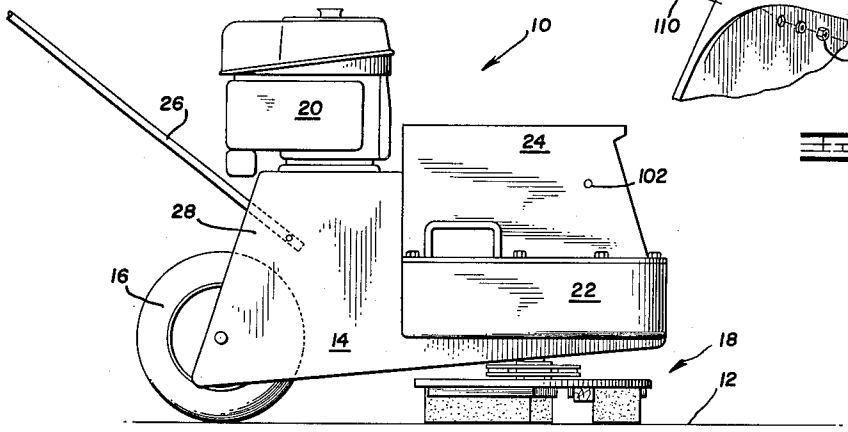
July 23, 1963 J. T. DORAN 3,098,329

CEMENT FLOOR FINISHING MACHINE

Filed Aug. 19, 1959 3 Sheets-Sheet 1

Fig. 1.



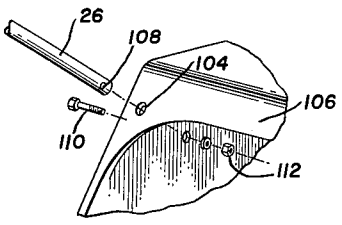


Fig. 2.

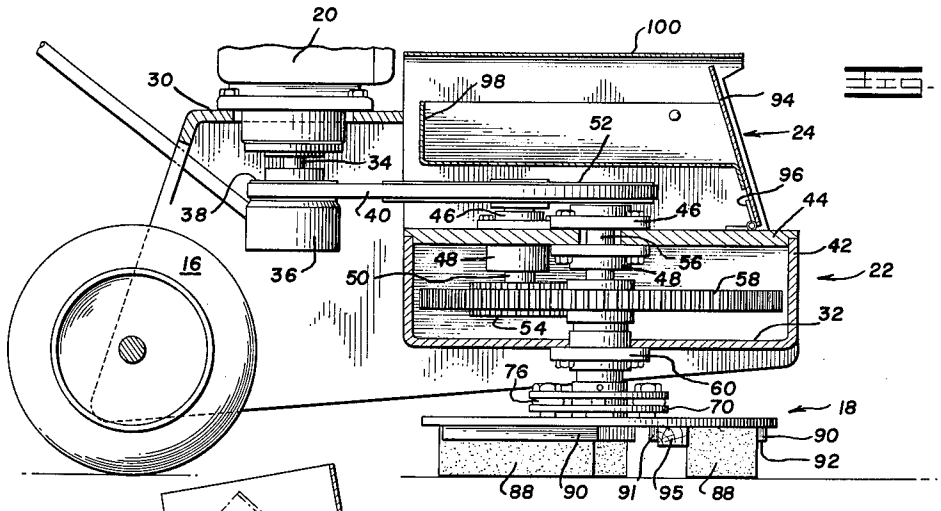
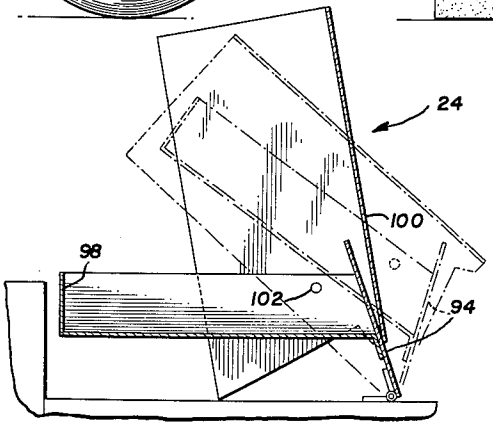


Fig. 7.



INVENTOR.
JOHN T. DORAN

BY Attorneys Wright & Tattersall

ATTORNEYS

July 23, 1963 J. T. DORAN 3,098,329

CEMENT FLOOR FINISHING MACHINE

Filed Aug. 19, 1959 3 Sheets-Sheet 2

Fig. 3.

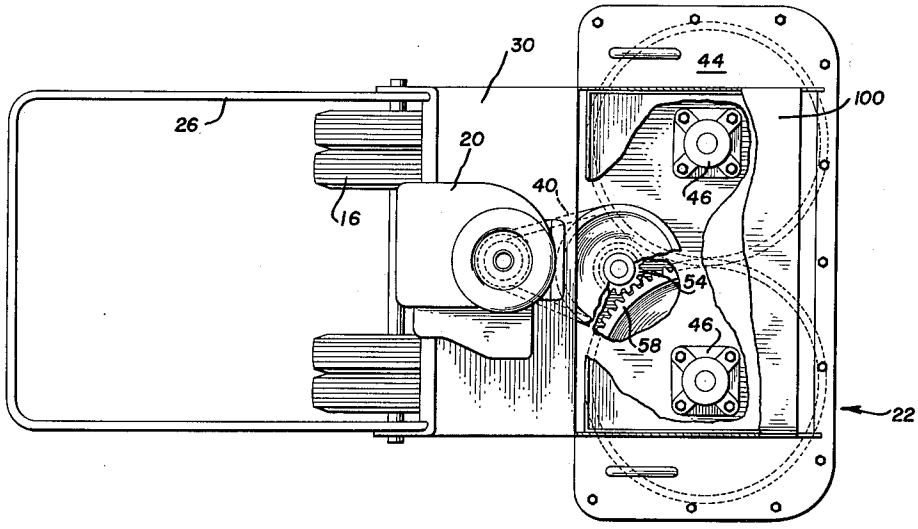


Fig. 6.

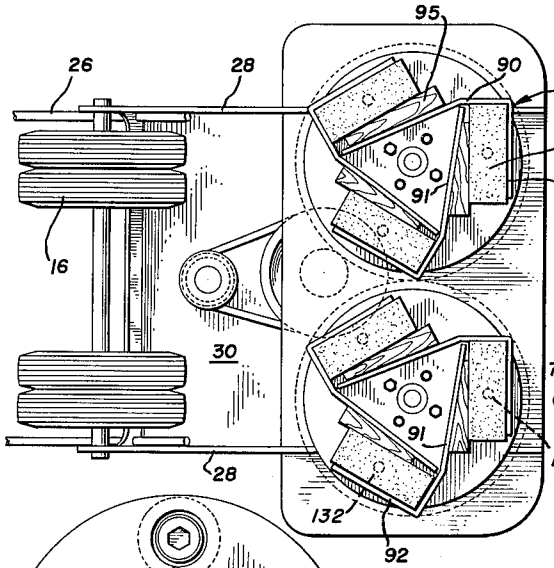
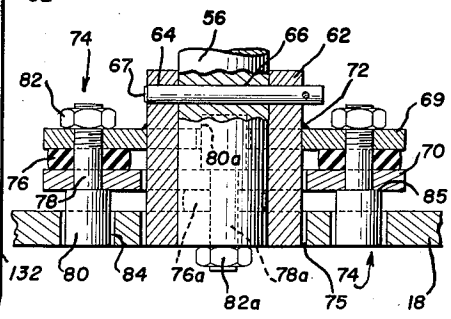


Fig. 4.



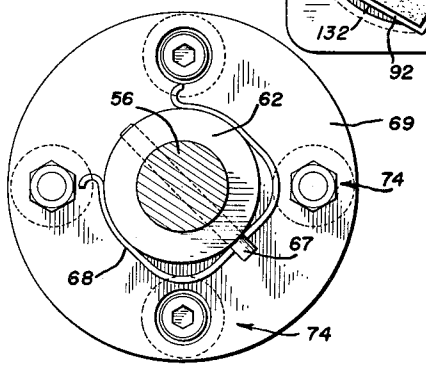


Fig. 5.

INVENTOR.
JOHN T. DORAN

BY Pattison, Wright & Pattison

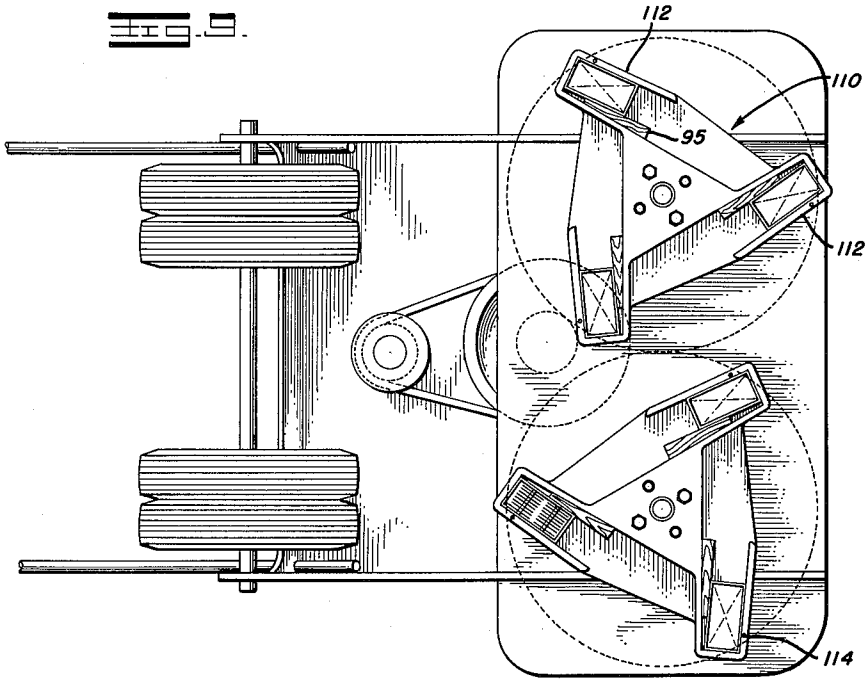
ATTORNEYS

July 23, 1963 J. T. DORAN 3,098,329

CEMENT FLOOR FINISHING MACHINE

Filed Aug. 19, 1959 3 Sheets-Sheet 3

Fig. 9.



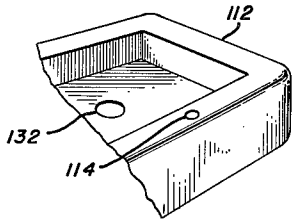


Fig. 10

INVENTOR.
JOHN T. DORAN
BY Patterson, Wright & Patterson
ATTORNEYS

United States Patent Office 3,098,329 Patented July 23, 1963

3,098,329

CEMENT FLOOR FINISHING MACHINE

John T. Doran, 119 Grant Ave., Takoma Park, Md.

Filed Aug. 19, 1959, Ser. No. 834,828
2 Claims. (Cl. 51—177)

This invention relates to abrading machines and more particularly and specifically to a power grinder for smoothing and finishing cement and ceramic floors.

Certain prior machines have been provided for use in grinding and polishing cement floors. However, these prior machines are of such design and construction as to be inherently heavy, awkward and difficult to manipulate and control. These machines have also been very high in initial cost and are high in repair, maintenance and general upkeep costs.

It is therefore a general object of this invention to provide a concrete or cement floor grinding machine which is of such a unique and novel construction as to inherently overcome and eliminate substantially all of the undesirable and disadvantageous characteristics commonly inherent in prior machines designed for like use and purposes.

It is a principal object of this invention to provide a grinding machine for concrete or cement floors which is compact, efficient, easy to manage and control and highly effective in use.

Another object of this invention lies in the provision of a grinding machine for concrete and cement floors which embodies horizontally disposed, counter-rotating abrading elements which balance thrust and torque in the operation of the machine thereby eliminating the unwieldy, awkward and unmanageable characteristics inherent in prior machines of a like purpose.

Further, it is an object of this invention to provide a grinding machine for concrete and cement floors which embodies a unique mounting means for the abrasive elements of the grinder which are detachably connected in such a manner as to be subject to rapid and easy replacement and which are so mounted and located as to give a maximum surface coverage for the size of the blocks or abrasive elements utilized.

Still another and further object of this invention is the provision of a unique and advantageous drive arrangement for operably interconnecting a remote power plate to the abrading elements of the grinding machine so that the components of the machine may be counterbalanced upon the frame of the machine to facilitate ease of control and manipulation.

Yet another object tof this invention is the provision of a novel drive arrangement for a power grinding machine including a unique and useful shock mount within the drive system which has an efficient torque characteristic and which operates to eliminate overload damage to the machine.

A still further object of this invention is the provision, in combination with a floor grinding machine, of a unique and useful storage container for the abrasive elements of the machine which is so designed and located on the machine as to retain the balance and maneuverability of the machine.

Still further and additional objects of this invention will become more readily apparent to those skilled in the art when the following description is read in the light of the accompanying drawings.

The nature of the present invention may be stated in general terms as relating to a grinding machine particularly adapted to finishing concrete or cement floors which consists of a carriage frame, wheels supporting one end of the frame, discs supported horizontally beneath the second end of the frame, abrasive members removably secured to the undersides of said horizontal discs in abrasive contact with the carriage frame supporting surface, a power unit mounted on said frame, and drive means operably interconnecting said power unit and said discs.

Referring now to the accompanying drawings in which like numerals designate similar parts throughout the several views:

FIG. 1 is a side elevation of the novel floor grinder constituting the present invention.

FIG. 2 is an enlarged fragmentary elevation of the grinder in partial vertical section.

FIG. 3 is a top plan view of the grinder with parts broken away in part for clearer illustration.

FIG. 4 is an enlarged vertical section of the shock-mount drive connection for one grinding disc of the novel floor grinder.

FIG. 5 is a plan view in partial section of one disc and drive assembly.

FIG. 6 is a bottom plan view of the novel floor grinder illustrating the mounting means for the abrasive elements.

FIG. 7 is a fragmentary elevation in partial section of the novel storage box.

FIG. 8 is a fragmentary pictorial illustration of the handle attachment for the grinding machine.

FIG. 9 is a view similar to FIG. 6 of a modified form of the machine.

FIG. 10 is a fragmentary pictorial view of a wedge socket.

In the accompanying drawings in which are disclosed illustrative embodiments of the concepts of the present invention, 10 generally designates a grinding machine for use in finishing concrete and cement floors such as that indicated at 12 upon which the grinder 10 is supported. The grinder consists of a carriage frame 14 supported at one end by spaced wheels 16 and at the other end by grinding or abrasive discs generally identified at 18. The carriage frame is provided with a power unit 20, a transmission or gear housing 22 and a storage box 24. A U-shaped handle 26 is provided to facilitate manipulation and control of the grinding machine.

In greater particularity and more specific detail, the carriage frame 14 is formed by a pair of spaced generally L-shaped panels 28 forming the side elements of the carriage and supporting horizontally transverse the stepped segments thereof an upper rear deck platform 30 and a lower forward deck platform 32. The upper rear deck platform 30 supports a power unit 20, illustrated as a typical rotary internal combustion engine, and the output shaft of the engine depends at 34 below the deck platform 30 within the confines of the carriage frame. Below the deck platform 30 the output shaft 34 carries a centrifugal clutch 36 associated with a sheave 38 receiving thereabout an endless drive belt 40.

The lower, forward deck platform 32 is extended transversely of the carriage to overhang the side panels 28. The platform 32 is provided with upstanding walls 42 about the periphery thereof which in turn support a flat top plate 44 which, with the deck platform and walls 42, defines the gear box 22.

The upper surface of top plate 44 is provided with three vertical apertures spaced in triangular arrangement with a bearing block 46 secured to the plate in alignment one above each of the apertures. The underside of the plate 44 is also provided with bearing blocks 48 one beneath each of the apertures, and the bearing blocks 48 are secured upwardly through the plate 44 to interlock with the bearing block 46 thereabove.

The triangulation of the apertures in plate 44 is such that one aperture, and its associated bearing block, is located adjacent the rearward edge of plate 44 on the longitudinal centerline of the grinder carriage. The remaining two apertures are spaced equi-distant from the first aperture forwardly therefrom and toward the side edges

of the plate 44 in an arrangement whereby they are aligned transversely of the grinder carriage.

A drive shaft 50 is rotatably mounted in the bearing blocks 46 and 48 in the rearwardly spaced aperture to extend above and below the plate 44. The upper end of the driving shaft 50 mounts a pulley sheave 52 horizontally thereon which receives in drive engagement the forward loop of the drive belt 40 associated with the centrifugal clutch and sheave of the power unit. Below the plate 44 the drive shaft 50 is provided with a pinion gear 54 which is supported horizontally within the gear box 22.

Each of the forwardly spaced apertures of the plate 44 mount vertically therethrough a driven shaft 56 which extends below the plate 44 to support thereon a driven gear 58 in meshed engagement with the pinion gear 54 on the drive shaft. Each of the driven shafts 56 depends through an aperture below the bottom plate 32 of the gear box and is supported in a bearing block 60 secured to the underside of the plate 32 to provide a stub extension on each shaft depending for a spaced distance below the bearing block. The depending stub extension of each of the driven shafts 56 below the lower bearing block 60 is connected into one of the horizontal discs 18 which support the abrasive elements in contact with the floor to be finished.

The attachment of each of the driven shafts 56 to its respective horizontal disc 18 is best illustrated in FIGS. 4 and 5 of the drawings wherein it is seen that each of the discs is connected to a driven shaft through the medium of a wobble-type shock absorbing coupling. The detailed structure of the connection of each of the discs 18 to its respective driven shaft includes a tube 62 which is telescopically received over the depending stub of the driven shaft and which is provided with a transverse passage 64 through the walls of the tube aligned with a transverse passage 66 bored centrally and transversely through the stub extension. A pin 67 mounted centrally of a U-shaped retainer clip 68 extends through the aligned passages to interlock the tube and the stub extension. Associated with the tube 62 is a pair of circular plates 69 and 70 which are telescoped over the tube with the uppermost plate 69 being securely welded, as at 72, to the outer circumferential wall of the tube. The lower plate 70 is concentrically free of the tube and is supported from the upper plate 69 by means of a series of lock bolts, generally designated 74, spaced thereabout.

As is best seen in FIGS. 4 and 5 of the drawings, the lower end of the tube 62 and shaft 56 extend below the bottom plate 70 to be positioned concentrically within a central opening 75 in the disc 18. A pair of circular collars 76 of rubber or the like are interposed between the upper plate 69 and lower plate 70 in diametrically opposed positions. The plates 69 and 70 are provided with bolt openings aligned with the axes of the collars 76, and disc is provided with an enlarged opening concentrically aligned beneath the axis of each collar 76. A pair of the bolts 74, each consisting of a threaded stem 78 having an elongated, enlarged tubular collar or head 80, is inserted upwardly one through each of the aligned, paired openings in the plates and intermediate collar 76. By this arrangement the tubular head 80 of each bolt is positioned concentrically within the enlarged opening in disc 18 and threaded stem 78 presents an end portion above upper plate 69 for the reception of a lock nut 82 thereon. As the bolts are drawn up by nuts 84 the shoulders 83 defining the tubular heads 80 tightly abut the underside of the lower plate 70 to compress the collars 76 between the plates.

A second pair of resilient collars 76*a* are interposed between lower plate 70 and disc 18 in diametric opposition and at 90° from the first pair of collars 76. The disc and lower plate are provided with aligned openings centrally of the collars 76*a* and the upper plate 69 with concentrically enlarged openings thereabove. A second pair of bolts 74 extend downwardly through these openings to interlock disc 18 and lower plate 70, as described, with the stems 78*a* projecting below disc 18 to receive lock nuts 82*a*, and with the tubular collars 80*a* disposed within the enlarged openings in upper plate 69.

By this foregoing described construction the driven shaft 56 is coupled to the disc 18 through the medium of a flexible arrangement established between the upper and lower plates 69 and 70, and the drive connection between the shaft and the disc permits of torque play by reason of the concentric locations of the collars 80 and 80*a* concentrically within the enlarged openings in the disc 18 and upper plate 69.

The underside of disc 18 is provided in a concentrically balanced arrangement with three brackets 86 adapted to receive and retain rectangular blocks 88 of abrasive material. As best seen in FIG. 6, the brackets 86 are cooperatively formed by means of three generally L-shaped plates 90, the upper leg portions 91 of which are deflected at an intermediate point at a slight angle ot overlie the foot portions 92 thereof. The plates are arranged in such a manner that the angular portions of the upper legs 91 of each cooperatively form an equilateral triangle about the axis of the disc 18 disposing the foot portions 92 of the plates equally spaced about the periphery of the disc with each lying perpendicular to a diameter of the disc. By this arrangement the foot portion 92 of each L-shaped plate cooperates with the angular upper leg portion 91 of an adjacent plate to define a pocket 93 opening in one direction of rotation of the disc with the inside wall thereof inclined so as to reduce the transverse width of the pocket at its inner end.

The rectangular abrasive blocks 88 are mounted on the underside of the disc by insertion of a block into the open end of one of the bracket formed pockets 93 with one face of the block in juxtaposition with the leg portion 91 of the plate forming the bracket. The block is secured by insertion of a wedge member 95 between the opposite face of the block and the inclined wall of the pocket defined by the adjacent plate member. By driving the wedge 95 tightly in place the abrasive block is secured within the pocket and the dimension of the block is such that it will depend below the bottom edge of the plate 90 forming the pocket, as best seen in FIGS. 2 and 8, to permit contact between the block and the floor surface to be finished. It is important to note that the open face of the pocket is disposed in the direction of rotation of the disc so that frictional forces produced upon the bottom surface of the disc are in such a direction as to tend to hold the block against the closed end of the pocket within which it is mounted.,

The storage box 24 is formed by a plate 94 positioned substantially vertically transverse the front end of the flat plate 44 forming the top of the gear box 22. This plate 94 is pivoted throughout the length of its lower edge to the top plate 44 by means of a hinge member 96 in such a manner that the upper edge of the plate may be rotated about the axis of the hinge 96 in an arc above the gear box. The rearward face of plate 94 is provided with a rectangular tray 98 which is welded or otherwise secured to the plate intermediate its height to project rearwardly therefrom in horizontally spaced relationship above the plate 44 and above the sheave 52 mounting the drive belt 40. The tray 98 is of such a configuration as to be adapted to receive and retain a plurality of the rectangular abrasive blocks 88 used in the finishing operation performed by the machine.

A hood or canopy 100 is provided as a cover for the storage box and as an enclosure for the drive elements located above the face of the flat plate 44. The hood or canopy consists of an inverted U-shaped plate which is mounted on horizontal pivots 102 through the sides thereof into the side walls of the tray 98. Thus, the hood or canopy is pivotal about the pins 102, as seen in FIG. 7, to permit a pelican-like opening of the storage box for

access to the tray 98, and at the same time, the tray 98 is generally pivotal with plate 94 about hinge 96, also as shown in dotted line in FIG. 7 of the drawings.

The details of FIG. 8 disclose the manner by which the ends of the U-shaped handlebar element 26 of the machine are secured to the carriage. The ends of the tubular handlebar 26 are inserted through drilled openings 104 in the vertically inclined lip portion 106 at the rear of the top deck 30 of the carriage. The inserted ends of the bars are transversely drilled as at 108 and each receives a threaded bolt 110 through the side panel 28 of the carriage and the drilled opening 108 to be secured by a nut 112 within the inner face of the side panel. This provides a two-point support of the attached end of each handle to the carriage frame.

In operation of the grinding machine it can be seen, particularly in FIGS. 1 and 2, that the wheels 16 support the rear end of the carriage frame beneath the motor in such a manner that the horizontal discs 18 beneath the forward end of the carriage are positioned in parallel spaced relationship above the floor surface to be finished, and whereby the abrasive blocks 88 which are removably secured to the undersides of the discs are located with their bottom surfaces in abrasive contact with the surface 12 to be finished.

Power supplied upon operation of the motor 20 will, through the medium of the centrifugal clutch 36 and drive belt 40 impart driving power to the pinion gear 54 which will uniformly rotate the discs 18 in opposite directions through the medium of the intermediate driven gears 58. The opposed counter-rotation of the abrasive block supporting discs 18 will balance the thrust forces created between the abrasive blocks and the floor surface enabling the easy control and handling of the machine.

It is further important to recognize the substantial advantages which are provided by the flexible torque coupling interconnecting each driven shaft with its associated disc 18. The flexibility of the torque drive arrangement serves to prevent overloading and damage to the machine where the load on one abrasive disc exceeds that on the other. At the same time, the flexible wobble structure incorporated in the flexible coupling readily permits either of the abrasive discs to adapt independently to uneven and irregular floor surfaces encountered in finish operations.

FIG. 9 discloses a modification of the grinder apparatus hereinbefore described wherein the discs 18 of the earlier form are replaced by the generally triangular plates 110, each of which carries integrally therewith, as by a cast or molded unit, three wedge sockets 112 for support of abrading blocks 88 as above described. The central portion of each plate 110 is secured to one of the driven shafts of the grinder transmission through a flexible coupling element of the same type and in the same manner as hereinbefore described relative to the attachment of discs 18.

The diameter of the circle described by rotation of each of the triangulated plates 110 is greater than the diameter of a disc 18 as earlier described. Thus, the apex portions of the two adjacent plates 110 mounted on the spaced, parallel driven shafts of the grinder overlap one another in counter-rotation. By setting the triangulated plates in proper offset relationship the common gear drive for both driven shafts will synchronize the overlapped rotation of the triangular plates preventing contact or engagement of the apex portions of one with the apex portions of the other. Accordingly, with overlapping paths of rotation it is seen that the triangulated, counter-rotating plates 110 will give full coverage of floor surface between the remote, peripheral edges of the paths of rotation of the two plates. It is also apparent from this modified form that the abrading blocks 88 are secured by wedges 95 in the sockets on the triangulated plates in the same manner as above described relative to the circular discs 18.

In FIG. 11 of the drawings it is seen that the side wall of each socket is provided with a passage or pocket 114 opening through the lower face of the wall. These pockets are preferably tapered in depth (not shown) and are adapted to telescopically receive and frictionally retain a marking member, such as crayon or chalk, in dependency below the triangulated plate on which the wedge socket is formed. The length of the depending marking member is fixed so as to bring it into contact with the floor surface when the grinding surface of an abrasive block 88 secured in the socket is worn down to a predetermined degree. This structure functions to signal the operator of the machine prior to the abrasive elements wearing down sufficiently to permit the walls of the wedge socket to be brought into contact with the floor surface.

An additional and advantageous feature of the grinder apparatus herein disclosed resides in the provision of knock-out holes, designated 132 in the discs 18 and plates 110. These holes are located one above each wedge socket centrally over the blocks 88 when they are secured in the sockets by wedges 95 and permit them to be knocked-out of the sockets from above the disc or plate.

Thus, having described and explained the structure and function of the present invention and the advantageous results obtained through its use, what is desired to be claimed is:

1. In a floor grinding machine including a driven rotary shaft and an abrasive supporting disc, a flexible drive coupling between said shaft and said disc comprising, a tubular sleeve telescoped over and secured rigidly to said shaft, a plate centraly telescoped over and secured rigidly to said sleeve, a second plate loosely telescoped over said sleeve, resilient collars interposed between said plates in diametrically opposed pairs, fastener elements interconnecting said spaced plates, and said fasteners projecting to loosely engage in depressions in said abrasive supporting disc.

2. In a floor grinding machine including a driven rotary shaft and an abrasive supporting disc, a flexible drive coupling between said shaft and said disc comprising, a rigid tubular sleeve telescopically engaged over and secured to said rotary shaft, a rigid ring plate secured annularly about said shaft, a second rigid ring plate telescoped loosely about said rotary shaft and spaced from said first-named ring plate, resilient collars interposed between said plates in diametrically opposed pairs, bolts interconnecting said plates projecting through said spaced collars, said bolts having end extensions thereon, and said abrasive supporting disc being loosely telescopically positioned relative to said sleeve and having loose engagement with the projected ends of said bolts.

References Cited in the file of this patent

UNITED STATES PATENTS

1,223,359	Berg	Apr. 24, 1917
1,230,842	Berg	June 26, 1917
1,438,283	Wolfe	Dec. 12, 1922
1,468,432	Wright et al.	Sept. 18, 1923
1,832,267	Toffolo et al.	Nov. 17, 1931
1,901,681	Vicenzi	Mar. 14, 1933
2,106,033	Mall	Jan. 18, 1938
2,171,060	De Spirt	Aug. 29, 1939
2,793,476	Lombardo	May 28, 1957
2,923,107	Biasoni	Feb. 2, 1960

FOREIGN PATENTS

454,896	Italy	Feb. 7, 1950