 fibers per milliliter. In 1986 when they used this new 8925 dust collections device, they ground one set of shoes, four total, and came out with 2.8 fibers per cc; correct?
MR. BODELL: Same objections.
THE WITNESS: That's what the report shows.
BY MR. GEORGE:
Q. After this report in 1986, Ammco decided rather than to redesign the brake grinding device and/or its collection system simply to stop

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selling it in the United States; correct?
MR. BODELL: Objection, assumes facts not in evidence, argumentative, vague and ambiguous.
THE WITNESS: We did stop selling it after that, yes.
BY MR. GEORGE:
Q. And that was the reason why --
MR. BODELL: Same objections.
BY MR. GEORGE:
Q. -- you stopped selling it in the United States in 1986 was because of the results of this test.
MR. BODELL: Pardon me, same objections.
THE WITNESS: I believe that's correct.
BY MR. GEORGE:
Q. Now, you did sell them, you could produce them, and you did sell them outside of the United States; correct?
A. Yes.
Q. And to be fair to the company, you put a warning label on the machines that you sold outside of the United States after 1986; correct?

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A. Yes.
Q. **And that warning label said do not grind an asbestos brake; correct?**
A. Yes.
Q. **You never put that warning label on any machine that you ever sold in the United States.**
A. I don't believe so.
Q. **Now, you stopped selling machines for good in 1999 after you were deposed in an asbestos product liability case; correct?**
MR. BODELL: Objection, assumes facts not in evidence, vague and ambiguous.
THE WITNESS: I'm not sure what the timing of that was.
MR. GEORGE: Well, can we go off for just second?
VIDEOGRAPHER: We're off the record. It's 2:55 p.m.
(Off record.)
VIDEOGRAPHER: We're on the record. It's 2:56 p.m.
BY MR. GEORGE:
Q. **And I'm going to refer you back to the testimony of the case in Texas, Bracket.**

REPORTER'S CERTIFICATE
STATE OF TENNESSEE)
) SS.
COUNTY OF DAVIDSON)

I, Lisa C. Hobbs, Court Reporter and Notary Public at Large, hereby certify that I reported the foregoing deposition on the Stenograph shorthand machine to the best of my skills and abilities and thereafter the same was reduced to typewritten form, by me, consisting of 95 pages.

I further certify that I am not related to any of the parties named herein, nor their counsel, and have no interest, financial or otherwise, in the outcome of these proceedings.

Lisa C. Hobbs, Court Reporter
and Notary Public at Large

My Commission Expires:
July 3, 2012

95

Question: And I don't know if I asked you this question, why did it ultimately quit selling it overseas or not outside the United States, not necessarily just overseas. Answer: The sales volume was almost nil, also it came right after one of our depositions in another case. Question: Do what now? Answer: After a deposition in another case, we just decided it wasn't worth it, so we stopped selling at that time.
And that's what you said; correct?
A. That's what I said at that time.
MR. GEORGE: Okay. I have nothing further. Thank you.
MR. BODELL: No questions. Anyone on the phone? That's it.
VIDEOGRAPHER: We're off the record. It's 2:58 p.m.
(Letter dated 5/3/78 marked Exhibit 10, and filed as a part of this deposition.)
(Industrial Hygiene Report marked Exhibit 11, and filed as a part of this deposition.)
FURTHER DEPONENT SAITH NOT.
(Signature of deponent waived.)

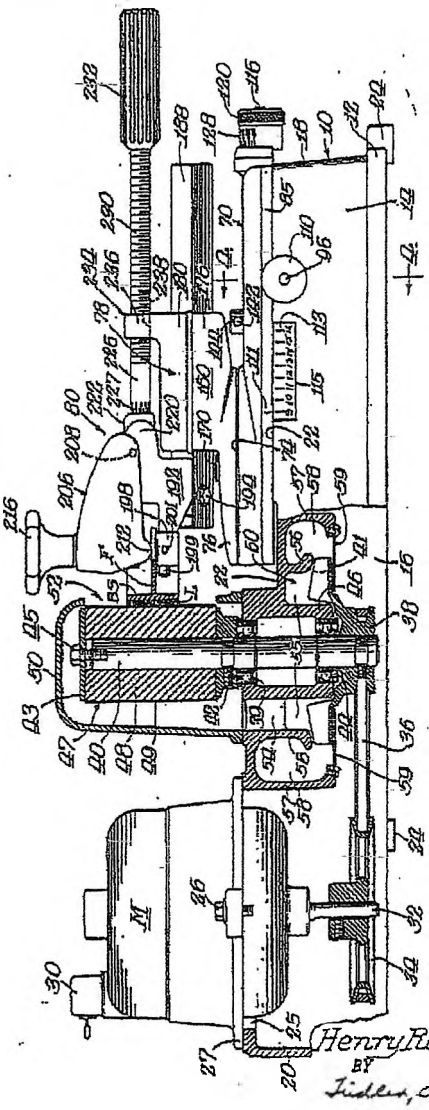
9/17/2008
Mountz Depo.
~ Exhibit 2 ~

Aug. 23, 1955 H. R. BILLETER 2,715,799

GRINDING DEVICE

Filed Aug. 19, 1950 4 Sheets-Sheet 1

Fig. 1.



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Aug. 23, 1955 H. R. BILLETER 2,715,799

GRINDING DEVICE

Filed Aug. 19, 1950 4 Sheets-Sheet 2

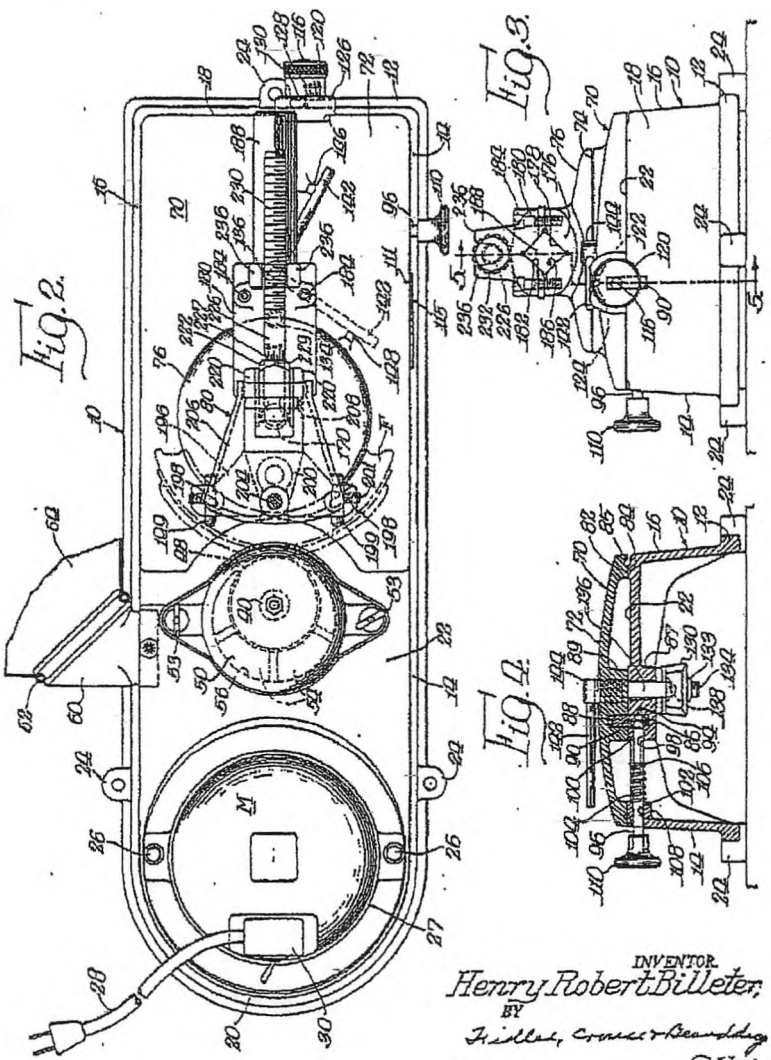

Fig. 2.

Fig. 3.

Fig. 4.

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GRINDING DEVICE

Filed Aug. 19, 1950 4 Sheets-Sheet 3

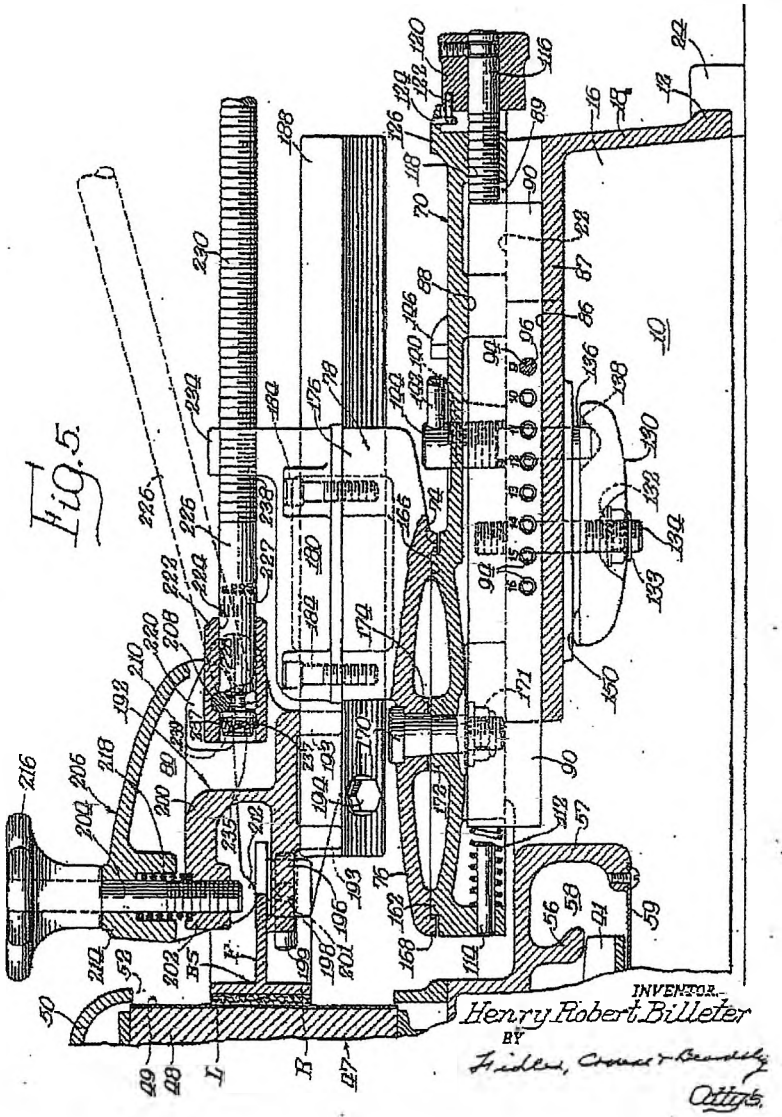

Fig. 5.

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GRINDING DEVICE

Filed Aug. 19, 1950 4 Sheets-Sheet 4

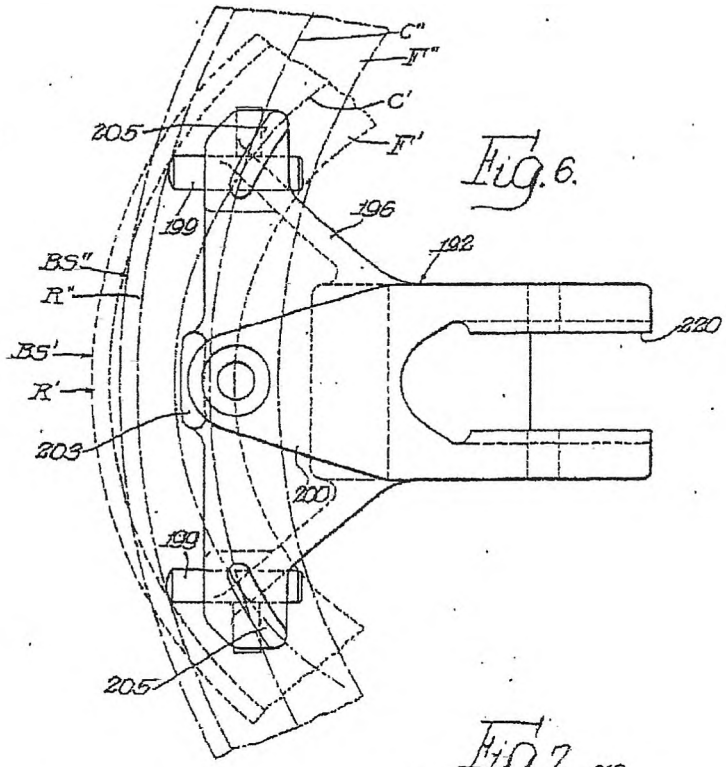

Fig. 6.

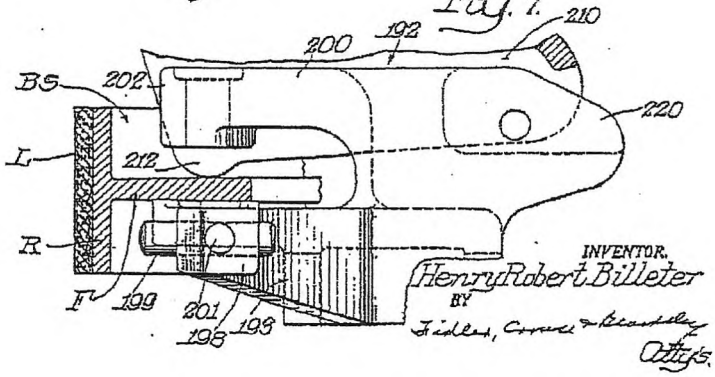

Fig. 7.

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United States Patent Office

2,715,799

Patented Aug. 23, 1955

2,715,799

GRINDING DEVICE

Henry Robert Billeter, Highland Park, Ill., assignor to Ammco Tools, Inc., North Chicago, Ill., a corporation of Illinois

Application August 19, 1950, Serial No. 180,425

14 Claims. (Cl. 51—96)

The present invention relates to a grinding device and more particularly to a device for grinding arcuate contours and especially well adapted for dressing down the exposed arcuate surfaces of automotive brake shoe linings to produce a true cylindrical face of proper radius to fit the brake drum with which the brake shoe is to be used.

In processing lined automotive brake shoes it is usually necessary to dress down a new lining so that the radius of curvature is the same as that of the brake drum with which the brake shoe is to be used in order that the entire braking surface of the shoe will engage the brake drum when the brakes are applied. When a brake drum becomes worn, it is usually bored out to insure that its braking surface is truly cylindrical and as a result its radius is greater than the radius of the brake shoe with which it is associated. When an oversize brake lining is applied to such brake shoe it is usually necessary to dress down the surface of the brake lining until its exposed curved surface is truly cylindrical, if it was not theretofore cylindrical and of a proper radius to accurately fit the inside surface of the brake drum.

An object of the present invention is to provide a grinding device wherein a carriage for pivotally supporting a holder for the article to be ground is adjustable linearly toward and away from a grinding element selectively into any one of a plurality of spaced predetermined positions for quick, approximate adjustment of the pivot axis of the article-holder relative to the grinding element and the carriage is further adjustable linearly toward and away from the grinding element through an infinitely variable adjustment from any one of said predetermined positions for exact adjustment of the position of the pivot axis relatively to the grinding element.

Another object is to provide a grinding device wherein a carriage for pivotally supporting a holder for the article to be ground is adjustable toward and away from a grinding element and may be firmly and rigidly secured in any position of adjustment in such manner as to insure that the pivot axis of the article-holder remains fixed in the position to which the carriage is adjusted, and no strain is imposed upon the adjusting mechanism during the grinding operation.

A further object is the provision in a grinding device of the type having a carriage slidable on a base and pivotally mounting a holder for an article to be ground of an indexing mechanism for positioning the carriage in any one of a plurality of spaced predetermined positions having an element thereof which serves also as a guide element for guiding the carriage for movement on the base.

Another object is the provision in a grinding device of the type wherein a holder for the article to be ground is pivotally mounted for oscillatory movement about a pivot axis adjustably fixed relatively to a grinding element, of a feed mechanism by which the holder may be rapidly advanced to bring the article into grinding relation with the grinding element and by a very simple manipulation secured in such advanced position and accurately advanced therefrom, which holder by another very simple operation may be rapidly retracted from any position into which it has been advanced.

A further object is to provide in a grinding device a holder for holding the article in proper grinding relation to a grinding element, of such construction and arrangement that an article to be ground may be quickly and easily inserted in the holder and firmly secured accurately in proper position, without requiring any aligning or positioning operations other than inserting the article properly in the holder and clamping it therein.

Still another object of the invention is to provide a brake shoe grinding apparatus in which the various parts which move frictionally upon one another are substantially enclosed and protected from the comminuted products of abrasion thereby materially lengthening the life of these moving parts.

An additional object is to provide a grinding device of the general type described wherein the indexing and adjusting mechanism for presetting the device for accurately forming a contour of predetermined radius may be readily calibrated by a simple adjustment of certain of the parts.

Another object is to provide a brake shoe grinder of the pivoted carriage type wherein the ends of the brake lining may be beveled by a simple manipulation of the operating handle of the device and without changing the setting of the pivoted carriage.

Still a further object is to provide a brake shoe grinder having a holder for the brake shoe to be ground which is so constructed and arranged that it will accommodate any brake shoe within the usual range of sizes and will hold the brake shoe with the surface of the lining closely parallel to the surface of the grinder, thus assuring accurate dressing down of the surface of the lining.

Other objects are to provide an apparatus of the character briefly outlined above which is simple in construction and possessed of a minimum number of moving parts and consequently unlikely to get out of order; rugged and durable and therefore possessed of a long life; may be manufactured at a comparatively small cost; simple and speedy in action; clean in its operation; and having its abrasive element so arranged that it may be quickly and easily removed and replaced.

Other objects and advantages will appear from the following description and the appended drawings wherein:

Figure 1 is a side elevational view of a brake shoe grinding apparatus constructed in accordance with the principles of the present invention, certain of the parts being shown as broken away and others sectioned to more clearly reveal the nature of the invention;

Fig. 2 is a top plan view of the apparatus;

Fig. 3 is a front elevational view thereof;

Fig. 4 is a fragmentary sectional view taken substantially along the line 4—4 of Figure 1;

Fig. 5 is an enlarged, fragmentary sectional view taken substantially along the line 5—5 of Fig. 3;

Fig. 6 is a top plan view of the lower brake shoe clamp, with broken lines showing somewhat diagrammatically the relative positions taken by two brake shoes of different sizes when in position in the clamp; and

Fig. 7 is a side elevational view of the lower brake shoe clamp and showing also a portion of the upper clamp and somewhat diagrammatically a brake shoe in position in the clamps.

The grinding device of the present invention is especially well adapted for grinding to true cylindrical contour the surfaces of linings attached to automotive brake shoes and the device is described herein in connection with such use for the purpose of illustration. It will be understood that the invention is not thus limited and that the principles may be applied to other uses where generally similar results are desired.

Referring now to the drawings in detail and in particular to Fig. 1, the grinding device includes a base

or frame 10 in the form of an elongated rectilinear casing-like member having a base flange 12 extending therearound from which there extends upwardly and inwardly, preferably at a slight taper, a pair of side walls 14 and 16, a front wall 18 and a curved rear wall 20. The top wall 22 of the structure constitutes a bed plate upon which is mounted the principal operating elements of the apparatus. The flange 12 is formed with a plurality of supporting feet or pads 24 by means of which the base 10 may be secured to a supporting surface such as a work bench, with the flange 12 slightly elevated from the surface thereof to permit circulation of air beneath the apparatus for purposes that will become apparent presently.

Supported within an opening 25 (Fig. 1) formed in the top wall of the base 10 is an electric motor M which is suitably secured to the base as by means of a mounting bracket 27 and bolts 26. Current may be supplied to the motor by means of a cable 28 and a conventional switch assembly 30 is provided to control the motor circuit. The motor M serves to drive a grinder 47 of suitable form adapted to dress down the surface of a brake shoe lining and hence is provided with a shaft 32 which projects downwardly in the base 10 and carries a driving pulley 34 thereon operatively connected by a driving belt 36 to a driven pulley 38 mounted on a vertically extending shaft 40 which projects through an opening 39 in the bed plate 22 of the base 10. The shaft 40 is mounted in upper and lower antifriction bearings 42 and 44 respectively carried in a boss 46 formed in the bed plate. The shaft 40 projects upwardly above the bed plate and detachably carries at its upper end a grinding element which preferably takes the form of a cylindrical grinding wheel 48 having a suitable abrasive surface 49.

The grinding wheel 48 preferably is formed as an expansible arbor carrying an abrasive element, and more particularly takes the form of an arbor of suitable material such as rubber or synthetic rubber detachably carrying an abrasive sleeve. An end plate 43 is secured to the shaft or spindle 40 by a bolt 45, which latter may be tightened to cause the end plate to compress the arbor lengthwise and expand it into tight engagement with the sleeve, whereby the tightness of the sleeve is thus readily adjustable. This construction also permits ready removal and replacement of the sleeve, should it become unserviceable or should substitution of another sleeve be found otherwise desirable.

A hood 50 having an open front 52 is removably secured to the base 10 as by means of wing fastening studs 53 (Fig. 2) and substantially encloses the wheel 48. The interior of the hood 50 communicates through a series of openings 54 with the interior of an annular suction chamber 55 surrounding the boss 46 beneath the bed plate 22 and defined between the boss 46 and a depending circular flange 56 integral with the bed plate. A second circular flange 57 formed on the bed plate 22 depends therefrom and surrounds the circular flange 56 to define therewith an annular dust-collecting chamber 58. A ring-like cover plate 59 is removably secured to the flange 56 and encompasses the driven pulley 38 in semi-sealing relationship with respect thereto and serves as a closure for the dust-collecting chamber 58.

The driven pulley 38 is provided with a plurality of spaced, radially extending blades 41 which are disposed in the chamber 55 whereby the pulley 38 functions in the manner of a fan or impeller to draw air and the comminuted products of abrasion from the hood 50 into suction chamber 55 and to expel the same by the action of centrifugal force into the dust-collecting chamber 58. The chamber 58 communicates with an elbow device 60 (Fig. 2) which projects through the side wall 16 of the base and to which there is removably attached by means of a garter spring 62 a dust-impervious but porous dust-collecting bag 64.

Referring now to Figs. 4 and 5, a carriage 70 is slidably disposed on the upper surface of the bed plate 22 for adjustable movement toward and away from the grinder 47. The carriage 70 is formed with an arcuate upper surface 72 (Fig. 4) of relatively long radius of curvature, which surface is formed with a flat circular turntable bed or supporting surface 74 (Figs. 1 and 5) on which there is rotatably disposed a circular turntable 76 forming part of a pivoted carriage 78 adapted to support a brake shoe holder 80. The carriage 78 pivots about a pivot axis established by a pivot pin 170 as explained more in detail hereinafter.

The carriage 70 is provided with downwardly extending slide rails 82 (Fig. 4) which rest upon slide rails 84 which project upwardly from and extend longitudinally of the bed plate 22. A continuous marginal flange 85 overlies the edge of the top wall 22 and serves to protect the rails 82 and 84 against the accumulation of the products of abrasion.

The bed plate 22 is formed with an integral, longitudinally extending, depending rib 87 having a longitudinal groove 86 formed in its upper surface, and the carriage 70 is formed with a longitudinally extending, depending rib 89 having a longitudinal groove 88 formed in its lower surface and in register with the groove 86. An indexing bar 90 which is rectangular in cross section is slidably disposed in and enclosed within the grooves 86 and 88 and serves in the manner of a key or guide rail to align the carriage 70 on the bed plate 22 in proper cooperating relationship with respect thereto, while at the same time permitting longitudinal adjusting movement of the carriage 70 on the bed plate 22 in a direction toward and away from the grinder. The indexing bar 90 constitutes the sole means for guiding the carriage 70 against lateral displacement on the bed plate 22. It also serves as an element of the indexing means hereinafter described for selectively positioning the carriage 70 in any one of a plurality of spaced, predetermined positions on the base 10.

The indexing bar 90 has formed therein a series of longitudinally spaced, aligned openings or index holes 94, each of which is tapered at one end and adapted to be selectively brought into register with the inner end of an indexing or locking pin 96 which is slidably disposed in a bore 98 formed in the rib 89 and opening into the groove 86 and in a bore 102 formed in a side wall 14 of the base 10. A coil spring 104 surrounding the pin 96 bears at one end against a washer 106 carried by the pin and at the other end against an internal boss 108 to yieldingly urge the pin inwardly of the base so that the inner end thereof may enter and is yieldingly held in a selected opening 94 in the guide bar. A handle or knob 110 is provided on the outer end of the locking pin 96 to facilitate manipulation of the latter. In order that the operator may determine which index hole 94 is in register with the end of the locking pin 96, a reference mark 111 (Fig. 1) is provided on the carriage 70 and cooperates with an index scale 113 which, for convenience, may be provided on the machine name plate 115 which may be attached to the side wall 14.

The carriage 70 is operatively connected to the indexing bar 90 so that it is maintained in adjusted position on the base 10 as determined by the position of the indexing bar 90. To this end the indexing bar 90 (Fig. 5) is normally urged toward the forward end of the carriage 70 by a compression spring 112 centered on a pin 114 projecting inwardly from the rear end of the carriage 70 and bearing against the rear end of the indexing bar 90. A micrometer adjusting screw 116, threadedly received in an opening 118 provided at the front end of the carriage in position to be abutted by the forward end of the indexing bar, serves to limit and determine the forward position of the guide bar 90 relatively to the carriage 70. Accurate adjustment of the position of the carriage relatively to the indexing bar 90 may be effected by turning the adjusting screw 116 in the

threaded opening 118 and to this end a control knob 120 is secured on the end of the adjusting screw 116. The knob carries an abutment pin 122 designed for engagement with a limit or stop pin 124 which projects through an overlying flange 126 formed on the front end of the carriage 70 and which establishes a "zero" position on the screw 116. A series of indicia 128 providing a scale is formed on the circular periphery of the adjusting knob 120 and is designed for cooperation with a reference mark 130 provided on the flange 126. For purposes that will be made clear presently the control knob 120 is calibrated in graduations of 0.005 inch each and each such graduation represents 0.0025 inch axial displacement of the adjusting screw 116 when the latter is turned in the threaded opening 118 in one direction or the other.

The indexing holes 94 are so located on the indexing bar 90 as to establish spaced predetermined positions of the carriage 70 on the base 10 and accordingly to establish corresponding predetermined positions of the pivot axis of the carriage 78 relatively to the surface of the grinding element 48. In the present illustrative embodiment the indexing holes 94 are spaced apart on one-half inch centers and are so located as to determine positions of the aforesaid pivot axis spaced from the grinding element 48, ranging from 4½ inches to 8 inches. The several indexing holes 94 are labeled respectively with indicia representing diameters corresponding to the respective radii which the holes establish as above explained. For example, the hole 94 at the right-hand end of the series (as viewed in Fig. 5) is so located that when the carriage is in the position in which that hole is in registry with the locking pin 96 and the screw 116 is in its zero position, the pivot axis of the carriage 78 is exactly 4½ inches from the surface of the grinding element.

Means are provided for securely locking the carriage to the bed plate 22 in any one of its indexed or adjusted positions. To this end a locking assembly is provided which includes a clamp shoe 130 (Figs. 4 and 5) tiltably supported on a collar 132 which is supported on an adjusting nut 133 threadedly received on the lower end of a stud 134, the other end of which is threadedly received in the carriage 70. A thrust pin 136 has its lower end seated in a depression 138 provided in the clamp shoe 130 and has a portion 140 thereof threadedly received in the carriage 70. A handle 142 is fixedly received in the head 144 of the thrust pin 136 and is adapted to be swung from the full line position thereof indicated in Fig. 2, wherein it is in engagement with a limit stop or abutment 146, to a dotted line position wherein it is in engagement with an abutment 148. In the full line position of the handle 142, the clamp shoe 130 has its clamping surface 150 in light engagement with the underneath surface of the bed plate 22 while in the dotted line position of the handle 142 the clamping surface 150 bears firmly against the underneath surface of the top wall 22 of the base 10 and serves to lock the carriage 70 in its desired position of adjustment. The rib 87 is provided with a longitudinally extending slot through which the stud 134 and pin 136 extend, enabling sliding movement of the carriage.

The brake shoe supporting assembly holder 80 (Fig. 5) is slidably mounted upon the carriage 78 which, as explained hereinbefore, is pivotally mounted on the reciprocable carriage 70 for oscillatory movements thereon. To this end the turntable supporting or bed surface 74 of the carriage 70 is formed with a circular track or rail portion 162 and the carriage 78 includes the turntable 76 previously mentioned which is formed with a surface 166 adapted to ride on the circular track portion 162. The turntable 76 also is formed with an annular flange 168 which encompasses the track portion 162 and provides a seal or protection against ingress of dust or other foreign material between the turntable 76 and turntable bed 74. A headed pivot pin 170 in the form of a shoulder bolt extends through and is secured to the carriage 70 centrally of the bed surface 74 thereof as by a nut 171 and passes through bosses 172 and 174, provided on the carriage 70 and on the turntable 76 respectively, and serves to center the turntable 76 on the bed 74 while permitting turning movement of the carriage 78 as a whole about the axis of the bolt 170, which is the pivot axis above mentioned. In the manufacture of the device, the head of the bolt 170 is held to close tolerances and accurate concentricity relative to the shank.

The carriage 78 includes an upstanding block portion 176 having a V-shaped groove or slot 178 formed therein and a cap member 180 having a V-shaped groove 182 formed therein is disposed upon the block portion 176 and is adapted to be secured thereto by means of countersunk studs 184. The V-shaped groove 178 provided in the block portion 176 and the V-shaped groove 182 provided in the cap member 180 together form an elongated guide opening or way 186, which slidably receives therein an elongated supporting bar 188, of similar cross-sectional shape. Preferably the V-shaped grooves are so formed that the way 186 is of square cross-section.

The brake shoe supporting holder or chuck 80 (see Figs. 5, 6 and 7) includes a saddle-like lower clamp or supporting bracket 192 having feet 193 which straddle the supporting bar 188 (Figs. 1 and 5) and which is secured by means of cap screws, one of which is shown at 194, to the rear end of the supporting bar 188 so as to be movable unitarily therewith.

The supporting bracket 192, which may be formed as a casting, includes a lower, generally T-shaped portion 196 (Figs. 2, 5, 6 and 7) which has formed thereon at spaced points a pair of bosses 198, each having an upstanding rib or pad 205 designed for reception thereon of the arcuate center flange F of a brake shoe BS, the lining L of which is to be ground. A locating pin 199 extends through each boss 198 and is adapted to be adjustably secured in position therein as by means of a set screw 201. The locating pins 199 are adapted to engage the inner surface of the brake shoe rim R at spaced points thereslong when the brake shoe is placed in the holder 80 to properly position the brake shoe therein.

The supporting bracket 192 is provided with an overlying portion 200 including a threaded boss 202 which receives therein the threaded end of a clamping stud 204. An upper clamp or clamping head 206 slidable on clamping stud 204 is provided with an apron 210 which encloses the boss 202 and certain other elements hereinafter described, and a pair of spaced toes 212 formed at spaced points at its rear end and disposed above and in alignment with the pads 205 for clamping engagement with the upper surface of the flange F of the brake shoe to be processed. The clamping stud 204 passes through a boss 214 formed on the head 206 and is provided with a manipulating knob 216 by means of which the head 206 may be moved downwardly to bring the toes 212 into clamping engagement with the flange F of the brake shoe. A spring 218 disposed between the apron 210 and overlying portion 200 of the supporting bracket 192 serves to yieldingly urge the movable head 206 toward open position relatively to the supporting bracket 192.

The portion 196 is also provided with a third upstanding rib or pad 203 located intermediate the two outer pads 205, the upper surface of the pad 203 and the upper surfaces of the pads 205 lying in a common plane perpendicular to the abrasive surface. The pad 203 and the two pads 205 are disposed generally along the arc of a circle and are so located that when any brake shoe within the range of sizes which the holder is designed to accommodate is disposed in position in the holder, the flange of such brake shoe is engaged by the three pads 203 and 205 at points approximately equidistant from the rim, which points lie in the afore-

mentioned plane which is perpendicular to the abrasive surface. Accordingly, and as will appear hereinafter, any brake shoe within the aforesaid range of sizes will be supported in position with its braking surface extending substantially vertically and therefore substantially parallel to the abrasive surface of the grinder.

In the case of many conventional brake shoes the flange extends with its medial plane perpendicular to the exposed braking surface of the brake shoe lining, but since the flange increases in thickness in a direction from the rim toward the inner edge of the flange, the faces of the flange therefore are not planar and are not parallel to the medial plane of the flange but are portions of cones and diverge from the rim and are inclined to the medial plane. Accordingly, if the brake shoe were supported in the grinder of this invention with one face of the flange clamped against a flat, horizontal surface, or two spaced surfaces, extending over a substantial portion of the radial length of the flange, or three surfaces not equidistant from the rim, the brake shoe would be positioned with its medial plane inclined to the abrasive surface and consequently the exposed braking surface would also be inclined to the abrasive surface. However, in the holder of the present invention the flange of the brake shoe is clamped against three spaced supporting surfaces of relatively narrow extent (measured in a direction radially of the brake shoe) and the surfaces are so arranged that they engage the brake shoe at three spaced points approximately equidistant from the rim. Since, as aforesaid, the three supporting surfaces lie in a plane normal to the abrasive surface the brake shoe is therefore supported with its exposed braking surface extending substantially parallel to the abrasive surface, i. e., in a position that may be, for practical purposes, considered parallel, because the variation from parallel arrangement in any particular case would be negligible. In order to permit the holder to accommodate brake shoes of various radii, as for example brake shoes for brake drums having diameters ranging from 9 to 16 inches, the pads are disposed so that they engage any brake shoe within the aforesaid range of sizes at points which are approximately equidistant from the rim.

Referring now to Fig. 6 wherein there is shown somewhat diagrammatically the relative positions of two brake shoes in position in the holder, namely, the smallest standard brake shoe BS' and the largest standard brake shoe BS", respectively. It will be noted that the two outer pads 205 are positioned to engage the flanges F' and F" of the respective brake shoes BS' and BS" at points along lines C' and C" representing arcs drawn about the centers of curvature of the rims R' and R" of the brake shoes BS' and BS", respectively, and passing along the flanges F' and F" intermediate the rims R' and R" and the inner edges of the flanges F' and F". The center pad 203 is positioned to engage the flanges at a point on each flange respectively between the arcs C' and C". Accordingly, while the center pad 203 does not engage either flange at precisely on the arc drawn about the center of curvature it does engage each flange at a point sufficiently close to such arc that the error thus resulting does not seriously affect the proper positioning of the brake shoe in the holder.

While the holder has been described with particular reference to its use in connection with brake shoes having tapered flanges, it will be apparent that it is also suitable for use with brake shoes having flanges of uniform thickness.

Means are provided for adjustably positioning the supporting bar 188 and the holder 80 relatively to the pivoted carriage 78 and for rocking the latter about its pivot. Such means includes a tubular socket member or block 222 of externally square cross-section, tiltably mounted upon a rock shaft 208 and provided with a cylindrical bore 224 therein adapted to receive one end of an elongated operating rod 226. The rock shaft 208 extends between and is supported in a pair of forwardly extending side flanges 220 (Figs. 1, 2 and 5) formed on the supporting bracket 192. The rear end of the rod 226 is provided with an annular groove 228 therearound and the rock shaft 208 passes through the socket member 222 in such a manner that it enters the groove 228 and serves as a locking pin for holding the end of the operating rod 226 within the bore 224 of the socket member 222 against longitudinal or axial shifting movement while at the same time permitting free turning movement of the rod 226 relative to the socket member 222.

From the above description of parts it will be seen that the rock shaft 208 serves the functions of tiltably supporting the socket member 222 and of holding the end of the operating rod 226 within the bore 224 of the socket member 222.

The operating rod 226 extends forwardly of the brake shoe supporting assembly to overlie the forward end of the machine and is provided with threads 230 throughout the major portion of its length. A handle 232 (Fig. 1) is secured on the forward end of the rod 226 in order that an operator may impart turning movements to the rod as well as to oscillate the same from side to side. The threaded portion 230 of the rod 226 is adapted to be received in a "half-nut" structure 234 provided on the carriage 78 by virtue of a pair of upstanding members or ears 236 (Figs. 2 and 3) which define therebetween a semicircular threaded bore 238, the threads of which are designed for cooperation with the threads 230 on the rod 226. The flat sides of the socket 222 cooperate with the side flanges 220 to constitute means for maintaining the threaded portion 230 of the rod 226 in vertical alignment with the half-nut 234 so that upon downward swinging movement of the rod 226 in any position of the turntable the threaded portion 230 will fall into register automatically with the half-nut 234.

Since the rod 226, by virtue of its reception in the socket member 222, is pivoted for rocking movement about the axis of the rock shaft 208 in a vertical plane, it will be seen that the operator may at will lift the rod 226 out of the half-nut structure 234 to disengage the same therefrom and by applying a thrust or a pull to the rod 226, as the case may be, slide the holder 80 and the supporting bar 188 as a unit longitudinally of the machine toward and away from the grinder 47. Such sliding movement of the holder 80 by the application of a thrust or a pull to the rod 226 provides a fast or coarse adjustment for the purpose of advancing a brake shoe into initial grinding relation with respect to the grinding wheel 48. When the lining L of the brake shoe has been brought into close proximity to the surface 49 of the grinding wheel 48, a fine adjustment may be made by lowering the operating rod 226 into the half-nut 234 for engagement between the threads thereof with the threads 230 on the rod, after which turning movement of the handle 232 in one direction or the other will feed the holder 80, together with the brake shoe supported thereon, toward the cylindrical grinding wheel 48 for grinding purposes. A scale 227, graduated in thousandths of an inch, is provided on the rod or feed screw 226 and cooperates with a reference mark 229 on the socket member 222 to indicate the extent of the feed just described.

It has been found that the operator when swinging the rod 226 to rock the carriage 78 about its pivot (as hereinafter explained) often tends to turn the rod 226 unintentionally about its axis and thereby advance or retract the brake shoe holder. Accordingly, I preferably provide suitable friction means for inhibiting such turning movement of the rod relatively to the half-nut 234. To this end I preferably form a bore 235 in the end portion of the rod 226 and dispose therein two ball bearings 237 which are yieldingly urged into engagement with the wall of the bore 224 by a coil spring 239 with sufficient force to provide the desired resistance to turning movement of the rod in the socket 222.

To illustrate the operation of the apparatus in processing the lining L of a standard brake shoe BS in new condition, it may be assumed that a 9 inch brake shoe is to be processed for use with a brake drum which is exactly 9 inches in diameter. Thus for effective processing of the lining L, grinding operations on a 4½ inch radius will have to be performed so that the surface of the brake shoe lining will have an arcuate contour formed with a 4½ inch radius. It is necessary, therefore, that during the grinding operation the distance from the pivot axis of the carriage 78 (Fig. 5) to the periphery of the grinding surface 49 of the grinding wheel 48 be 4½ inches. With the handle 142 in its full line position (as shown in Fig. 2), the clamp shoe 130 is free and the carriage 70 is capable of free sliding movement on the bed plate or top wall 22 of the base 10. Inasmuch as the brake shoe is to be ground to a 4½ inch radius no adjustments of the knob 120 (Fig. 5) are necessary other than to ascertain the fact that the scale 128 is at its zero position with the abutment pin 122 bearing against the right-hand side of the stop or limit pin 124 as viewed in Fig. 3.

The end of the indexing locking pin 96 is retracted and the carriage 70 is moved to an approximate position wherein the opening or hole 94 labeled "9" is brought into register with the opening 98 in the side wall 100 (Fig. 4) on the groove 88, after which release of the pin 96 will permit the spring 104 to urge the pin inwardly into the opening 94 to index the carriage 70 to its proper position for grinding on a 4½ inch radius. To lock the carriage 70 securely in this position the handle 142 is moved from its full line position to its dotted line position (as shown in Fig. 2), so that the thrust pin 136 engages the depression 138 provided in the clamp shoe 130 to tilt the shoe in a clockwise direction (as viewed in Fig. 1), and thus bind the carriage 70 and base 10 against relative displacement.

Prior to the grinding operation it is, of course, necessary to properly position a brake shoe of the desired size in the holder 80 and accordingly the knob 216 is manipulated to back off the clamping stud 204 to move clamping jaws 212 away from the bosses 198 after which time a brake shoe BS is positioned in the holder with the flange F resting on the surfaces of the pads 203 and 205 and with the locating pins 199 engaging the inner surface of the rim R at spaced points. Tightening of the knob 216 will serve to move the clamping head 206 downwardly and cause the jaws 212 to engage the flange F and clamp the same against surfaces of the pads 203 and 205 in proper position for grinding the lining L of the brake shoe. The brake shoe is positioned in the holder by abutment with the two pins 199 which are so located that the surface of the brake shoe is concentric with the pivot axis of the carriage 78 and the surface of the lining L is closely parallel to the abrasive surface 49. Accordingly when the carriage 78 is rocked about its pivot axis, with a brake shoe positioned in the holder 80, the brake shoe surface moves about such axis in a true circular path.

With the brake shoe BS thus positioned in proper alignment with the grinding wheel 48, the holder 80 may, by a fast adjustment as previously described, be brought to a position wherein the lining L is brought into close proximity with the abrading surface 49 of the grinding wheel 48. To accomplish this the operating rod 226 is manually tilted upwardly about its pivotal axis of support on the shaft 208 so that the threaded portion 230 of the operating rod is removed from the half-nut structure after which, by exerting a manual thrust on the rod 226, holder 80 is advanced until the surface of the lining L closely approaches the grinding surface of the grinding wheel 48. At this time the threaded portion 230 of the operating rod is lowered into the half-nut structure 234 to secure the holder 80 in position. With the brake shoe lining L in close proximity to the cylindrical grinding surface of the grinding wheel 48 and with the threaded portion 230 of the rod 226 located within the half-nut structure 234, the operator may, by rotating the rod 226 in a clockwise direction (as viewed in Fig. 3), accurately feed the lining L toward the rotating grinding wheel.

When the rod 226 is swung from side to side and rotated to impart feed movement to the holder 80, the surface of the lining will be dressed down by the grinding wheel to a true circular arc having a radius of curvature corresponding to the setting of the indexing means. Screw feed movement of the rod 226 regulates the amount of material removed.

In certain instances the operator may wish to remove a predetermined depth of material from the brake shoe lining or to determine exactly how much material has been removed. Accordingly a scale 227 is provided in the shank of the rod 226 adjacent the socket member 222 and an index mark 229 is provided on the latter. Thus, the distance that the holder is moved by the fine screw feed may be determined by observing the scale.

In processing brakes it is often found that the drum has been badly scored and that in order to provide a true cylindrical braking surface the drum has to be bored out to make its surface truly cylindrical. The brake shoe must be relined and dressed accordingly. If, for example, a depth of 0.060 inch of metal is removed from a 10 inch diameter drum thereby increasing the drum diameter by twice that amount; it is apparent that the dressing procedure on an oversize new lining provided on the original brake shoe would have to be conducted with the grinding taking place on a radius of 0.060 inch greater than the radius of the original standard drum and brake shoe. In such case it is necessary to adjust the sliding carriage 70 so that the pivot axis of the pivoted carriage 78 assumes a position 5.060 inches from the surface of the grinding wheel 47, whereby, upon oscillation of the carriage 78 during the grinding operation, the radius of the path of movement of the dressed surface of the lining will be 5.060 inches.

To provide for the grinding of a brake shoe lining L on such an oversize radius of curvature as that given in the example outlined above, it is merely necessary for the operator to index the carriage 70 by moving it to the appropriate position wherein the second hole of the series (reading from right to left in Fig. 5) is in registry with the pin 96 and permitting the pin to enter the hole, and to adjust the knob 120 to a position wherein the 0.120 index on the scale 128 is opposite the pointer. This latter adjustment is attained by a clockwise movement of the micrometer knob 120 which draws the abutment pin 122 away from the stop pin 124 and feeds the adjusting screw 116 inwardly of the carriage 70. The end of the adjusting screw 116 thus bears against the end of the indexing bar 90 and draws the carriage 70 forwardly the desired 0.060 inch distance. The grinding of the lining L on the 5.060 inch radius may then take place in the manner previously described by oscillation of the rod 226 from side to side.

The device of the present invention provides convenient means for forming a bevel on each end of the brake shoe lining by a simple manipulation of the operating rod 226 and without changing the setting of the carriage 76. To form such bevel, the operating rod is raised out of engagement with the half-nut and the carriage 76 swung to a position wherein one end of the brake shoe lining is opposite the grinder 47. By appropriate manipulation of the rod 226, the holder 80 is then moved rearwardly without swinging movement to push the end of the brake shoe lining against the surface 49 of the grinder 47 and thereby grind a bevel on the end of the lining. The holder 80 is then backed off and swung to a position to bring the other end of the lining opposite the grinder whereupon the beveling operation is repeated in respect to that end of the lining.

From the foregoing it will be seen that the present

invention provides a grinding device which is especially well adapted for grinding lined brake shoes to true arcuate contour, which is simple in construction, and which may be made economically. At the same time, however, the device is rugged and sturdy and can be used for a long period without likelihood of breakage of parts and without the necessity of replacing parts.

The device is relatively simple to operate and can be operated without requiring great skill or training on the part of the operator. The initial setting of the carriage to a position of adjustment corresponding to the standard size of brake shoe to be ground may be effected quickly and easily by merely pulling the pin 96 out of engagement with the indexing bar 90 and sliding the carriage on the base to the proper position as indicated on the appropriate scale and then releasing the pin 96. The carriage thus is accurately and positively indexed in a substantially foolproof manner. It may then be quickly clamped securely in the indexed position. The final adjustment of the carriage may be made quickly and easily by turning the knob 120 and it is only necessary for the operator to make a single reading to be sure that the knob is turned to the proper position.

The brake shoe to be ground may be easily inserted in the holder by a simple operation consisting merely of sliding the flange into position and causing the rim to abut the positioning pins whereafter the clamping knob 216 is tightened. As previously explained the brake shoe is positioned accurately by the pins and no centering or adjusting operation is required other than merely insuring that the shoe firmly abuts the pins.

The brake shoe is brought into close proximity to the grinding wheel by merely tilting the operating rod out of the half-nut and sliding the support rearwardly of the device. Thereafter the fine adjustment may be effected by merely turning the rod. It will be noted that after one brake shoe has been ground and has been removed and a second brake shoe placed in the holder and it is desired to move the holder forwardly in order to reset it for feeding the second brake shoe, it is not necessary to back off the operating rod but it need only be rocked out of the half-nut whereupon the holder may be slid forwardly of the device sufficiently to allow for the desired feed of the second brake shoe.

The sliding carriage is mounted directly on the base of the device and is supported thereon by the side rails which are spaced apart a substantial distance, as well as by the central rib, and accordingly the carriage is very firmly supported. Additionally the carriage is clamped directly to the base which provides a very firm and positive support for the carriage so that there is no likelihood of displacement of the pivot axis during operation and no strain on the indexing or micrometer adjustment mechanisms.

The construction of the device is such that substantially all of the bearing surfaces are protected and there is little possibility of foreign matter such as the comminuted products of abrasion collecting on such surfaces and interfering with the proper operation of the device. For example, it will be noted that the bearing surfaces for the turntable are completely protected as are the bearing surfaces which support the sliding carriage; also the indexing bar is substantially enclosed between the base and sliding carriage. Furthermore, the grinding wheel is enclosed, except for a small portion which is exposed for contact with the brake shoe lining, and means are provided for collecting and removing the comminuted products of abrasion so that there is little likelihood of such products escaping and being deposited on any of the operating portions of the device outside of the casing portions which perform the collecting function.

The device is of such design that there are a minimum of critical dimensions and, accordingly the device can be manufactured relatively inexpensively. It will be appreciated that an important dimensional relationship is the positioning of the pivot pin 170 which establishes the pivot axis of the pivoted carriage relatively to the grinding element. This, as will be understood, is established by the cooperation between the indexing bar, the base and the sliding carriage as well as the micrometer adjusting screw. It is, of course, necessary that the indexing holes 94 be accurately positioned relative to each other, which operation as will be understood can be easily performed with accuracy. The calibration of the device for accurate adjustment of the pivot pin may be accomplished in a very convenient manner by adjusting the rotational position of the knob 120 on the screw 116. For example, should it be found that through some small manufacturing error the pivot axis is not located exactly at the distance from the surface of the grinding wheel corresponding to the setting of the indexing bar, the device may be calibrated to exact "zero" setting as follows. The carriage is indexed to one of its predetermined spaced positions corresponding to a standard brake drum diameter, and the micrometer adjustment knob 120 operated to move the carriage to a position wherein its pivot axis is located a distance from the surface of the grinding wheel corresponding exactly to the indexed position of the carriage as determined by an actual measurement made by the manufacturer. This conveniently is accomplished by gauging the distance between the head of the shoulder bolt 170 and the spindle 40, and adjusting the carriage to the proper position. Should it be noted that after such adjustment the knob 120 is not in its zero position, the set screw in the knob is loosened and the knob turned on the screw 116 until the knob stands in its zero position. Thereafter the set screw is tightened to secure the knob in its relocated position on the screw 116.

It will be noted that the adjustable relationships between the various adjustable members of the device are either linear or truly circular and there is no eccentric adjustment; accordingly all of the indexes and scales are graduated in linear relationships. That is to say, the indexing holes 94 are spaced apart equally and the scales on the micrometer adjustment knob and on the operating rod are both lined in equal graduations. It will be understood by those skilled in the art that such scales can be readily lined with a high degree of accuracy.

I claim:

1. In a brake shoe grinding apparatus, a base, a grinding element mounted on said base, a carriage mounted on said base for movement toward and away from said grinding element, a turntable pivotally mounted on said carriage, a brake shoe supporting chuck assembly slidably disposed on said turntable for radial movement thereon, an open half-nut on said turntable, a feed screw rotatably and swingably secured to said chuck assembly and swingable into and out of threaded engagement with said half-nut, said feed screw constituting a thrust rod for manually sliding said chuck assembly radially on said turntable when disengaged from said half-nut and constituting feed means for adjustably moving said chuck assembly radially on the turntable upon rotation of the feed screw when it is in threaded engagement with said half-nut.

2. In a brake shoe grinding apparatus, a base, a grinding element mounted on said base, a carriage mounted on said base for movement toward and away from said grinding element, means on said base for selectively securing said carriage in any one of a plurality of predetermined positions, a turntable pivotally mounted on said carriage, a brake shoe supporting chuck assembly slidably disposed on said turntable for radial movement thereon, an open half-nut secured to said turntable, a rotatable feed screw, means pivotally securing said feed screw to said chuck assembly for swinging movement in a plane passing through the pivotal axis of said turntable and through said half-nut, said feed screw being movable in said plane into and out of threaded engage-

ment with said half-nut, said feed screw constituting a thrust rod for manually sliding said chuck assembly radially on said turntable when disengaged from said half-nut and constituting feed means for adjustably sliding said chuck assembly radially on the turntable when it is in engagement with said half-nut, said feed screw and half-nut constituting means for oscillating said chuck assembly and turntable about the pivotal axis of the latter when said feed screw is in engagement with said half-nut.

3. In a brake shoe grinding apparatus, a base, a grinding element mounted on said base, a carriage-mounted on said base for movement toward and away from said grinding element, a turntable pivotally mounted on said carriage, a brake shoe supporting chuck assembly slidably disposed on said turntable for radial movement thereon, an open half-nut on said turntable, a socket member pivotally secured to said turntable for swinging movement in a plane passing through the pivotal axis of said turntable and through said half-nut, and a feed screw having one end secured in said socket member for rotation therein but restrained against axial movement therein, said feed screw being movable from a position out of threaded engagement with said half-nut to a position wherein it is in threaded position with said half-nut.

4. In a brake shoe grinding apparatus, a base, a grinding element mounted on said base, a carriage mounted on said base for movement toward and away from said grinding element, means on said base releasably interengageable with said carriage at any of a plurality of positions on the carriage for securing the carriage on the base in any one of a number of selected positions thereon, a turntable pivotally mounted on said carriage, a brake shoe supporting chuck assembly slidably disposed on said turntable, said chuck assembly including a block portion adapted to receive thereon the flange of a brake shoe to be operated upon, a clamping head movably mounted on said block portion and having a pair of spaced clamping jaws designed for cooperation with said block portion to clamp the brake shoe flange thereon, means interconnecting said block portion and clamping head for producing clamping action therebetween, a rock shaft mounted on said block portion, a socket member pivotally mounted on said rock shaft with the rock shaft extending transversely through the socket, a half-nut on said turntable, a feed screw having one end thereof disposed in said socket member for rotation therein, said end of the feed screw having a circumferential groove through which said rock shaft extends to prevent longitudinal shifting movement of the feed screw in said socket member, said feed screw being swingable about the axis of said rock shaft for movement into and out of engagement with said half-nut and having a threaded portion designed for threaded engagement with said half-nut.

5. A brake shoe grinder comprising a base, a grinding element supported on said base, a carriage supported on said base and adjustable thereon toward and away from said grinding element, and a brake shoe holder on said carriage including a first clamp element formed with three fixed, spaced pads having brake shoe flange-engaging surfaces lying in a plane to engage one face of the flange of a brake shoe in the holder, the inner of said surfaces being so located relatively to the outer of said surfaces that it lies intermediate two arcs in said plane, passing through said outer faces and having curvatures equal respectively to the curvatures of the circumferential center lines of the flanges of the largest and smallest brake shoes corresponding to the limits of adjustment of said carriage on said base, a second clamp element having brake shoe flange-engaging surfaces spaced apart, in alignment respectively with the outer ones of said pads and lying in a plane spaced from the first plane and positioned to engage the other face of the flange, and means interacting between said clamp elements for effecting relative movement of said clamp elements to clamp a brake shoe flange between said surfaces.

6. A brake shoe grinder comprising a base, a grinding element supported on said base, a carriage supported on said base and adjustable thereon toward and away from said grinding element and a brake shoe holder on said carriage including a first clamp element formed with three spaced pads having brake shoe flange-engaging surfaces, lying in a plane, and disposed along a circular arc, all of said surfaces being elongated in the direction of said arc and disposed to engage one face of the flange of a brake shoe in the holder, means on said holder adjacent the outer ones of said pads for engagement with the brake shoe rim and constituting sole means for positioning the brake shoe so that said surfaces are disposed at points lying approximately equidistant from the rim of the brake shoe, a second clamp element having brake shoe flange-engaging surfaces spaced from said surfaces and positioned to engage the other face of said flange, and means interacting between said clamp elements for effecting relative movement of said clamp elements to clamp a brake shoe flange between said surfaces.

7. A brake shoe grinder adapted for supporting and grinding brake shoes having flanges within a predetermined range of sizes, comprising a base, a grinding element supported on said base, a carriage supported on said base and adjustable thereon toward and away from said grinding element and a brake shoe holder on said carriage including a first clamp element formed with three fixed, spaced pads having brake shoe flange-engaging surfaces, lying in a plane, and disposed along a circular arc, having a radius intermediate the radii of the circumferential center lines respectively of the largest and smallest brake shoes within said range, in position to engage one face of the flange of a brake shoe, a second clamp element having spaced brake shoe flange-engaging surfaces lying in a plane parallel to and spaced from the plane of said first surfaces and positioned to engage the other face of the flange, means on said holder adjacent the outer ones of said pads for engagement with the brake shoe rim and constituting sole means for positioning the brake shoe and locating it relative to the arcs of the shoe and pads, and means interacting between said clamp elements for effecting relative movement of said clamp elements to clamp a brake shoe flange between said surfaces.

8. A brake shoe grinder comprising a base, a grinding element supported on said base, a carriage supported on said base and adjustable thereon toward and away from said grinding element and a brake shoe holder on said carriage including a first clamp element formed with three fixed, spaced pads having brake shoe flange-engaging surfaces lying in a plane to engage one face of the flange of a brake shoe in the holder, the inner of said surfaces being so located relatively to the outer of said surfaces that it lies intermediate two arcs in said plane, passing through said outer faces and having curvatures equal respectively to the curvatures of the circumferential center lines of the flanges of the largest and smallest brake shoes corresponding to the limits of adjustment of said carriage on said base, a second clamp element having brake shoe flange-engaging surfaces spaced apart and spaced from the first surfaces and positioned to engage the other face of the flange, a pair of spaced abutments adjacent but displaced forwardly from and below the plane of the first surfaces for engagement with the inner face of the rim of the brake shoe in said holder, and means interacting between said clamp elements for effecting relative movement of said clamp elements to clamp a brake shoe flange between said surfaces.

9. A brake shoe grinder comprising a base, a grinding element supported on said base, a carriage supported on said base and adjustable thereon toward and away from said grinding element and a brake shoe holder on said carriage including a first clamp element formed with three

fixed, spaced pads having brake shoe flange-engaging surfaces lying in a plane to engage one face of the flange of a brake shoe in the holder, the inner of said surfaces being so located relatively to the outer of said surfaces that it lies intermediate two arcs in said plane, passing through said outer faces and having curvatures equal respectively to the curvatures of the circumferential center lines of the flanges of the largest and smallest brake shoes corresponding to the limits of adjustment of said carriage on said base, a second clamp element having brake shoe flange-engaging feet opposite and aligned with the outer two of said pads, and means interacting between said clamp elements for effecting relative movement of said clamp elements to clamp a brake shoe flange between said surfaces and said feet.

10. A grinder comprising a base, a grinding element supported on said base, a carriage supported on said base and slidably adjustable thereon solely along a straight line toward and away from said grinding element, a holder for an article to be ground, means movably and pivotally mounting said holder on said carriage, means on said holder for moving said holder on and relative to said carriage and relative to said pivot means in directions toward and away from said grinding element, means on said base and carriage for releasably locking said carriage selectively in any one of a plurality of spaced positions of adjustment relatively to the base and grinding element, said locking means including a locking element having a fixed location relative to the base and an adjustable element cooperable with the locking element, means interposed between said locking element and adjustable element for establishing reaction therebetween, said adjustable element being operative for adjusting said carriage along said straight line toward and away from said grinding element when said locking means is in locking condition through an infinitely variable adjustment from any one of said positions, indicia means on said base and carriage for indicating the distance between the carriage and grinding element according to each of said positions, and indicia means for indicating the extent of movement by said adjustable element from any given one of said positions.

11. A grinder comprising a base, a grinding element rotatably supported on said base, a carriage supported on said base and slidably adjustable thereon toward and away from said grinding element, a holder for an article to be ground pivotally mounted on said carriage on an axis parallel with the axis of rotation of the grinding element, an indexing element on said base slidably adjustable thereon toward and away from said grinding element, means on said base guiding said indexing element for movement in straight line directions, said indexing element having a plurality of longitudinally aligned and spaced locking elements at predetermined intervals, means on said base engageable with said locking elements selectively for locking said indexing element in respective positions corresponding with the locking elements, and calibrated means interacting between said carriage and indexing element for adjustably moving said carriage in micrometric movements along and relatively to said indexing element in directions toward and away from said grinding element, said indexing element and carriage having interengaging elements for guiding the carriage in straight line directions.

12. A brake shoe grinding apparatus comprising a base, a grinding element rotatably mounted on said base, a carriage slidably mounted on said base and movable toward and away from said grinding element, a brake shoe holder, means pivotally mounting the brake shoe holder on said carriage on an axis parallel with the axis of rotation of said grinding element, said brake shoe holder being adjustable on the carriage in directions toward and away from said grinding element and relative to said pivot means whereby the brake shoe holder is enabled to be placed in different positions in any given fixed position of the pivot means relative to the grinding element, a guide element mounted on said base for sliding adjustment toward and away from said grinding element and having engagement with the carriage for guiding the carriage longitudinally of the guide element, means on said base for selectively retaining said guide element in any of a plurality of different positions, a stop on the carriage positioned for engagement with an end surface of said guide element to locate the carriage in a predetermined position relatively to the guide element, means interacting between said carriage and guide element normally retaining said stop and guide element in interengagement, and indicating means on the base and carriage for indicating the positions of the carriage relative to the grinding element corresponding to said positions of the guide element, said stop being adjustable in the carriage in the directions of movement of the carriage.

13. A brake shoe grinding apparatus comprising a base, means on said base establishing a grinding surface, a guide bar slidably disposed on said base and movable toward and away from said grinding surface, a carriage slidably mounted on said base and likewise movable toward and away from said grinding surface, said carriage having sliding engagement with said guide bar whereby the latter controls the direction of movement of the carriage, an adjustable stop mounted on said carriage and positioned for engagement with said guide bar to move said carriage in micrometric movements relative to the guide bar, means on said base for selectively retaining said guide bar on said base in any of a plurality of different predetermined positions, a brake shoe holder, means movably and pivotally mounting the brake shoe holder on said carriage, and means on said brake shoe holder for moving the brake shoe holder on and relative to the carriage and relative to the pivot axis of the holder toward and away from said grinding surface.

14. A brake shoe grinding apparatus comprising a base, means on said base establishing a grinding surface, a guide bar slidably disposed on said base and movable in directions toward and away from said grinding surface, means on said base for selectively and releasably retaining said guide bar in any of a plurality of different predetermined positions, a carriage mounted on the base and movable toward and away from said grinding surface and slidable relative to said guide bar and base, said guide bar controlling the direction of movements of said carriage, yieldable means interacting between said carriage and guide bar normally biasing said carriage relative to said guide bar in the direction toward the grinding surface, calibrated means on said base for adjusting the position of said carriage relative to said guide bar in any selected position of the latter, a brake shoe holder, means movably and pivotally mounting said brake shoe holder on said carriage, and means on said brake shoe holder for moving the brake shoe holder on and relative to said carriage and relative to the pivot axis of the holder in directions toward and away from said grinding surface.

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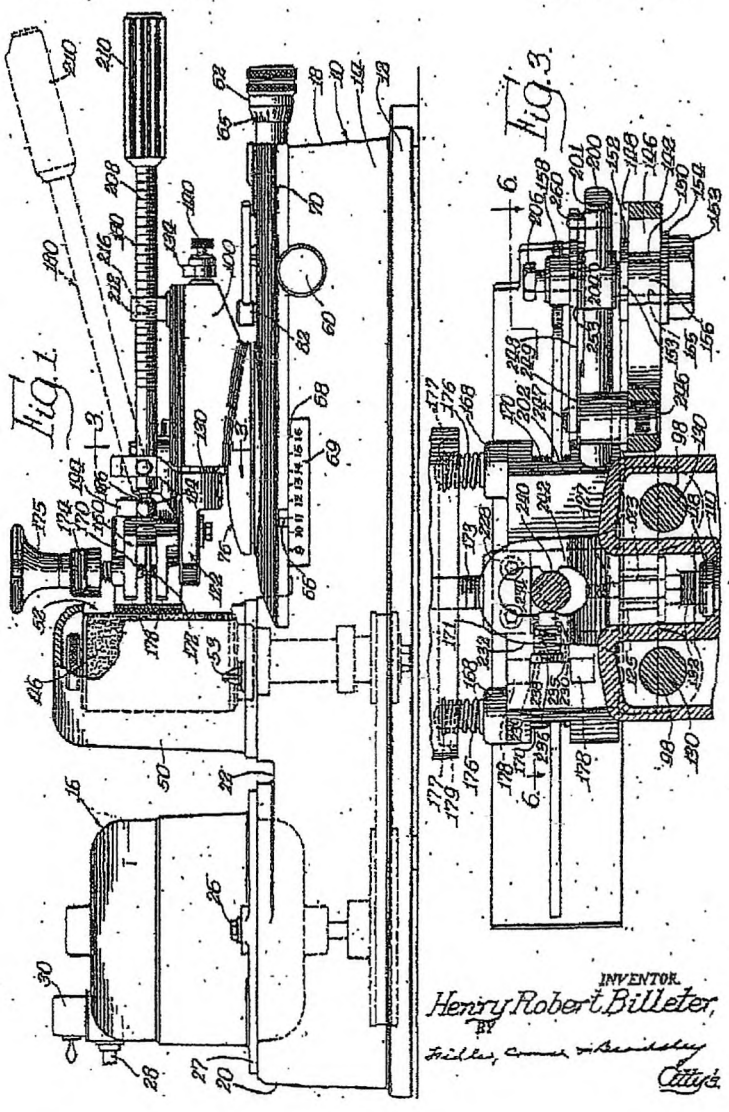
Mountz Depo.
~ Exhibit 3 ~

Jan. 21, 1958 H. R. BILLETER 2,820,331

GRINDING DEVICE

Filed Feb. 15, 1956 4 Sheets-Sheet 1



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GRINDING DEVICE

Filed Feb. 13, 1956 4 Sheets-Sheet 2

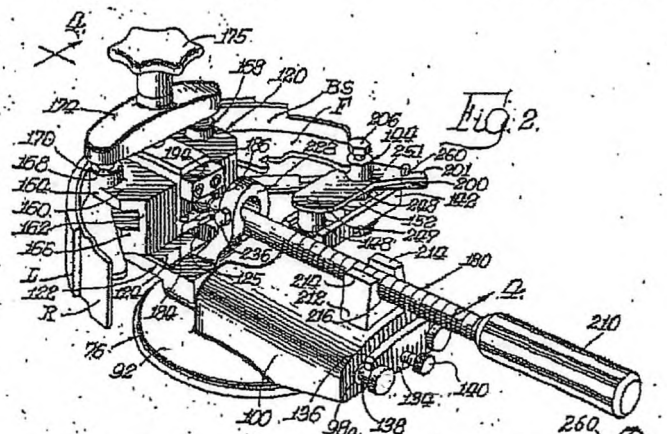

Fig. 2.

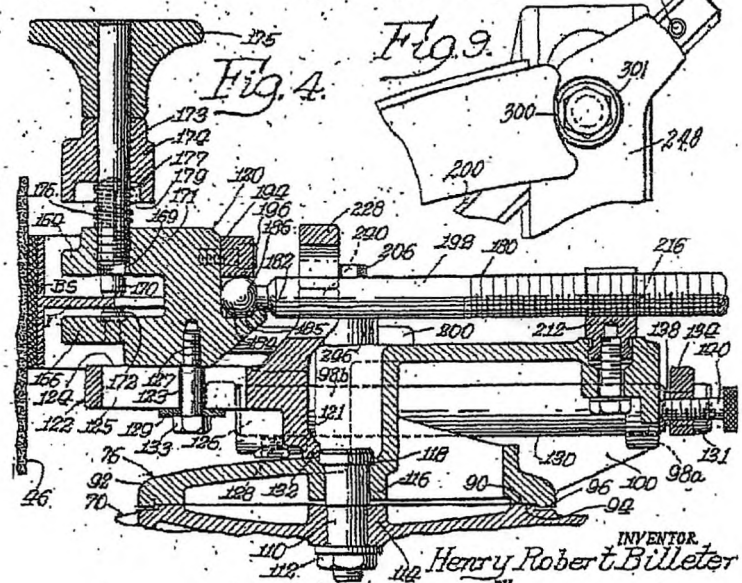

Fig. 4.

Fig. 9.

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GRINDING DEVICE

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Fig. 5.

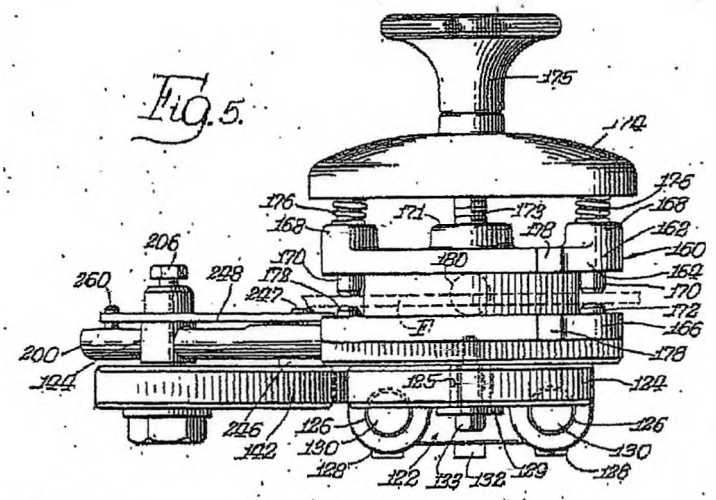


Fig. 8.

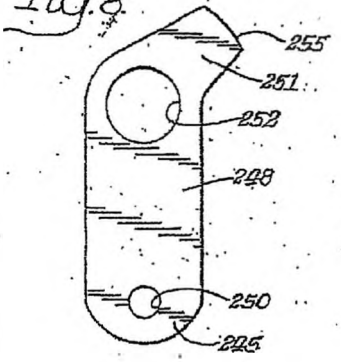
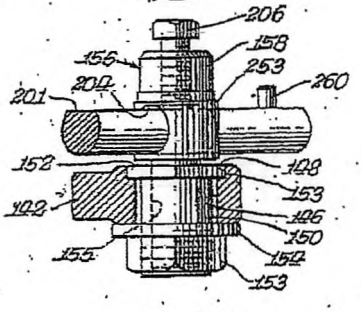


Fig. 7.



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GRINDING DEVICE

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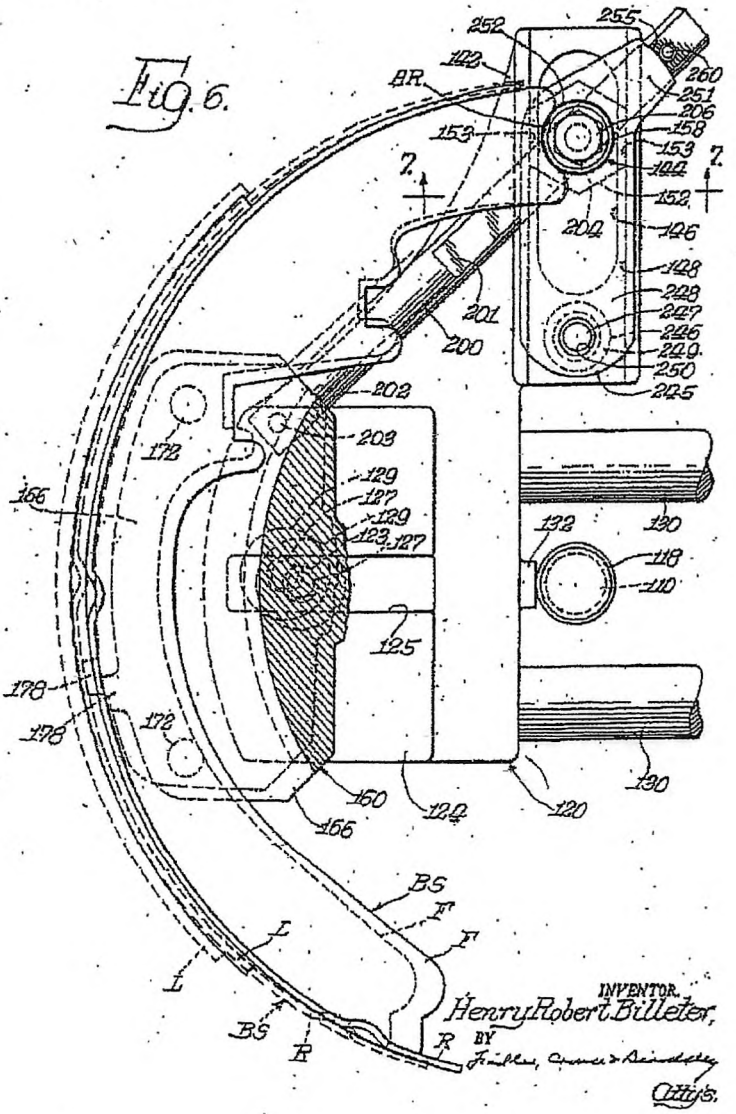
Fig. 6.



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United States Patent Office

2,820,331

Patented Jan. 21, 1958

2,820,331

GRINDING DEVICE

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Application February 13, 1956, Serial No. 565,141

21 Claims. (Cl. 51—96)

This invention relates to a grinding device and has to do more particularly with a machine for grinding arcuate contours, such as a grinder employed in dressing down lined automotive brake shoes, and a new and improved workpiece holder therefor.

Grinding devices for forming arcuate contours, such as automotive brake shoe grinders, commonly include a rotatable grinding element and a workpiece holder mounted for pivotal movement of the workpiece relative to the grinding element and in contact therewith whereby the grinding element forms an arcuate surface on the workpiece or dresses down an already arcuate surface.

The pivot is adjustable toward and away from the grinding element to determine the radius of the arcuate surface to be formed, but is adapted to be fixed or held in one position of adjustment relative to the grinding element during the grinding operation. In order to permit control over the amount of material removed by the grinding operation, the workpiece holder is so constructed as to permit the workpiece to be advanced or "fed" toward the grinding element without disturbing the location of the pivot, and therefore without disturbing the pre-set radius of the arcuate surface.

In prior grinders and especially those employed in grinding automotive brake shoes, the workpiece holder has been adapted to hold the workpiece symmetrically and to feed the workpiece into a wheel-type grinding element in such a manner that the surface to be ground is advanced toward the grinding element in a direction perpendicular to the pivot axis and along a line joining that pivot axis and the closest point thereto on the grinding element. As the workpiece, for example, a brake shoe, is fed into the grinding wheel and pivoted while in contact therewith so that material is removed from the shoe lining, the lining surface is ground as to be uniformly arcuate about the center of curvature for the brake shoe, this center point coinciding with the pre-set pivot for the workpiece holder when the shoe is symmetrically positioned in that holder. This operation is suitable and effective when dressing down or grinding the lining on a brake shoe adapted to be moved toward and away from a brake drum along a radius bisecting the arc of the lining, and when a lined brake shoe of that type is ground as described, it will properly engage the brake drum simultaneously along all portions of the length of the lining. However, many present brake shoes swing from one end about an anchor fixed within a brake drum, and pivot into engagement with the drum. For this type of shoe, merely grinding the lining to an arcuate contour does not necessarily insure the simultaneous contact of all portions of the length of the lining with the brake drum, since the brake shoe center of curvature will not always coincide with the brake drum center of curvature at the instant of contact of the brake shoe lining with the brake drum. For this type of brake shoe, the important reference point for the arcuate surface relative to the shoe is not the brake shoe center of curvature, but rather the fixed anchor or pivot for the shoe, a point which has a fixed position relative to the brake drum center of curvature.

The need for a fixed reference point for the brake shoe relative to the brake drum axis is even more critical when grinding brake shoe linings for used fixed anchor brakes wherein the drums have been machined to remove scorings or to restore true cylindrical contours to the drums. These drums have larger internal diameters than originally, and their brake shoes no longer match those brake drum diameters as well as they did prior to the machining. Any differential in arcuate contour between the two must be absorbed by the lining, the surface of which must be brought to the arcuate contour of the drum, not the shoe.

Since optimum braking efficiency can only be achieved by providing a maximum area of simultaneous contact between lining and brake drum, a proper arcuate contour must be imparted to the lining in a manner such that the contoured surface is properly positioned relative to the brake drum and therefore to the fixed pivot or anchor of the shoe, rather than to the center of curvature of the brake shoe. This proper dressing down of the lining of a fixed anchor brake shoe is best accomplished by advancing that lined shoe into engagement with a grinding element in a manner which simulates the movement of the brake shoe in a brake assembly.

An object of this invention is to provide a grinding device having a novel holder for pivotally advancing a workpiece into a grinding element, which holder itself is pivotally supported on a carriage having sliding rectilinear adjustment on a base toward and away from the grinding element for exact adjustment of the position of the holder pivot axis relatively to the grinding element.

Another object is to provide a grinding device having a novel mechanism for advancing a workpiece into a grinding element pivotally about an axis which can be positioned to accommodate a standard range of workpiece sizes and configurations.

A further object is to provide an automotive brake shoe grinder of the turntable type having a novel work holder for advancing a fixed anchor brake shoe into a grinding element pivotally about the anchor recess of the shoe itself, thus assuring a correct positioning of a predetermined arcuate contour on the lining of the shoe.

Another object is to provide an automotive brake shoe grinder having a holder for pivotally advancing a brake shoe to be ground into a grinding element, which holder is so designed and constructed as to easily and accurately accommodate and hold any standard size and configuration of brake shoe, and to correctly align the surface of the brake shoe lining with the grinding element for proper dressing down of that surface.

A further object is to provide in a grinding device of the type having a workpiece holder mounted on a turntable for oscillatory movement about a turntable axis adjustably fixed relatively to a grinding element, of a pivotal advance mechanism by which the workpiece may be rapidly advanced to bring the workpiece into grinding relation with the grinding element, and by a simple manipulation secured in that advanced position and advanced in finely-controlled manner therefrom, which holder by another simple manipulation may be rapidly retracted from any position to which it has been advanced.

Yet a further object is to provide an automotive brake shoe grinder having a mechanism for pivotally advancing a fixed anchor brake shoe into engagement with a grinding element in a manner similar to that in which the subject shoe pivots within its brake drum.

A still further object is to provide a device for grinding arcuate contours, which device has a novel three-way means for associating a workpiece with a grinding element so that a radius of curvature for the arcuate con-

tour can be accurately and positively set, the workpiece pivotally advanced into the grinding element without disturbing the radius of curvature set, and the workpiece swung through an arc of engagement with the grinding element.

Another object is to provide a mechanism for pivotally advancing a workpiece into engagement with a grinding element, which mechanism is simple and sturdy, free from any requirement of delicate adjustment, and which can be easily mounted on a standard grinding device of the sliding carriage and turntable type.

Other objects and advantages of this invention will appear from a detailed description thereof taken in connection with the appended drawings, in which:

Figure 1 is a side elevational view of a brake shoe grinding device constructed in accordance with the principles of the present invention, certain of the parts being shown as broken away and others sectioned to more clearly reveal the nature of the invention;

Fig. 2 is a perspective view of the brake shoe holder of the present invention mounted on a turntable;

Fig. 3 is a fragmentary sectional view taken substantially on line 3—3 of Fig. 1;

Fig. 4 is a fragmentary sectional view taken substantially on line 4—4 of Fig. 2;

Fig. 5 is a rear elevational view of the brake shoe holder of Fig. 3, with a fragmentary diagrammatic illustration of the flange of a brake shoe engaged by the chuck;

Fig. 6 is an enlarged fragmentary sectional view taken substantially on line 6—6 of Fig. 3, with broken lines showing somewhat diagrammatically, and in exaggerated position for purposes of illustration, the relative position taken by the brake shoe when pivotally advanced about the anchor pin;

Fig. 7 is a sectional view taken on line 7—7 of Fig. 6;

Fig. 8 is a top plan view of the gauge of Fig. 6; and

Fig. 9 is a fragmentary top plan view showing the use of a modified form of anchor pin.

The grinding device of the present invention is especially well adapted for grinding to true arcuate contour the surfaces of linings attached to automotive brake shoes of the fixed anchor type, and the device is described herein in connection with such use for the purpose of illustration. It is to be understood that the invention is not limited to such an adaptation or use, and that the principles of this invention may be applied to other uses where generally similar results are desired.

It will be understood that the workpiece holder of the present invention is especially well adapted for use in a grinding device embodying a base, adjustable carriage and abrasive or grinding means similar to those disclosed and claimed in my copending application Serial No. 332,310, filed January 21, 1953, now Patent No. 2,734,319, granted February 14, 1956, to which reference may be had for a detailed disclosure of the construction and operation of such elements.

Referring now particularly to Fig. 1 of the drawings, the grinding device includes a base 10 in the form of an elongate, rectilinear casing-like member having a base flange 12 extending thereabout from which there extend upwardly and inwardly, preferably at a slight taper, a pair of side walls 14, a front wall 18 and a curved rear wall 20. The top wall of the base constitutes a bed plate 22 upon which are mounted the principal operating elements of the device.

Supported within an opening formed in the top wall of the base 10 is an electric motor 16 which is suitably secured to the base as by means of a mounting bracket 27 and bolts 26. Current is supplied to the motor, as by means of a cable 28, and a conventional switch assembly 30 is provided to control the motor circuit. The motor 16 serves to drive a grinding element 46, preferably in the form of a cylindrical grinding wheel adapted to dress down the surface of a brake shoe lining.

A hood 50 having an open front 52 is removably secured to the base 10 as by means of wing fastening nuds 53, and substantially encloses the grinding element 46. The interior of the hood communicates through a series of passages (not shown) with a suction chamber and a dust collection chamber (not shown) into which air and comminuted products of abrasion are drawn.

A carriage 70 is slidably disposed on the upper surface of the bed plate 22 for adjustable movement toward and away from the grinding element 46. The carriage is substantially flat in shape, and is formed with a flat circular turntable bed (Figs. 4 and 4) on which there is rotatably disposed a turntable 76 adapted to support a workpiece holder 80. The turntable 76 pivots about a turntable pivot axis established by a pivot pin 78 as explained more in detail hereinafter.

Means for accurately positioning the carriage 70 on the base 10 are provided in the form of indexing and adjusting means, as, for example, the means disclosed and claimed in my heretofore mentioned copending application. The external controls for these means comprise a knob 60 projecting from one side wall 14 of the base and constituting a part of the mechanism by which the carriage is adjustably positionable in predetermined spaced-apart index locations on the base, and an adjusting screw 62 fixed to the forward end of the carriage 70 and constituting a part of the mechanism by which the carriage is accurately adjustable on the base intermediate of the respective index locations.

A reference mark 66 provided on the carriage cooperates with an index scale 68 provided, for convenience, on a plate 69 attached to the side wall 14 of the base 10 to indicate to the operator the indexed location of the carriage on the base, while a series of indicia 65 provide a scale on the circular periphery of the adjusting screw 62 to cooperate with reference marks on stationary portions of the carriage, and indicate the distance the carriage has moved along the base from the indexing location in which the carriage is positioned.

The indexing locations are so arranged as to establish spaced predetermined positions of the carriage on the base, and, accordingly, to establish corresponding predetermined positions of the turntable pivot axis relative to the surface of the grinding element. In the present illustrated embodiment, the indexing locations are spaced one-half inch apart, and are so located as to determine positions of the turntable pivot axis spaced progressively from the grinding element, ranging from 4½ to 8 inches therefrom. The index scale 68 is arranged and marked as to indicate diameters corresponding to the respective radii which the indexing holes establish between the turntable pivot axis and the grinding element. For example, when the reference mark 66 registers with the indicium "11" (Fig. 1) on the index scale 68, and the adjusting screw is at its zero point, the pivot axis of the turntable is exactly 5½ inches from the surface of the grinding element. Radius-indexing increments one-half inch in length have proved to be satisfactory for the present embodiment, inasmuch as new automotive brake drums are commonly manufactured with diameters in one-inch multiples. In processing a lining on a brake shoe for a drum manufactured with a diameter not a multiple of whole inches, or for a drum which has been machined off a whole-inches diameter, the adjusting means must be used to complement the indexing means for establishing the correct grinding radius. Accordingly, should a brake drum of a manufactured diameter of 11" have been machined to remove material .060 inch in depth, the adjusting screw must be manipulated so that the index and adjusting scales together indicate a brake drum diameter of 11.120 inches, or a distance of 5.060 inches between the turntable pivot axis and the surface of the grinding element.

Means are provided for securely locking the carriage to the bed plate 22 in any one of its adjusted positions, and for protecting the indexing and adjusting means from receiving any of the forces developed during a

grinding operation. These means may take the form disclosed in my above-mentioned co-pending application, in which a rotatable thrust pin 82 (Fig. 1) constitutes a part of clamp means releasably biasing the carriage and the base together.

Referring now to Fig. 4, the turntable bed of the carriage 70 is provided with a circular track or rail 90, while the turntable 76 is formed with a circular base 92 having an annular surface 94 corresponding to and adapted to ride on the circular rail. The turntable 76 also is formed with an annular flange 96 which encompasses the circular rail 90 and provides a seal or protection against ingress of dust or other foreign material between the circular base 92 of the turntable 76 and the turntable bed.

A headed pivot pin 110, in the form of a shoulder bolt, extends through and is secured to the carriage 70 centrally of the circular rail 90 thereof, as by a nut 112, and passes through bosses 114 and 116 provided on the carriage 70 and on the turntable 76 respectively. The pivot pin 110 serves to center the turntable 76 on the circular rail 90 while permitting turning movement of the turntable about the axis of the pivot pin, which is the turntable axis.

The turntable 76 includes an upstanding body 100 having a pair of transversely spaced bearings 98 formed therein, each of which preferably consists of longitudinally spaced portions 98*a* and 98*b* formed in the forward and rear wall members of the upstanding body respectively.

A workpiece holder 120 is removably mounted on the turntable 76, and includes a holder base 122 comprising a substantially flat shelf 124 having a pair of cylindrical sockets 126 in its forward face 121. The sockets have parallel axes, and are spaced apart transversely to correspond with the bearings 98 in the turntable. The sockets 126 are adapted to receive respectively, corresponding ends of two elongate guide rods 130 which are fixed to the shelf 124, as by set screws 128, when seated in the sockets. When thus seated, the guide rods extend forwardly of the holder base, and are adapted to be received in the bearings 98 in the turntable body 100.

The holder base 122 carries a projection 132 (Figs. 4 and 6) extending from its forward face 121 positioned to abut the head 118 of the turntable pivot pin 110 when the guide rods are projected through the bearings 98. The guide rods are of such length that their forward ends 131 project slightly from the turntable body when the guide rods are inserted through the bearings until the projection 132 of the holder base abuts the head of the turntable pivot pin.

A keeper bar 134 (Fig. 2) is provided as a means for preventing the guide rods and the holder base from sliding relative to the turntable. The keeper bar substantially takes the shape of a truncated T, and has arms 136 adapted to enter annular grooves 138, one in the projecting forward end 131 of each guide rod 130. A thumb screw 140 is threaded through the keeper bar 134 intermediate the two arms 136 to bear against the forward wall of the turntable body. The force exerted by the thumb screw 140 against the keeper bar 134 and the turntable body forward wall firmly seats the projection 132 of the holder base in abutting relationship with the head 118 of the turntable pivot pin 110.

The holder base shelf 124 has an arm 142 (Figs. 5 and 6) extending laterally therefrom upon which a pivot assembly 144 is adjustably positionable. The arm is provided with an elongate slot 146 extending transversely of the axes of the guide rods, the slot being positioned such that its extended center line intersects the turntable pivot axis. The length of the slot and its lateral location relative to the turntable pivot axis are such as to permit adjustment of the position of the pivot assembly 144 throughout the entire range of movement required to accommodate in the workpiece holder the standard

range of sizes of brake shoes. The workpiece holder simulates the actual brake assembly in respect to the relative locations of the brake drum center and the fixed anchor for the shoe. A shallow elongate channel 148 concentrically overlies the slot 146 and is of greater length and width than the latter for reasons hereinafter explained.

The pivot assembly 144 (Fig. 7) includes a cylindrical bushing 150 having a hexagonal flange 152 on the upper end thereof. This bushing is disposed vertically in the slot 146 with the hexagonal flange seating in the channel 148 as to be slidable therein along the length of the channel due to the engagement of two opposed segments 153 of the flange with the upstanding sides of the channel. When the hexagonal flange is properly seated in the channel, the axis of the cylindrical bushing 150 will be parallel to the turntable pivot axis, while a plane containing both axes will be perpendicular to the axes of the guide rods.

The bushing 150 is of sufficient length to project through the slot 146, and is adapted to be firmly fastened in any desired position of adjustment along the length of the slot by a nut 153 and washer 154, the former being threaded onto the bushing.

The bushing contains an axial cylindrical bore 155 within which an anchor pin 156 is slidably and pivotally received. The anchor pin has an enlarged head 158 which has a diameter adapted to be received firmly in the anchor guide recess of the brake shoe to be ground, in order to permit accurate positioning of the shoe in the grinding device. In this connection, an anchor pin head .810 inches in diameter will fit the most commonly used brake shoe. However, brake shoes are used which have recesses adapted to accommodate larger anchors. In order to correctly position such a recess about an undersized anchor pin head, the anchor pin may be modified to provide a symmetrical base for the recesses. Accordingly, a generally rearward facing vertical flat 300 is formed on the anchor pin head 301, this flat extending longitudinally of the cylindrical pin head to provide two sharp vertical edges against which the arcuate anchor guide recess can be firmly seated as shown in Fig. 9. In order to properly center the recess about the anchor pin, the flat is located such that a radius of the arcuate recess which bisects that recess will lie substantially in a plane extending radially from the cylindrical anchor pin head perpendicularly to the flat. If the recess is either too small for the anchor pin head or is so oversize that the vertical flat will not provide a firm seat therefor, it will be necessary to replace the anchor pin with one having a head of correct diameter.

A workpiece chuck 160 (see Fig. 4) is supported on the holder base for sliding movement relative thereto, and includes a frame 162 having a generally U shape, with the U disposed on its side, extending transversely of the device, and opening toward the grinding element. As thus disposed, the frame has upper and lower horizontal members or arms 164 and 166. A pair of bosses 168 (Fig. 3) project from the upper surface of the upper member 164 and are spaced apart transversely, the bosses bearing cylindrical bores 169 vertically therethrough in which a pair of identical thrust pins 170 (Fig. 3) are slidably disposed. A pair of workpiece locater buttons 172, in the form of headed pins, project slightly from the upper face of the lower member 166, these pins being concentric with the thrust pins 170. Overlying the two thrust pins is a cap 174 which is provided with a recess 179 on its lower face into which are received the upper ends of the thrust pins. Means for attaching the cap to the frame are provided in the form of a threaded stud 173 paralleling the thrust pins and slidably projecting through the cap into threaded engagement with a boss 171 formed on the upper member of the frame 162 intermediate of the bosses 168. The stud carries a manipulating knob 175 at its upper end to facilitate the advance or retraction of the threaded por-

tion thereof. Disposed between the cap and the bosses 168 of the frame and on the portions of the thrust pins 170 therebetween, are a pair of helical springs 176. These springs abut the upper surface of the bosses at one end thereof and abut split washers 177 fastened to the upper portions of the thrust pins at the other ends of said springs such that any force tending to propel the thrust pins downwardly through the cylindrical bores in the upper member of the frame is resisted by the springs. It will be seen that a turning of the manipulating knob will thread the stud into the frame and cause the cap to force the thrust pins downwardly toward the locator buttons. A workpiece, such as an automotive brake shoe BS, can be firmly held in the chuck by tightening the manipulating knob to the point where the workpiece is gripped between the thrust pins and the locator buttons.

Provision is made for attaching the chuck 160 to the holder base shelf 124 for relative sliding movement therebetween, including an elongate slot 125 formed longitudinally in the shelf, the center line thereof extending substantially parallel to and intermediate the guide rods 130. A cap screw 127 of shank diameter substantially less than the width of the slot 125, for reasons hereinafter set forth, is projected vertically upward through the latter and threaded into the chuck. A washer 129 is disposed between the head 133 of the cap screw and the bottom of the holder base shelf to prevent the head of the cap screw from passing into or up through the slot. A spacer in the form of a bushing 123 of a length slightly in excess of the thickness of the shelf is telescoped over the shank portion of the cap screw. The external diameter of the bushing also is substantially smaller than the width of the slot 125 for reasons explained hereinafter, while the length of the bushing permits the cap screw to be threaded tightly into the chuck, the bushing bearing the force exerted between the washer 129 and the chuck, while free sliding relationship is maintained between the chuck and the holder base.

A rod-like pivot arm 200 (Figs. 5 and 6) connects the chuck 160 with the anchor pin 156 on the holder base arm 142. The pivot arm is rigidly fixed at one end, as by a set screw 203, within a cylindrical socket 202 in the chuck, and at the other end slidably projects through a bore 204 in the head 158 of the anchor pin. A clamp screw 206 is threaded into the anchor pin axially thereof to bear against the pivot arm portion disposed within the bore, and provides a means whereby the pivot arm can be released so as to be slidable within the bore for adjustment of the effective length thereof, and then firmly secured in that adjusted position. To provide a firm seating of the clamp screw against the pivot arm, the pivot arm has a flattened portion 201 against which the clamp screw can bear. Once the clamp screw is firmly screwed down against the pivot arm, the chuck 160 is secured to the holder base 122 for pivotal movement about the anchor pin 156. It can be seen that the pivot arm extending from the chuck serves to support the anchor pin against any movement axially of bushing 150.

The extent of pivotal movement of the chuck on the holder base is limited by the length and width of the longitudinal elongate slot 125 in the holder base shelf 124, for it can be seen that the bushing-surrounded cap screw 127 can travel only the arcuate path from one face of the slot 125 generally diagonally, relative to its center line, to the other face. It is for the purpose of permitting the diagonal movement of the bushing-surrounded cap screw across the width of the slot that the cap screw 127 and the bushing 123 are of diameter substantially less than this width of the slot.

Means are provided for attaching a feed screw 180 (Figs. 1 and 4) to the chuck, and take the form of a projection 182 extending from the forward wall thereof and having a transverse recess 184. The feed screw comprises an elongate rod 192 terminating in a substantially ball-shaped rearmost end portion 186, with an annular recess formed in the rod adjacent and forwardly of the ball portion. The ball portion 186 of the rod is disposed within the transverse recess 184 of the projection 182 and is retained in that recess by an overlying retaining block 194 fastened to the frame of the chuck by cap screws 196. When the block 194 is in position, the rod is restrained against longitudinal or axial movement by a lip 185 of the recess.

The feed screw 180 extends forwardly of the chuck 160 to overlie the forward end of the carriage 70, and is provided with threads 208 throughout the major portion of its length. A handle 210 is secured on the forward end of the feed screw 180 in order that an operator may impart rotational movements to the feed screw and also to oscillate the same, as well as the turntable, from side to side. The threaded portion 208 is adapted to be received in a half-nut 212 provided on the turntable 76 having a pair of upstanding ears 214 which define therebetween a semi-circular threaded bore 216, the threads of which are designed for cooperation with the threads 208 on the feed screw 180.

A guide arch 228 (Figs. 3 and 4) in the shape of an inverted U upstanding from the holder base 122 straddles the feed screw adjacent the ball portion 186, and serves the dual purpose of limiting the movement of the feed screw to a pivoting movement in substantially a vertical plane, and of rigidly binding the feed screw against transverse movement when the latter is depressed into threaded engagement with the half-nut 212. To this latter end, a spring-loaded, headed thrust pin 230 is received transversely through a first arm 232 (Fig. 3) of the guide arch 228 and in a countersunk bore 234 therethrough. A hollow plug 236 is threaded into the major opening 235 of the countersunk bore, and has an internal recess 238 in which is located a helical spring 239 compressed therein and against the pin 230 to project the latter within the guide arch. The spring-loaded pin 230 is positioned to bear transversely against the feed screw 180 when the latter is in depressed, thread-engaged position within the half-nut 212, and serves to bias the feed screw against an opposing elongate boss 240 projecting within the guide arch from the second arm 242 thereof. The boss is of sufficient length in a direction parallel to the axes of the guide rods 130 to provide a flat surface imparting to the feed screw a corresponding parallelism with the guide rod axes. The elongate boss 240, therefore, constitutes means for maintaining the threaded portion 208 of the feed screw 180 in vertical alignment with the half-nut 212 so that upon angular depression of the feed screw in any position of the turntable the threaded portion 208 will fall into register automatically with the half-nut 212.

Since the feed screw 180, by virtue of its reception in the recess 184 and within the guide arch 228 is pivoted for movement substantially in a vertical plane, it will be seen that the operator may at will lift the feed screw out of the half-nut structure to disengage the same therefrom and by applying a thrust or a pull to the feed screw 180, as the case may be, slide the chuck 160 arcuately relative to the holder base about the anchor pin 156 in a direction toward and away from the grinding element 47. Such a sliding movement of the chuck by the application of a thrust or a pull to the feed screw 180 provides a fast or a coarse adjustment for the purpose of advancing a brake shoe into initial grinding relation with respect to the grinding element. When the lining of the brake shoe has been brought into close proximity to the surface of the grinding element 47, a fine adjustment may be made by lowering the feed screw 180 into the half-nut 212 for engagement between the threads thereof with the threads 208 on the feed screw, after which rotation of the feed screw about its longitudinal axis in one direction or the other will feed the chuck 160, together with the brake shoe supported thereon, toward the grinding element for grinding purposes.

Means are provided for locating the pivot assembly 144, and therefore the anchor pin 156, a predetermined distance from the axis of the turntable pivot pin 110 along the slot 146, and for positioning the pivot arm 200 on the anchor pin to establish a predetermined effective length of the pivot arm on which the chuck 160 will pivot about the anchor pin (see Figs. 3 and 6). These means include a first reference pin 246 fixedly upstanding from the holder base arm 142, and a gauge 248 of predetermined shape for each given size and type of brake shoe. The first reference pin is centered on the extended center line of the slot 146, and provides a convenient reference point fixed relative to the turntable pivot axis. The gauge 248 (Fig. 8) has a first cylindrical bore 250 on a first end 245 adapted to receive therethrough the head 247 of the first reference pin 246 and seats itself on a shoulder 249 on the head 247. The gauge has a second bore 252 a predetermined distance from the first bore 250, the second bore being adapted to receive therethrough the anchor pin head 158 when the anchor pin 156 is adjusted to a position in the slot 146 wherein the head 158 is in register with the second bore 252 in the gauge 248. A shoulder 253 of height equal to that of the shoulder 249 on the first reference pin head 247 is provided on the anchor pin head 158 for seating the gauge 248. The gauge 248 thus provides a means by which the anchor pin 156 is easily located in a predetermined position relative to the turntable pivot axis. Once the gauge is seated on both the first reference pin and the anchor pin head 158, the anchor pin may be firmly fastened in place by a tightening of the nut 153 on the bushing 150.

The gauge 248, when seated on both the first reference pin 246 and the anchor pin head 158, serves also to establish a predetermined effective length for the pivot arm 200, in that the other end 251 of the gauge extends beyond the second bore 252 a predetermined distance. This end 251 is of substantial width to provide an abutment edge 255 against which is seated a second reference pin 260 fixedly upstanding from the end of the pivot arm 200. Since the chuck is positioned rearwardly of the turntable axis, and the anchor pin is positioned transversely thereof, the pivot arm 200 joining the chuck and anchor pin takes an angular direction relative to both the longitudinal and transverse extents of the device. Accordingly, the abutment end 251 of the gauge 248 may be angularly disposed from the center line direction between the bores 250 and 252. When the second reference pin 260 and the end 251 of the gauge 248 are in contact, and the gauge is otherwise properly seated on the first reference pin and the anchor pin head, the pivot arm 200 will have a predetermined effective length between the anchor pin 156 and the chuck 160. Brake drums may have varying radii of curvature, and the assemblies therefor may have fixed anchors positioned differently from one another relative to their spindles. Accordingly, a different gauge is provided for the shoe of each differently dimensioned and designed assembly, each gauge having a predetermined length between centers of the first reference and the anchor pin bores. The bore-to-bore length is predetermined for each different brake drum so that the total of that length and the distance between the turntable pivot axis and the first reference bore is equal to the distance between the fixed anchor and the spindle of the brake drum whose shoe is to be processed. The use of a first reference pin and an elongate anchor pin slot extending radially from the turntable pivot axis thus facilitates the positioning of the anchor pin on the holder base arm.

Referring now to Fig. 6, it will be clear that once the anchor pin is positioned on the holder base arm, the pivotal position for a brake shoe relative to the turntable is also fixed. Adjustment of the effective length of the pivot arm positions the chuck so that it may receive and hold a brake shoe of any radius of curvature in operating proximity to the grinding element and substantially symmetrically thereto. Additionally, the force exerted between the grinding element and the brake shoe is borne by the chuck, which firmly holds the brake shoe against slipping, chattering or erratic movement while the shoe is in contact with the grinding element.

The lengths of the two elongate slots 146 and 125 (see Fig. 6) limit the range of sizes of brake shoes that can be received by the device, but the slots and the gauge means for positioning the anchor pin relative to the turntable axis as well as for establishing a predetermined effective length of the pivot arm on that anchor pin are adapted to enable processing of all standard sizes of brake shoes.

A projection 278 (Figs. 5 and 6) is provided on the rearward face of each of the frame members 164 and 166, these projections extending rearwardly of the chuck frame to provide two seats in a perpendicular plane against which the rim of a workpiece, such as an automotive brake shoe, is positioned, while the anchor pin head 158 provides a third seat for the brake shoe. These three seats are reference points establishing a very positive and firm means of positioning a brake shoe workpiece in the grinding device.

To illustrate the operation of the device in dressing down the lining L of a standard fixed anchor brake shoe BS it may be assumed that a brake shoe is being processed for an 11-inch brake drum in new condition. Accordingly, it is necessary that an accurate 5½ inch pivot radius be set for the turntable in order to grind the lining L to a true arc matching that of the brake drum. In order to set the arcuate radius, the operator must first free the carriage 70 for sliding movement longitudinally on the base 10. This is accomplished by the release of the clamp means thrust pin 82, and by the lateral retraction of the knob 60 from locking engagement with the indexing mechanism (not shown). The determination of the location in which the carriage is positioned on the base the correct distance from the grinding element is accomplished by use of the reference mark 66 and the scale 69 on the base. When the mark is in register with the desired indicium, "11" in the present illustration, the knob 60 is depressed to index-lock the carriage on the base. A 5½ inch pivot radius for the surface of the lining L has thus been set, and no movement of the adjusting screw 62 off its zero point should be made for the brake shoe of this illustration since its brake drum is an accurate 11 inches in diameter. The carriage indexing and adjusting mechanism is next protected from receiving the forces developed during the grinding by actuating the clamp means thrust pin 82 to frictionally lock the carriage onto the base at the correctly established location. These clamp means will thereafter receive any forces developed during the grinding operation, rather than the indexing means or the adjusting screw.

The correct locating of the pivot assembly 144 on the arm of the holder base is accomplished by means of a selected gauge 248 corresponding to the particular brake shoe to be ground. The pivot assembly 144 is released for sliding movement on the arm by loosening the nut 153 from the bushing 150. Thereupon the gauge 248 is placed on the first reference pin 246 so that the latter pin penetrates the bore 250 and the gauge seats itself on the shoulder 249 of the pin. The pivot assembly is moved along the slot 146 until the anchor pin head 158 is in register with and penetrates the second bore 252 in the gauge. Once the gauge is seated on both the shoulder 249 of the first reference pin and the shoulder 253 of the anchor pin head 158, the nut 153 is tightened on the bushing to fasten the pivot assembly firmly on the holder base arm.

The effective length of the pivot arm 200 is properly set for the particular brake shoe to be ground by backing off the clamp screw 206 from contact with the planar surface 201 of the pivot arm, and by sliding the pivot arm within the cylindrical bore 204 in the anchor pin

head until the second reference pin 260 abuts the end 251 of the gauge 248. When the pivot arm is so positioned, it is firmly fixed relative to the anchor pin by tightening down the clamp screw 206.

The chuck 160 is prepared for the brake shoe to be ground by backing off the thrust pins 170 from the locater buttons 172. This is accomplished by rotation of the manipulating knob 175, and therefore the stud 173, to effect a raising of the cap 174. This, in turn, permits the helical springs 176 to withdraw the thrust pins away from the workpiece locater buttons. When the thrust pins are sufficiently removed from the workpiece locater buttons, the brake shoe to be ground is inserted therebetween until the rim R of the brake shoe abuts both of the projections 178 of the chuck 160 and the anchor recess AR accommodates the anchor pin head 158. The brake shoe is fastened in this position by screwing the stud 173 further into the frame 162 until the thrust pins 170 firmly bias the flange F of the brake shoe between them and the locater buttons 172. Due to the vertical alignment of both projections 178, one with the other, and the horizontal alignment of both locater buttons 172 one with the other, the brake shoe is seated as to have its pivot axis correctly disposed parallel to the axis of the grinding wheel.

The brake shoe is brought into close proximity to the grinding wheel rapidly by the coarse advancing means. This is accomplished by swinging the feed screw 180 upwardly out of engagement with the half nut 214, whereupon a forward thrust on the feed screw will cause the workpiece chuck 160, together with the brake shoe that it holds, to move toward the grinding element pivotally about the anchor pin 156. When the surface of the lining L is in close proximity with the grinding element, the accurate advancing means are employed to complete the advance of the workpiece into the grinding element. This is accomplished by depressing the feed screw 180 pivotally about its ball portion 186 to cause its threaded portion 208 to engage the threads 216 in the half-nut 214. The feed screw 180 is then firmly held between the half-nut 214 and the guide arch 228, and by its rotation about its longitudinal axis advances the chuck 160 in a finely controlled manner by means of the threaded engagement between the feed screw and the half-nut 214. Inasmuch as the radius of curvature of the arcuate surface to be processed is fixed by the location of the turntable axis and corresponds to the distance between the turntable axis and the closest point thereto on the grinding wheel, the brake shoe is advanced into the grinding wheel until the entire arcuate extent of the lining L will be dressed down upon oscillation of the entire turntable, workpiece holder assembly, and brake shoe as a unit, by oscillatory manipulation of the handle 210.

When a brake drum has been machined to either remove scorings on the inner surface thereof or to bring the inner surface thereof to a true circular shape, the drum will no longer have a diameter of standard whole-inches dimension, such as, for example, 11 inches. The present device is equally well adapted to process the lining of the brake shoe for this enlarged brake drum, the only additional adjustment necessary being that of advancing the adjusting screw so that the turntable radius established between the turntable axis and the surface of the grinding wheel is increased by the difference between the initial or standard radius of the brake drum and its rebored radius. Since the position of the fixed anchor in the brake drum relative to the drum spindle is the same as in the drum when in new condition, no adjustment of the anchor pin on the holder base arm need be made, and the brake shoe can be ground as heretofore described in connection with a brake shoe for a new or standard size brake drum.

While the present invention is particularly well-adapted to and has been described in connection with grinding linings of brake shoes of the fixed anchor type, the invention is not limited to such a use, for a grinding device incorporating the principles of this invention can accommodate equally well brake shoes of the adjustable anchor type. As when dressing down the linings of a fixed anchor brake shoe, a gauge 248 must be selected for use, which corresponds to the particular brake shoe to be ground. An adjustable anchor shoe is positioned in the chuck in the same manner as a fixed anchor shoe; utilizing the projections 178 of the chuck 160 and the anchor pin head as reference seats for the shoe rim and the brake shoe anchor recess. The shoe is pivotally advanced in the manner of fixed anchor shoes toward the grinding element, and swung through an arc of engagement therewith. It can be seen that the capability of this grinding device of processing both types of brake shoes, adds considerably to the efficiency and convenience of its use, particularly in the herein discussed automotive brake shoe field.

It can be seen that the present invention substantially duplicates the brake drum for a fixed anchor brake shoe being ground. The turntable pivot axis and the workpiece holder anchor pin correspond respectively to the drum spindle and the drum anchor. The grinding element edge closest to the turntable pivot axis corresponds to a line on the drum braking surface, while the circular extent of that drum surface is duplicated, not by rotation of the grinding element edge around the turntable and about the turntable pivot axis, but rather by rotation of the turntable, with its supported workpiece holder and brake shoe, about the turntable pivot axis. The contour of the drum surface is represented by the path the closest edge of the grinding element describes relative to the turntable periphery. It can be further seen that as the shoe is advanced pivotally into that path, the lining of the shoe will be ground to the contour of the brake drum.

The elongate slot 146 in which the anchor pin is slidably positionable extends transversely of the axes of the guide rods 131, and therefore the anchor pin is always located laterally from the axial direction of the application of force by the feed screw 180. Such a structure makes possible the advance of the shoe pivotally about the anchor pin by the application of a feed screw force in substantially the same manner as a braking force pivots the shoe within the drum therefor. The combination of the elongate transverse slot and the first reference pin a fixed distance from the turntable pivot axis provides a novel and convenient means of locating the anchor pin a predetermined distance from the turntable pivot axis, and enables the use of a gauge 248 convenient for that purpose.

The elongate slot 125 extending longitudinally relative to the turntable makes possible not only the arcuate movement of the chuck cap screw 127 therein as the chuck and workpiece are pivoted about the anchor pin, but also the longitudinal adjustment of the chuck and workpiece toward or away from the grinding element as the effective length of the pivot arm 200 is lengthened or shortened. The proper position of the chuck relative to the grinding element is dependent on whether the workpiece is of relatively large or small radius of curvature and therefore of relatively flat or of sharp arcuate contour. It will be apparent that the surface of a workpiece of relatively flat contour will not project from the chuck to the extent the surface of a workpiece of relatively sharp contour projects, and that the chuck for the workpiece of flat contour must itself be farther advanced to the grinding element to establish grinding contact between that element and the workpiece.

The bushing-surrounded chuck cap screw 127 is free to move arcuately in the longitudinal slot 125 (Fig. 6) until the bushing-surrounded cap screw abuts a face of the slot. Since the cap screw is rigidly connected to the chuck, which in turn firmly holds a brake shoe BS, it can be seen that any advancing movement of the cap screw 127 is attended by movement of the brake shoe. The brake shoe is preferably advanced to a position where the lining L of the shoe will be in engagement with the grinding ele-

ment throughout the entire extent of the lining when the brake shoe is pivoted with the turntable. When the brake shoe is pivoted with the turntable and in contact with the grinding element, material will be ground from the lining tapering from a greatest depth of removal in an area generally intermediate of the lining ends toward areas of least depth of removal adjacent those ends.

The pivot arm 200 is made to be slidably positionable on the anchor pin to provide adjustment of the effective length of the former. This adjustment is required to accommodate the shoes for drums of varying diameters, for it can be seen that as the distance from the turntable pivot axis to the grinding element is increased to simulate larger diameter drums, and as the anchor pin is positioned laterally farther from the turntable pivot axis to simulate the position of the anchor in the larger drums, so also must the pivot arm, corresponding to a hypotenuse of these two lengths, be increased to correctly position the chuck and workpiece relative to the grinding element.

It will be apparent that this device is simple in construction and can be economically manufactured. At the same time, however, the device is rugged and sturdy, free from any requirement of delicate adjustment, and free from easily broken or deformed parts which might require replacement.

I claim:

1. A workpiece holder for a grinder of the type having a base, a grinding element supported on the base, a carriage mounted on the base for sliding movement toward and away from the grinding element, and a turntable rotatably mounted on the carriage, said workpiece holder comprising a holder base rigidly mounted on the turntable, an arm extending laterally from said holder base, an anchor pin on said arm, a workpiece chuck slidably mounted on said holder base for arcuate movement relative thereto about said anchor pin toward and away from the grinding element, and a pivot arm connecting said chuck and said anchor pin.

2. A workpiece holder for a grinder of the type having a base, a grinding element supported on the base, a carriage mounted on the base for sliding movement toward and away from the grinding element, and a turntable rotatably mounted on the carriage, said workpiece holder comprising a holder base rigidly mounted on the turntable, an anchor pin upstanding from said holder base, a workpiece chuck, a pivot arm connecting said chuck and said anchor pin, and means slidably mounting said chuck on said holder base for arcuate movement of said chuck relative to said holder base toward and away from the grinding element, said mounting means including an elongate slot in said holder base extending generally toward and away from said grinding element, a screw projected through said slot and threaded into said chuck, and a cylindrical spacer on said screw, said spacer being of substantially smaller external diameter than the width of said slot.

3. A workpiece holder for a grinder of the type having a base, a grinding element supported on the base, a carriage mounted on the base for sliding movement toward and away from the grinding element, and a turntable rotatably mounted on the carriage, said workpiece holder comprising a holder base rigidly mounted on the turntable, an arm extending laterally from said holder base, an anchor pin positionable in a plurality of locations on said arm, a workpiece chuck slidably mounted on said holder base for arcuate movement relative thereto about said anchor pin toward and away from the grinding element, a pivot arm connecting said chuck and said anchor pin, and means for adjusting the effective length of said pivot arm.

4. A workpiece holder for a grinder of the type having a base, a grinding element rotatably mounted on the base, a carriage mounted on the base for sliding movement toward and away from the grinding element, and a turntable carrying an open half-nut and rotatably mounted on the carriage on a pivot axis parallel with the axis of rotation of the grinding element, said workpiece holder comprising a holder base rigidly mounted on the turntable, an anchor pin upstanding from said holder base, a workpiece chuck slidably mounted on said holder base for arcuate movement relative thereto about said anchor pin toward and away from the grinding element, a pivot arm connecting said chuck and said anchor pin, and a feed screw attached to said chuck rotatably relative thereto and swingably relative thereto into and out of threaded engagement with the half-nut, said feed screw constituting a thrust rod for manual movement of said chuck relative to said holder base when said feed screw is disengaged from the half-nut and constituting screw means for accurate movement of said chuck relative to said holder base upon rotation of the feed screw when the latter is in threaded engagement with the half-nut.

5. A workpiece holder for a grinder of the type having a base, a grinding element supported on the base, a carriage mounted on the base for sliding movement toward and away from the grinding element, and a turntable carrying an open half-nut and rotatably mounted on said carriage, said workpiece holder comprising a holder base rigidly mounted on said turntable, an anchor pin upstanding from said holder base, a workpiece chuck slidably mounted on said holder base for arcuate movement relative thereto about said anchor pin toward and away from the grinding element, a pivot arm connecting said chuck and said anchor pin, a feed screw attached to said chuck as to be rotatable relative thereto and swingable relative thereto into and out of threaded engagement with the half-nut, and a guide arch upstanding from said holder base and straddling said feed screw, said feed screw constituting a thrust rod for manual movement of said chuck on said holder base when said feed screw is disengaged from the half-nut and constituting screw means for accurate movement of said chuck on said holder base upon rotation of said feed screw when the latter is in threaded engagement with the half-nut, said guide arch holding said feed screw against transverse movement when the latter is in engagement with the half-nut and vertically aligning said feed screw with the half-nut when the feed screw is depressed toward threaded engagement therewith.

6. A workpiece holder for a grinder of the type having a base, a grinding element rotatably mounted on the base, a carriage mounted on the base for sliding movement toward and away from the grinding element, and a turntable rotatably mounted on the carriage on a pivot axes parallel with the axis of rotation of the grinding element, said workpiece holder comprising a holder base rigidly mounted on the turntable, an anchor pin upstanding from said holder base, a workpiece chuck slidably mounted on said holder base for arcuate movement relative thereto about said anchor pin toward and away from the grinding element, a pivot arm connecting said chuck and said anchor pin, a feed screw having a ball-like end portion, and means rotatably and swingably attaching said feed screw to said chuck, said attaching means including a projection extending from said chuck, a recess in said projection for receiving said ball-like end portion, and a retaining block fixed to said chuck and holding said ball-like end portion in said recess, said feed screw constituting a thrust rod for manual movement of said chuck relative to said holder base when said feed screw is disengaged from the half-nut and constituting screw means for accurate movement of said chuck relative to said holder base upon rotation of the feed screw when it is in threaded engagement with the half-nut.

7. A workpiece holder for a grinder of the type having a base, a grinding element supported on the base, a carriage mounted on the base for sliding movement

toward and away from the grinding element, and a turntable rotatably mounted on the carriage and containing a pair of transversely spaced cylindrical bores, said workpiece holder comprising a holder base, means removably mounting said holder base on the turntable, said mounting means including a pair of transversely spaced longitudinally extending guide rods projecting from said holder base and slidably received in the turntable bores, and means for rigidly clamping said guide rods in the bores, an anchor pin upstanding from said holder base, a workpiece chuck slidably mounted on said holder base for arcuate movement relative thereto about said anchor pin toward and away from said grinding element, and a pivot arm connecting said chuck and said anchor pin.

8. The invention of claim 7 wherein said guide rods project through said bores forwardly of said turntable, and said means rigidly clamping said guide rods in the bores include an arcuate groove in the projecting end of each of said guide rods, a keeper bar engaging both of said arcuate grooves, and means acting between said keeper bar and the turntable for holding the guide rods against axial movement relative to the turntable.

9. A workpiece holder for a brake shoe grinder of the type having a base, a grinding element supported on the base, a carriage mounted on the base for sliding movement toward and away from the grinding element, and a turntable rotatably mounted on the carriage, said workpiece holder comprising a holder base mounted on the turntable, an anchor pin upstanding from said holder base, a workpiece chuck slidably mounted on said holder base for arcuate movement relative thereto about said anchor pin toward and away from the grinding element, and a pivot arm connecting said chuck and said anchor pin, said workpiece chuck including a frame, a pair of transversely spaced pads fixedly supported by said frame and having brake shoe flange-engaging surfaces lying in a plane and disposed to engage one face of the flange of a brake shoe in the holder, a pair of pins slidably projectable through said frame in register with said pads and into abutment with the other face of the flange of the brake shoe in the holder, a cap overlying both of said pins, a stud projected through said cap intermediate of said pins and threaded into said frame, a manipulating knob on the end of said stud, and spring means urging said pins away from said pads.

10. A workpiece holder for a brake shoe grinder of the type having a base, a grinding element supported on the base, a carriage mounted on the base for sliding movement toward and away from the grinding element, and a turntable rotatably mounted on the carriage, said workpiece holder comprising a holder base mounted on the turntable, an anchor pin upstanding from said holder base, a workpiece chuck slidably mounted on said holder base for arcuate movement relative thereto about said anchor pin toward and away from the grinding element, and a pivot arm connecting said chuck and said anchor pin, said workpiece chuck including a frame, a pair of transversely spaced pads fixedly supported by said frame and having brake shoe flange-engaging surfaces lying in a plane and disposed to engage one face of the flange of a brake shoe in the holder, a pair of pins slidably projectable through said frame in register with said pads and into abutment with the other face of the flange of the brake shoe in the holder, a cap overlying both of said pins, a stud projected through said cap intermediate of said pins and threaded into said frame, a manipulating knob on the end of said stud, spring means urging said pins away from said pads, and a brake shoe rim-engaging abutment projecting from said frame toward the grinding element.

11. A workpiece holder for a brake shoe grinder of the type having a base, a grinding element supported on the base, a carriage mounted on the base for sliding movement toward and away from the grinding element, and a turntable rotatably mounted on the carriage, said workpiece holder comprising a holder base mounted on the turntable, an anchor pin upstanding from said holder base, a workpiece chuck slidably mounted on said holder base for arcuate movement relative thereto about said anchor pin toward and away from the grinding element, and a pivot arm connecting said chuck and said anchor pin, said workpiece chuck including a frame, a pair of transversely spaced pads fixedly supported by said frame and having brake shoe flange-engaging surfaces lying in a plane and disposed to engage one face of the flange of a brake shoe in the holder, a pair of pins slidably projectable through said frame in register with said pads and into abutment with the other face of the flange of the brake shoe in the holder, a cap overlying both of said pins, a stud projected through said cap intermediate of said pins and threaded into said frame, a manipulating knob on the end of said stub, spring means urging said pins away from said pads, and a pair of vertically spaced abutments projecting from said frame toward the grinding element and having brake shoe rim-engaging surfaces lying in a plane perpendicular to the flange-engaging surfaces of said pads.

12. A workpiece holder for a grinder of the type having a base, a grinding element supported on the base, a carriage mounted on the base for sliding movement toward and away from the grinding element, and a turntable rotatably mounted on the carriage, said workpiece holder comprising a holder base rigidly mounted on the turntable, an anchor pin positionable in a plurality of locations on said holder base along a line perpendicular to the line of movement of the carriage and passing through the axis of rotation of the turntable, a workpiece chuck slidably mounted on said holder base for arcuate movement relatively thereto about said anchor pin toward and away from the grinding element, a pivot arm connecting said chuck and said anchor pin, and means for positioning said anchor pin in any of its said locations on said holder base and for adjusting the effective length of said pivot arm.

13. A workpiece holder for a grinder of the type having a base, a grinding element supported on the base, a carriage mounted on the base for sliding movement toward and away from the grinding element, and a turntable rotatably mounted on the carriage, said workpiece holder comprising a holder base rigidly mounted on the turntable, an anchor pin assembly positionable in a plurality of locations on said holder base, a workpiece chuck slidably mounted on said holder base for arcuate movement relatively thereto about said anchor pin assembly toward and away from the grinding element, a pivot arm connecting said chuck and said anchor pin assembly, and means for positioning said anchor pin assembly in a predetermined location on said holder base and for adjusting the effective length of said pivot arm, said means including an elongate slot in the holder base for guiding the movement of said anchor pin assembly, said anchor pin assembly including a headed and threaded cylindrical bushing slidably projected through said slot, a nut holding said bushing in said slot, an anchor pin slidably carried within said bushing, an enlarged head on said anchor pin, a transverse cylindrical bore in said head for slidably accommodating said pivot arm, said pivot arm supporting the anchor pin against axial movement within said bushing, and means for releasably fastening said pivot arm to said anchor pin head.

14. A workpiece holder for a grinder of the type having a base, a grinding element supported on the base, a carriage mounted on the base for sliding movement toward and away from the grinding element, and a turntable rotatably mounted on the carriage, said workpiece holder comprising a holder base rigidly mounted on the turntable, an anchor pin assembly positionable in a plurality of locations on said holder base, a workpiece chuck slidably mounted on said holder base for arcuate movement relatively thereto about said anchor pin assembly toward and away from the grinding element, a pivot arm connecting

said chuck and said anchor pin assembly, and means for positioning said anchor pin assembly in a predetermined location on said holder base and for adjusting the effective length of said pivot arm, said means including an elongate slot in the holder base for guiding the movement of said anchor pin assembly and a shallow channel concentrically overlying said slot, said anchor pin assembly including a threaded cylindrical bushing, a polygonal head on said bushing, said bushing projecting through said slot and said polygonal head slidably supported within said channel, a nut threaded on said bushing to hold said bushing in said slot, an anchor pin slidably carried within said bushing, an enlarged head on said anchor pin, a transverse cylindrical bore in said anchor pin head for slidably accommodating the pivot arm, said pivot arm supporting the anchor pin against axial movement within said bushing, and means for releasably fastening said pivot arm to said anchor pin head.

15. A workpiece holder for a grinder of the type having a base, a grinding element supported on the base, a carriage mounted on the base for sliding movement toward and away from the grinding element, and a turntable rotatably mounted on the carriage, said workpiece holder comprising a holder base rigidly mounted on the turntable, an anchor pin slidably adjustable on said holder base along a line perpendicular to the line of movement of said carriage and passing through the axis of rotation of the turntable, a workpiece chuck slidably mounted on said holder base for arcuate movement relative thereto about said anchor pin toward and away from the grinding element, a pivot arm fixed at one end to said chuck and slidably carried by said anchor pin at another end, means for positioning said anchor pin in any of its said locations on said holder base and for positioning said pivot arm on said anchor pin, said means establishing a predetermined radius of and positioning the center for the arcuate movement of said chuck.

16. A workpiece holder for a grinder of the type having a base, a grinding element supported on the base, a carriage mounted on the base for sliding movement toward and away from the grinding element, and a turntable mounted on the carriage and rotatable about an axis, said workpiece holder comprising a holder base rigidly mounted on the turntable, an anchor pin positionable in a plurality of locations on said holder base, a workpiece chuck slidably mounted on said holder base for arcuate movement relatively thereto about said anchor pin toward and away from the grinding element, a pivot arm connecting said chuck and said anchor pin, and means for establishing a predetermined radius of and positioning the center for the arcuate movement of said chuck, said means including a gauge positioning said anchor pin on said holder base a predetermined distance from said turntable axis and positioning said pivot arm on said anchor pin to establish a predetermined effective length for said pivot arm.

17. A workpiece holder for a grinder of the type having a base, a grinding element supported on the base, a carriage mounted on the base for sliding movement toward and away from the grinding element, and a turntable rotatably mounted on the carriage, said workpiece holder comprising a holder base rigidly mounted on the turntable, an anchor pin positionable in a plurality of locations on said holder base, a workpiece chuck slidably mounted on said holder base for arcuate movement relatively thereto about said anchor pin toward and away from the grinding element, a pivot arm connecting said chuck and said anchor pin, and means for positioning said anchor pin in a predetermined location on said holder base and for adjusting the effective length of said pivot arm, said means including a first reference pin fixedly upstanding from the holder base, a second reference pin fixedly upstanding from the end of the pivot arm adjacent said anchor pin, an elongate slot in the holder base for guiding the movement of said anchor pin, and a gauge adapted to be

mounted on one end thereof on said first reference pin and to be mounted at a central portion thereof on said anchor pin when said anchor pin is moved along the slot to a predetermined distance from said first reference pin, the second end of said gauge providing an abutment for said second reference pin a predetermined distance from said anchor pin.

18. A workpiece holder for a brake shoe grinder of the type having a base, a grinding element supported on the base, a carriage mounted on the base for sliding movement toward and away from the grinding element, and a turntable rotatably mounted on the carriage, said workpiece holder comprising a holder base mounted on the turntable, an arm extending laterally from said holder base, an anchor pin positionable in a plurality of locations on said arm, said anchor pin being adapted to engage the anchor recess of a brake shoe when the latter is positioned in the holder, a workpiece chuck slidably mounted on said holder base for arcuate movement relative thereto about said anchor pin toward and away from the grinding element, a pivot arm adjustable in effective length connecting said chuck and said anchor pin, said workpiece chuck including a frame, a pair of transversely spaced pads fixedly supported by said frame and having brake shoe flange-engaging surfaces lying in a plane and disposed to engage one face of the flange of a brake shoe in the holder, a pair of pins slidably projectable through said frame in register with said pads and into abutment with the other face of the flange of a brake shoe in the holder, a cap bearing against corresponding ends of both of said pins, a stud projected through said cap intermediate of said pins and threaded into said frame, a manipulating knob on the end of said stud, spring means urging said pins away from said pads, and means for positioning said anchor pin in a predetermined location on said holder base arm and for adjusting the effective length of said pivot arm, said means including a first reference pin fixedly upstanding from said holder base arm, a second reference pin fixedly upstanding from the end of said pivot arm adjacent said anchor pin, an elongate slot in said holder base arm for guiding the movement of said anchor pin, and a gauge adapted to be mounted on one end thereof on said first reference pin and to be mounted at a central portion thereof on said anchor pin when said anchor pin is moved along the slot to a predetermined distance from said first reference pin, the second end of said gauge providing an abutment for said second reference pin a predetermined distance from said anchor pin.

19. A workpiece holder for a grinder of the type having a base, grinding element supported on the base, a carriage slidable on the base toward and away from the grinding element and a turnable mounted on the base for pivotal movement about an axis on the axis of movement of the carriage, said holder comprising a holder base rigidly secured to the turntable, a brake shoe clamp slidable in an arc on said holder base in a direction toward and away from the grinding element, and adjustable means for locating the position of the center and determining the radius of movement of said clamp including a radius arm rigidly projecting from said clamp, a pin for engagement by the anchor pin recess of a brake shoe in said clamp, said pin being located on a line perpendicular to the axis of movement of said carriage and passing through the pivot axis of said turntable and adjustable along said line toward and away from the axis of said turntable and means for adjustably connecting said arm to said pin at different positions along said arm to thereby vary the effective length of said arm from said clamp to said pin.

20. A workpiece holder for a grinder of the type having a base, a grinding element supported on the base, a carriage slidable on the base toward and away from the grinding element and a turntable mounted on the base for pivotal movement about an axis on the axis of movement of the carriage, said holder comprising a holder

base rigidly secured to the turntable, a brake shoe clamp slidable in an arc on said holder base in a direction toward and away from the grinding element, and adjustable means for locating the position of the center and determining the radius of movement of said clamp including a radius arm rigidly projecting from said clamp, a pin for engagement by the anchor pin recess of a brake shoe in said clamp, said pin being located on a line perpendicular to the axis of movement of said carriage and passing through the pivot axis of said turntable and adjustable along said line toward and away from the axis of said turntable, means for adjustably connecting said arm to said pin at different positions along said arm to thereby vary the effective length of said arm from said clamp to said pin, and a gauge removably disposed on said pin and having portions extending along said perpendicular line and along the axis of said radius arm for determining the position of said pin and the effective length of said radius arm.

21. A workpiece holder for a grinder of the type having a base, a grinding element supported on the base, a carriage slidable on the base toward and away from the grinding element and a turntable mounted on the base for pivotal movement about an axis on the axis of movement of the carriage, said holder comprising a holder base rigidly secured to the turntable, a brake shoe clamp slidable in an arc on said holder base in a direction toward and away from the grinding element, and adjustable means for locating the position of the

center and determining the radius of movement of said clamp including a radius arm rigidly projecting from said clamp, a pin for engagement by the anchor pin recess of a brake shoe in said clamp, said pin being located in a line perpendicular to the axis of movement of said carriage and passing through the pivot axis of said turntable and adjustable along said line toward and away from the axis of said turntable, means for adjustably connecting said arm to said pin at different positions along said arm to thereby vary the effective length of said arm from said clamp to said pin, an abutment on said holder base between said pin and said pivot, an abutment on that portion of said arm which extends on the other side of said pin from said clamp, and a gauge removably disposed on said pin and having a portion abutting the abutments in said holder base and on said arm respectively for determining the position of said pin and the effective length of said radius arm.

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9/17/2008
Mountz Depo.
~ Exhibit 6 ~

United States Patent [19]

Mitchell

[11] **3,853,517**

[45] **Dec. 10, 1974**

[54] **DUST COLLECTOR**

[75] Inventor: Wallace F. Mitchell, Arlington Heights, Ill.

[73] Assignee: Ammco Tools, Inc., North Chicago, Ill.

[22] Filed: Mar. 12, 1973

[21] Appl. No.: 340,324

[52] U.S. Cl. 55/288, 15/352, 55/304, 55/334, 55/366, 55/374, 55/395, 55/459, 55/DIG. 3, 55/DIG. 6

[51] Int. Cl. B01d 41/00

[58] Field of Search ..... 55/DIG. 3, DIG. 6, 337, 55/429, DIG. 26, 288, 334, 378, 293, 366, 372, 392, 394, 395, 399, 428, 459, 304, 374; 15/327 R, 327 D, 352

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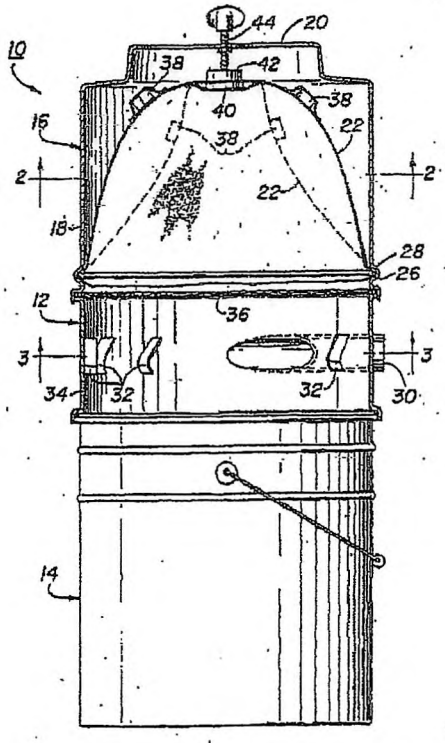
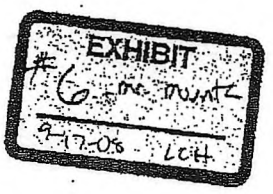
[57] **ABSTRACT**

An inverted dust collecting bag has a plurality of weights including a magnetic member affixed thereto and a magnet mounted externally of the bag for operative engagement with the magnetic member when the bag is inflated and for temporarily holding the bag while the weights pendulum downwardly to wrinkle the bag before the bag drops from the magnet and falls abruptly to dislodge the dust particles collected therein.

2 Claims, 3 Drawing Figures





DUST COLLECTOR

The present invention relates in general to dust collectors of the type including a porous bag in which dust particles are trapped as dust laden air is forced into the bag, and it relates more particularly to a new and improved dust collector incorporating novel means for removing dust particles deposited on the inner surface of the bag.

BACKGROUND OF THE INVENTION

There is a serious need for an efficient dust collector for use with grinding and other industrial machinery which produce or handle fine particulate materials. Whether such collectors are of the pressure or vacuum type they commonly employ a fabric bag through which dust laden air is passed to trap the entrained particles on the inner surface of the bag. With certain types of dust the bag surface becomes coated with an almost solid cake which, long before the bag or associated container is filled with dust, decreases the efficiency of the dust collector system to the point where the fine particles are not collected but are transmitted to the surroundings creating a definite health hazard. Various means including vibratory bag shakers and reverse flow systems have been devised to clean filter bags and other filter surfaces by automatically dislodging the filter cake therefrom. Such prior art techniques have, however, required the use of large, cumbersome and usually expensive equipment not suitable for use with small dust collectors of the type commonly associated with individual machine tools or the like.

OBJECTS OF THIS INVENTION

Therefore, a principal object of the present invention is to provide a new and improved dust collector incorporating means for removing filter cake from the inner surface of a dust collecting bag.

Another object of this invention is to provide a new and improved method and means for removing fine particulate matter from the surface of a filter bag.

A further object of this invention is to provide a dust collecting system for periodic use, which system incorporates a filter bag cleaner which automatically cleans the filter bag at the end of each operating cycle.

SUMMARY OF THE INVENTION

The above and further objects may be realized in accordance with the present invention by sealably mounting a filter bag above an imperforate container and feeding the dust laden air into the space between the container and the bag to inflate the bag in an upward direction. In order to break up the filter cake deposited on the interior surface of the bag, a plurality of weights are affixed to the bag at spaced apart intermediate locations, and a magnet is mounted above the bag to coact with one of the weights when the bag is inflated thereafter to temporarily hold the bag in an upstanding condition when the air flow is interrupted. When the air flow ceases, the other weights thus fall and swing downwardly from the area on the bag held by the magnet thereby to wrinkle the bag and crack the filter cake. The magnet then releases the bag whereupon the weights and the entire bag fall abruptly against a grid through the openings of which the dust and cake fall from the bag into the container.

BRIEF DESCRIPTION OF THE DRAWINGS

Further objects and advantages and a better understanding of the present invention may be had by reference to the following detailed description taken in connection with the accompanying drawings, wherein:

FIG. 1 is a partially sectioned dust collector embodying the present invention;

FIG. 2 is a cross sectional view of the dust collector of FIG. 1 taken along the line 2—2 thereof; and

FIG. 3 is another cross sectional view of the dust collector of FIG. 1 taken along the line 3—3 thereof.

DETAILED DESCRIPTION OF THE DRAWINGS

Referring to FIG. 1, a dust collector 10 comprises an air inlet and distributor unit 12 removably mounted over the open top of a container 14, and a filter unit 16 mounted on the unit 12. The container 14 may be a conventional five gallon pail of the type commonly found in garages and machine shops whereby only the units 12 and 16 need be marketed. The filter unit 16 includes a housing 18 having a plurality of air outlet ports 20 at the top and containing a fabric filter bag 22. The rim of the filter bag is sealably held in place in an annular groove 26 near the bottom of the housing 18 by a spring ring 28.

An air inlet duct 30 opens tangentially into the unit 12 and a plurality of baffles 32 extend inwardly from the inner wall of the annular air inlet housing 34 to act as a cyclonic dam to prevent the formation of a vortex within the dust collector. The baffles 32 direct the incoming air in a downward direction toward the container 14 where the dust or other entrained particles are collected. Air seals are provided between the top of the container 14 and the bottom of the air inlet section 12 and between the rim of the housing 18 and the top rim of the housing 34 whereby all of the air entering the collector 10 must exit through the filter bag 22 and the outlet ports 20. The inlet air pressure thus inflates the bag 22 into an inverted condition as shown in FIG. 1 and dust and other particulate matter entrained in the incoming air is trapped on the inner surface of the bag 22. When the supply of inlet air is interrupted, the bag 22 drops down against a rigid screen or grid 36 mounted across the top of the air inlet housing 34.

As thus far described, the dust collector 10 functions satisfactorily with some types of particulate matter. Where, however, a heavy tenacious filter-cake is deposited on the bag surface, the cake remains on the bag when the air flow is interrupted thereby impairing the efficiency of the dust collector.

In order to break up the filter cake and cause it to fall from the bag 22 each time the air flow into the collector is terminated, a plurality of weights 38 are fastened to the bag near the top thereof. A weight 40 in the form of a plate of magnetic material such as steel is fastened to the top center of the bag and a permanent magnet 42 is mounted to the housing 18 for coaction with the weight 40 when the bag 22 is inflated. As shown, the magnet 42 is mounted for adjustable vertical movement on a screw 44 threadedly received in a central opening at the top of the housing 18.

OPERATION

Air in which particulate matter is entrained is supplied under pressure to the inlet 30 from which it enters the air inlet and distributor section 12. The heavier par-

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~ Exhibit 10 ~

NATLSCO
National Loss Control Service Corporation
Long Grove, IL 60049 • 312| 540-2400
TWX 910 | 651-3571

a subsidiary of
Kemper CORPORATION

May 3, 1978

Mr. Robert S. Hampton, Jr.
Product Engineering Manager
Ammco Tools, Inc.
2100 Commonwealth Avenue
North Chicago, IL 60064

RE: PROPOSED PRODUCT SAFETY STUDY FOR MODELS 800, 880 and 890 BRAKE SHOE GRINDERS

Dear Mr. Hampton:

This letter will confirm our recent telephone conversation.

We propose to conduct a product liability study for the Models 800, 890 and 880 brake shoe grinders. This study will focus upon the following areas:

1. Engineering - The engineering design aspects of the machine will be examined, including the type of consideration given to operator error, misuse, or abuse of the equipment. The type of design testing which has been conducted will also be reviewed.

2. Quality Control - The quality control system as it relates to these three pieces of equipment will also be reviewed. This will include the type of incoming inspection or testing done on purchased parts, finished product testing and inspection, as well as the documentation and recordkeeping aspects of the quality control function.

3. A review of printed literature and information on the products will also be conducted. This includes warning and precautionary labels on the products themselves, sales catalogs, and operating instructions.

The study will result in a written report to Ammco, containing all our analyses of the present product liability exposures of the equipment and recommendations on how these exposures can be controlled.

EXHIBIT
10 - Mr. Mount 2
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NATLSCO
National Loss Control Service Corporation

May 3, 1978
Mr. Robert S. Hampton, Jr.
-2-

As I indicated, this service is normally provided at a cost of $300/day. We have anticipated that this should take no more than one day at your facilities in North Chicago, Illinois to gather the appropriate information, and approximately three days of report preparation. The total charges for this service will not exceed $1200.

We will need your written authorization prior to initiation of the study. Should you have any questions regarding the above, please feel free to contact me.

Sincerely,

E. L. Ziemba
Manager, Product Safety Services
Direct Dial Number: 312/540-2016

ELZ/jbc

H 0080

PRODUCT SAFETY SURVEY

FOR

AMECO TOOLS, INC.

NORTH CHICAGO, ILLINOIS

JULY 7, 1978

NATLSCO
National Loss Control Service Corporation
Long Grove, IL 60049

[redacted]

PRODUCT SAFETY SURVEY

FOR

AMMCO TOOLS, INC.

NORTH CHICAGO, ILLINOIS

JULY 7, 1978

NATLSCO
National Loss Control Service Corporation
Long Grove, IL 60049

NATLSCO
National Loss Control Service Corporation

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National Loss Control Service Corporation

INTRODUCTION

A Product Safety Survey was conducted by National Loss Control Service Corporation (NATLSCO) for Amsco Tools, Inc. in North Chicago, Illinois.

The purpose of the survey and report was to review the product liability exposures associated with the Model Numbers 880, 890 and 8000 brake shoe grinders, as well as the Model Number 1250 brake washer. Included in this review is an analysis of the product liability exposures and methods used to minimize these exposures in each of the following corporate functional areas:

Engineering

Quality Control

Assembly and Operating Instructions

The report includes recommendations on the types of additional activities, or on the types of revisions to existing service manuals and warning labels, which should be implemented to further control potential liability exposures.

We wish to express our appreciation to Mr. Robert Hampton for the courtesy and cooperation extended during our survey.

All recommendations developed in this report are based upon information supplied by the client, sound engineering and management practices, and the professional judgment of NATLSCO's consulting staff.

The report is divided into the following four segments:

I. General Conclusions - This section summarizes our findings regarding the product liability exposures associated with the four products studied.

II. Product Lines - This section describes the four products which were studied and the potential product liability exposures of each.

III. Corporate Functions - This section describes the exposures associated with the corporate operations and recommends solutions in greater detail.

IV. Recommendations - This section summarizes all recommendations made in the body of the report.

GENERAL CONCLUSIONS

The major product liability exposure associated with the use or misuse of the Model Numbers 880, 890 or 8000 brake shoe grinders and the Model No. 1250 brake assembly washer is the potential of personnel operating these machines to inhale asbestos fibers present in the environment as a result of the brake grinding or brake washing operation.

Ammco has recently developed a new dust collection system for the brake grinders, which is designed to provide a more effective system of dust collection and to reduce the potential for operator exposure to asbestos fibers. However, the ultimate effectiveness of this dust collection system is, to a large degree, dependent upon the customer properly installing, operating, and maintaining both the dust collection system as well as the brake shoe grinder.

The primary way in which an operator could be exposed to asbestos dust while using the brake assembly washer is by failing to purge the air from the system when the washer has not been used for an extended period of time. There is also some product liability exposure associated with the potential for the customer to misuse the product by using flammable solvents or gasoline in the unit to wash other automotive parts, rather than the detergent solution. These exposures can most effectively be addressed through instructional material provided on or with the product.

It is extremely important that Ammco provide adequate instructional material and sufficiently warn the customer of the proper installation, use and maintenance of their equipment, as well as the consequences of improper use, installation or maintenance.

Much of this report is concerned with additional measures Ammco can take in both the warning information on the product itself and the maintenance and installation instructions which are provided in pamphlet form with the product. Such information serves two purposes - it can reduce the number of incidents in the field by better informing personnel who use these products of the proper use and maintenance of the products, and can serve as evidence of Ammco's efforts to fulfill their "duty to warn" of the proper installation, use, and maintenance of the products, as well as the consequences of misuse of these products. This can greatly assist in Ammco's defense should there be allegations of product defects related to a failure to warn.

I. PRODUCT LINES

Models 880, 890 and 8000 Brake Shoe Grinders - These machines basically function to automatically grind automotive brake shoes in order that the shoe fits the curvature of the brake drum. Models 880, 890 and 8000 differ only in the type of clamp which is utilized to hold the shoe in place during the grinding operation. The Model 890 is provided with a Model Number 8250 fixed anchor brake shoe clamp, the Model 880 is provided with a Model Number 8150 cam action brake shoe clamp, and the Model 8000 is provided with a Model Number 8050 universal brake shoe clamp.

These products are normally used by car dealers, independent garages, service stations, brake specialists, tire dealers, or other facilities who custom grind brake shoes to match a specific set of brake drums. The machines all bear the Underwriters Laboratories listing mark.

The primary product liability exposure associated with the brake shoe grinders is the fact that brake lining material is normally fabricated from an asbestos compound, and during the grinding operation there is a possibility of introducing asbestos fibers into the air. The operator operating the equipment could conceivably breathe these fibers. Ammco has addressed this potential hazard through a dust collection system which, if properly installed and maintained, is designed to protect the operator from breathing asbestos fibers. The system operates primarily by a blower which takes the material ground off the brake shoes and conveys this to a disposable plastic bag for removal. This system represents an improved version of a dust collection system. The new dust collection system was initially marketed for retrofitting on existing machines, but is now also standard equipment on all brake grinders. The old version of the dust collection system consisted of a fabric bag which had to be emptied by the machine operator when it was filled to a certain level and then reinstalled on the machine. The new system, which is now standard on all brake grinders, consists of a disposable plastic bag which fits into a metal canister. The disposable bag is fabricated from a heavy gauge, red plastic and is marked with the wording "CAUTION - Contains Asbestos Fibers - Avoid Creating Dust - Breathing Dust May Cause Serious Bodily Harm." The metal canister has holes in the bottom, so that if the customer attempted to use the dust collection system without the plastic bag installed, the grinding dust would fall on the floor.

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INTRODUCTION

A Product Safety Survey was conducted by National Loss Control Service Corporation (NATLSCO) for Ammco Tools, Inc. in North Chicago, Illinois.

The purpose of the survey and report was to review the product liability exposures associated with the Model Numbers 880, 890 and 8000 brake shoe grinders, as well as the Model Number 1250 brake washer. Included in this review is an analysis of the product liability exposures and methods used to minimize these exposures in each of the following corporate functional areas:

Engineering

Quality Control

Assembly and Operating Instructions

The report includes recommendations on the types of additional activities, or on the types of revisions to existing service manuals and warning labels, which should be implemented to further control potential liability exposures.

We wish to express our appreciation to Mr. Robert Hampton for the courtesy and cooperation extended during our survey.

All recommendations developed in this report are based upon information supplied by the client, sound engineering and management practices, and the professional judgment of NATLSCO's consulting staff.

The report is divided into the following four segments:

I. General Conclusions - This section summarizes our findings regarding the product liability exposures associated with the four products studied.

II. Product Lines - This section describes the four products which were studied and the potential product liability exposures of each.

III. Corporate Functions - This section describes the exposures associated with the corporate operations and recommends solutions in greater detail.

IV. Recommendations - This section summarizes all recommendations made in the body of the report.

Model 1250 Brake Assembly Washer - The Model 1250 assembly washer is intended to enable a mechanic to wash the entire brake shoe assembly without causing asbestos fibers to enter the air. This system was developed as an alternative to the practice which has been in wide use by brake mechanics of blowing the asbestos dust from the brake shoes by means of compressed air prior to beginning work on the brake assemblies. This practice tends to create a great deal of asbestos dust in the air. The Model 1250 brake assembly washer consists of a gun assembly and a wash pan assembly. Basically, the operation consists of spraying a detergent solution over the brake drum to wet down the brake parts and allow the dust and asbestos fibers to fall suspended in water into the wash pan assembly.

Although the brake assembly washer is a product intended to reduce the potential hazards associated with cleaning the asbestos particles from the brake assembly, there is still some product liability exposure associated with the use of the system. For example, when the washer has not been in use over an extended period of time, the detergent fluid will drain into the sump, and there will be some initial air coming out of the gun prior to the solution. This could result in asbestos dust being blown around the area. This situation is addressed in the brake assembly washer operating and assembly instructions, included as Illustrations 1 and 2 of this report.

In addition, there is some liability exposure associated with the potential misuse of the brake assembly washer in that this product could be used with flammable solvents for parts washing and degreasing. This is an undesirable application, particularly since there is no cover provided over the top of the wash pan assembly.

Warning Labels

Models 880, 890 and 8000 Brake Shoe Grinders - There are several warning labels provided on the brake shoe grinders. The label included as Illustration 3 of this report is provided on the top of the abrasive belt guard. The label included as Illustration 4 of this report is provided on the metal ring and guard assembly of the dust collection system. The label included as Illustration 5 of this report is riveted to the main base assembly of the brake shoe grinder.

In addition, there are several precautionary and instructional tags which are provided on each brake grinder. Illustrations 6 and 7 represent the caution tag which is provided to indicate operating voltage for which the grinder is factory wired. Illustrations 8 and 9 represent the motor manufacturer's recommendations for installation, running overload protection, lubrication, and sizing of branch circuit conductors.

Model 1250 Brake Assembly Washer - At the present time, there are no precautionary or warning labels provided on the brake assembly washer. We recommend that such a label be developed, and include several items:

1. The brake washer assembly utilizes a nonflammable detergent solution in water. Ammco sells packets of detergent to be added to one gallon quantities of water. Because of the utility and simplicity of the brake assembly washer, it may be attractive for service or maintenance personnel using the equipment for parts washing to substitute a petroleum base solvent for the detergent. Such solvents would act as a more effective degreasing agent and be used to clean other parts or for other applications in the service area. Although the present instructions for this unit include a cautionary statement indicating "DO NOT USE GASOLINE OR FLAMMABLE SOLVENTS," such a statement is not marked on the product itself. It is recommended that a cautionary label be developed and applied to the unit. The content or wording of such a label should be similar to the wording which is presently contained on the back of the assembly and operating instructions, included as Illustration 2 of this report.

2. It is not uncommon for the brake drums to be corroded to the wheel hub and stud assembly, requiring that the drum be hit with the hammer in order to loosen it prior to removal. These striking blows to the drum can often create significant amounts of dust. It is recommended that the warning label for the brake assembly washer include instructions for the user to wet down the entire brake drum assembly with the solution prior to removal of the brake drum itself.

3. In addition, it is recommended that the warning label placed on the wash pan assembly caution the user regarding the necessity to start the pumping action by aiming the gun into the pan and depressing the trigger, prior to commencing washing of the brake assembly.

For a warning label to be effective, it is important that the label remain legible throughout the life of the product on which it is applied. The warning label on the abrasive belt guard (Illustration 3) is coated with a plastic film, while the label on the dust collector (Illustration 4) is fabricated from uncoated paper. We recommend that Ammco carefully evaluate the various types of labels, inks, and adhesives available, and select the type of label which exhibits the optimum durability over an extended period of time.

II. ENGINEERING

In an effort to evaluate the effectiveness of the new dust collection system in controlling the emissions of asbestos fibers from the brake grinders, Ammco recently hired an independent consulting firm to measure the extent to which an operator is exposed to asbestos when operating the brake shoe grinding machine. Tests were performed on both a well maintained unit and a poorly maintained unit. The test report for these tests concluded that "asbestos concentrations as determined do seem to indicate that the present OSHA ceiling limits would not be exceeded during brake dressing on a properly maintained brake shoe grinder."

Ammco has recently instituted some changes to the new dust collection system on the brake shoe grinders. The plastic dust collection bag has been decreased in size. Originally, a standard size plastic bag was utilized, but this bag was too large, and the installation of the oversize bag could result in a bunching of the plastic bag around the outer rim of the metal collection drum. This could result in small gaps around the rubber gasket where the drum is fastened to the underside of the collection system's fabric bag, resulting in emissions of asbestos fibers during operation of the machine. Ammco has discontinued the use of this larger bag and now supplies a smaller bag designed specifically for the dust collection system, eliminating the problem of the collection bag bunching up.

Ammco has also recently developed an arbor plug for use on its Models 880, 890 and 8000 brake shoe grinders. The purpose of this plug is to prevent brake shoe dust build-up in the arbor and to improve the air flow through the abrasive belt guard to the dust collection system. The installation instruction sheet for the arbor plug is included as Illustration 12 of this report.

III. QUALITY CONTROL

When each brake shoe grinder is completely assembled, each unit is calibrated by adjusting the settings for specific shoe sizes. In addition, each unit is tested, but this test consists basically of operating the unit to verify that the motor is electrically operable. A log is kept of the serial numbers for each unit versus the motor size and type which is provided, as there are several different motors available for the brake shoe grinders. It is at this final inspection point that all appropriate warning labels are put on the units, and the units are tagged with the tags which normally are put on the unit. The service and maintenance information is put along with the unit into the packing crate.

Aside from the log of serial numbers which is kept, there is no record kept of the calibration or quality control inspection or tests which are performed. We recommend that Ammco develop a quality control checklist to be used as a final check on the assembly of the brake shoe grinders. This checklist should list all the critical items which the operator should check prior to shipping the machine. For example, the following items should be verified.

1. All warning labels firmly secured in place.
2. Calibration of the unit.
3. Operation of the unit.
4. Inclusion of the service manual.

It is recommended that a checklist form be developed for this purpose, and that the form include a space for the inspector to record the serial number of each machine checked, the manufacturing date, and the verification that all of the various inspections and tests have been performed. These completed forms should be kept as part of the permanent quality control records of the machine.

IV. ASSEMBLY AND OPERATING INSTRUCTIONS

Brake Assembly Washer Model 1250

The brake assembly washer is presently being provided with the assembly and operating instructions included as Illustrations 1 and 2 of this report. As discussed earlier in this report, it is not uncommon for a brake mechanic to hammer on a corroded drum to attempt to loosen it prior to removal of the drum for servicing the brakes. These striking blows to the drum can create significant amounts of dust, and asbestos particles inside the brake assembly can be blown into the air. This fact was borne out by the analysis conducted by the independent test laboratory. We recommend that the brake assembly washer instructions be modified to include an initial step in the process where the entire brake drum assembly is wetted down with solution prior to removal of the brake drum itself. This should be depicted in the instructions by means of a photograph, as well as written copy. In addition, a separate set of cautionary instructions should be included on this instruction sheet. These precautionary instructions should precede the operating instructions and should be printed in red or some other brightly contrasting color for emphasis. The following areas should be emphasized in the set of precautionary or safety instructions:

1. The fact that the entire brake drum should be wetted down prior to removal of the drum.

2. The fact that the user should assure that the pumping action of the detergent solution has been started prior to aiming the gun into the brake assembly.

3. The fact that the brake assembly washer should never be used with gasoline or other flammable solvents.

Models 880, 890 and 8000 Brake Shoe Grinders

At the present time, the Models 880, 890 and 8000 brake shoe grinders are provided with an "Operating Instructions and Parts Identification" manual. This manual is an 8½ x 11 brochure which is some 12 pages long and is intended to be kept in a looseleaf binder by the customer.

It is extremely important that this manual effectively communicate the proper operation and maintenance procedures for the brake shoe grinders, since, to a large degree, the effectiveness of the dust collection system in controlling the asbestos dust exposure is dependent upon proper installation and maintenance of the system. In addition, it is important that Ammco warn the user not only of the proper procedures and steps to be taken in operating and maintaining the equipment, but also of the consequences of the user not following these instructions. We have reviewed the present manual referenced above (Ammco Publication No. 8818-6-76) and have the following recommendations for additional information and revisions to the manual:

1. It is recommended that the inside front cover of the manual have a set of safety instructions printed in red or some other brightly contrasting color and entitled "IMPORTANT." These instructions should be a summary of the information presently dispersed throughout the manual related to the proper use and maintenance of the dust collection system, as well as other precautions which must be taken to assure the environmental safety of the individual operator. The areas addressed in these safety instructions should include, but not be limited to, the following:

   a) A statement indicating that breathing asbestos dust may cause serious bodily harm.

   b) A statement indicating that the dust collection system must be properly cleaned and maintained for continued safe operation.

   c) A statement indicating that the grinder should never be operated without the disposal bag properly installed.

   d) A statement indicating that only Ammco replacement bags should be used.

   e) A statement cautioning the user to only use Ammco abrasive belts.

   f) A statement cautioning the user not to remove more than .005" on any one cut.

2. Page 3 of the manual should illustrate the new dust collection system, which we understand is now standard on all models. In addition, the appropriate instructions for this dust collection system (see Illustrations 10 and 11) should also be included on Page 3.

3. Page 4 of the manual contains instructions for replacing the abrasive belt, which actually does the grinding of the brake shoe material. Replacement of this belt requires removal of the cylindrical abrasive belt guard. In addition to protecting the user from accidental contact with the grinding surface of the machine, the guard housing serves as a means for collecting the asbestos dust from the grinding operation before it is sucked into the collection bag. Therefore, the abrasive belt guard is somewhat critical to the safe operation of the machine. We recommend that the instructions for replacing the abrasive belt include a step advising the user to replace the abrasive guard after the belt has been installed. This should be shown both graphically and also indicated in the copy of the instructions.

4. Page 4 of the manual also includes some lubrication instructions for the machine, as well as a paragraph stating: "In general, keep a clean work area. For your environmental safety, do not allow asbestos dust to accumulate anywhere but in the Ammco dust bag or in closed containers." It is recommended that this paragraph be highlighted by printing in a different color, printing in bold print, or some other graphic technique in order to emphasize its importance. In addition, the paragraph should include a statement to the effect that any accumulation of dust could be an indication that the dust collection system is either not functioning properly or the dust collection bag needs to be changed.

5. Page 4 of the Introduction Manual includes a set of statements under the general heading "CAUTIONS." These cautionary statements should also be highlighted by means of contrasting color, bold print, or other graphic techniques. In addition, it is recommended that the statement "DO NOT REMOVE MORE THAN .005 INCHES ON ANY ONE CUT - MORE WILL ONLY SLOW THE MOTOR AND REDUCE DUST COLLECTION EFFICIENCY" be expanded to provide a more specific indication of the consequences of having reduced dust collection efficiency and the potential dangers associated with asbestos dust.

6. Page 5 of the Instruction Manual contains general operating instructions. The right-hand column on this page begins with the heading "GRINDING THE SHOE: BEFORE STARTING THE MOTOR...." It is recommended that this section of the instructions be expanded to include some copy indicating that the operator should verify that the dust collection system, as well as the abrasive belt guard, are properly installed on the machine prior to starting the motor.

7. Pages 6 through 11 of the manual are basically replacement parts lists and illustrations. When the manual is revised, the parts list should include the new dust collection system parts, including the replacement bags. These bags are a heavy-gauge red plastic, designed and sized specially for the brake shoe washer, and include a cautionary statement. Because these bags are quite similar to commonly available plastic trash collection bags, it is foreseeable that the user of the machine would substitute such bags rather than order the proper bags through Ammco. It is recommended that the replacement parts portion of the manual include a statement to the effect that the bags have been specially designed for use with the asbestos dust collection system and other bags should not be substituted.

8. At the present time, the motor manufacturer's installation, running overload protection, lubrication, and branch circuit conductor sizing instructions are included on a tag which is attached to the brake shoe grinders when they are shipped to the customer. We believe that it is highly likely that this tag will be discarded once the machine is installed. Since the tag contains important information related to the safe use and operation of the equipment, it is recommended that the motor manufacturer's information be duplicated and provided as part of Ammco's assembly and operating instructions manual.

Arbor Plug Instruction Sheet (No. 11181)

The arbor plug is intended to be installed in the arbor for the abrasive belt, and is intended to prevent brake shoe build-up in the arbor in order to improve the air flow through the abrasive belt guard to the dust collection system. In order

to install the arbor plug, the abrasive belt guard must be removed. Since the abrasive belt guard is critical to the safe operation of the machine and the effective operation of the dust collection system, it is recommended that the instructions for the arbor plug installation include, as a final step, instructions to reinstall the abrasive belt guard.

V. SUMMARY OF RECOMMENDATIONS

WARNING LABELS

1. It is recommended that a precautionary or warning label be developed for the Model 1250 brake assembly washer. This label should address the potential exposures associated with using a flammable solvent with the brake assembly washer, not wetting down the brake assembly prior to removal of the drum, and the potential for air coming out of the gun assembly when the unit has not been used over an extended period of time.

2. Ammco should review the physical characteristics of warning labels and determine the label material, ink, and adhesive which will afford the optimum durability over an extended period of time.

QUALITY CONTROL

3. We recommend that Ammco develop a quality control checklist to assist assembly personnel in the final inspection of the brake shoe grinders, as well as to serve as a record of the fact that such inspections have been conducted.

ASSEMBLY AND OPERATING INSTRUCTIONS

Brake Assembly Washer

4. It is recommended that the brake assembly washer instructions be modified to include an initial step in the process where the entire brake drum assembly is wetted down prior to removal of the brake drum itself.

5. A set of precautionary instructions should be included and should be printed in red or other brightly contrasting color for emphasis. These instructions should precede the operating instructions.

Brake Shoe Grinders

6. It is recommended that the inside front cover of the instruction manual have a set of safety instructions printed in red or brightly contrasting color, and entitled "IMPORTANT."

7. The manual should illustrate the new dust collection system which is now standard on all models. and should include appropriate instructions for this system.

8. The instructions for replacing the abrasive belt should include a step instructing the user to replace the abrasive guard after the belt has been installed.

9. It is recommended that on Page 4 of the manual, under the "Lubrication Instructions," the paragraph relating to asbestos dust include a statement indicating that any accumulation of dust could be an indication that the dust collection system is either not functioning properly or the dust collection bag needs to be changed.

10. It is recommended that the statement "DO NOT REMOVE MORE THAN .005 INCHES ON ANY ONE CUT - MORE WILL ONLY SLOW THE MOTOR AND REDUCE DUST COLLECTION EFFICIENCY" be expanded to include specific indications of the consequences of having reduced dust collection efficiency and the potential dangers associated with asbestos dust.

11. It is recommended that the instructions "BEFORE STARTING MOTOR..." include instructions to the operator to verify that the dust collection system, as well as the abrasive belt guard, are properly installed on the machine prior to starting the motor.

12. The parts list section of the manual should include the parts for the new dust collection system, including replacement bags.

13. It is recommended that the manual include a statement indicating that the collection bags have been specially designed for use with the dust collection system, and other bags should not be substituted.

14. It is recommended that the motor manufacturer's instructions related to installation, running overload protection, lubrication, and branch circuit conductor sizing be duplicated in Ammco's manual.

15. The arbor plug instruction sheet should include, as a final step, instructions to reinstall the abrasive belt guard.

Respectfully submitted,

E. L. Ziemba/BVK

E. L. Ziemba
Manager, Product Safety Services
Direct Dial Number: 312/540-2016

July 7, 1978

9/17/2008
Mountz Depo.
~ Exhibit 11 ~

INDUSTRIAL HYGIENE REPORT

FOR

AMMCO TOOLS
NORTH CHICAGO, ILLINOIS

The purpose of this NATLSCO Industrial Hygiene study and report is to assist you, the client, in your responsibility to establish and maintain a loss control program to prevent illness and injury to your employees and others. NATLSCO's activities and recommendations are a supplement to, and not a substitute for, any part of your own responsibilities and activities. These NATLSCO services are based upon information supplied by client management and conditions that are readily observable, and should not be relied upon exclusively to prevent all possible illnesses, injuries or losses.

INTRODUCTION

This is the report of the Industrial Hygiene study conducted at this plant in the training center on October 2, 1986. The purpose of the study was to:

Measure employee exposures to airborne substances at specific operations as detailed in the table in the SUMMARY OF RESULTS section of this report.

Measure general area concentrations of airborne substances at specific operations as detailed in the table in the SUMMARY OF RESULTS section of this report.

The data presented in this report represent conditions existing at this location on the day of this study.

SUMMARY OF RESULTS

Detailed results of this study may be found in the attached tables at the end of this report.

Employee exposures to airborne substances expressed as a percentage of the OSHA Permissible Exposure Limit (PEL) and the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV) were as shown below.

An exposure which is greater than 100% of the PEL or TLV is excessive.

DEPARTMENT/LOCATION	CONTAMINANT	% of PEL	% of TLV
Brake removal, washing, grinding and reassembly	asbestos	85-115	8.5-11.5
Washing brakes only	asbestos	<5.0	<1.0
Grinding shoes only	asbestos	240	24
General area sample/removal washing, and reassembly, no grinding	asbestos	<5.0	<1.0
General area sample/removal washing, and reassembly and grinding in background	asbestos	<5.0	<1.0
General area sample/removal front disc brakes without washing, etc., no grinding	asbestos	<5.0	<1.0
General area sample/bag collection system		15-45	1.5-4.5

The study was conducted in the new training center facility which consists of seven bay areas. The heating/air conditioning system was in operation during this study.

Removal and replacement with ground brake shoes was done on a 1984 K-5 Blazer. This vehicle was equipped with brake drums in the rear and disc brakes in the front. This vehicle was used for all samples 18-728 through 18-728.

Removal, washing, wire brushing, and reassembly operations were conducted on a 1966 Dodge Coronet. No grinding of shoes was performed during this sampling period. Only rear brake drums were removed. This vehicle was used for sample 18-729.

Washing operations were conducted using the AMMCO Washer Model 1250 and grinding was conducted with the AMMCO Grinder 8000. Brake washer cleaner Pt# SP-20972--P & G 60442--Product #1256 was utilized in the washer system during this study.

RECOMMENDATIONS

The following recommendations are made in accordance with the Federal OSHA Asbestos Standard 1910.1001.

These recommendations are only the major points of this standard, therefore, the standard should be used as a source of the other requirements.

1. Further engineering controls should be investigated for the AMMCO Grinder 8000 since all exposures during grinding operations were found to be in excess of the new OSHA Permissible Exposure Limit. This fact is noted in samples 18-726 and, 18-730 which were sampling periods for grinding operations only.

2. Until such time as engineering and/or administrative controls can reduce excessive employee exposure to asbestos to below the new OSHA Permissible Exposure Limits, employees should be issued and required to wear NIOSH/MSHA approved respirators, affording protection against asbestos when conducting total brake removals and grinding shoes.

3. The metal pans used under the brake drum to catch wetted material should be cleaned after each use. The material on these trays should be considered contaminated with asbestos; thus, proper disposal methods according to the Federal Register 1910.1001 should be followed.

4. Disposable type cloths should be used instead of cloths requiring laundering, since the cloths are considered to be contaminated with asbestos from wiping down the brake parts. If laundered cloths are used, the laundry facility will need to be notified in writing according to OSHA Regulation 1910.1001.

EQUIPMENT AND STUDY PROCEDURES

Breathing zone samples were collected by attaching the sampler in the "breathing zone" of the operator(s) being monitored. The "breathing zone" is defined as a hemisphere two feet in diameter centered on and in front of the employee's head.

Asbestos samples were collected on 37mm and/or 25mm mixed cellulose ester membrane filters with the outer face cap of the filter cassette removed using MSA Model G or S Pumps. 37mm filters were used for general area monitoring and 25mm filters for personal sampling. Samples were collected at a flow rate of 2.0 liters per minute for the time periods reported in Table I. The air flow rate through each filter was checked before, during, and after the sampling period with a filter in line using a Brooks precision rotameter, inventory number 12 . Samples were counted for fibers greater than five micrometers in length and with a length to width ratio of at least three to one using phase contrast illumination at 450X magnification in accordance with the requirements of OSHA 29CFR 1910.1001.

Sample flow rates were initially set and periodically checked during the sampling periods with a Brooks Precision Rotameter (Laboratory inventory number 12 - high flow). This rotameter was calibrated against a bubble flow meter, which is a primary standard.

All samples for laboratory analysis collected during this study were submitted for analysis to the NATLSCO Environmental Sciences Laboratory, which is accredited by the American Industrial Hygiene Association.

Where two or more samples were collected to evaluate an employee's exposure, the time weighted average exposure was determined from the formula:

$$TWAE = \frac{C_1T_1 + C_2T_2 + \ldots C_nT_n}{T_s}$$

Where C_1 denotes the concentration of contaminant number 1 during time period T_1, and Ts is the total duration of sampling (T1 + T2 + . . . Tn).

OSHA Permissible Exposure Limits are taken from the OSHA Safety and Health Standards 29 CFR 1910.1001.

TLV's refer to the American Conference of Governmental Industrial Hygienists "Threshold Limit Values for Chemical Substances and Physical Agents in the Workroom Environment" 1986-87 Edition. The TLV's, according to the Preface of the above publication, refer to air concentrations of substances which "represent conditions under which it is believed that nearly all workers may be repeatedly exposed day after day without adverse effect". The ACGIH also states that their TLV's are intended to be applied only by persons trained in industrial hygiene and used in the control of occupational health hazards, and that they should not be used as fine lines between safe and unsafe conditions.

DISCUSSION

The new OSHA Asbestos Standard 1910.1001 became effective July 21, 1986. However, it should be noted that the following sections of that standard have been stayed by the Office of Management and Budget. They are:

(d)(2)
(d)(3)
(d)(5)
(d)(7)
(f)(2)
(g)(3)(i)
(j)(5)
(l)
(m)

Please refer to the enclosed copy of 1910.1001 for further requirements of the asbestos standard.

Through discussion with the senior training instructor, it was determined that the following conditions exist for clients that utilize the AMMCO Washer and Grinder equipment.

1. A typical NAPA grinder may grind 4 shoes and then cut 2 drums for a routine work day.

2. A service station mechanic may normally conduct three brake jobs per day as an average which would consist of washing, grinding approximately 3 sets (6 shoes), and reassembly.

3. In special cases, it is possible for a NAPA dealer selling high volumes of brake shoes to conduct grinding for a full workshift (8-hour day).

In reviewing the data in Table I, it is shown that any grinding of asbestos brake shoes will create exposures to asbestos in excess of the current OSHA limit. Therefore, any service station mechanic or NAPA type dealer would be overexposed to asbestos if asbestos brake shoes are ground. It should be noted that, if the brakes are replaced with non-asbestiform brakes, the operators' exposures would be within the current limits, since the old asbestos shoes are only washed and discarded in their entirety.

Washing operations as noted in sample 18-725, 18-727, 18-728, and 18-729 indicate that employees would not be overexposed to asbestos when performing washing operations and/or when the entire brake pad unit is removed.

It is this hygienist's opinion that old brake shoes, whether containing asbestos or not, should be washed prior to removal and non-asbestiform brake shoes should be installed to eliminate the grinding process to minimize the operators exposures to asbestos.

During this study, it was noted that laundered type cloths were used to wipe down the brake drums once washed. In addition, the water in the collection trays were put down the drain. According to the OSHA Asbestos standard. All this equipment would be considered contaminated. Therefore, special disposal methods according to the standard should be followed.

During this study, exposures for brake jobs were found to be in excess of the current limits; therefore, further requirements, such as providing protective clothing to the operators, as well as including them in a Medical Surveillance Program would be necessary. Please refer to the standard for further requirements and discussion on the various aspects.

Respectfully submitted,

Laurie B. Corsi

Laurie B. Corsi
Industrial Hygienist
Direct Dial Number: (312) 540-2072

LBC/ccw
5799H

Attachments: 1910.1001 New OSHA Asbestos standard
BNA ad

TABLE I

ATMOSPHERIC FIBER CONCENTRATIONS
October 2, 1986

AMMCO TOOLS
NORTH CHICAGO, ILLINOIS

Sample Number	Location	Time	Concentration Fibers/cc[a]
	OSHA Permissible Exposure Limit (1910.1001)		0.2
	OSHA Action Level		0.1
	ACGIH Threshold Limit Value		2.0
	OPERATOR'S BREATHING ZONE		
	Training Center		
	Ben Darda, Senior training instructor		
18-723	Remove tire, wash, grind shoes,and reassemble left side back brake drum	0930/1011	0.02
18-724	Remove tire, wash, grind shoes and reassemble right side back brake drum, and removed front disc brakes and reassembled.	1011/1157	0.23
	TIME WEIGHTED AVERAGE EXPOSURE (Sampling time, 2.4)		0.17
	ESTIMATED TIME WEIGHTED AVERAGE EXPOSURE (8-hour average)[c]		0.21
	Ben Darda, Senior training instructor		
18-725	Remove back left side brake drum, washing and reassembly, no grinding done	0930/0946	0.03
18-726	Grinding one set of shoes (4 total) (#LS-512-FE-6044 Pt. #514 with bag collection device on	0946/0952 1022/1027	2.8
18-727	Remove right side back drum, wash and reassemble, no grinding	1013/1022 1027/1125	0.02
18-728	Remove front brake disc and reassemble, no washing or grinding	1125/1157	<0.02
	TIME WEIGHTED AVERAGE EXPOSURE (Sampling time, 2.4 hours)		<0.23
	ESTIMATED TIME WEIGHTED AVERAGE EXPOSURE (8-hour average)[c]		<2.0

TABLE I
Page -2-

ATMOSPHERIC FIBER CONCENTRATIONS
October 2, 1986

AMMCO TOOLS
NORTH CHICAGO, ILLINOIS

Sample Number	Location	Time	Concentration Fibers/cca
18-729	Ben Darda, Senior training instructor Washing two rear brake drums (removed brakes #3H-FF-11-042-8-KR) disassembled, washed, wire brushed back plate, and reassembled 2 shoes each side (1 set). No grinding.	1354/1454	<0.01
	Sampling time, 1.0 hour ESTIMATED TIME WEIGHTED AVERAGE EXPOSURE (8-hour average)[c]		<0.01
18-730	Ken Laurel, R & D Machinist Grinding 2.5 sets of shoes to 9.5" diameter(LS-512-FE-6078-9, Pt. #246, LS-512-FE6044-Pt. #514, MAM-30-FE -Pt. #462) with bag collection system on	1500/1621	0.48
	Sampling time, 1.3 hours ESTIMATED TIME WEIGHTED AVERAGE EXPOSURE (8-hour average)[c]		0.48
	GENERAL AREA MEASUREMENTS		
18-733	Sample collected at back left side to left of wheel well during removal, washing and reassembly, no grinding	0932/1008	<0.01
18-734	Sample collected at back right side wheel well during removal, washing, and reassembly, grinding conducted in background	1009/1128	<0.01
18-735	Sample collected at both front wheel wells during removal of front disc brakes, no washing or grinding	1128/1158	<0.01
18-736	Sample collected at the bag collection device approximately 4 inches from bag at top of metal holder	1023/1114	0.03

ATMOSPHERIC FIBER CONCENTRATIONS
October 2, 1986

AMMCO TOOLS
NORTH CHICAGO, ILLINOIS

Sample Number	Location	Time	Concentration Fibers/cc[a]
18-737	Sample collected at the bag collection device approximately 4 inches from bag at top of metal holder	1512/1621	0.09

a fibers per cc denotes fibers per cubic centimeter of air.

< - Denotes a concentration which is less than the concentration specified here. The real number for this sample is below our lower limit of detection for the analytical method.

c Estimated Time-Weighted Average Exposures (ETWAE) - The ETWAE is determined by making assumptions regarding the concentration of asbestos to which operators will be exposed during the portion of the day not sampled if the operation runs an entire day. This is being done as a means of representing the employees' 8-hour ETWAE which can then be compared to the OSHA PEL (8-hour). For this study, the following assumption was made:

Darda - 0.23 fibers/cc asbestos for the remainder of the day for the long term sampling period of samples 18-723 and 18-724

Darda - 2.8 fibers/cc asbestos for the remainder of the day for the short term sampling period of samples 18-725 through 18-728

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EXHIBIT F

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S T A T E O F C O N N E C T I C U T

IN RE: BRIDGEPORT ASBESTOS LITIGATION
NO: CV06-5001259S

SAUL HIMMELFARB, et al., Plaintiffs,	*	SUPERIOR COURT
vs.	*	J.D.
ARVIN INDUSTRIES, INC., et al., Defendants.	*	FAIRFIELD AT BRIDGEPORT

DEPOSITION OF HENNESSEY INDUSTRIES,

by its designee, CRAIG MOUNTZ

June 26, 2007

Ryan, Ryan, Johnson & DeLuca

707 Summer Street

Stamford, Connecticut

---------- Deanna Veinotte, CSR, RPR ----------
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A. Or maybe Mr. Chasteen would know that.
Q. So one of those two probably would know more about the sales records?
A. Probably.
Q. And I know you don't know how far back they go, but do you know whether sales records still exist for, say, the 1960s and '70s?
A. I don't know that.
Q. Okay. Again, I'd probably want to go to Mr. Chasteen or Mr. Newton?
A. I would think Mr. Chasteen.
Q. Okay. I'm going to mark as Exhibit No. 4 another document that you produced today and this is another oversized --
(Exhibit 4, Instruction Sheet, so marked.)
Q. Why don't you tell me what Exhibit 4 is. I don't want to call it something that it's not.
A. This was just an instruction sheet for the 2000 shoe grinder.
Q. Model 2000?
A. Yes.
Q. Can you tell from Exhibit 4, is there

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any date on that instruction sheet or on the diagram itself?
A. I have April of 1960.
Q. Okay. Mr. Mountz, did you help to accumulate the documents that were produced today?
A. Yes.
Q. Okay. These were all located among Hennessey's documents, Hennessey's records?
A. They were.
Q. Okay. And in 1987 when Hennessey merged with AMMCO, did all the AMMCO's corporate documents and records go over to Hennessey?
A. Yes.
Q. And I think you told me the same AMMCO facility kept going on with business; you kept working, they retained the AMMCO name; is that right?
A. Yes.
Q. So there's a lot of fine print on Exhibit 4, and I'm going to spare everybody from having to read it all, but can you basically tell me -- you called it an

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instruction sheet, but what is Exhibit 4? It just tells you how to operate or how to change the abrasive element or all of that, or what does it do?
A. Basically how to operate the piece of equipment, how to set it up, how to maintain it, how to use it.
Q. Okay. And when you were helping to assemble the documents for the deposition today, can you tell me why it is that you selected Exhibit 4 to be included?
A. At the time we pulled documents, which was years ago, I just boxed up everything that I could find that had to do with shoe grinders.
Q. Okay. And does Exhibit 4 contain any warnings or cautions of any kind regarding health hazards associated with asbestos?
A. There's one caution that tells the operator to empty the dust bag daily. That's the only reference.
Q. Okay. That caution that you just referred to, that doesn't use the word "asbestos," though, does it?
A. No.

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Q. And the dust bag, just so we're clear, the dust bag would have been a bag attached to the dust collection system that would have been collecting some of the brake dust that was being ground off the brake linings; is that right?
A. Correct.
Q. And back in 1960 what were the brake linings themselves made out of?
A. I don't know for sure.
Q. Okay. Have you learned that in 1960 brake linings were made, at least in part, out of asbestos?
A. Yes.
Q. Okay. When you joined AMMCO in 1975, were you aware at that time, yourself, that brake linings were made still, in part, out of asbestos?
A. Yes.
Q. Okay. And I think you -- well, we'll wait until we get to some of the other documents, I guess.
Okay. It looks like from the picture that the brake grinder, the Model 2000, has a

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label or tag on it that says "Safe-Arc Brake Shoe Grinders." Was that a trade name?
A. Yes.
Q. That was a trade name of AMMCO?
A. Yes.
Q. And it has the AMMCO logo on there it appears; is that right?
A. The old one, correct.
Q. And we see the new logo on Exhibit 3?
A. Yes.
Q. Okay. Do you know what year the logo changed?
A. No, I don't.
Q. Okay. I'm going to mark as Exhibit 5 another document you brought with you today.
(Exhibit 5, Photocopy of Photograph, so marked.)
Q. Let me just back up one step.
In 1975 when you joined the company, were they still using the old logo, or was it the new logo?
A. They had the new logo then.
MR. DELUCA: I'm unclear. When you use the word "logo" what you're referring to on

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Exhibit 4.
MR. MEISENKOTHEN: Right here.
MR. DELUCA: Oh, the picture that's there, okay.
MR. MEISENKOTHEN: Right.
MR. DELUCA: Is that what you're talking about, Craig?
THE WITNESS: Yes.
Q. So in '75 when you joined the company, they were already using the new logo that's shown on Exhibit 3?
A. Yes.
Q. Okay. Mr. Mountz, I've marked as Exhibit 5 another document that you've brought with you today, and it appears to be a color photograph of an AMMCO caution label for the Model 8925 dust collection system. Can you tell me am I correct; is that what that is?
A. Yes, this was a decal that was right on the 8925 system.
Q. Okay. And do you know what year Exhibit 5 was first used by AMMCO?
A. That was on the 8925 when it was first produced in 1973.

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Q. And I think you've testified previously that AMMCO first put an asbestos warning on their brake grinders in '73 in response to the recent enactment of OSHA; is that fair?
MR. DELUCA: I just object to the form of the question. You can answer it, if you can, Craig.
A. Could you ask it again, please?
Q. Horrible question. Let me just ask it again.
When was the first time that AMMCO ever put any warning label about asbestos dust on any of their brake grinders?
A. I think I'd have to go through the instruction -- the old instruction documents to answer that correctly.
Q. Are those in the documents that we're going to look at later?
A. Yes.
Q. If you remember, just let me know. If not, we'll just get to it as we go through.
So Exhibit 5, again, this was the original warning label put on the Model 8925

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dust collector?
A. Correct.
Q. As of '73 when it was first made?
A. Correct.
Q. That answers my next question, which was the Model 8925 dust collector was made in what year?
A. 1973.
Q. Okay. Do you know who was the person at AMMCO that drafted or created this warning label, Exhibit 5?
A. It was probably our engineering manager.
Q. Who was that?
A. Bob Hampton.
Q. Is he still with the company?
A. No, he's deceased.
Q. Do you know whether he ever testified in any asbestos cases?
A. I don't know if he did.
Q. Do you know when he passed away?
A. 1994.
Q. So he already passed away at least a few years before you even got involved in any

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asbestos litigation for AMMCO; is that fair?
A. Yes.
Q. Can you tell me where Exhibit 5 would have been located on the equipment?
A. It was at the bench level on the sheet metal frame of the collector.
Q. Okay. So if we look at Exhibit 3, which is the diagram of the collector, can you show me where the warning label would have been?
A. It wrapped right around this sheet metal part.
Q. And how big was the Exhibit 5 warning?
A. I believe that is full size.
Q. Oh, okay. So Exhibit 5, you think, is actual life size?
A. I believe so.
Q. And was it always these colors?
A. No. It started out yellow and then our corporate colors changed to red and white and blue, so that's what that one is.
MR. MEISENKOTHEN: Let me mark that as Exhibit 6.
(Exhibit 6, Photocopy of Label,

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so marked.)
Q. And Exhibit 6 is another document that you brought with you today; is that right?
A. Correct.
Q. And Exhibit 6 is another caution label. And can you tell me how Exhibit 6 differs from Exhibit 5?
A. I believe the only difference is we changed corporate colors. We got rid of the yellow and went to white.
Q. So Exhibit 5 is a life size true color copy of the original warning on the dust collector?
A. Correct.
Q. And Exhibit 6 is a life size true color copy of the warning when the colors changed?
A. Yes.
Q. And what year was that?
A. I believe it was '75 or '76.
Q. Okay. And what was the impetus for the original creation and attachment of Exhibit 5 to the dust collector?
A. That would be the OSHA regulations

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that came out in, I believe, it was the summer or late '72.
Q. And those would be the OSHA regulations regarding asbestos?
A. Correct.
Q. Is there a person at AMMCO back in the '70s whose job it was, or responsibility it was, to keep abreast of regulations like OSHA?
A. Bob Hampton did that.
Q. Okay. Who was his successor in that position?
A. Well, in which position?
Q. The OSHA regulation guy?
A. It was probably Bob Chasteen.
Q. Okay. Do you know what year Mr. Hampton left the company?
A. 1994.
Q. When he passed away?
A. Yes.
Q. And I see on the warning label it makes reference to AMMCO No. 5399 disposal bag. That was the part number for the actual bag on the dust collector? It's right here.
A. It was the plastic bag, disposable

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bag.
Q. And if we're looking at Exhibit 3, the plastic bag is the lower portion and the shaded portion on top is the fabric bag?
A. Correct.
Q. And the fabric bag on the 8925 dust collector, was that made out of the same material as the fabric bag that was on the Model 2000 brake grinder?
A. I don't know that.
Q. Okay. Do you know whether the fabric bag on the Model 8925 ever changed during your tenure with the company?
A. Not that I know of.
Q. Over the course of your tenure with the company, have part of your non-litigation job responsibilities been engineering duties with respect to the Model 8925 dust collector?
A. Yes, I support all products.
Q. Okay. And can you tell me what you personally have done, if anything, with respect to the Model 8925 dust collector from an engineering perspective?
A. I think we changed manufacturers of

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(Exhibit 18, AMMCO Document, so marked.)

Q. I've marked as Exhibit 17 the data that goes with Exhibit 18, which is the January '78 industrial hygiene study by NATLSCO?

A. Correct.

Q. So Exhibit 17 and 18 go together?

A. Correct.

Q. * Okay. And are Exhibit 17 and 18 a copy of an industrial hygiene survey done by NATLSCO regarding asbestos exposure from working with an AMMCO brake grinder?

A. Yes.

MR. DELUCA: I sort of fell asleep there, I apologize. Can you just read that last question.

(*Testimony read back by reporter.)

MR. DELUCA: You answered that, right?

THE WITNESS: Yes.

Q. And again, would your knowledge of Exhibit 17 and 18 be based on just your review of Exhibits 17 and 18?

A. I was actually involved in setting

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this one up.

Q. Okay. And that's the January '78?

A. Yes.

Q. And can you tell me what your involvement was?

A. It was basically communication with the company to set up the date, set up the facility with the people, purchase the brake shoes, just –

Q. Logistics?

A. Just logistics, pull everything together for the test.

Q. Did you have anything to do with the collection, the analysis, or the interpretation of any of the results or samples?

A. No, NATLSCO are the experts. They came in and they ran the whole study.

(Exhibit 19, Product Safety Survey, so marked.)

Q. Exhibit 19 is a product safety survey for AMMCO dated July 7, 1978 by NATLSCO; is that right?

A. Correct.

Q. And can you tell me what that document

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is?

A. This was basically a product review of our equipment.

Q. What equipment?

A. The shoe grinders and the brake washers.

Q. Okay. And was the purpose to determine whether there was any asbestos exposure?

A. These were more the internal, the engineering and quality control and manufacturing assembly, what would you call them, requirements or kind of quality control of the manufacturing of the units.

Q. Internal to AMMCO?

A. Yes.

Q. And was that document drafted by employees of AMMCO?

A. No. This whole thing is by NATLSCO.

Q. Okay. Did any part of Exhibit 19 have anything to do with asbestos exposure?

A. I think it was a follow-up to the previous, the January study.

Q. Follow-up to Exhibit 17 and 18?

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A. Correct.

Q. Okay. And did you have anything to do with the drafting, editing, or reviewing or preparation of Exhibit 19?

A. No. This complete document was by NATLSCO.

(Exhibit 20, Document Titled Asbestos Study for AMMCO Tools, so marked.)

Q. Okay. And Exhibit 20 is another document that you produced today; is that right?

A. Correct.

Q. And that's entitled Asbestos Study For AMMCO Tools, and what's the date of that one?

A. This one is June 5, 1973.

Q. And what was – it says "Asbestos Study." What were they studying?

A. Brake shoe grinders.

Q. They were studying exposure to asbestos from the use of brake shoe grinders?

A. In conjunction with our 8925 dust collection system.

Q. Okay. So this would have been pretty

Exhibit 18

sample was removed to expose the entire area of the filter during sample collection. Air was drawn through the filter at 2.0 liters per minute, and the sampling media was positioned as close as possible to the breathing zone of the exposed employee, except for the general area samples which were positioned at indicated locations, at approximate breathing zone height unless otherwise noted in the tables.

Subsequent to collection, the filters were brought to the NATLSCO Environmental Sciences Laboratory where fibers were counted on the filters using phase contrast microscopy techniques at a magnification of 450. The NATLSCO Environmental Sciences Laboratory is accredited by the American Industrial Hygiene Association and licensed by the U.S. Department of Health, Education, and Welfare's Center for Disease Control.

The Time-Weighted Average Exposure was calculated using the formula:

$$\frac{C_1T_1 + C_2T_2 + \ldots C_nT_n}{T_s}$$

Where C represents the contaminant concentration, T the sampling time at that concentration, and T_S represents the total sampling time.

The conditions under which air sampling was conducted is defined as follows:

1. Work room: 60'1" x 38'6" x 19'4" (height)
   or 44,727 ft.^{3}
   All doors and bays closed
   Ventilation in the room consisted of recirculating warm air through 2 warm air returns mounted about 10 feet above the floor.

2. Grinders: Two Model 880 brake shoe grinders were used, both equipped with Model 8150 cam action brake shoe clamp, and the Model 8925 Dust Collection system. It is felt that air sampling results would have be similar with the other grinders (Model 890 and 8000) since they differ only in the type of brake shoe clamp employed. The sanding drums on each grinder rotated at 3450 rpm. The grinders were positioned a few feet apart on the south side of the room

   The "poorly maintained" brake shoe grinder was several years old, and had been used considerably. The inner plastic collection bag of the 8925 dust

collection system was about half full. The bag was oversized, and as a result was bunched in spots around the outer rim of the metal collection drum. As a result, small gaps were present around the rubber gasket where the drum is fastened to the underside of the collection system fabric bag. It was observed that puffs of dust were blown out from around the gasket during start-up of the poorly maintained grinder.

The "well maintained" grinder was about the same age, but the dust collection system had been cleaned, and a fresh, unused plastic bag was apparently carefully fitted in the Dust Collection System. No dust was observed to have been blown out through the gasket junction of the drum and fabric bag during operation.

3. Comparison Grinder tests:

(See attached tables)
General area air samples were duplicated on both grinders during some typical dressing of brake shoes. In addition, samples were duplicated during the destroying of brake linings. In all, about 16 total grindings were made, on eight different shoes, at each of the two brake shoe grinders. In the opinion of the operator, this represented a good day's work in a typical garage.

4. Other grinder tests:

In addition to the above tests, follow up air samples were taken on the "poorly maintained" grinder after the dust collection bag was replaced and the metal collection drum was washed. A test was attempted with the collection system disconnected, but this was terminated when it became apparent that large amounts of dust and fibers would accumulate in the air when shoe grinding was done.

5. Grinder operator personal exposure:

During operation of both grinders, personal samples to evaluate operator exposure to asbestos fibers were taken. The time weighted average exposure for the sampling period was calculated for the operator based on the results of each set of samples taken at the "poorly maintained" and "well maintained" grinders.

6. Brake shoe washer:

Air samples to determine area concentrations of, and personal exposure to, asbestos fibers was done during the use of the model 1250 Brake Assembly Washer with the #1256 Brake Washer Concentrate. The car (a late 60's model Chevrolet) was located on the lift in the same workroom, about 20 feet diagonally northwest of the brake shoe grinders. This test was considered a good example of a set of wheels in poor shape, with heavy corrosion and a large deposit of ground material contained in each wheel.

DISCUSSION

The samples taken during destruction of brake shoe linings showed that during such abuse, significant fiber concentrations were generated in the operator's breathing zone, as well as in the general area.

Based on visual observations made during the aborted test during grinding with the Dust Collection System detached, it is advised that these brake shoe grinders always be employed with the use of such a System. Excessive airborne asbestos fiber levels could be generated in the absence of the Dust Collection System.

Based on visual observation made during brake washing, it is advised that the outside of the wheel be wetted if possible before hitting it to dislodge corrosion around the brake cover. Considerable airborne suspended particulate was generated when the wheel brake covers were struck, before the inside was washed.

Respectfully submitted,

Frank O. Brown

Frank O. Brown, Jr.
Industrial Hygienist
Certified/Comprehensive Practice

FOB/lb

TABLE I
ATMOSPHERIC ASBESTOS CONCENTRATIONS
AMMCO TOOLS, INC.
NORTH CHICAGO, ILLINOIS
JANUARY 6, 1978
MODEL 880 BRAKE SHOE GRINDERS

SAMPLE NUMBER	LOCATION	TIME START/STOP	FIBER CONCENTRATION (fibers/ml)[a] Poorly Maintained Model 880	Well Maintained Model 880
OSHA Allowable Limit				2*
				10**
OSHA Proposed Limit				0.5*
				5.0**
NIOSH Proposed Limit				0.1*
				0.5**
OPERATOR'S BREATHING ZONE				
	Ken Bullock, brake shoe grinder operator			
Y22	Grinding 12" relined WEP-43-FE-MM shoe, and 11" new MAN-594-FF, destroyed lining	0852/0857	1.4	--
Y47	Same grinding, destroyed lining	1116:15/1121:15	--	1.4
Y28	Grinding 4 shoes; 2 11" Maremont MG-08-FE-P; 2 11" Maremont MG-12-FE-3	0906:20/0913:00	0.77	--
Y43	Same grinding	1056:45/1101:15	--	< 0.38
Y31	Grinding 2 shoes twice; 11" Chrysler SEC 336X; 11" MG-08-FE-P	0930:10/0936:05	2.6	--
Y40	Same grinding	1042:27/1046:05	--	< 0.44
Y33	Grinding 4" shoes twice; 2,9" GM-304-F, 2,9" GM-207-FE	0948:35/0959:30	0.62	--
Y36	Same grinding	1022:20/1028:00	--	0.29
	TIME WEIGHTED AVERAGE EXPOSURE for Sampling Period[b], all grinding work		1.2	< 0.63

TABLE I
PAGE TWO

SAMPLE NUMBER	LOCATION	TIME START/STOP	FIBER CONCENTRATION (fibers/ml)[a] Poorly Maintained Model 880	Well Maintained Model 880
Y46	In area, no grinding work	1103/1116 1122/1136		<0.06
	Estimated 8 Hour Time Weighted Average Exposure, for grinding work, assuming no other brake work		0.05	<0.02
Y51	Changing collection bag from #8925 dust collection system, on poorly maintained model 880 brake shoe grinder	1243/1252	0.19	--
Y53	Grinding shoes on Poorly Maintained model 880, after collection bag change and collection bucket wash. Grind 2, MG-08-FE-P shoes and 2 MG-12-FE-S shoes	1306:30/1310:15	<0.46	--
	GENERAL AREA SAMPLES			
Y21	One foot above arbor, no activity	0809/0839	<0.06[b]	<0.06[b]
Y24	One foot above arbor, during grinding as per Y22	0852/0859	2.1	--
Y48	One foot above arbor, during grinding as per Y47	1116:15/1121:15	--	<0.34
Y26	One foot above arbor, grinding as per Y28	0906:20/0913:00	0.26	--
Y44	One foot above arbor, grinding as per Y43	1056:45/1101:15	--	<0.38
Y30	One foot above arbor, grinding as per Y31	0930:10/0936:05	<0.29	--
Y41	One foot above arbor, grinding as per Y40	1042:27/1046:05	--	<0.44
Y34	One foot above arbor, grinding as per Y38	0948:35/0959:30	0.62	--
Y37	One foot above arbor, grinding as per Y36	1022:20/1028:00	--	0.29

TABLE I
PAGE THREE

SAMPLE NUMBER	LOCATION	TIME START/STOP	FIBER CONCENTRATION (fibers/ml)[a] Poorly Maintained Model 880	Well Maintained Model 880
Y25	Two inches from collar where collection bag joins grinder housing, 2½' above floor. During grinding as per Y22	0852/0857	6.5	--
Y27	Two inches from collar where collection bag joins grinder housing, 2½' above floor. During grinding as per Y28	0906:20/0913:00	0.51	--
Y29	Two inches above end of collection system housing, 1 foot above floor where plastic lined collection drum meets housing. Grinding as per Y31	0930:10/0936:05	3.1	--
Y42	Two inches above end of collection system housing, 1 foot above floor where plastic lined collection drum meets housing. Grinding as per Y40	1042:27/1046:05	--	< 0.44
Y35	Two inches above end of collection system housing, 1 foot above floor where plastic lined collection drum meets housing. Grinding as per Y33	0948:35/0959:30	0.31	--
Y38	Two inches above end of collection system housing, 1 foot above floor where plastic lined collection drum meets housing. Grinding as per Y36	1022:20/1028:00	--	0.29
Y45	Two inches above end of collection system housing, 1 foot above floor where plastic lined collection drum meets housing. Grinding as per Y28	1056:45/1101:15	--	< 0.38
Y49	Two inches above end of collection system housing, 1 foot above floor where plastic lined collection drum meets housing. Grinding as per Y47	1116:15/1121:15	--	3.8

TABLE I
PAGE FOUR

SAMPLE NUMBER	LOCATION	TIME START/STOP	FIBER CONCENTRATION (fibers/ml)[a]	
			Poorly Maintained Model 880	Well Maintained Model 880
Y23	Middle of work shop, 15 feet from grinders, during all grinding on poorly maintained Model 880.	0852/1001	0.25	--
Y39	Middle of work shop, 15 feet from grinders, during all grinding on well maintained Model 880	1022/1123	--	0.06
Y50	Middle of work shop, 15 feet from grinders, no activity	1142/1243	<0.03[b]	<0.03[b]

a fibers greater than 5 microns in length per milliliter of air sampled. All fibers with an aspect ratio of 3:1 or greater were counted

b Concentration is representative for both grinders.

* Eight hour time weighted average exposure limit.

** ceiling concentration not to be exceeded.

< - denotes "less than". Where a "less than" value is used in the table, it means that no countable fibers were observed on the sample. The calculated fiber concentration for these samples was arrived at using "less than 1" in the calculation.

TABLE II
ATMOSPHERIC ASBESTOS CONCENTRATIONS
AMMCO TOOLS, INC.
NORTH CHICAGO, ILLINOIS
JANUARY 6, 1978
MODEL 1250 BRAKE ASSEMBLY WASHER

SAMPLE NUMBER	LOCATION	TIME START/STOP	FIBER CONCENTRATION (fibers/ml)[a]
OSHA Limits - See Table I			
OPERATOR'S BREATHING ZONE			
	Ken Bullock, brake washing operator		
K54	Detach 4 tires, (from old Chevrolet), knock corrosion off wheels with hammer, take wheel cover off, wash 4 brake housings with Washer and #1256 Brake Washer Concentrate	1322:25/1337:00	1.1
Y56	As above, plus not activity following brake washing	1322:25/1352:30	0.53
	Estimated 8-Hour Time Weighted Average Exposure, assuming no other brake work		0.03
GENERAL AREA SAMPLES			
Y55	Left side of car, at door, during washing	1322:45/1337:30	0.36
Y52	15' from shoe grinders, 25' from car, during 1 grinding operation and 1 brake washing operation	1306:30/1353	0.04

[a] Fibers greater than 5 microns in length per milliliter of air sampled. All fibers with an aspect ratio of 3:1 or greater were counted.

< - denotes "less than". Where a "less than" value is listed in the table, it means that no countable fibers were observed on the sample. The calculated fiber concentration for these samples was arrived at using the number "less than 1" in the calculation.

EXHIBIT G

SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF LOS ANGELES

ADELAIDA GRAHAM, Individually and as Successor-in-Interest to LEON GRAHAM, deceased; and ANDREA GRAHAM, FAITH ZAMUDIO, LEROY GRAHAM, DAVID GRAHAM, and BARBARA VREE as legal heirs of LEON GRAHAM, deceased, Plaintiffs, vs. BIG A AUTO PARTS, INC., et al., Defendants.	Case No. BC421758

DEPOSITION OF CRAIG MOUNTZ

LOS ANGELES, CALIFORNIA

TUESDAY, JANUARY 25, 2011

DEBORAH MORIN
Certified Shorthand Reporter
in and for the State of California
License No. 11558
Expiration Date 9/15/2011

Henjum Goucher Reporting Services
1-888-656-DEPO

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A I don't know exactly.
Q Can you make a -- what's your best estimate?
A Maybe 18 inches.
Q How wide in circumference is the woven bag when it is open, is the opening of that bag?
A Around two or two and a half inches.
Q And just -- were -- in terms of warnings, was there ever a warning on a piece of Ammco equipment that the operator should use a respirator or other breathing protection prior to 1988?
A I don't believe so.
Q When you say you don't believe so, does that mean you have never seen a warning that had that?
A I don't believe I ever had, no.
Q And you've looked and seen all of the copies of warnings that were placed, to the best of your knowledge, on Ammco products; correct?
A Correct.
Q Is there anybody else who might know anything about warnings with more knowledge than what you have gained over the passage of years with regard to Ammco products?
A No.
Q People always ask this first, and I almost always forget, but in Exhibit 1 we have a bunch of

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categories. Did you ever -- were you ever given the notice of deposition for this deposition?
A Yes.
Q And have all the documents that are responsive, to the best your knowledge, with regard to the categories in Exhibit 1, have all of those been produced here today or before today in this case?
MR. SOBEL: I'll just make an objection it may call for attorney-client or work product privilege.
MS. SHINING: Can someone tell me if anything has been withheld or still exists that hasn't been produced?
MR. SOBEL: It's his deposition. He can answer the question. I'm just putting the objection.
BY MS. SHINING:
Q Okay. As a custodian of records, do you know if everything that's called for in there -- and I can go category through category and all that kind of thing -- but do you know offhand if you complied with all the requests in the notice?
A Everything that we had that was listed has been given.
Q Just a few things that I was asked to cover by my co-counsel. And I know some of the things, but I think they wanted this all in one place.

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Essentially there were the two different dust collection systems available for use on brake shoe grinders between 1970 and 1984. The canvas one that we discussed for the 2000 series and the redesigned dust collection system post 1973 for use on the 8000 series and retrofitting to all the versions of the 8000 series; is that correct?
A Yes.
Q Is there anyone else besides the three engineers that -- oh, I can do this with --
I wanted to ask you if there were other persons besides yourself and the three engineers that we've discussed who might still be around with knowledge of the design of these systems before 1975 when you got there.
So -- and to help refresh your recollection, here is a memo from 1977 that's Bates 153. I think we talked about that earlier. Maybe we should mark that as Exhibit 14.
(Plaintiffs' Exhibit 14 marked for identification.)
BY MS. SHINING:
Q Do you know if any of the persons who are identified in the handwriting on that memo or in the footer of the CC of that memo, were they still -- were

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they employed prior to 1975 at Ammco?
A I believe that they are.
Q They all were?
A I believe that they all were.
Q Who was Eugene Ziemba? It states here he's industrial -- I-n-d-h-y-g. Is he an industrial hygienist?
A He was one of the hygienists from NATLSCO.
Q And how about Geo Krafsisin? And that's manager industrial hygiene. Was he also from NATLSCO?
A Yes.
Q And these folks down here at the bottom, I assume these are people who were CC'd with a copy of this request; is that correct?
A That's what it looks like.
Q Do you know J, period, Cannistraro's first name?
A It might be John. I'm not sure.
Q Okay. Do you know J, period, Hallberg's first name?
A He definitely was John.
Q Okay. E. Jarcnik?
A Ed Jarcnik.
Q R. Kohn. K-o-h-n. First name.
Actually, why don't you look at that, and if