Oct. 27, 1942. M. G. STEELE 2,300,138

FLOOR MACHINE

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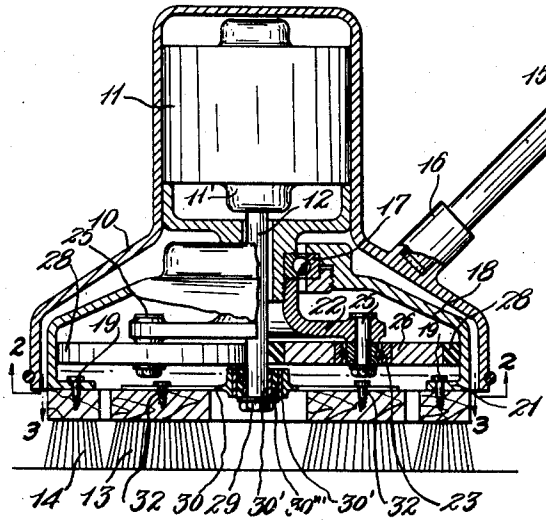


FIG. 1

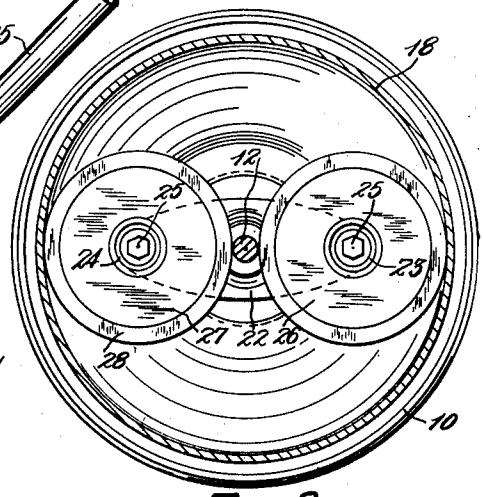


FIG. 2

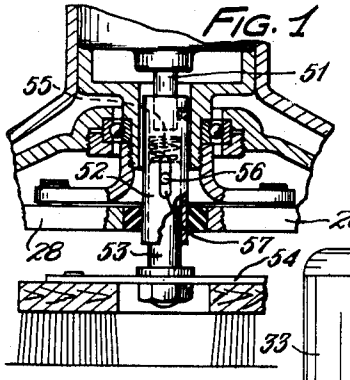


FIG. 5

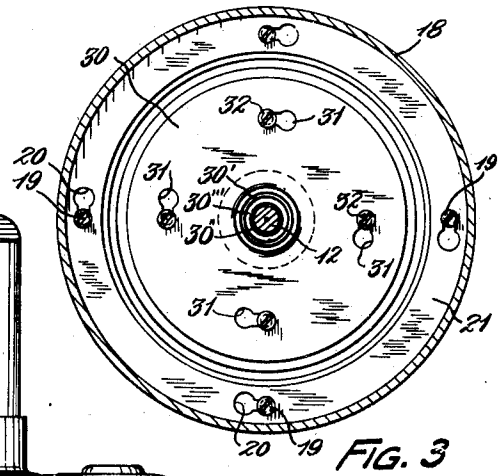


FIG. 3

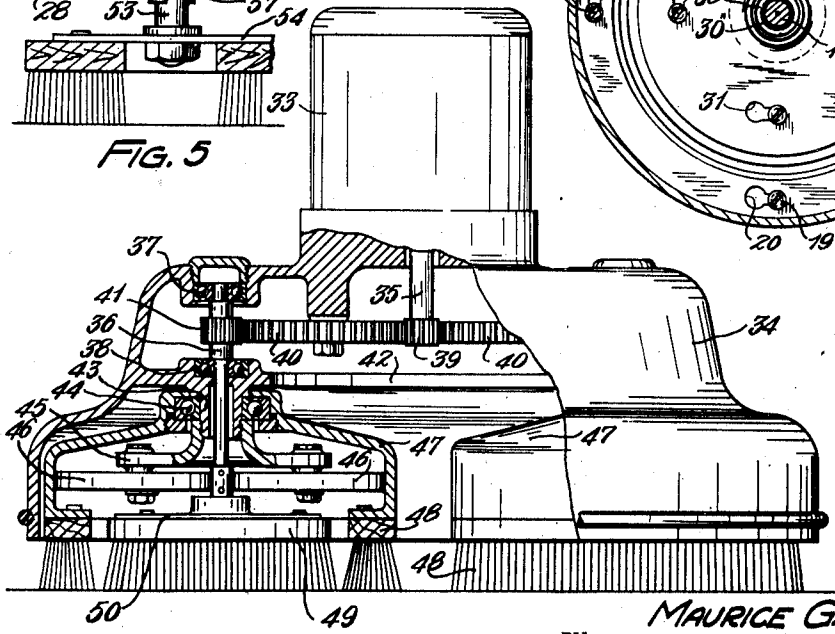


FIG. 4

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FLOOR MACHINE

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10 Claims. (Cl. 15—49)

This invention relates to floor machines of the type that are commonly used for scrubbing, polishing and sanding floors. These floor machines may be generally classified into two classes, one class employing a single disk-type brush and the other class employing a plurality of brushes commonly of the disk type and arranged side by side.

An example of the single brush type machine is shown in the Yutzler and Kent Patent 1,847,323, dated March 1, 1932. In this type of machine all of the weight is on the brush, and whenever the machine is tilted slightly, either forward or backward or to either side, the machine travels on the surface on which it is operating and experience has shown that it requires some skill and experience on the part of the operator to properly control the movements of the machine and to effect travel over a desired course. While this tendency of the machine to travel is considered by those skilled in the operation of the machine to be a decided advantage in that it lessens the amount of manual labor required, as compared with a machine of the multiple brush type in which there is no tendency to travel, it is considered objectionable in a small domestic type of machine for use in scrubbing and polishing floors in a home for the reason that these domestic machines are usually operated by servants who have no particular skill for the work, with the result that the machine is considered to be difficult to control and, therefore, liable to cause damage to furniture, etc.

It is one of the objects of the invention to provide an improved type of machine that will possess the advantages of the single brush machine and, at the same time, avoid the tendency to travel, and possess other advantageous features of the multiple brush type of machine.

A further object of the invention is to provide a machine that will be quiet in operation, simple in design, low in cost and easy to maintain.

A further object of the invention is to provide a machine that is so designed that it may be built in comparatively small light-weight units that will nevertheless do satisfactory work in polishing and scrubbing floors in a home and also be a perfectly safe machine in the hands of an unskilled operator.

Other objects of the invention and the features of novelty will be apparent from the following description taken in connection with the accompanying drawing, in which:

Fig. 1 is a vertical section through a machine embodying my invention.

Fig. 2 is a horizontal section on the line 2—2 of Fig. 1 and looking upward.

Fig. 3 is a section on the line 2—2 of Fig. 1 but looking downward.

Fig. 4 is a view similar to Fig. 1 of a modification, certain parts being shown in elevation.

Fig. 5 is a fragment of Fig. 1 showing a modification of the center brush mounting.

Referring to the drawing, and more particularly to Figs. 1 and 3, it will be noted that the machine comprises a frame or housing 10 in the upper part of which there is a motor 11, the rotor 11' of which has a downwardly extending shaft 12. The frame 10 is, in effect, a part of the frame of the motor 11 and extends downwardly from the motor to enclose the operating mechanism for the two annular brushes 13 and 14. A handle 15 may be secured to the frame 10 as shown at 16 or it may be pivotally connected with the frame 10 through a bail such as is illustrated in the Yutzler Patent 1,675,078, June 16, 1928.

A bearing 17 is mounted on the frame 10 and rotatably supports the carrier 18 for the brush 14, the latter being secured to the carrier by means of a plurality of screws or lugs 19 which engage in key-slots 20 in the flange 21. The bearing 17 is secured in position on the frame 10 by means of the hub of a bracket 22. The bracket 22 carries the bearings 23 and 24 which are secured to the bracket by means of bolts 25. The bolts 25 are preferably arranged on opposite sides of the shaft 12, as will be seen from Fig. 2, and the bearings 23 and 24 rotatably support the idler wheels 26 and 27, respectively, each of these idler wheels being provided with a rubber tire 28 which engages the shaft 12 and also the interior of the carrier 18. By the arrangement described, the rotation of the shaft 12, by the motor 11, will effect the rotation of the carrier 18 and brush 14 at a reduced speed, depending upon the ratio of the diameters of the shaft 12 and the inner surface of the carrier 18 which is engaged by the tires 28. While I have illustrated in the preferred construction two of the idler wheels 26, 27, it is obvious that more than two may be employed if desired or needed to increase the driving torque.

Secured to the lower end of the shaft 12 is a clutch plate 30 having the key-slots 31 therein which are engaged by the screws or lugs 32 on the brush 13, this arrangement permitting the brush to be readily applied to or removed from

the clutch plate. In order to flexibly mount the clutch plate 30 on the shaft 12 I provide in the hub of the plate 30 a bushing consisting of the outer shell or sleeve 30', the inner shell or sleeve 30'' and the intermediate sleeve 30''' of flexible rubber or other suitable material. This bushing may be of the kind disclosed in the Welker Patent 2,116,254, dated May 3, 1938. In practice the outer sleeve 30' may have a pressed fit in the hub of the plate 30 and the inner sleeve 30'' may be similarly mounted in the shaft 12 and further secured by the nut 29. In the operation of the machine the rubber sleeve 30''' is adapted to flex torsionally and also to permit the plate 30 to float or rock to a limited extent so that the brush 13 will automatically adjust itself to any unevenness in the surface on which it is operating.

In the operation of the machine shown in Figs. 1 to 3, the rotation of the shaft 12 effects the rotation of the brush 13 at the same speed and the rotation of the brush 14 at a much reduced speed as described above. The brushes 13 and 14 rotate in opposite directions and the outer brush 14 tends to nullify any travel tendency that might otherwise result from the rotation of the brush 13 at high speed. The brush 14 also serves as a shield to prevent the high speed brush 13 from throwing water or particles of wax or other substances against objects in the room where the machine is being used.

The method of driving the brushes 13 and 14 insures very quiet operation. The low speed of rotation of the brush 14 will minimize any travel tendency due to this brush and make the machine very easy to control and to guide in its movements over any surface being operated upon.

One of the advantages of a single brush type of machine is that it may be readily and conveniently used with a polishing pad such as that described in the aforesaid Yutzler Patent 1,675,078, and one of the advantages of the multiple brush machine shown in Figs. 1 to 3 is that by the removal of either of the brushes 13 or 14 the other brush may then be used with this polishing pad. For this purpose it will usually be desirable to remove the brush 14 and effect high speed rotation of the polishing pad by means of the brush 13.

In the modification illustrated in Fig. 5 the motor shaft 51 has secured thereto by a set screw or otherwise a sleeve 52 in which the stub shaft 53 is slidable. The shaft 53 carries the clutch plate 54 on which the center brush 13 is mounted. A spring 55 engages the upper end of the shaft 53 and yieldingly presses the brush 13 against the surface on which it operates. A pin 56 in the shaft 53 is slidable in the slot 57 in the sleeve 52 and causes it to rotate with the motor shaft 51. The wheels 28 engage the sleeve 52 and transmit power to the carrier 18 as in the Fig. 1 construction.

The advantage of this form is that the center brush is largely relieved of the weight of the machine and this reduces the starting torque load on the motor. Another advantage is that the center brush is vertically adjustable and thus is capable of adapting itself to any unevenness in the surface on which the machine operates and since the major portion of the weight of the machine may be on the outer brush the wear of the two brushes will be more uniform.

In the construction illustrated in Fig. 4 the principle of the invention as described above is embodied in a machine having brushes arranged side by side, as is common in some types of multiple brush machines. In this construction there is a motor 33 mounted on the frame 34. The motor shaft is indicated at 35 and on opposite sides of this shaft the frame 34 carries vertical shafts such as that illustrated at 36, these shafts being mounted in bearings 37 and 38 and being driven from the shaft 35 by the train of gears 39, 40 and 41. There is an annular shelf 42 in the frame 34 and this shelf has downwardly projecting hollow bosses 43 which surround the shafts 36 and on which a bearing 44 is mounted in a manner similar to the mounting of the bearing 17 in Fig. 1. At their lower end the bosses 43 carry the brackets 45 on which idler wheels 46 are mounted. A carrier 47 for an annular brush 48 is mounted on each of the bearings 44 and the idler wheels 46 form the driving connection between the shaft 36 and the carrier 47. Each of the shafts 36 carries at its lower end a brush 49 which is similar to the brush 13 and is attached to a clutch plate 50. The connection between the clutch plates 50 and the shafts 36 may be similar to the connection between the plate 30 and the shaft 12 in Fig. 1 or the form illustrated in Fig. 5.

In this machine the two sets of brushes 48 and 49 operate in the manner above described with reference to the brushes 13 and 14 and it is believed that, from the description above, the operation of the machine illustrated in Fig. 4 will be fully understood.

While I have illustrated and described what I consider to be the preferred embodiments of my invention, it will be understood that changes in the details of construction may be made without departing from the spirit of the invention as defined in the appended claims.

Having thus described my invention, I claim:

1. In apparatus of the class described, the combination of a motor having a frame and a rotor, a bearing on said frame, a member rotatably mounted on said bearing and having an annular brush attached thereto, a brush within said annular brush secured to the shaft of said rotor and rotatable therewith, a bracket fixed on said frame and carrying a bearing, and a friction wheel on the last-mentioned bearing through which said member is driven by said rotor.

2. In apparatus of the class described, the combination of a motor having a frame and a rotor, a bearing on said frame, a member rotatably mounted on said bearing and having an annular brush attached thereto, a brush within said annular brush secured to the shaft of said rotor and rotatable therewith, a bracket fixed on said frame and carrying a plurality of bearings angularly spaced about said shaft, and friction wheels on the last-mentioned bearings engaging said shaft and said member and through which said member is driven.

3. In apparatus of the class described, the combination of a motor having a frame and a rotor, a bearing on said frame, a member rotatably mounted on said bearing and having an annular brush attached thereto, a shaft driven by said rotor, a brush within said annular brush slidably secured to said shaft and rotatable therewith, a bracket fixed on said frame and carrying a bearing, and a friction wheel on the last-mentioned bearing through which said member is driven from said shaft.

4. In apparatus of the class described, the

combination of a motor having a frame and a rotor, a bearing on said frame, a member rotatably mounted on said bearing and having an annular brush attached thereto, a shaft driven by said rotor, a brush within said annular brush slidably secured to said shaft and rotatable therewith, a bracket fixed on said frame and carrying bearings angularly spaced about said shaft, and friction wheels on the last-mentioned bearings engaging said member and through which said member is driven.

5. In apparatus of the class described, the combination of a motor having a frame and a rotor provided with a shaft, a bearing on said frame, a member rotatably mounted on said bearing and having an annular brush attached thereto, a brush mounted on said shaft within said annular brush, and speed-reducing means arranged between said bearing and said brushes for driving said member from said shaft.

6. In apparatus of the class described, the combination of a motor having a frame and a rotor provided with a shaft, a bearing on said frame, a member rotatably mounted on said bearing and having an annular brush attached thereto, a brush within said annular brush, the last mentioned brush having a connection with said shaft permitting movement of the brush axially relative to the shaft while being rotated thereby, and speed-reducing means for driving said member from said rotor.

7. In apparatus of the class described, the combination of a motor having a frame and a rotor provided with a shaft, a bearing on said frame, a member rotatably mounted on said bearing and having an annular brush attached thereto, a brush within said annular brush, the last mentioned brush being mounted on a member which is slidably connected with the shaft of said rotor but rotatable therewith, and speed-reducing means for driving the first mentioned member from said rotor.

8. In apparatus of the class described, the combination of a motor having a frame and a rotor provided with a shaft, a bearing on said frame, a member rotatably mounted on said bearing and having an annular brush attached thereto, a brush within said annular brush, the last mentioned brush being mounted on a member which is slidably connected with the shaft of said rotor but rotatable therewith, spring means for yieldably pressing the last mentioned brush against the surface on which it operates, and speed-reducing means for driving the first mentioned member from said rotor.

9. In apparatus of the class described, the combination of a motor having a frame and a rotor, a pair of bearings on said frame arranged on opposite sides of the axis of said rotor, a member rotatably mounted on each of said bearings and each having an annular brush attached thereto, a shaft extending through each of said bearings and rotatably mounted in bearings on said frame, means for driving said shafts from said rotor, a brush within each of said annular brushes and each mounted on and rotated by one of said shafts, a bracket arranged within each of said members and fixedly supported on said frame, and a friction wheel rotatably mounted on each of said brackets and for driving one of said members.

10. In apparatus of the class described, the combination of a motor having a frame and a rotor, a pair of bearings on said frame arranged on opposite sides of the axis of said rotor, a member rotatably mounted on each of said bearings and each having an annular brush attached thereto, a shaft extending through each of said bearings and rotatably mounted in bearings on said frame, means for driving said shafts from said rotor, a brush within each of said annular brushes and each mounted on and rotated by one of said shafts, a bracket arranged within each of said members and fixedly supported on said frame, and a pair of friction wheels rotatably mounted on each of said brackets and each of said pairs of friction wheels forming the driving connection between one of said shafts and one of said members.

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