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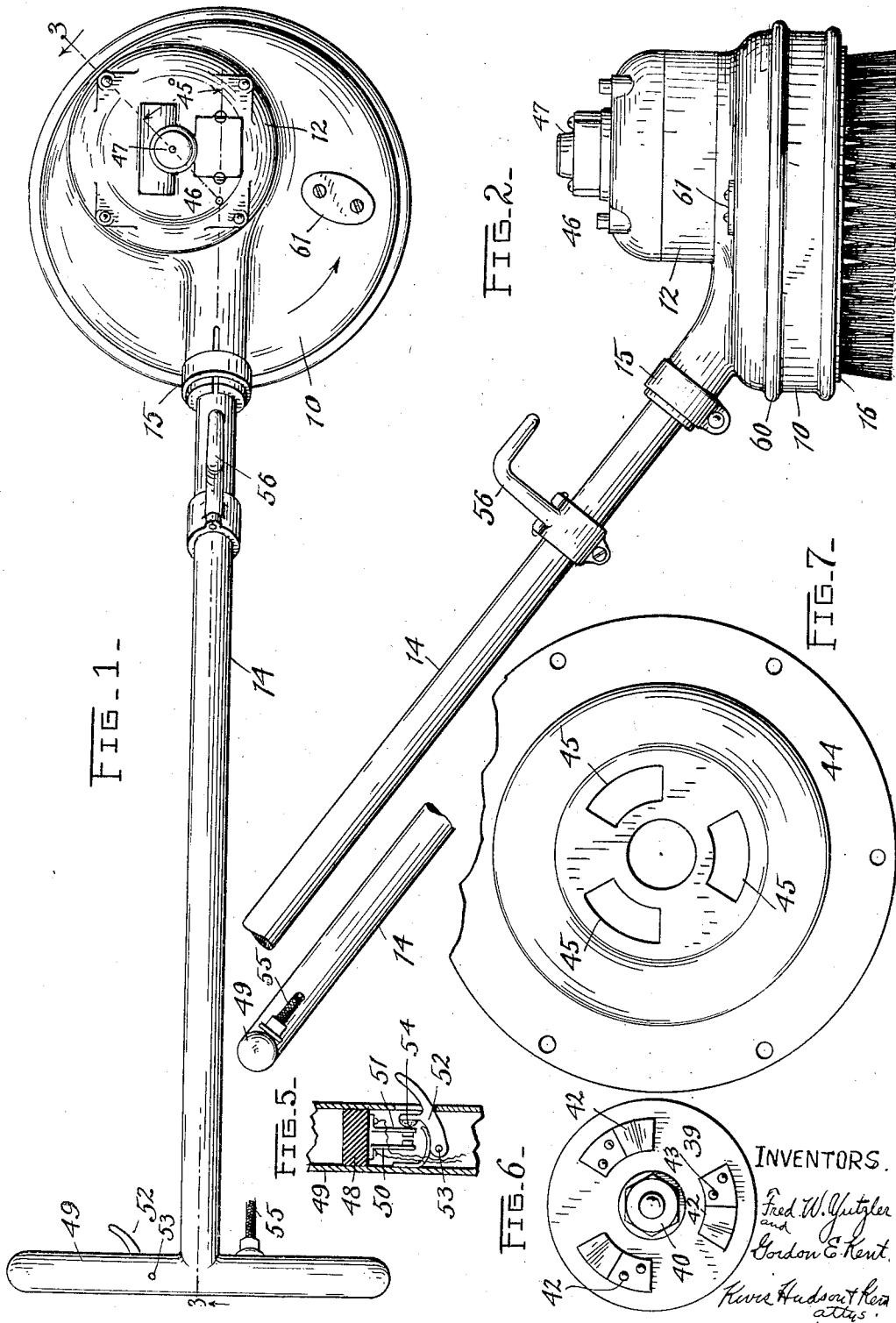
F. W. YUTZLER ET AL

1,847,323

FLOOR MACHINE

Filed Oct. 8, 1927

2 Sheets-Sheet 1



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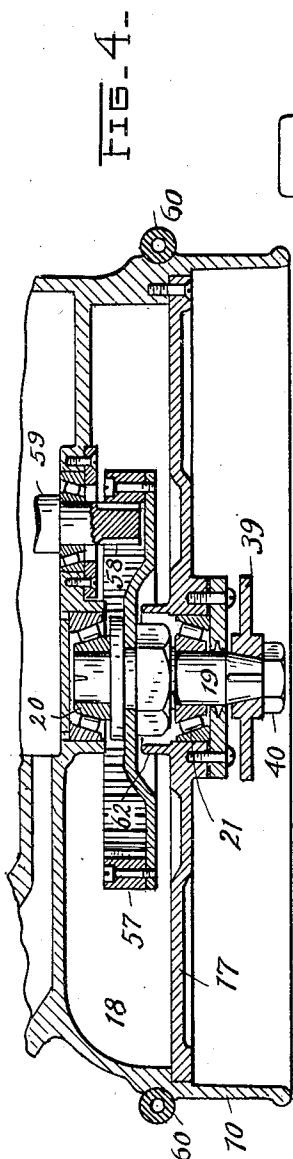
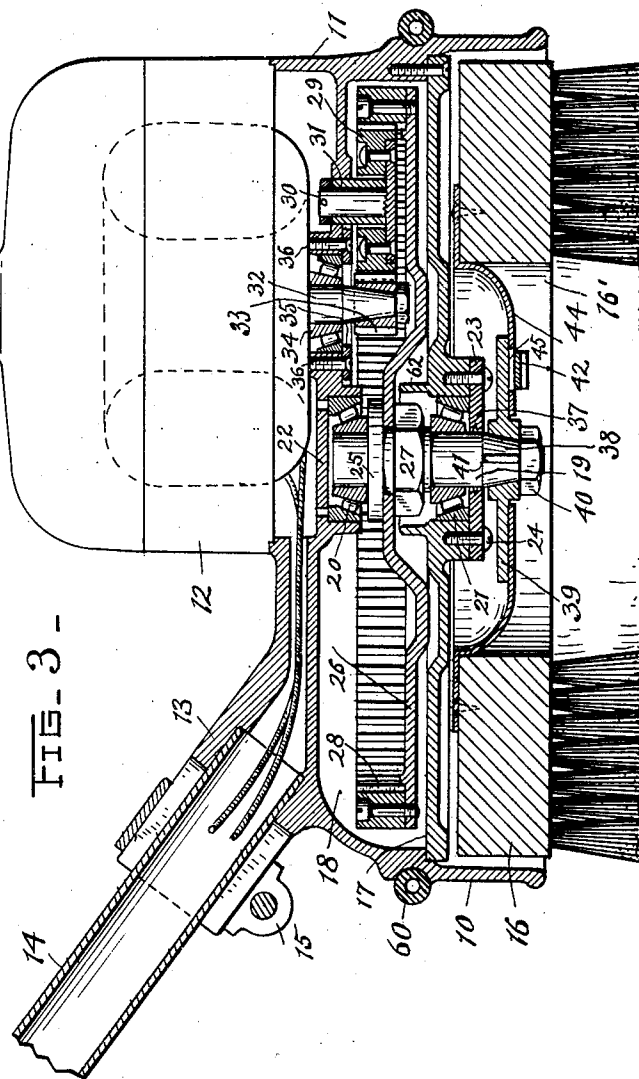
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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FLOOR MACHINE

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This invention relates to machines for surfacing, polishing and scrubbing floors, tables, etc., and has for one of its objects the provision of a machine that will be efficient in operation, simple in design and convenient to operate, and that will also overcome certain objections to machines now in use for the purposes specified.

A further object of the invention is to provide a machine in which the weight on the working brush or member is so distributed that the handle will not tip the machine.

A further object of the invention is to so position the motor as to produce the effect of a counterbalancing weight, with respect to the axis of the working brush or member, and thereby obviate the usual tendency for the machine to "kick back" against the operator when in use.

A further object of the invention is to provide an electrically driven machine with an automatically opening switch that will prevent accidental starting of the motor at all times except when the operator has control of the handle.

A further object of the invention is to provide an electrically driven machine embodying a simple speed-reducing gearing whereby the motor may operate the working brush or member, and to enclose this gearing in a closed chamber adapted to contain a sufficient body of lubricant to thoroughly lubricate the working parts, and also make the machine quiet in operation.

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

Fig. 1 is a plan view of a machine embodying our invention;

Fig. 2 is a side elevation thereof;

Fig. 3 is an enlarged section on the line 3—3 of Fig. 1;

Fig. 4 is a fragmentary section similar to Fig. 3 but showing a simpler form of speed-reduction gearing which we prefer to use;

Fig. 5 is a detail section through a portion of the handle, showing the control switch;

Fig. 6 is a bottom plan of the driving flange to which the working brush is attached; and

Fig. 7 is a plan view of the member by which the working brush is attached to the driving flange.

Referring to the drawings, 10 indicates a casing or housing having a flange 11 on its upper side on which an electric motor 12 is secured. The housing 10 has a split tubular boss 13 in which the lower end of a tubular handle 14 is secured by means of the clamping collar 15, or in any other suitable manner. The housing 10 has an open bottom in which there is arranged a rotatable working brush or member 16, preferably of annular form. A partition 17 is arranged in the housing 10 and spaced from the top wall thereof to provide a gear chamber 18 that is adapted to contain a body of lubricant.

A vertical shaft 19 has its upper end supported in an anti-friction bearing 20 that is mounted in the top wall of the housing 10, the lower end of this shaft being supported by means of an anti-friction bearing 21 that is carried by the partition 17. The bearings 20 and 21 should be of a type adapted to take end thrusts as well as annular loads and we have shown tapered roller bearings for this purpose but any other suitable bearings may be used. The bearing 20 has its upper end in engagement with the top wall 22, of the housing 10, and a plate 23 is secured to the partition 17 by means of screws 24 and engages the lower side of the bearing 21 so that these bearings are adapted to support the shaft 19 against endwise movement either upward or downward.

The shaft 19 has a collar 25 against which a disc 26 is clamped by means of a nut 27. The disc 26 carries an internal gear 28 with which an intermediate or idler gear 29 meshes, the gear 29 having a shaft 30 which is supported in a bushing 31 that is secured to the top wall 22 of the housing 10.

The motor shaft is indicated at 32 and has a pinion 33 secured on its lower end, this pinion meshing with the gear 29 and driving the gear 28 through the gear 29. A thrust bearing 34 supports the shaft 32 and is mounted in the top wall 22 of the housing, being secured therein by means of a ring 35 and screws 36.

The shaft 19 projects through the plate 23 and the plate is provided with a groove 37 for a felt packing or any other suitable or well known device for preventing the lubricant from escaping downwardly along the shaft. The lower end of the shaft 19 is preferably provided with a tapered portion 38 and a flange 39 is secured on this tapered portion by means of the nut 40 and a key 41. As will be seen from Fig. 6 spring fingers 42 are secured to the lower side of the flange 39 by means of rivets 43, or in any other suitable manner. A centrally cupped disc 44 is secured to the upper side of the working brush or member 16 and the cupped portion thereof projects into the central opening 16', as shown in Fig. 3. The disc 44 is provided with arcuate openings 45 which permit the disc to be slipped over the spring fingers 42 into engagement with the lower face of the flange 39 and then, by rotation of the member 16, the fingers 42 will be caused to clamp the disc against the lower face of the flange 39 in such a manner as to form a driving connection between the flange 39 and the disc 44. The clamping of the disc 44 against the flange 39 has the effect of closing the openings 45 so that lubricant escaping into the central cupped portion of the disc 44 will not leak out through the openings 45.

As will be seen from Fig. 1, the housing 10 is of circular form, the member 16 being concentrically arranged within the housing, the axis of the member 16 being at the point 46. The axis of the motor shaft is indicated at 47 and it will be noted that the point 47 is in a plane extending radially from the point 46 and arranged at an angle of approximately 45° to the plane of the axis of the handle 14. By thus locating the motor 12 eccentrically on the housing 10, the weight of the motor has the effect of counterbalancing the handle 14, with respect to the axis of the member 16, which is at the point 46. If the motor were to be positioned with its axis at the point 46, as is customary in machines of this type that are now in use, the weight of the handle 14 would tend to tip the machine over when it is not supported by the operator, but by our novel arrangement of the motor it counterbalances the handle and the machine will stand in a stable condition, as shown in Fig. 2.

In the operation of machines of this character, wherein there is a rotating brush in contact with the floor or other surface and the brush supports the entire weight of the machine, the machine is self-propelling in its movements from one position on the floor to another. In operating the machine to scrub or polish a floor it is customary to cause it to swing back and forth from one side of the operator to the other, in an arcuate path of several feet in length and to move the machine backward or forward a distance substantially equal to the diameter of the brush,

at the end of each stroke. In this way large floor areas are covered in a short time by a progressive movement. The self-propelling feature of the machine arises from the fact that when it is evenly supported so that all sides of the brush press against the floor with equal pressures there is no tendency for the machine to move in any direction and the brush simply rotates on a given spot. However, by tilting the handle 14 upward to a slight extent, the pressure of the forward side of the brush on the floor will be increased and the pressure of the rearward side will be correspondingly decreased. This will cause the machine to be moved to one side or the other, depending upon the direction of rotation of the brush. In a similar manner tilting the handle downward will increase the pressure of the rearward side of the brush and correspondingly decrease the pressure of the forward side with the result that the machine will move laterally in the opposite direction to that when the handle is raised. By slight lateral tilting of the machine the pressure at either the right or left side of the brush may be increased or decreased as desired and the effect will be to cause the machine to move toward or away from the operator. In the machine illustrated in the drawings the brush is intended to rotate in the direction of the arrow in Fig. 1 so that, with reference to an operator standing at the rear of the handle and facing the machine, by raising the handle slightly the machine will be propelled toward the right and when the handle is depressed it will be propelled toward the left. Also by tilting the machine so as to increase the pressure of the right side of the brush on the floor the machine will tend to move backward toward the operator and by tilting the handle laterally in the opposite direction it will tend to move forward away from the operator. Thus, it is possible, by carefully manipulating the handle 14, to cause the machine to move in any desired direction.

In the operation of machines of this general type, wherein the motor is arranged coaxially with the brush, an objectionable tendency for the machine to kick back against the operator has been experienced at the end of each stroke toward the right and upon the reversal of the movement, this being probably due to the fact that the center of gravity of the motor is relatively high above the floor and the inertia of the motor has a tendency to cause the machine to be tilted toward the right at the end of each stroke toward the right and this tilting increases the pressure of the right hand side of the brush on the floor which, in turn, causes the machine to kick back against the operator.

We have overcome this objection by locating the motor with its axis to the left of the plane of the handle, as will be seen in

Fig. 1, so the motor will act as a counter-weight placed eccentric to the axis of rotation of the brush and this constitutes one of the novel features of our invention. If the brush were to be rotated in a direction opposite to the arrow in Fig. 1 the above named conditions would be reversed and the axis of the motor, which is the point 47, should be located to the right of the plane of the drawings, it being understood that all of the foregoing references to "right" and "left" are with respect to the normal position of the operator at the end of the handle and facing the machine.

Another important feature of our invention is the provision of an automatically opening switch that is so positioned that it can be closed only by the operator when in the normal position to control the machine.

One form of such a switch is illustrated in Fig. 5, wherein a block 48 of insulating material is provided in the transverse portion 49 of the handle and carries the normally separated spring contact fingers 50 and 51.

A trigger 52 is pivotally mounted in the handle, as indicated at 53, and engages with the contact finger 51, this engagement being preferably through a button 54 of insulating material. One of the leads, to the motor 12, is connected to the fingers 50 and 51 so that by actuating the trigger 52 to press the finger 51 against the finger 50, the circuit will be closed and current supplied to the motor. It is customary to supply current to the machine by means of a two-wire flexible cable 55 which, in order to give a wide range of movement to the machine, should be 25 feet or more in length. On account of the length of this cable the operator is usually at a considerable distance from the machine when he connects the cable to an electric circuit and, therefore, by the provision of the self-opening switch, above described, the connection may be safely made without danger of the motor being started until the operator reaches the machine and is in position to hold the handle. It has been customary heretofore to employ control switches on the machine which are manually opened and closed and, from experience, it has been found that sometimes the switch on the machine has been inadvertently left in the closed position with the result that when the connection to the supply circuit is made the motor starts and, since the operator is not at the machine to hold the handle, the brush remains stationary and the housing and handle start to rotate on the brush, thereby causing serious accidents because of the collision of the handle with a glass show case or some other object which the collision would damage.

An arm 56 may be secured to the handle 14 for the purpose of providing a convenient means for holding the cable 55 when the

machine is not in use. By providing the arm 56 the cable may be looped around this arm and over the transverse portion 49 of the handle several times and, in this way, all of the cable conveniently arranged in an out-of-the-way position.

In the modification illustrated in Fig. 4 the internal gear 57 is considerably smaller than the gear 28, and gear teeth 58 are cut on the end of the motor shaft 59, thereby forming a pinion which meshes directly with the gear 57. This has the advantage of eliminating the intermediate gear 29 and providing a construction having a more compact and simpler arrangement of parts that will make the machine more durable and less expensive to manufacture.

In order to prevent injury to base boards and furniture, with which the machine may come in contact during operation, we provide a rubber buffer ring 60 around the housing 10. Access to the gear chamber, for the purpose of supplying lubricant, or for inspection, is had through an opening that is normally closed by means of the removable plate 61 on the top wall of the housing 10. An annular dam 62 projects upwardly on the partition 17 and serves to assist in retaining the lubricant in the chamber 18, and also prevents the lubricant from being thrown out of the bearing 21 when the machine is in operation.

Having thus described our invention, we claim:

1. In a machine of the character described, the combination of a frame, a working member rotatably mounted beneath said frame and which acts as the supporting member for the rest of the machine, a motor mounted on said frame with its axis in offset relation to the axis of said member, said frame having a handle fixed thereon and rigidly held in such position that it projects from one side the frame so that the motor counter-balances the tilting effect of the handle on the frame, and means whereby said motor rotates said member.

2. In a machine of the class described, the combination of a frame, a working member rotatably mounted beneath said frame and which acts as the supporting member for the rest of the machine, a handle projecting rearwardly from said frame in a vertical plane through the axis of said member, a motor mounted on said frame with its axis to one side of said plane, and means whereby said motor rotates said member.

3. In a machine of the class described, the combination of a frame, a working member rotatable on a vertical axis and mounted beneath said frame, a handle rigidly connected to and projecting rearwardly from said frame in a vertical plane through the axis of said member, a motor mounted on said frame with its axis arranged vertically and to one

side of said plane and forward of the axis of said member, and means whereby said motor rotates said member.

4. In a machine of the class described, the combination of a frame, a working member 5 rotatable on a vertical axis and mounted beneath said frame, a handle rigidly connected to and projecting rearwardly from said frame in a vertical plane through the axis of 10 said member, a motor mounted on said frame with its axis arranged vertically and in a plane containing the axis of said member and cutting the first mentioned plane at an angle of substantially forty five degrees, and 15 means whereby said motor rotates said member.

5. In a machine of the character described, the combination of a housing having an open bottom, a partition in said housing forming 20 with the top wall of the housing a gear chamber, a shaft extending downwardly through said partition and having a bearing in said top wall, an internal gear on said shaft, a motor mounted on said housing 25 with its shaft projecting into said chamber and having a gear thereon for rotating said internal gear, a flange on said shaft below said partition, and a working member connected to said flange.

30 6. In a machine of the character described, the combination of a housing having an open bottom, a partition in said housing forming with the top wall of the housing a gear 35 chamber, a shaft extending downwardly through said partition, an internal gear on said shaft, a motor mounted on said housing with its shaft projecting into said chamber and having a gear thereon for rotating said 40 internal gear, anti-friction bearings for said shaft one of which is mounted in the wall of said housing and the other in said partition, a flange on said shaft below said partition, and a working member connected to said 45 flange.

7. In a machine of the character described, the combination of a housing having spaced top and bottom walls forming a gear chamber, a shaft mounted in bearings in both of 50 said walls of said housing and projecting through said bottom wall, a motor mounted on said housing with its shaft parallel with but eccentric to and operatively connected with the first-mentioned shaft, a flange on the 55 first-mentioned shaft exteriorly of said bottom wall, an annular working member extending into the lower side of said housing and provided with a central attaching plate adapted to engage the lower face of said flange, and means for detachably clamping 60 said plate to said flange.

8. In a machine of the character described, the combination of a frame having a handle projecting from one side thereof, a working member rotatably mounted beneath said 65 frame and which acts as the supporting mem-

ber of the machine, and counterbalancing means on said frame with its center of gravity located on the same side of the vertical plane of said handle as the side of the working member which is moving in the direction 70 in which said handle projects from said frame.

9. In a machine of the character described, the combination of a one-piece housing member having an open bottom, a removable partition in said member forming with the top 75 wall thereof a gear chamber, a shaft extending downwardly through said partition, a gear on said shaft, a motor mounted on said housing member with its shaft parallel to the first mentioned shaft, said motor shaft being 80 operatively connected with said gear, a flange on said shaft below said partition, and a working member connected to said flange.

In testimony whereof, we hereunto affix 85 our signatures.

FRED W. YUTZLER.
GORDON E. KENT.

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