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FLOOR POLISHER

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FIG. 1

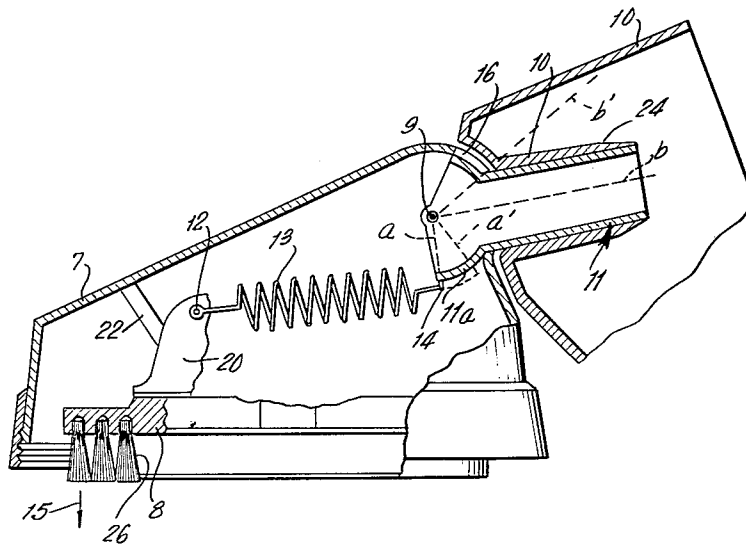
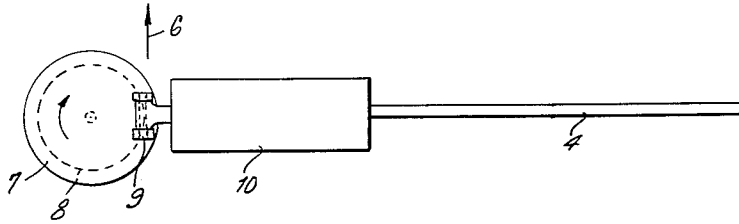


FIG. 2

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## FLOOR POLISHER

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E 22,311

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This invention relates in general to appliances, and in particular to a new and useful single disc floor polisher which is driven by an electric motor having a polisher head in which the disc is rotatable and having a handling stick or handle connected thereto by a pivotal connection arranged such that the forward end of the polisher is urged downwardly with a substantially equal force regardless of the position of the handle in relation to the head.

In single disc floor polishers which are driven by electric motors, it is common to mount the disc polisher in a head in a manner permitting rotation of the polisher disc by means of a motor which is arranged in a handle. When only a single disc is employed there is a tendency, due to the frictional cooperation of the revolving disc brushes with the floor, to have reaction forces which result in a lateral migration of the polisher head. Thus, the housewife who manipulates the polisher and wishes to move it evenly backwardly and forwardly, must always exert a counterforce on the handle with her hand in order to overcome the natural tendency of the device to migrate to the side. The disadvantage of the lateral migration of the polisher head is increased when the polisher head is loaded eccentrically by the handling stick or handle and/or by the drive parts connected with the stick, for example the driving motor.

In accordance with the present invention there is provided a polisher which includes a single rotating disc arranged for rotation within the polisher head which is manipulated by means of a handle articulated thereto and wherein the tendency to migration is substantially eliminated. This is achieved by incorporating a connection between the handle and the head which includes spring means to bias the forward portion of the head downwardly against the floor at all times.

In accordance with a preferred arrangement the handling stick is articulated to the polisher head at an upper portion thereof adjacent one end and is mounted for pivotal movement about a substantially horizontal axis to permit elevating and lowering of the handle in relation to the head. The inventive construction includes a spring element connected between the handle and a stationary portion of the polisher head which is arranged to bias the head downwardly in all positions of the handle in relation to the head. The arrangement is such that the downward biasing force of the front portion of the head is always approximately the same in the various pivot positions of the handling stick. This is caused by the changes of the side of a lever arm through which the force of the spring acts. This change in lever arm compensates for the change in the spring force due to the change in compression thereof caused by the change of handle position. Thus, the effective force acting on the forward portion of the polisher head is maintained substantially the same. In order to effect such a result a coil spring is advantageously connected between a stationary portion of the head at the forward end thereof and a pivotal arcuate portion of the handle, so that the lever arm which is the perpendicular from the axis of the spring to the center of rotation of the handle will change due to the pivotal movement of the handle.

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Accordingly, it is an object of this invention to provide an improved appliance construction.

A further object of the invention is to provide an appliance which includes a polisher head in which there is rotatably mounted a single disc element and a handle pivotally connected to said head at one end thereof and including spring means engaged between said handle and said head effectively biasing the forward portion of the head downwardly independently of the position of the handle relative to the head.

A further object of the invention is to provide a polisher which includes a head having a disc element rotatably mounted therein and which includes a handle having a driving electric motor which is pivotally connected to the head for rotation in respect to the head about a substantially horizontal axis, and spring means connected between the handle and a stationary portion of the head urging the forward portion of the head downwardly with substantially an even force during all pivotal orientations of the handle in respect to the head.

A further object of the invention is to provide a polisher which includes a handle connected to a head portion in which is rotatable a single disc element characterized by means which tend to lessen the tendency of the head to migrate laterally.

A further object of the invention is to provide a polisher which is simple in design, rugged in construction and economical to manufacture.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of the invention, its operating advantages and specific objects attained by its use, reference should be had to the accompanying drawing and descriptive matter in which there is illustrated and described a preferred embodiment of the invention.

In the drawing:

FIG. 1 is a somewhat schematic top plan view of a polisher constructed in accordance with the invention; and

FIG. 2 is an enlarged fragmentary transverse section of a polisher indicated in FIG. 1.

Referring to the drawing in particular, the invention embodied therein includes a polisher which comprises a polisher head or housing 7 in which is rotatably mounted a disc 8 for rotation about a substantially vertical axis. The disc, as indicated, is revolved in a clockwise direction, as indicated by the arrow in FIG. 1. A handle or handling stick 4 is connected to the polisher head 7 by means of a pivot or axle 9 disposed substantially horizontally, thus permitting the handling stick 4 to be raised and lowered in respect to the head. The handling stick 4 carries a housing 10 in which is positioned a driving electric motor (not shown) having a flexible shaft (not shown) which extends through the connection of the handle 4 with the head 7 for driving the disc 8. The shaft (not shown) upon which the disc 8 is affixed, is rotated by means of bevel gearing which is connected through the flexible shaft to the electric motor (all not shown) in the housing 10. The weight of the handle 4 and the housing 10 is such that the handle is loaded eccentrically in respect to its articulation on the axis 9. When the disc 8 rotates in the direction indicated by the arrow, that is clockwise, there is a tendency for the polisher to migrate in the direction of the arrow 6.

In accordance with the invention, however, the tendency to migration has been substantially eliminated. The disc 8 which contains the brushes 25 is rotatably mounted on a stationary portion 20 which is secured such as through mounting brackets 22 to the head 7. The upper portion of one end of the housing is curved in order to abut against a similarly curved portion of the lower

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end of the motor housing 10. The lower end of the motor housing 10 also includes an inwardly extending substantially conical portion 24 which receives a connecting piece or extension 11 which has a cylindrical inner portion which fits in tight engagement with the conical portion and includes a spherical or curved end portion 11a which fits into the curved upper end of the head 7. The extension piece 11 is pivoted on the horizontal axis 9 and the head is slotted, as at 16, to permit pivotal up and down movement about the axis 9 of the handle 4. The electric driving motor and its flexible shaft (not shown) are mounted so that the flexible shaft extends through the hollow connecting piece generally designated 11 into the interior of the polisher head or housing 7 for connection to the vertical axle of the polisher disc 8 through suitable gearing such as a worm gear (not shown).

In accordance with the invention a spring such as a coil spring 13 (which may be either a tension or compression spring depending on the location of its connections to motor 20 and connection piece 11), is connected at one end to a bolt element 12 on a fixed portion 20 of the polisher head 7 and is connected at its opposite end to a fixed point or pin 14 formed as an extension of the curved portion 11a of the extension piece 11. When the housing 10 or the respective handling stick 4 connected with the housing is located, as indicated in FIG. 2, in its lowermost position, then the spring 13 engages at a lever arm *a* represented by the solid line extending perpendicular to the longitudinal direction of the spring 13. The corresponding medium line of the handle or stick 4 is indicated in FIG. 2 by the solid line *b*. In the embodiment of FIG. 2 the spring 13 is a tension spring. The arrangement is such that the spring 13 causes the forward end of the polisher head 7, that is the end opposite the connection to the handle 4, to be urged downwardly in the direction marked by the arrow 13. The connection of the spring 13 is such that the polisher disc 8 is always urged against the floor with an equal force at the front and back ends thereof, so that the two oppositely directed reaction forces compensate each other and no lateral movement in the direction of the arrow 6 in FIG. 1 can occur.

When the handling stick 4 is raised from its lowermost position as indicated in FIG. 2 to its uppermost position (not shown), the medium line *b* shifts upwardly as represented by the dotted line *b'*. In this location the perpendicular line from the longitudinal axis of the spring 13 to the pivot center is represented by the dotted line *a'*. It can thus be seen that the effective lever arm *a'* is a little smaller than the effective lever arm *a* when the handling stick 4 is raised. It also may be seen that the spring 13 is tensioned a little more so that the restoring force is a little greater. However, since the restoring force acts through a shorter lever arm, the exerted torque or effective force acting downwardly on the head 7 remains approximately the same. In this manner also equal down-pressure on the head 7 is provided in any position of the stick 4 in respect to the associated housing 10. This even downward force on the head 7 both when the stick is lifted and when it is lowered, insures that a lateral migration of the polisher head will not occur.

It should be clear that the helical spring or coil spring 13 may be any resilient force and may be either a tension spring or a compression spring. When a compression spring is employed it must be connected between bolt element 12 and extension 11 such that the outwardly directed force of the spring produces a resultant which acts downwardly at the spring bolt 12. In addition, the spring may be a spiral spring which is arranged around the axle 9 in the manner of a torsion spring. It should also be appreciated that the pivot axis 9 is formed of two axle pieces which are separated in axial alignment and which may be removed outwardly to permit an unhindered introduction of the drive shaft.

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While a specific embodiment of the invention has been shown and described in detail to illustrate the application of the inventive principles, it will be understood that the invention may be embodied otherwise without departing from such principles.

What is claimed is:

1. A floor polisher comprising a head, a single polisher disc mounted for rotation about a substantially vertical axis within said head, a handle pivotally connected to said head for lifting and lowering movement about a substantially horizontal axis, and spring means connected between said handle and said head adjacent the pivotal connection of said handle to said head urging said head downwardly with a uniform force independently of the pivoting of said handle in respect to said head.

2. A floor polisher according to claim 1, wherein said handle includes a connecting piece with a curved end portion, said spring means including a spring connected to a stationary portion of said head at the forward end thereof and connected to the curved end portion of said handle, the distance from the pivot axis of said handle to the connection of said spring to said handle defining an effective lever arm, the connection of said spring to said handle being such that the force of said spring is changed by changing the spring length during pivotal movement of said handle along with the effective lever arm from said spring to the center of pivotal movement of said handle, the change of the spring length and the effective lever arm being such that the effective force acting downwardly on the forward portion of said head remains substantially unchanged.

3. A floor polisher comprising a floor polisher head, a single disc rotatable within said head about an axis which is substantially vertical, said head having a curved portion adjacent one end thereof and which is slotted to receive a handle, a handle having a motor housing thereon pivotally connected to said head for pivotal movement about an axis which is substantially horizontal, said motor housing being curved complementary to the curved portion of said head and having a cylindrical recess portion adapted to receive a connecting piece, a connecting piece held in said cylindrical recess portion of said motor housing and including a curved portion extending into said head and being slidably movable within the curved portion of said head, said connecting piece being pivoted within said head about the horizontal axis of pivotal movement of said handle, the curved portion being radially spaced from the pivotal axis of rotation of said handle, a coil spring connected to a fixed portion of the forward end of said head opposite from the connection to said handle and connected, at its opposite end, to the curved portion of said connecting piece at a spaced location from the pivotal connection of said handle, the connection being such that the longitudinal axis of said spring is disposed at a spaced location from the center of the pivotal movement of said handle, the distance from the connection of said spring to said connecting piece defining an effective lever arm which changes in length upon upward and downward movement of said handle, the effective force of said spring changing correspondingly with upward and downward movement of said handle due to the change of elongation thereof, the construction and arrangement being such that the change in length of said spring and the effective lever arm produces a uniform downward effective force at the connection of said spring to said head.

4. A floor polisher comprising a polisher head, a polisher disc mounted for rotation about a substantially vertical axis within said head, a handle pivotally connected to said head, said handle including a motor housing portion, said motor housing portion having an opening at one end, a connecting piece extending through said opening and secured therein, said extending piece having a curved portion fitted into said head, said curved portion being pivotally connected to said head for articulation of said handle in respect to said head, and a spring con-

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nected to the forward end of said head and to the curved portion of said connecting piece, said connecting piece curved portion being spaced from its pivotal connection to said head and defining an effective lever arm extending from the connection of said spring to said connecting piece to the pivot of said curved portion, the effective lever arm being changeable in length in accordance with the orientation of said handle with said head and said spring being changed correspondingly, the construction and arrangement being such that the change in length

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of said spring and the effective lever arm produces a uniform downward effective force at the connection of said spring to said head.

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