

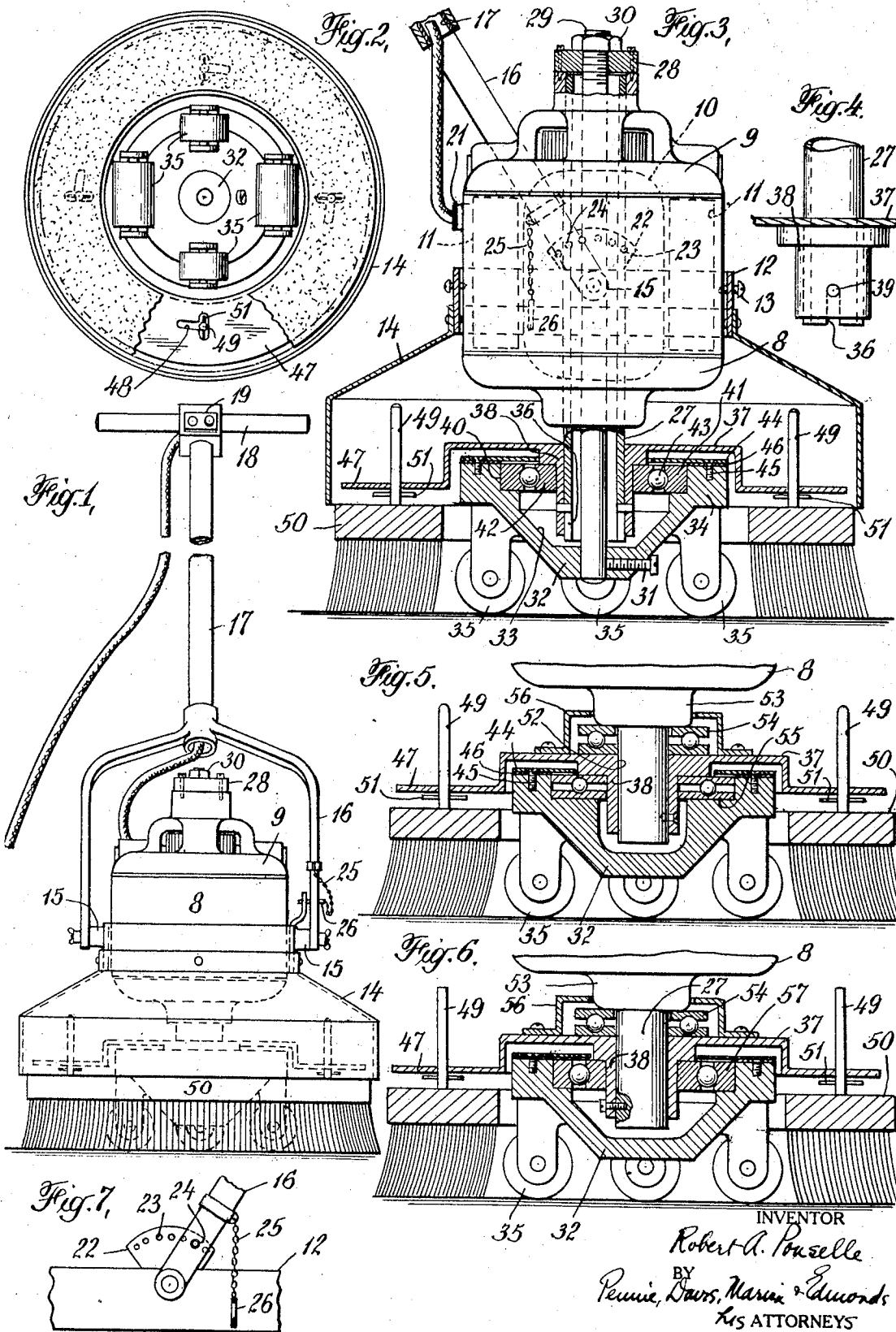
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FLOOR MACHINE

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FLOOR MACHINE.

REISSUED

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This invention relates to machines for treating floors and the object of the invention is to provide a device by which the floor may be scrubbed, polished, waxed, re-finished, or otherwise treated by means of power driven tools. Floors of hard wood, tile, and the like, such as are in extensive use in public buildings, hotels, auditoriums, and also in private homes, require considerable attention, and to keep these floors clean and polished manually is a laborious and expensive operation. To save this manual labor machines of various types have been devised in which there is provided a driving means such as a motor which is used to actuate a tool which may take the form of a revolving brush or buffer. By the use of such a machine a single operator may scrub, clean, or otherwise treat a floor area which would ordinarily require many workmen using hand tools.

In the machines for treating floors as heretofore constructed, it has been customary to employ an electric motor mounted on a base, and the tool which is driven by the motor, usually through reduction gearing, is so placed that when the machine is in use the weight of the entire mechanism rests directly on the tool. In these machines a wheel carriage is also provided which may be raised from the floor when the machine is in actual operation. In such a machine the operator makes use of the rotation of the tool in order to cause the machine to travel, tilting the machine to one side or the other so that only one edge of the tool will bear against the floor. In order to control the movements of the machine so that it will do no damage to the walls, considerable skill and muscular effort is required, and the cost of the machines is increased by reason of the necessity of providing the reduction gearing.

The object of the present invention, now to be described, is to provide a floor machine in which the motor and its associated parts are carried on a movable support which bears on the floor at all times. This support is located within the effective area of the tool which is driven directly from the motor, and since the carriage lies within this effective area some portion of the tool will always act on the floor after the carriage has passed over it, thus eliminating any wheel marks. By constructing a machine which includes a carriage of the type

above referred to, it is possible to use a directly connected tool and to reduce the weight and cost of the machine. Also, such a machine may be readily used by an unskilled operator since it is easily controlled and may be moved over the floor without depending on the rotation of the tool for such movement.

In order to attain the desired objects, I construct the machine with its motor preferably in the vertical position. Mounted on the lower end of the motor shaft is a disc or plate near the periphery of which are several apertures. The tool which may be in the form of a brush, a felt buffer, or the like, is annular in form and provided with pins which pass through the apertures in the disc. The tool is free to move up and down, relative to the disc, while the driving connection is maintained. Consequently the tool will always bear against the floor, regardless of any irregularities in the floor surface and regardless also of the length of the bristles or the thickness of the felt. The motor and its associated parts are supported on a wheeled truck or carriage which bears on the floor within the effective area of the tool, extending through the center of the annulus. This truck is attached to the end of a rod which passes through the motor shaft which is made hollow for the purpose, and at its upper end the rod is secured in a block which is attached to the motor casing. Also, at the lower end of the shaft there is provided a bearing which keeps the carriage properly spaced with relation to the shaft, and which also permits the rotation of the disc or plate while the carriage remains stationary. In another form of construction the motor shaft is made solid and is provided with thrust bearings by which the weight of the motor is transmitted to the carriage. These bearings are placed above and below the driving disc so that the latter may be secured to the shaft and driven by it without transmitting motion to the carriage. In another similar construction there is used a combination of ball and thrust bearings with a solid shaft, as before.

With either of the constructions above briefly described it will be seen that the tool is driven directly from the motor at the motor speed. This tool bears lightly on the floor under its own weight and is free to move up and down in accordance with irregularities in the floor surface, and also in

accordance with the length of the bristles or the thickness of the felt. The movable support carries all the weight of the device except the tool and bears on the floor at a place within the effective area of the tool. Consequently as the machine is moved any possibility of wheel tracks is obviated. Also, since the weight of the motor and its associated parts is carried on a wheeled support the machine may be moved about without undue exertion, and may be constructed of parts which are light in weight so that the machine may be readily carried from floor to floor.

The embodiment of the invention which is now preferred is illustrated in the accompanying drawings, in which

Fig. 1 is a rear elevational view of the device, showing in dotted lines the parts ordinarily covered by the protective cover,

Fig. 2 is a bottom plan view of the device showing a part of the operating surface of the tool broken away,

Fig. 3 is a view in side elevation of the complete device with the parts shown in section,

Fig. 4 is a view in detail of the end of the motor shaft,

Fig. 5 is a detailed cross-sectional view of a modified form of support,

Fig. 6 is a view similar to Fig. 5, showing another support, and

Fig. 7 is a view of a detail of the handle mounting.

In these drawings, the machine is seen to be provided with motor 8 having the usual casing 9 within which are located the armature 10 and poles 11, illustrated in dotted lines in Fig. 3. A ring-like casting 12 fits over the lower end of the casing and is secured in place thereon by means of a series of set screws 13 which enter small depressions made in the surface of the casing. Riveted to the lower end of this casting is a bell-like guard 14 which partially encloses the support and the tool. On either side this casting is provided with bosses 15 on which are swiveled the ends of a fork 16, carrying the handle 17. The handle is provided at its upper end with a cross bar 18 and a switch 19, and a motor cable enters the switch and passes downwardly through the hollow handle 17 and is thence led to the motor terminals through bushings 21. The casting 12 is preferably mounted as near the lower end of the motor as possible so that the handle will be secured at or near the center of gravity of the device. As the handle is freely swiveled on the machine it can be swung on its pivots without tending to tilt the machine, but in some instances it is desirable to hold the handle rigidly in place relative to the motor, as for instance, when the machine is being moved over a door sill. For this purpose the casting 12 is

provided with an up-standing lug 22 which is provided with apertures 23, designed to register with another aperture 24 in one of the arms of the fork 16, and mounted on this fork by a chain 25 is a pin 26 which may be inserted in the registering apertures so as to hold the handle fast in position.

As is shown in Fig. 3 the shaft 27 of the motor is made hollow and it extends a considerable distance beyond the lower end of the motor casing. At its upper end the casing is provided with a block 28 which may be secured rigidly in place by screws and into which is threaded a rod 29, with a nut 30 on its outer end. This rod extends downwardly through the shaft 27 and at its lower end is secured by a set screw 31 in the bed plate 32 of the movable support, which is in the form of a 4-wheel truck. This bed plate has a depressed center as at 33, and a rim 34. The rollers or wheels 35 are secured in any convenient manner to the rim 34. The shaft 27 has a pair of slots 36, (see Fig. 4) extending inwardly from its lower end, and a plate 37 provided with an integral sleeve 38 fits over the end of this shaft with pins 39 mounted in the sleeve extending into the slots 36 so that when the plate is in the position illustrated in Fig. 3 it is driven directly by the shaft.

The plate 37 is supported in the position shown in Fig. 3 by means of the carriage 32. For this purpose the carriage is channeled as at 40, along the inner face of its rim, and mounted in this channel is the outer race 41 of a ball bearing, the inner race 42 being secured to the sleeve 38. Between these races runs a plurality of balls 43 so that with this arrangement the ball bearing also serves as a thrust bearing and the race 42 which lies against the shoulder formed in the sleeve serves to hold the plate 37 with its pins 39 in the notches 36. The ball bearing, therefore, serves the further function of supporting the motor shaft and its armature, and the motor shaft is free to drive the plate 37 without tending to cause rotation of the support. In order to protect these parts there is provided an annular plate 44 secured by screws 45 to the upper face of the bed plate or support and this plate is mounted over a spacer plate 46 which serves to provide the necessary clearance so that the plate will not bear against the race 42.

The plate 37 may either be flat or may be given the off-set rim 47 as illustrated, the latter form permitting the machine to be made more compact. The off-set rim is provided with a series of T-shaped apertures 48 shown more clearly in Fig. 2, and extending upwardly through these apertures are pins 49, bolted or otherwise secured in the plate 50 of the tool, here illustrated as a brush. These pins 49 are provided

with cross-pins 51 which are of such size as to pass through the heads of the apertures as shown in Fig. 2. When the tool is to be moved into the operating position illustrated in Fig. 3, the brush will be moved slightly so that the cross-pins 51 may pass through the heads of the apertures, in which case the tool has a driving connection with the plate by reason of the main pins 49, but, as will be seen, the tool also has a limited freedom of movement toward and away from the floor while this driving connection is maintained. In operative position the tool rests on the floor simply of its own weight, and does not serve as a support. When the machine is to be moved about from one room to another it is desirable to support the tool out of contact with the floor, and for this purpose the tool will be moved so that the cross pins are opposite the heads of the apertures, then pushed upwardly and given a slight rotation so that the cross-pins bear on the upper surface of the plate 37 so as to hold the tool above the floor.

With the construction shown, it will be seen that the entire weight of the machine is supported on the wheels or rollers 35, here illustrated as being four in number, and the machine may be readily moved from place to place while the tool is rotating at a high rate of speed. The tool is driven at motor speed and moves up and down slightly, according to the irregularities of the floor surface. In the case of a brush, it will be understood that the high speed of rotation given it causes the bristles to be drawn outwardly and this causes the plate of the brush to move down toward the floor surface. Such a movement is permitted with the driving connection shown. Furthermore, since the support bears on the floor within the effective area of the brush, any tracks which may be left by the wheels will be eliminated by the brush because no matter which way the machine is moved there is always some portion of the brush which acts on the floor after the wheels have passed over it. The machine, by reason of the manner in which the weight is carried, is easily controlled and may be operated with little exertion.

In Fig. 5 there is illustrated a slightly modified form of construction, in which there is used a solid motor shaft 52. Secured by set screws on the lower end of this shaft is a plate 37, as before, by means of which the tool 50 is driven. Interposed between the upper surface of the plate 37 and the end 53 of the motor casing, is a thrust bearing, designated generally as 54, and below the lower surface of the plate 37 and the rim of the movable support is another thrust bearing designated as 55. These thrust bearings permit the weight of the

motor to be transmitted through the plate to the support while the plate is rotating, and without causing any rotation of the support. In this construction it is preferable to provide the plate 37 with a guard casing 56 which encloses the upper thrust bearing so as to keep dirt from entering it. The lower thrust bearing is protected by a plate similar to the plate 44 shown in Fig. 3.

In Fig. 6 the construction is similar to that described in Fig. 5, with the exception that the lower thrust bearing 55 has been replaced by a ball bearing 57, which is mounted in a manner similar to the bearing employed in Fig. 3. In either of the constructions illustrated in Figs. 5 and 6 it will be seen that the weight of the motor, the handle, etc., are transmitted through the lower end of the motor casing to the thrust bearing 54, thence to the plate 37 and through another bearing to the truck 32. This permits the plate and tool to be directly driven from the motor without causing any rotation of the support and the latter carries all the weight of the device except the tool itself.

It will be seen that the plate 37 which is here shown as having an off-set rim, may be simply in the form of a flat disc or, if preferred, in the form of a spider, but the construction illustrated makes it possible to use a support of considerable size, while keeping the machine compact. With any construction the guard 14 must be so designed as to permit the pins 49 to be moved upwardly the distance necessary for securing the tool in inoperative position.

The machine illustrated is capable of use for scrubbing floors, in which case a bristle brush will be employed or it may be used for waxing or polishing floors or for other purposes. The tool which will be used, will, of course, depend on the purpose for which the machine is to be used, and to replace a tool it is only necessary to tip the machine on its side, rotate the tool slightly so that the cross-pins may pass through the apertures, whereupon the tool may be readily removed by withdrawing the pins 49 from the plate. The new tool is then slipped in place in the same way. Any tool, however, will be of the construction generally illustrated in Fig. 2, that is to say, it will have an annular effective area which surrounds and is spaced from the movable support.

The type of machine illustrated in Fig. 3 is to be preferred over the modifications shown in Figs. 5 and 6 by reason of the fact that in the first form referred to the device is in stable equilibrium. It will be seen from an examination of Fig. 3 that the motor shaft which is supported in bearings in the usual manner would normally have a tendency to rest against the lower bearing, but this shaft engages the pins 39 in

the sleeve 38 which forms a part of the disc 37. Accordingly by adjusting the rod 29, the carriage 32 may be moved upwardly to the desired position and this causes the ball bearing to press upwardly against the plate 37, carrying with it the shaft 27. By proper adjustments of the position of the rod 29 the motor shaft may be held in such a way that the weight of the shaft and armature is not carried by the motor bearings. At the same time, the motor casing with the motor poles mounted in it is suspended from the block 28 which is rigidly connected to the casing and in which is also mounted the upper end of the rod. The motor casing, therefore, is suspended from its support instead of being mounted above it, and consequently in this type of machine there is no strain on the ball bearing when the machine is moved over the floor or when it strikes an irregularity in the floor surface because the motor casing tends to swing about the top of the rod 29 as a center and such a movement is transmitted to the support in such a way as to exert a force tending to drive the ball races toward each other in a straight line. Were the motor casing, however, supported so as to swing about the wheeled support as a center, then any swinging of the casing due to irregularities in the floor surface would have a tendency to force the ball bearings apart in an angular direction. The ball bearings used in the preferred form of machine, therefore, will have a much longer life than would ordinarily be the case were the motor supported above the center about which it would have a tendency to swing.

In the type of machine in which the weight of the motor and the various other parts rests directly on the brush without other support, it is possible to clean all parts of the floor area because upon rotation of the brush the bristles are thrown outwardly and extend beyond the enclosing apron to such a distance that the machine may be moved along the walls and all parts of the floor are cleaned without causing the apron to come in contact with the wall. A machine using a support external to the brush is objectionable because of the fact that this support would prevent a thorough cleaning of the floor, but in the present type of machine the advantages of supporting the weight of the motor on a carriage are available, while at the same time the entire floor area may be treated.

I claim:

1. A machine for treating floors comprising the combination of a motor having its drive shaft vertical, a tool for operating on the floor surface, means for driving the tool directly from the motor shaft without the interposition of gearing, and a stable support for the motor bearing on the floor

and lying wholly within the effective area of the tool.

2. A machine for treating floors comprising the combination of a motor having its drive shaft vertical, a stable support for the motor secured against detachment therefrom and bearing on the floor at points lying spaced from the axis of the motor, a tool for operating on the floor surface bearing on the latter over an area encircling the support, and means for driving the tool directly from the motor shaft without the interposition of gearing.

3. A machine for treating floors comprising the combination of a motor having its drive shaft vertical, a stable support for the motor resting on the floor, a tool for operating on the floor surface and bearing on the latter over an area encircling the support, and means for driving the tool directly from the motor shaft and at the same speed of rotation as the latter without the interposition of gearing, the said means permitting the tool to have a limited freedom of movement toward and away from the floor.

4. A machine for treating floors comprising the combination of a motor having its drive shaft vertical, a stable support for the motor, a tool for operating on the floor surface and bearing on the latter over an area encircling the support, and a plate mounted on the motor shaft, the tool and the plate being operatively secured together.

5. A machine for treating floors comprising the combination of a motor enclosed in a casing and having its drive shaft vertical, a wheeled support for the motor secured against detachment therefrom and bearing on the floor to hold the motor in stable equilibrium, a tool for operating on the floor surface and bearing on the latter over an area encircling the support, a plate rigidly mounted on the motor shaft, and driving connections between the plate and the tool, said connections causing the tool to be driven at the same speed as the motor shaft and also permitting the tool to have a limited freedom of movement toward and away from the floor.

6. A machine for treating floors comprising the combination of a motor, a stable support for the motor, a tool driven directly by the motor without the interposition of gearing and bearing on the floor around the support, and means extending axially of the motor for connecting the motor to the support.

7. A machine for treating floors, comprising a motor enclosed in a casing, and having a hollow shaft, a rod extending through the shaft and attached at one end to the casing, a movable support resting on the floor and mounted on the other end of the

rod, and a tool driven by the motor and having an operating surface adapted to bear on the floor.

8. A machine for treating floors, comprising a motor enclosed in a casing, and having a hollow shaft, a rod extending through the shaft and attached at one end to the casing, a movable support resting on the floor and mounted on the other end of the rod, a plate secured to the shaft above the support, and a tool adapted to rest on the floor beyond the support and driven by the plate.

9. A machine for treating floors, comprising a motor enclosed in a casing, and having a hollow shaft projecting beyond one end of the casing, a rod extending through the shaft and attached at one end to the casing, a wheeled support mounted on the other end of the rod, a bearing between the support and the projecting end of the shaft, a plate fast on the shaft above the support, and a tool having driving connections with the plate and resting freely on the floor surface.

10. A machine for treating floors, comprising a motor enclosed in a casing, and having a hollow shaft projecting beyond one end of the casing, a rod extending through the shaft and attached at one end to the casing, a wheeled support mounted on the

other end of the rod, a bearing between the support and the projecting end of the shaft, a plate fast on the shaft above the support and provided with a plurality of apertures, and a tool provided with pins engaging in said apertures for driving the tool, said tool having a limited freedom of movement along the axis of the plate.

11. A machine for treating floors comprising the combination of a motor having its drive shaft vertical, a stable support for the motor resting on the floor, a tool for treating the floor driven directly by the motor without the interposition of gearing and bearing on the floor outside of the support, and means extending axially of the motor for suspending the motor above the support.

12. A machine for treating floors, comprising a motor, having a casing, a tool driven by the motor and resting of its own weight on the floor, a support bearing on the floor within the effective area of the tool, a rod mounted in the support and extending through the motor casing, and means for securing the casing to the rod above the center of gravity of the motor.

In testimony whereof I affix my signature.

ROBERT A. PONSELLE.