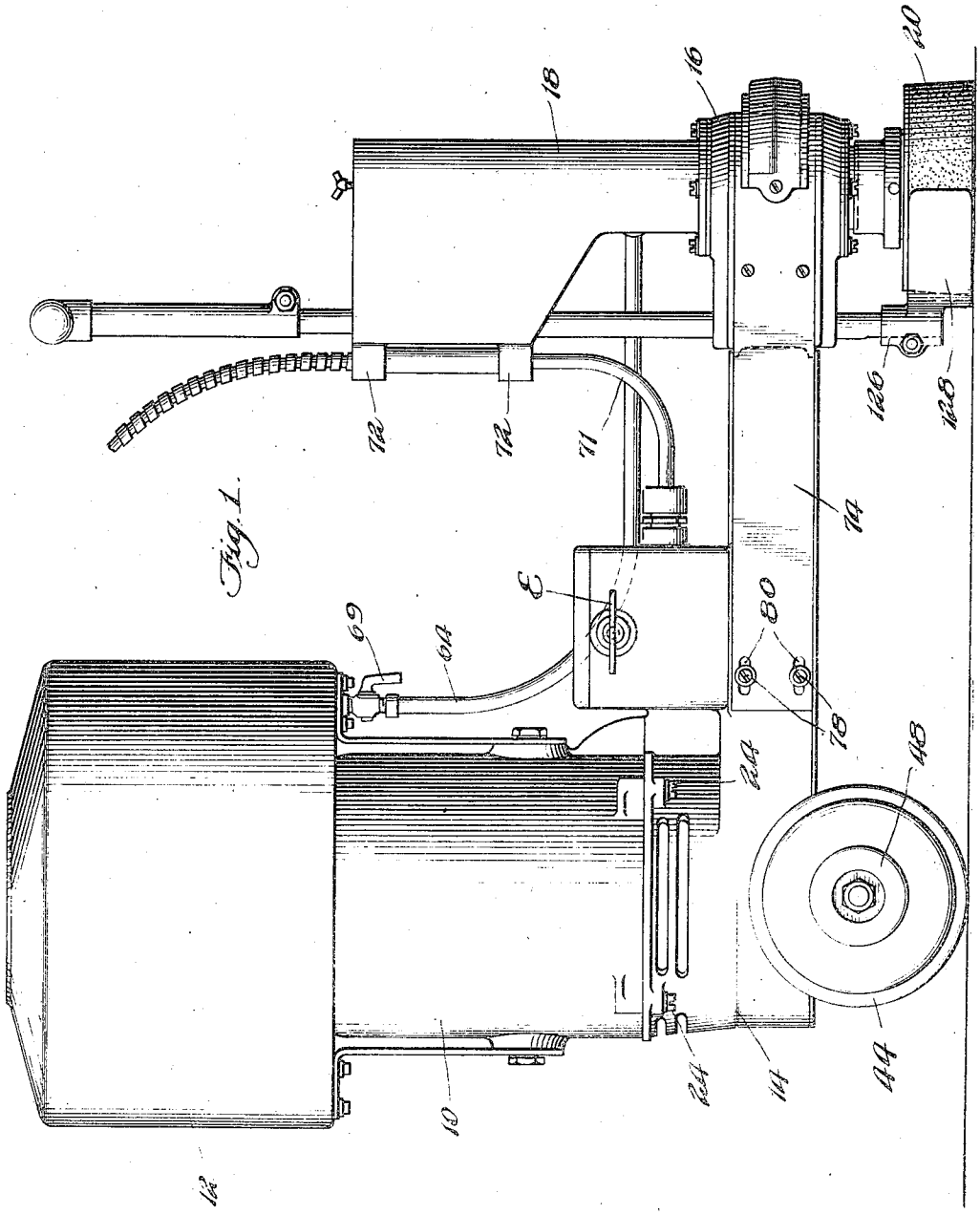
Jan. 18, 1938. A. W. MALL 2,106,033

TERRAZZO GRINDING APPARATUS

Filed Aug. 25, 1936 4 Sheets-Sheet 1



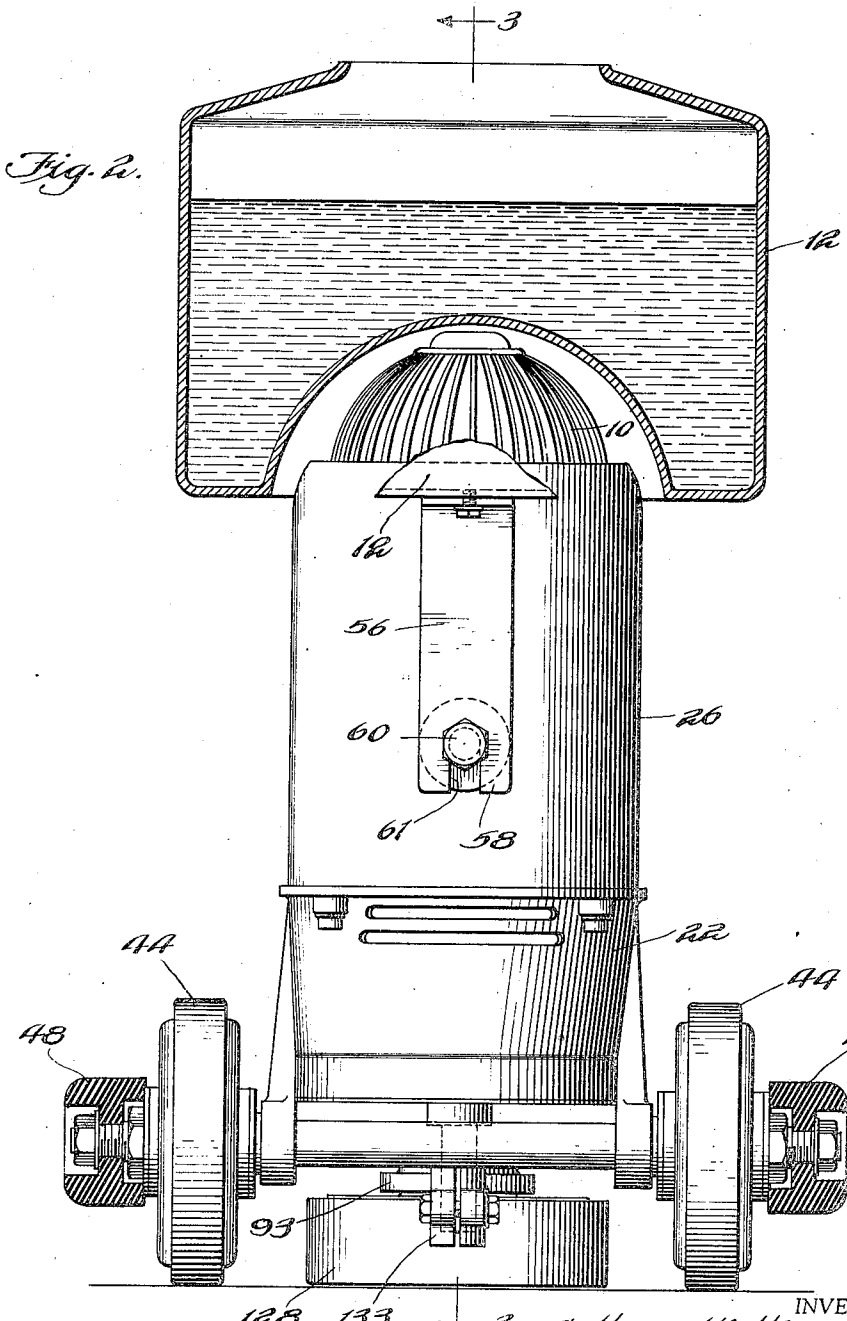
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TERRAZZO GRINDING APPARATUS

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Fig. 2.



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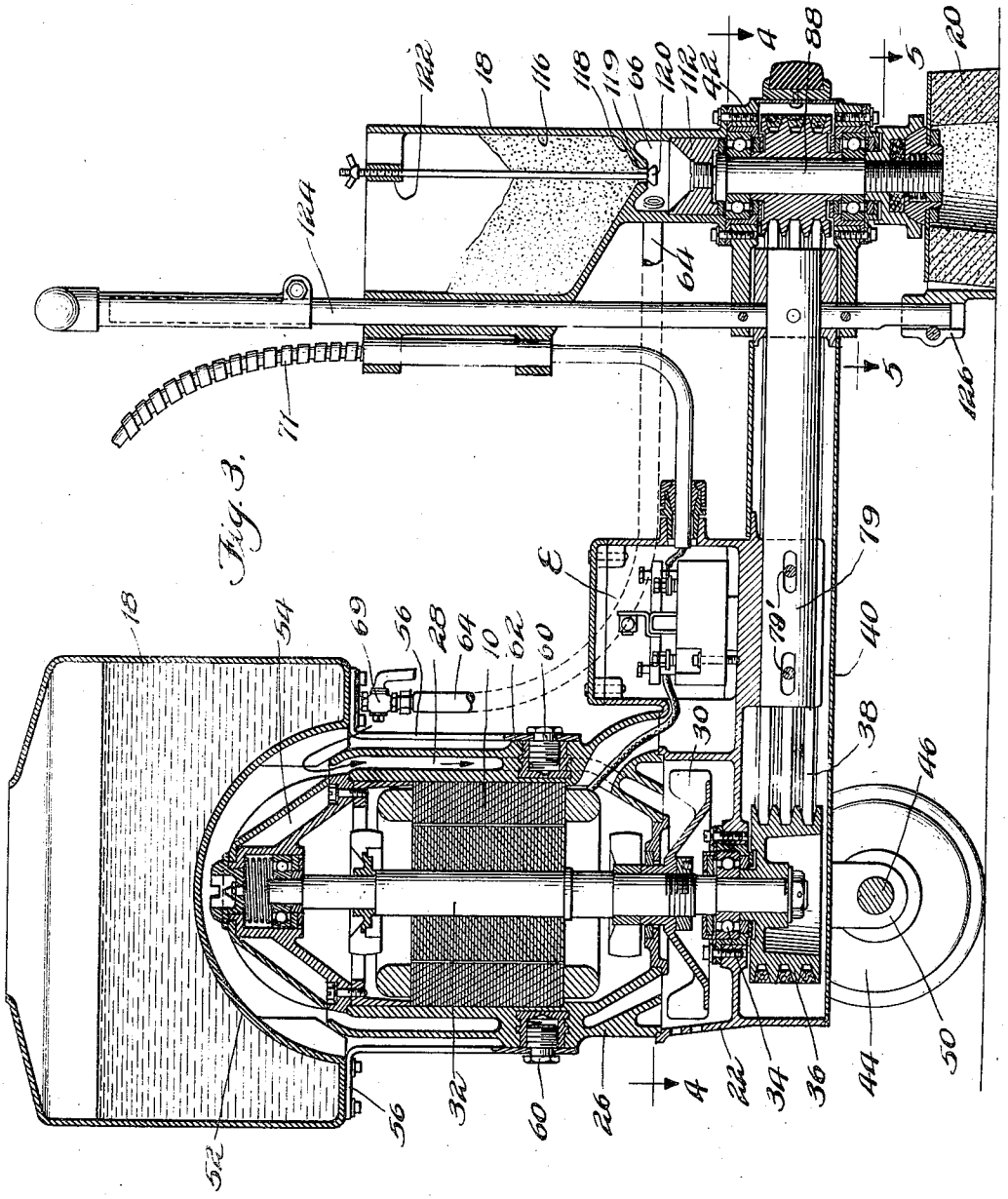


Fig. 3.

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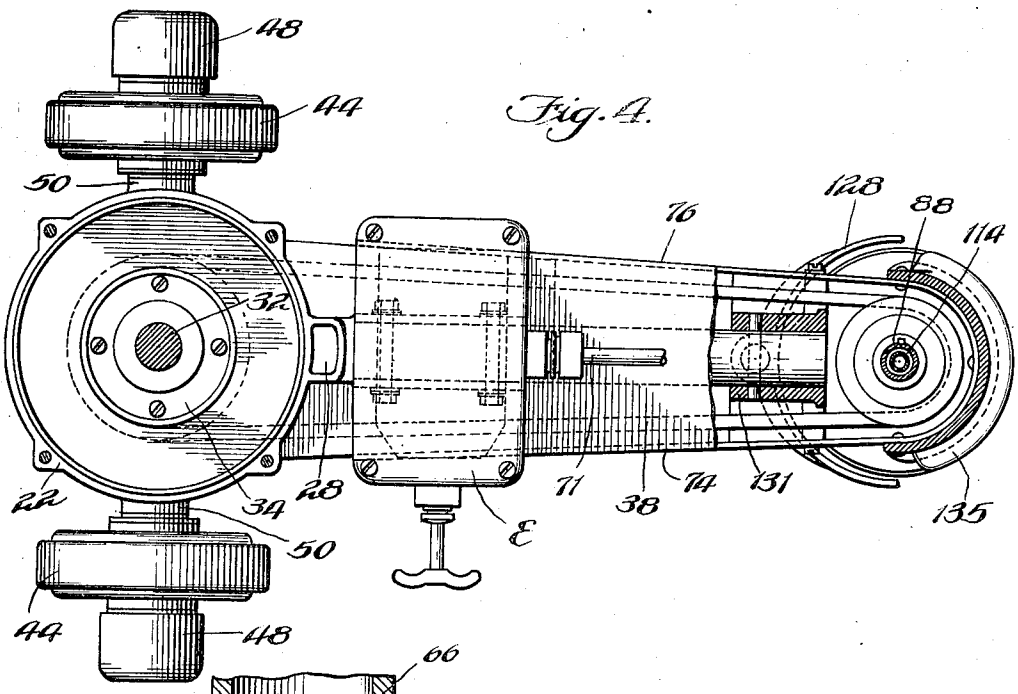


Fig. 4.

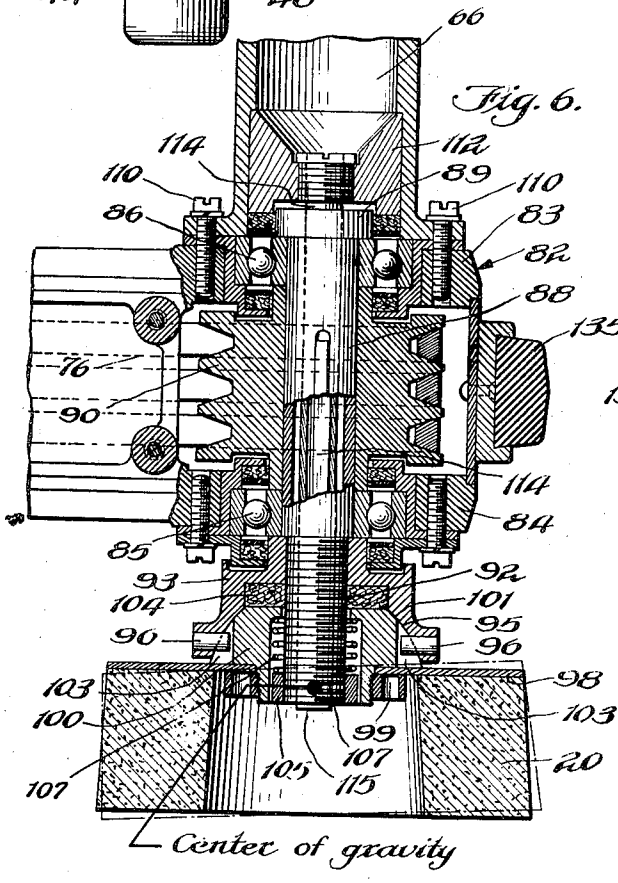


Fig. 6.

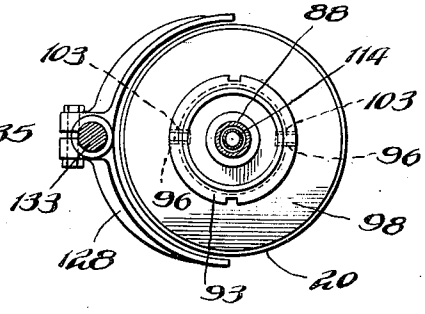


Fig. 5.

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UNITED STATES PATENT OFFICE

2,106,033

TERRAZZO GRINDING APPARATUS

Arthur William Mall, Chicago, Ill.

Application August 25, 1936, Serial No. 97,781

10 Claims. (Cl. 51—177)

My invention relates to improvements in apparatus for grinding terrazzo floors and like devices.

My invention relates more particularly to certain fundamental improvements in machines of this type adapted to simplify and reduce the cost of construction of the same, particularly in machines wherein the head which supports the grinding wheel rests of its own weight on the floor to be ground.

The principal object of the present invention is to provide an improved grinding, scrubbing or polishing device.

A further object of the invention is to provide an improved grinding, scrubbing or polishing machine capable of operating at a greatly increased rate of speed and in a cheaper, more economical manner than devices of the prior art.

A further object is to provide an improved machine of the type described having a vertical motor adapted to be rigidly mounted upon a horizontal wheeled frame and connected by a direct drive to the grinding wheel.

A further object is to provide a machine of the class described having improved structure for supplying sand and water to the grinding wheel, which structure is so arranged and positioned on the machine that the same can easily be removed without interfering in any other way with the operation or the assembly of the machine.

A further object of the present invention is to provide in a device of the type described an improved universally tiltable grinding head having a low center of gravity, thereby materially decreasing the travel of vibrations to any other parts of the machine.

A further object is to provide improved bumper means associated with the support for the grinding wheel.

A further object is to provide an improved sand and water supply and a mixing chamber wherein both the amount of water and the amount of sand or other abrasive feed to the grinding wheel may be exactly regulated.

A further object is to provide in a machine of the class described an improved vertical motor and a simplified and direct flexible drive between the motor and the driven spindle of the grinding wheel.

A further object is to provide an improved construction of motor of the type required for terrazzo grinding machines capable of operation at high speed and so constructed that the same is easily and quickly cooled during operation.

Other objects and advantages will be more apparent from the following description wherein reference is had to the accompanying four sheets of drawings upon which:

Fig. 1 is a side elevational view of my improved grinding machine;

Fig. 2 is a rear elevational view thereof with parts broken away in section to more clearly show other parts;

Fig. 3 is a vertical sectional view taken generally on the line 3—3 of Fig. 2;

Fig. 4 is a horizontal sectional view taken generally on the line 4—4 of Fig. 3;

Fig. 5 is a fragmentary plan sectional view taken generally on the line 5—5 of Fig. 3; and

Fig. 6 is an enlarged vertical sectional view through the driving head and grinding wheel.

Referring generally to Fig. 1, the apparatus comprises generally a motor 10 with a water reservoir 12 mounted thereabove, a horizontal frame 14 upon which the motor is mounted, a grinding head 16 secured to the end of the horizontal frame 14, a sand hopper 18 mounted above the grinding head, and a grinding wheel 20.

The motor 10 is vertically positioned upon the upper edge of an upright portion 22 of the frame 14, being secured by suitable bolt members 24 which extend through suitable flanges in the motor housing 26. The motor 10 may be of a special type of heavy duty motor that is vapor and dust proof. In the embodiment which is shown on the drawings, I provide a three horse power motor which normally operates at approximately 3500 R. P. M.

I provide a plurality of air ducts or passageways 28 in the motor housing so that the same is capable of being air cooled. This action is assisted by a fan 30 mounted on the motor shaft 32 below the bottom of the motor housing 26. I provide a suitable ballbearing mounting 34 in the housing 22 and secure a pulley 36 to the lower end of the motor shaft 32. In the embodiment illustrated, I have shown a pulley that accommodates three V-belts 38, but it will be understood that more or less may be employed depending upon the nature of the work to be done by the machine.

The frame 22 is provided with a lower cover plate 40 which extends to the forward end of the machine where the drive head 42 is located. The frame is adapted to be mounted upon a pair of wheels 44 positioned upon an axle 46 which extends transversely of the machine. Each of the ends of the axle are covered with rubber bumper members 48 to insure against marring or scratching the walls of the building. The axle 46 is

mounted in suitable bearings 50 adapted to be formed integral with the frame 22.

The water tank 18 previously mentioned, is formed with a hemispherical depression 52 which is adapted to enclose the upper end 54 of the motor. The tank is mounted upon a pair of L-shaped brackets 56 which extend downwardly and are provided with the forked end 58. At this point they engage a pair of set screws 60 which pass through the slots 61 and are mounted in screw-threaded plugs 62 in the motor housing 26.

I provide a water conduit 64 which extends from the forward end of the reservoir 12 to a lower chamber 66 in the sand hopper 18. A suitable valve 69 is mounted beneath the reservoir 12 for regulating the flow of water from the tank to the sand hopper.

The horizontal frame 22 may extend forward as shown and provide a support for the electric switch E and associated mechanism. It will be noted that the conduit 71 which extends from the switch is carried upward through a pair of bearings 72 on the rear of the sand hopper 18 and supported thereby. The conduit may extend from this point in a flexible cover to any suitable source of electrical energy.

The frame 14 may be provided at its forward end with a pair of side members 74 and 76 secured thereby by bolt members 78 which pass through elongated slots 80 to permit of a slight lateral adjustment. This may be desired in connection with the adjustment for the V-belts 38.

To adjust the same, the rod 79 may be secured to the motor support frame by bolts 79' which pass through elongated openings in the rod. Thus by loosening bolts 78 and bolts 79' the spindle housing may be moved slightly away or closer to the motor, and this is done whenever there is too much slack in the bolts 38. The frame side members 74 and 76 carry the spindle housing 82 at their forward end. The spindle housing may be constructed of a pair of upper and lower members 83 and 84 within which a pair of ballbearing units 85 and 86 are adapted to be mounted. The ballbearings described may support a hollow spindle member 88 which is formed with a collar 89 at its upper end.

The spindle 88 may have keyed thereto a pulley member 90, similar to the pulley 36 secured on the end of the motor shaft 32, and may have the V-belts 38 geared thereon to provide a drive from the motor shaft. As thus described, a direct flexible drive is secured from the motor to the hollow spindle 88. The lower end of spindle 88 may be screw-threaded, as shown at 92, and have secured thereto a driving member 93. The member 93 is formed with a hemispherically shaped socket 95 and carries a pair of horizontally disposed pin members 96 which project into the socket.

The grinding wheel 20 is formed in the usual manner with a plate member 98 on its upper surface and is secured by means of a nut 99 to a drive nut 100. The drive nut 100 is formed with an arcuately shaped head portion 101 to coincide with the socket 95 and also with a pair of slots 103 within which the pins 96 may be positioned. A suitable grease retainer 104 is provided for lubricating the associated parts.

The drive nut 100 is adapted to be held in driving position by a nut member 105 secured to the screw-threaded portion 92 of the spindle. To provide a yielding and partial oscillating effect, a spring member 107 is interposed between the nut 105 and a shoulder of the drive nut 100. In this manner (see Fig. 6) it can be seen that the grinding wheel 20 is free to oscillate slightly and in effect have a universal tilting motion.

The upper end of spindle member 16 provides a base for the sand hopper 18 which is secured thereto by suitable cap screws 110. A sand and water mixing chamber 112 is positioned in the chamber 66 directly above the end of the hollow spindle 88. The mixing chamber is provided with a hollow tube member 114 which extends downwardly through the spindle 88 through a point 115 directly below the lower end thereof. The sand hopper contains a chamber 116 formed with sloping walls 118 and an outlet 119 directly above the mixing chamber 112. I provide a sand flow regulator 120 in the outlet 119 that is capable of adjustment in a suitable bearing 122 located at the upper end of the sand hopper.

A suitable handle 124 is adapted to be mounted adjacent the grinding wheel 20 at the front of the machine and extends downwardly to and seats in a suitable bearing 126 in the forward end 131 of frame 14. A stub shaft 133 extends downwardly from the frame and supports the shield member 128 which partially surrounds the grinding wheel 20. The usual bumper 135, formed of rubber or other desirable material may be secured to the forward end of frames 74 and 76.

With the construction as thus far described, it will be obvious that a comparatively simple and highly efficient grinding machine has been provided. Due to the direct drive and elimination of attendant bearings and intricate lubrication problems that have confronted designers in the past, it will be apparent that a highly simplified machine has been provided.

By the provision of the universally tiltable grinding head as shown, it will be obvious that many of the problems of the past due to vibration and difficulty of keeping the grinding head flat on the surface to be ground is largely eliminated.

By pivotally mounting the grinding wheel as shown with the center of gravity at the low point provided, at the center of the radius of the ball and socket bearing, the tendency of the grinding wheel to chatter to throw off or get an uneven or rough rotation is eliminated. This construction makes speeds of 6000 R. P. M. or even higher possible in machines of this type.

The apparatus which I have described can be used for cleaning floors by the use of sand or other sharp cutting material, water, oil or other compound, and a grinding wheel made of wood or cast iron or steel, sand paper, fibre brush, fabric brush, or any other may be employed. The device may be used on concrete floors for removing hard greases which form, especially in factories such as automobile plants. By the use of sand or a cast scroll wheel varnish may be removed from wooden floors. It will be obvious that the sand will prevent the sand paper from filling up when the machine is used for this purpose.

The machine may also be employed as a power grouting labor saving device by placing cement in the sand hopper and allowing a small flow of water to run through the center tube with the cement to form a paste. The cutting of the abrasive wheel is stopped by the paste which fills the pores of the grinding wheel surface. After this has been done and the small air holes in the floor surface have been filled with the cement paste, the floor surface is reground with a fine abrasive wheel to provide a smooth, dense surface.

From the above and foregoing description it will be apparent to those skilled in the art that many uses may be found for the mechanism by the simple changing of the grinding heads as described. It will also be apparent that changes and modifications may be made in the exact details shown, and I do not wish to limit myself in any particular; rather, what I desire to secure and protect by Letters Patent of the United States is:

1. The combination of a vertically disposed motor, a shaft extending below the bottom thereof, a water reservoir above said motor, a pulley secured to said shaft, a horizontal frame for supporting said motor, a vertical spindle housing at one end of said frame, a hollow vertical spindle therein, a horizontally disposed grinding wheel at the lower end of said spindle, a sand hopper mounted on said housing, a pulley on said spindle, a flexible belt member between said pulley and said motor pulley, and conduits for supplying a mixture of water and sand to said grinding wheel extended through said spindle.

2. A grinding, scrubbing or polishing machine comprising a horizontally disposed frame, a wheeled support for one end of said frame, a vertically disposed motor mounted on said frame over said wheeled support, a water tank mounted above said motor, a drive shaft extending below said motor, a driving pulley thereon, a hollow vertical spindle mounted in the extended end of said frame, a driven pulley thereon, a continuous belt geared to said pulleys, a universally mounted vertically disposed face grinding wheel secured to the lower end of said spindle and a conduit from said tank to said grinding wheel extending through said spindle.

3. A grinding, scrubbing or polishing machine comprising a horizontally disposed frame, a wheeled support for one end of said frame, a vertically disposed motor mounted on said frame over said wheeled support, a water tank mounted above and enclosing the upper end of said motor, a drive shaft extending below said motor, a driving pulley thereon, a hollow vertical spindle mounted in the extended end of said frame, a driven pulley thereon, a sand hopper mounted thereabove, flexible drive means between said pulleys, a universally mounted vertically disposed face grinding wheel secured to the lower end of said spindle and a conduit from said tank and said sand hopper through said hollow vertical spindle to said grinding wheel whereby a mixture of the same is fed to said grinding wheel.

4. A grinding, scrubbing or polishing machine comprising a horizontally disposed frame, a wheeled support for one end of said frame, a vertically disposed motor mounted on said frame over said wheeled support, a water tank mounted above and enclosing the upper end of said motor, a drive shaft extending below said motor, a driving pulley thereon, a hollow vertical spindle mounted in the extended end of said frame, a driven pulley thereon, a sand hopper mounted thereabove and communicating with said hollow spindle, drive means comprising a continuous belt between said pulleys, a universally mounted vertically disposed face grinding wheel secured to the lower end of said spindle and a conduit from said tank to said sand hopper whereby a mixture of sand and water is fed to said grinding wheel.

5. The combination in a terrazzo grinding machine of a wheeled supporting frame, a vertically positioned motor mounted thereon, a water reservoir positioned on said motor, a drive shaft extended below said motor, a hollow vertical spindle mounted in said frame at its extended end, a driving pulley on said shaft and a driven pulley on said spindle, flexible drive means geared about said pulleys, means for adjusting the distance between said spindle and said motor, a housing for supporting said spindle, a universally tiltable grinding wheel secured to the lower end of said spindle and a water conduit extending from said reservoir through said spindle to the interior of said grinding wheel.

6. The combination in a terrazzo grinding machine of a wheeled supporting frame, a vertically positioned motor fixedly mounted thereon, a water reservoir positioned on said motor and enclosing the upper end of the same, a motor shaft extended below said motor, a hollow vertical spindle mounted in said frame at its extended end, a sand hopper secured above the same and in communication therewith, a driving pulley on said shaft and a driven pulley on said spindle, flexible drive means geared about said pulleys, a housing for supporting said spindle, a universally tiltable grinding wheel secured to the lower end of said spindle and a water conduit extending from said reservoir to said sand hopper whereby sand and water is fed through said spindle to the interior of said grinding wheel.

7. The combination in a grinding machine of the type described of a vertically disposed motor, a water reservoir positioned thereon, a wheeled support for said motor, a vertical housing at one end of said support, a pair of chambers formed in said housing, one of said chambers adapted to hold sand and the other adapted to be a mixing chamber, a conduit from said water reservoir to said mixing chamber, a hollow vertical spindle mounted in said housing below said mixing chamber, a face grinding wheel secured to the lower end of said spindle, drive means between said motor and said spindle, and a conduit from said mixing chamber to the center of said grinding wheel.

8. In apparatus of the class described, a vertically mounted face grinder comprising a head member, ballbearing supports therein, a vertical spindle journalled in said supports, means for rotating said spindle secured thereto between said ballbearing supports, a driving member screw-threadedly mounted on the lower end of said spindle, said driving member having a downwardly disposed hemispherically-shaped socket, a grinding wheel, a drive nut secured to the upper end thereof, said drive nut having an axial opening therethrough through which said vertical spindle extends, a nut secured to the lower end of said spindle and a spring member disposed between said nut and said drive nut preventing the removal of said grinding wheel from said spindle, said drive nut having a shape complementary to the socket in said drive member.

9. In apparatus of the class described, the combination of a vertical spindle, means for rotating said spindle, a driving member screw-threadedly mounted on the lower end of said spindle, said driving member having a downwardly disposed hemispherically-shaped socket, a grinding wheel, a drive nut secured to the upper end thereof, said drive nut having an axial opening therethrough through which said vertical spindle extends, a nut secured to the lower end of said spindle and a spring member disposed between said nut and said drive nut preventing the removal of said grinding wheel from said spindle,

said drive nut having a shape complementary to the socket in said drive member.

10. In apparatus of the class described, the combination of a vertical spindle, means for rotating said spindle, a driving member screw-threadedly mounted on the lower end of said spindle, said driving member having a downwardly disposed hemispherically-shaped socket, a grinding wheel, a drive nut secured to the upper end thereof, said drive nut having an axial opening therethrough through which said vertical spindle extends, a nut secured to the lower end of said spindle, a spring member disposed between said nut and said drive nut preventing the removal of said grinding wheel from said spindle, said drive nut having a shape complementary to the socket in said drive member, and a sand and water conduit extending downwardly through said spindle, drive member, drive nut and grinding wheel.

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