Aug. 9, 1960 I. JEPSON 2,948,088

ABRADING MACHINE

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Fig. 1.

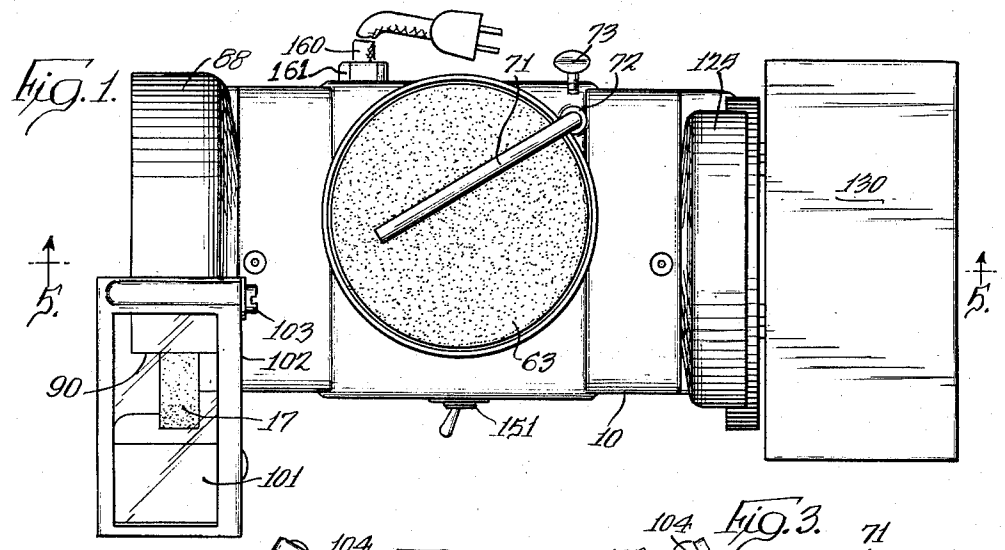


Fig. 2.

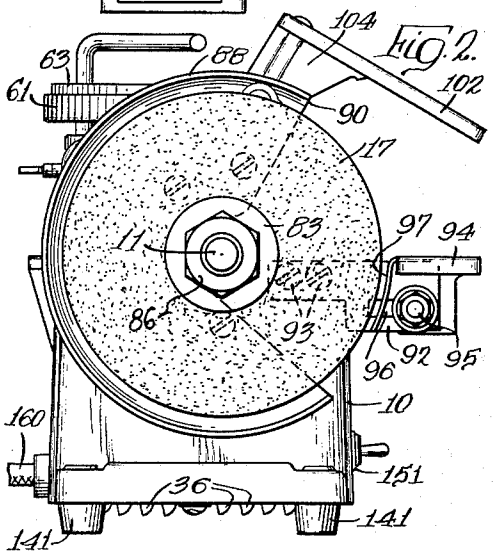


Fig. 3.

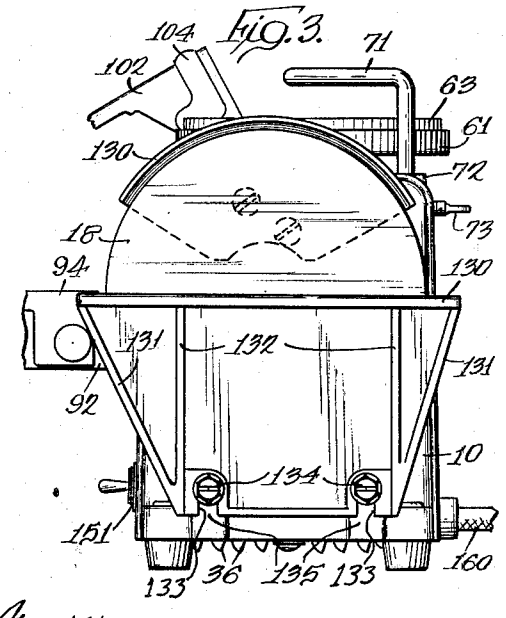
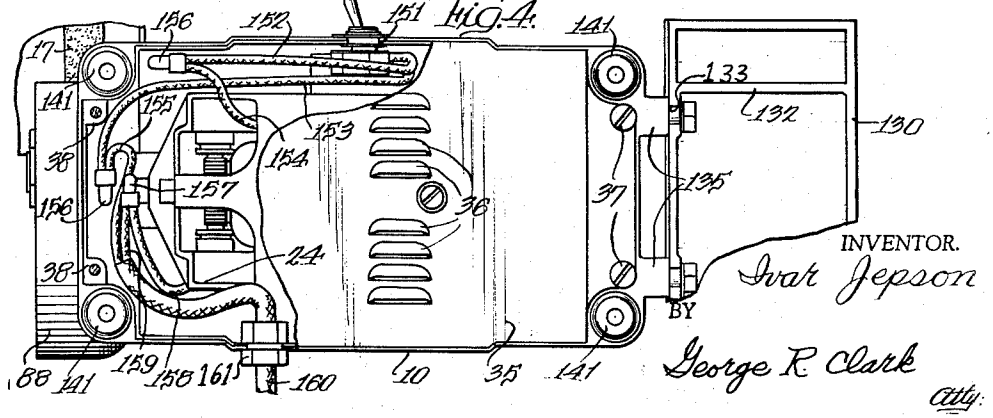


Fig. 4.



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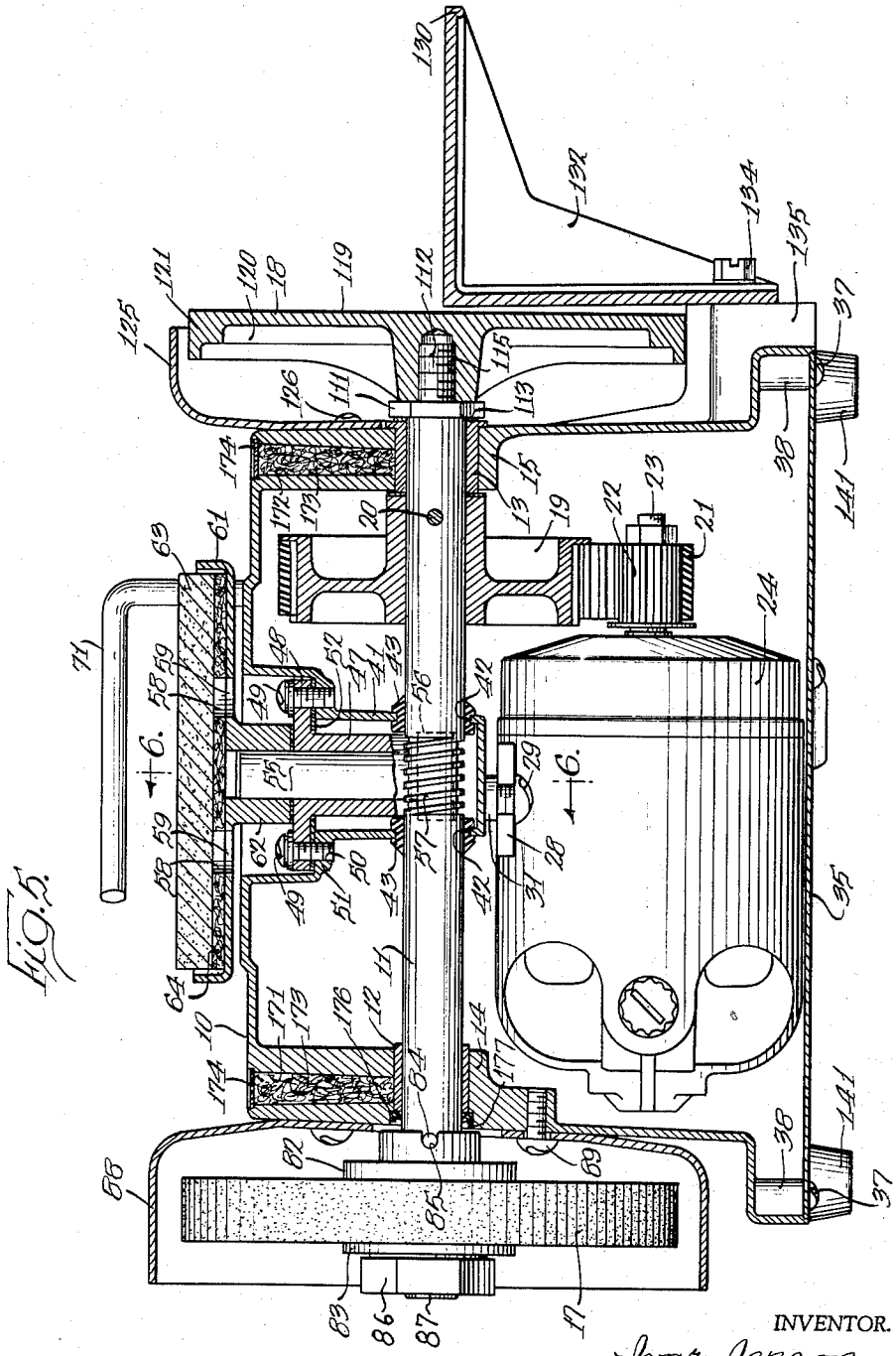


FIG. 5.

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Fig. 6.

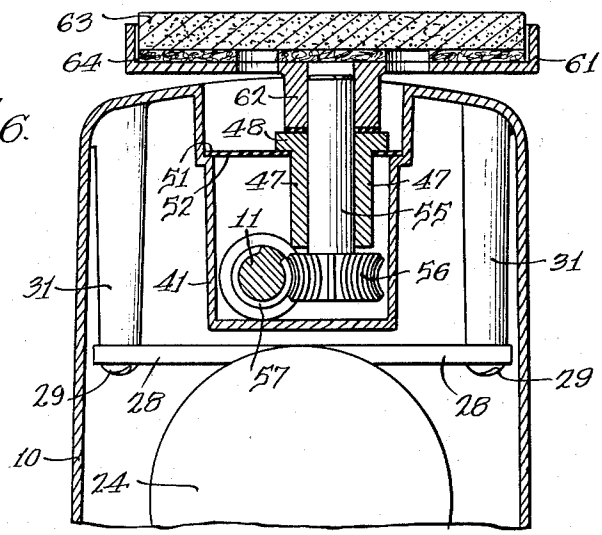
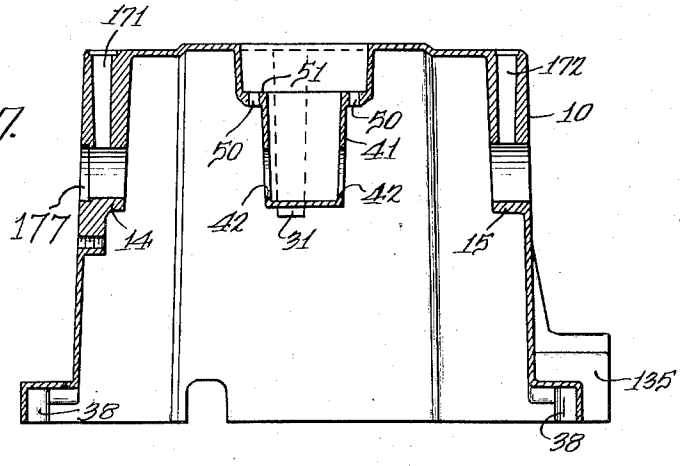


Fig. 7.



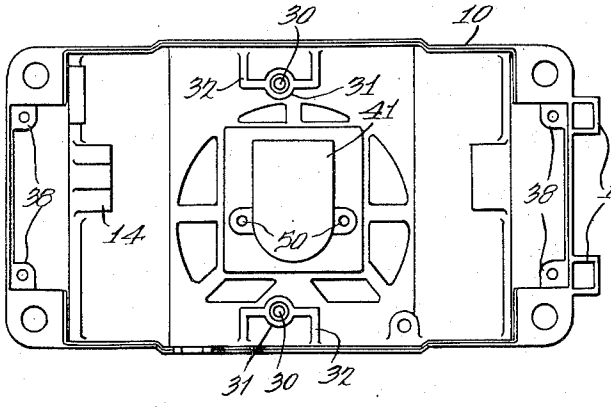


Fig. 8.

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United States Patent Office 2,948,088 Patented Aug. 9, 1960

2,948,088

ABRADING MACHINE

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Filed Sept. 6, 1957, Ser. No. 682,349

3 Claims. (Cl. 51—166)

This invention relates to an abrading machine, and more particularly to a combined grinder-sander-honer.

There have been provided in the past abrading machines of the type having a motor having grinding wheels mounted on the ends of its shaft and a second or honer shaft connected by a worm gear to the motor shaft and mounting a honer turntable thereon. The motor housing is split so that access is provided to the interior parts of the motor and one end of the housing carries one shaft bearing while the other end of the housing has bearings for the other end of the motor shaft and the second shaft. Since the grinding wheels are heavy and must be rotated at high speed, the motor shaft and the bearings and housing have had to be heavy. Since the housing is split, there has been difficulty in aligning the motor shaft bearings and keeping the bearings aligned during use. Another problem existing in the prior art devices has been that of maintaining lubricating material in the shaft bearings and in the gearing connecting the motor shaft to the honer shaft. Also, since abrading elements are connected directly to the shaft of the motor, the motor must have a speed near the optimum for the abrading elements, and this speed is much lower than the optimum for the electric motor. As a result, the motor has had to be large and heavy to provide the necessary power at the slower speed of operation. Another disadvantage of the prior art machines has been that the machines have either been of the type described above in which the abrading discs are fixed directly to the motor shaft so that repair and maintenance of the motor is difficult or of a type where an external separately mounted motor is connected by a belt to the driving shaft and the motor and grinder or abrader are in no sense unitary. Also, the prior art abrading machines of the unitary type are heavy and difficult to move around, this being a disadvantage particularly where the machines are used in a home workshop where portability is important.

It is, accordingly, an object of the invention to provide a new and improved abrading machine.

Another object of the invention is to provide a grinder-sander-honer of rugged construction and high power while being light in weight.

Still another object of the invention is to provide a grinder-sander-honer in which the abrading elements and the driving motor form a unitary assembly with the motor being detachable as a unit from the other elements.

Yet another object of the invention is to provide a grinder-sander-honer in which a grinder and a sander are mounted on opposite ends of a shaft and a second shaft mounts a honer and is connected by gearing to the first shaft in a socket formed in a housing with seals to make the socket a tight grease container.

A further object of the invention is to provide a grinder-sander-honer having a housing in which a motor is detachably mounted and the housing mounts a drive shaft separate from the motor in a position passing through a grease-containing recess in the housing in which

a honer turntable shaft is connected by a worm gearing to the drive shaft with seals at the openings in the walls of the recess through which the drive shaft extends.

Other objects of the invention will become apparent from the following detailed description of a grinder-sander-honer forming a specific embodiment thereof, when read in conjunction with the appended drawings, in which:

Fig. 1 is a top plan view of a grinder-sander-honer forming one embodiment of the invention;

Fig. 2 is a side elevation of the grinder-sander-honer shown in Fig. 1;

Fig. 3 is a side elevation of the grinder-sander-honer shown in Fig. 1;

Fig. 4 is a fragmentary, bottom plan view of the grinder-sander-honer shown in Fig. 1;

Fig. 5 is an enlarged vertical section taken along line 5—5 of Fig. 1;

Fig. 6 is a fragmentary enlarged vertical section taken along line 6—6 of Fig. 5;

Fig. 7 is a vertical section of the housing of the grinder-sander-honer shown in Fig. 1; and

Fig. 8 is a bottom plan view of the housing shown in Fig. 7.

The present invention provides a grinder-sander-honer in which a motor is detachably mounted as a unit in the machine. A one-piece housing serves to mount both the motor and a drive shaft mounted independently of the motor. The drive shaft carries a grinding wheel on one end and a sanding disc on the other end. The shaft passes through openings in a cup-shaped grease container in the top of the housing, and is connected by worm gearing in the container to a honer shaft mounted in a bearing supported by a cover for the recess. Since the motor is mounted separately from the drive shaft, the motor may be of the series-wound, high speed type which provides a high power to weight ratio, and reduction gearing is provided to connect the motor to the drive shaft.

In the grinder-sander-honer shown in the drawings, there is provided a one-piece cast housing **10**, which may be composed of die cast aluminum or the like, and the housing serves to mount a main or drive shaft **11** in bushings **12** and **13** (Fig. 5). The bushings are press fitted in journals **14** and **15** formed in the one-piece housing **10**. To provide alignment of the bushings, the journals are line reamed so that they are perfectly in alignment with one another. The shaft **11** has a grinding wheel **17** keyed to one end thereof and a sanding disc or plate **18** mounted on the other end thereof and is driven by a toothed pulley or sprocket **19** secured rigidly thereon by a pin **20**. The shaft **11** is driven through the pulley **19** by means of a toothed belt **21** of a known type driven by a toothed pulley **22** mounted on an armature shaft **23** of an electric motor **24**.

The motor **24** is a series-wound motor of known construction with self-aligning bearings and has a fan therein for cooling purposes. The motor rotates its armature shaft **23** at a higher rate of speed than that desired for the grinding wheel **17** and the sanding disc **18**, and, to provide the proper speed for the elements **17** and **18**, the pulley **22** is made substantially smaller than the pulley **19** so that a speed reduction is effected therebetween. The motor is provided with slotted mounting brackets **28** secured to the housing **10** by means of screws **29** projecting into tapped bores **30** (Fig. 8) formed in posts **31** cast integrally with the top wall of the housing **10** and reinforced by cast webs **32**.

A bottom cover plate **35** (Figs. 4 and 5) having air openings **36** is secured to the bottom of the housing by screws **37** threaded to tapped post portions **38** formed integrally with the housing **10**. To form a grease-re-

taining compartment, the housing **10** is also provided with a cup-shaped container **41** opening at the top thereof and integral with the top wall of the housing **10**, and the container **41** is provided with aligned bores **42** in which are mounted grommets **43** of "neoprene" (polymerized chloroprene). A sintered bronze bearing **47** having a mounting flange **48** is secured in the lower portion of the container **41** by screws **49** threaded into tapped bores **50** formed in an annular shoulder **51** of the container **41**. A cover plate **52** rests on the shoulder **51** to retain grease in the container **41**, and is held in place by the flange **48**. The bearing **47** mounts a honer shaft **55** rotatably therein. A worm gear **56** is pinned to the lower end of shaft **55**, and meshes with a worm gear **57** formed on the shaft **11**. A turntable cup **61** has a sleeve portion **62** keyed to the upper end of the shaft **55**, and serves to support and rotate a honer disc or stone **63** of a fine abrasive material with a felt grip pad **64** positioned between the cup **61** and the disc **63**. To form an enclosed chamber formed in the lower portion of the container **41**, the flange **48** of the bearing **47** holds the cover **52** against the shoulder **51**, and the chamber is filled with a known non-liquid grease and is made grease-tight by the grommets **43** so that the worm gears **56** and **57** are immersed in grease. There is a substantial speed reduction effected by the gears **56** and **57** between the shafts **11** and **55** so that the honer **63** is rotated at an optimum speed for honing. The grinding disc **17** and the sanding disc **18** are rotated at a speed ideally suited for grinding and sanding. For the purpose of supporting articles to be honed, and L-shaped rod **71** is mounted in a boss **72** cast integrally with the housing **10**, and is held in adjusted position by a set screw **73**.

To mount the grinding disc **17** on the shaft **11**, the disc **17** is clamped between a flanged sleeve **82** and a washer **83** (Figs. 2 and 5), the sleeve **82** being provided with notches **85** through which a pin **84** extends to key the sleeve **82** to the shaft **11**. A nut **86** is screwed onto a threaded end **87** of the shaft **11** to press the washer **83** toward the sleeve **82** to tightly clamp the wheel **17** and drive the wheel **17** by means of frictional engagement therebetween. A cup-shaped guard **88** is secured by screws **89** to the housing **10** and has a wedge-shaped opening **90** to provide access to one portion of the periphery of the wheel **17** for grinding purposes. The left hand face of the wheel **17**, as viewed in Fig. 1, also is accessible for grinding purposes. A mounting bracket **92** is secured to the housing **10** by means of screws **93**, and a tool support or rest **94** is adjustably mounted on the bracket by means of a bolt **95** and a slot **96**. To prevent tools from accidentally being introduced between the wheel **17** and the support **94**, the tool support **94** is provided with a lip portion **97** extending along and spaced from the disc **17**. A transparent guard **101** is supported by a frame **102** pivotally secured to the guard **88** by post **104** and a bolt **103**, and may be adjusted to desired positions. The frame **102** is connected rigidly to the post **104**, which is pivotally connected to the guard **88** by means of the bolt **103**.

At the right hand end of the shaft **11**, as viewed in Fig. 5, a thrust nut **111** is screwed over a threaded end **112** of the shaft **11** and a washer **113** being positioned between the bushing **13** and the nut **111** to minimize friction between the nut **111** and the bushing **13**. The sanding disc plate **18** is provided with a tapped bore **115** which is threaded over the end **112** until the plate **18** engages the nut **111**. The threads of the shaft **11** and the plate **18** are in a direction relative to rotation of the shaft by the motor **24** such that the plate **18** tends to be threaded further on the shaft by rotation of the shaft by the motor. A disc of sandpaper having a pressure sensitive adhesive backing may be secured to the face **119** of the plate **18**. The sandpaper disc may also be glued to the wheel **18**. Re-enforcing webs **120** are provided for the plate **18** along with a re-enforcing periphery **121**. A cup-shaped guard **125** is secured to the housing **10** by screws **126** and covers the upper portion of the plate **18**. A sander work rest **130** is generally L-shaped and is re-enforced by webs **131** and **132**. The work rest **130** has slots **133** formed therein so that the work rest may be removed from the grinder merely by unloosing screws **134** threaded into tapped bores formed in bosses **135** (Figs. 3 and 4) cast integrally with the housing **10**.

Molded rubber feet **141** are mounted in openings formed in the corners of the housing **10** and serve to support the housing in an elevated position from the top of a bench or the like where it is to be used. This permits cooling air to flow through the openings **36** in the cover plate **35** from the action of the fan in the motor **24**. A switch **151** (Figs. 3 and 4) is mounted in the front wall of the housing **10**, and is connected by conductors **152** and **153** (Fig. 4) to conductors **154** and **155**, respectively, by connectors **156**. A connector **157** serves to connect a conductor **158** of the motor **24** to a conductor **159** of a jacketed cord **160** leading to a plug (not shown) which may be inserted into a socket to connect the grinder to a source of electric power. The cord **160** passes through a grommet **161** mounted in the rear wall of the grinder, and the grommet serves to grip the cord **160** to relieve strain from the connectors **156** and **157**. It will be seen that the motor **24** may be readily removed from the housing merely by unscrewing the connectors **156** and **157** and removing the screws **29** (Figs. 5 and 6), all this being done after the bottom cover plate **35** is removed from the housing **10**, of course.

For lubricating purposes, the bushings **12** and **13** (Fig. 5) are composed of porous bronze, and to provide lubrication between the bushings **12** and **13** and the shaft **11**, there are provided oil holes **171** and **172** open at the top to receive oil and at the bottom to the bushings **12** and **13**. The bores **171** and **172** are filled with oil-retaining absorbent material **173** such as wicking, felt or the like. Perforated discs **174** are provided for covering the upper ends of the bores **171** and **172** and serve to provide oil holes to permit oil to be introduced into the wicking **173** and maintain oil on the bushings **12** and **13**. A U-ring **176** mounted in a counterbore **177** formed in the housing **10** seals the shaft and bushing **12** against leakage of oil into the guard **88**. Similarly, the washer **113** restricts seepage of oil into the housing **125** covering the sanding disc **119**.

It should be noted that the above-described grinder-sander-honer is provided with a light-weight, high powered, heavy duty, series-wound motor **24** which, although operating at a high speed, drives the grinding wheel **17** and sanding plate **18** at an optimum speed, for grinding and sanding. The motor **24** is detachable as a unit from the rest of the machine for maintenance and repair purposes thereon. The motor **24** has only standard size bearings since its armature shaft **23** does not mount the heavy wheel **17** and plate **18**. Hence, the shaft **23** may be much smaller than the shaft **11**. The honer assembly including the disc **63**, shaft **55**, the worm gear **56** and the flanged bearing sleeve **47** is removable from the housing **10** as a unit and holes **58** and **59** are provided in the felt disc **64** and the wheel **61** to permit the screws **49** to be loosened for removal of the honer assembly. The container **41** of the housing and cover plate **52** along with the grommets **43** form a grease-tight container for retaining the grease therein.

While there has been illustrated and described a particular embodiment of the present invention, it will be apparent to those skilled in the art that various modifications may be made without departing from the invention in its broader aspect and it is therefore aimed in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the present invention.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. In an abrading machine, a unitary inverted cup-shaped housing having a recess in one wall thereof and also being provided with horizontally aligned openings in the walls of said recess, a first shaft extending through said openings, bearing means supported by said housing for rotatably mounting said first shaft, seals mounted in said openings, a second shaft, a cover plate closing said recess and having an opening for said second shaft, bearing means supported in said recess and mounting said second shaft for rotation about a vertical axis, gear means in said recess below said cover plate connecting said first and second shafts, said seals and said cover plate serving with the walls of said recess to form a grease-tight compartment, a motor mounted on the inside of said unitary housing displaced from said first shaft, power transmission means interconnecting said motor and said first shaft, and abrasive wheels mounted on the ends of said first shaft and on the top of said second shaft outside of said unitary housing.

2. In an abrading machine, a housing open at the bottom and having a cup-shaped re-entrant portion opening at the top thereof, said portion being provided with aligned openings in the side walls thereof, a cover plate covering the upper side of said portion and having an opening therein, a first shaft, bearing means mounted in said opening in said cover plate mounting said shaft rotatably, sealing grommets mounted in said aligned openings, a drive shaft extending through said grommets, said housing having openings in the outer walls thereof through which said drive shaft extends, bearing means

mounted in the last-mentioned openings, a motor detachably secured to the top of said housing in a position enclosed in said housing, means connecting said motor to said shaft, a cover for the bottom of said housing, and abrading means mounted on the ends of said shafts.

3. An abrading machine comprising a one-piece housing member having an open bottom and a cup-shaped re-entrant portion in the top wall thereof, said cup-shaped portion having a mouth opening upwardly, said portion being provided with aligned openings in the side walls thereof, a plate covering said mouth and having an opening therein, a first shaft, bearing means for said first shaft mounted in said portion and extending through said opening in said plate, a drive shaft extending through said aligned openings perpendicular to said first shaft, sealing means positioned in said aligned openings to sealingly engage said drive shaft, said housing having openings in the outer walls thereof through which said drive shaft extends, bearing means mounted in said last-mentioned openings, said housing having posts extending along opposite sides of said re-entrant portion to a level below said re-entrant portion, a motor secured to said posts in a position enclosed in said housing, power transmission means connecting said motor to said drive shaft, and abrading means mounted on the ends of said drive shaft and on the upper end of said first shaft.

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