

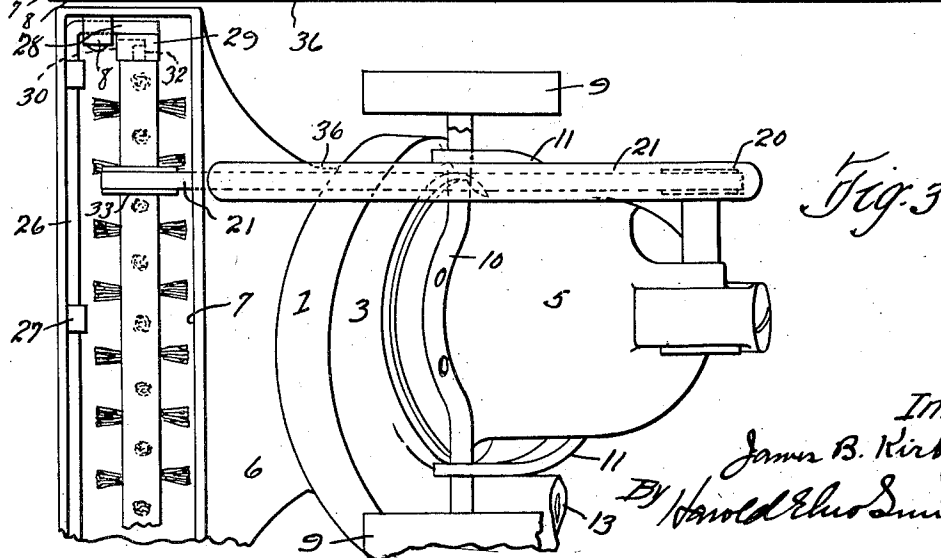
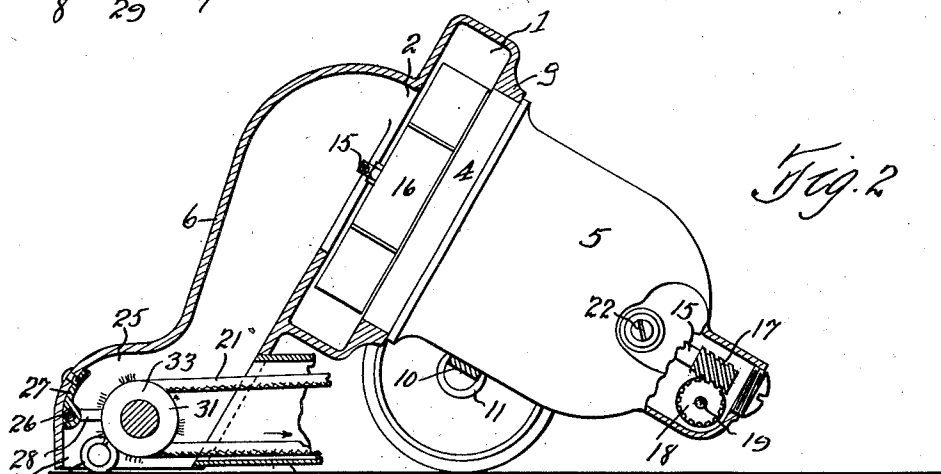
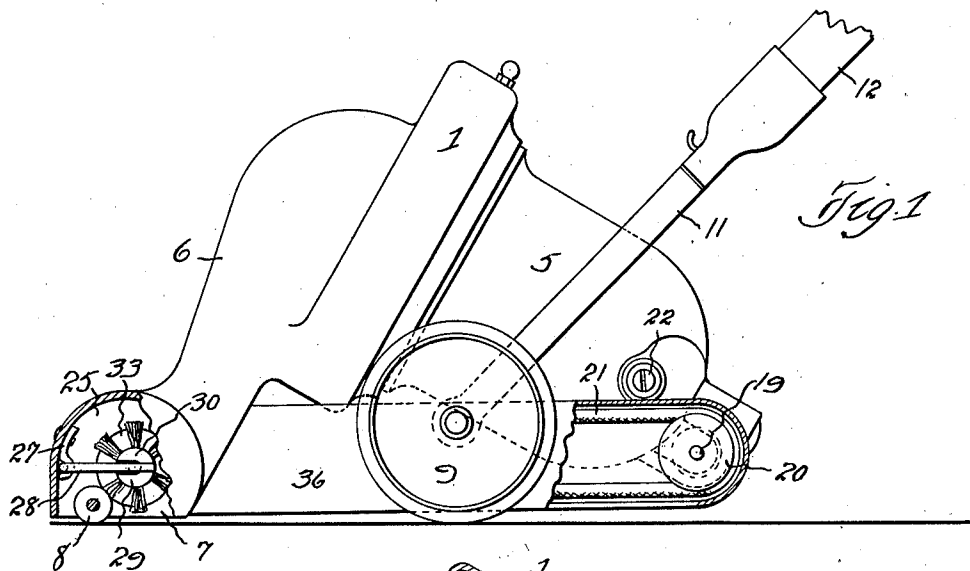
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J. B. KIRBY

SUCTION CLEANER

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Inventor

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By Harold Elms Smith
Att'y.

UNITED STATES PATENT OFFICE.

JAMES B. KIRBY, OF CLEVELAND, OHIO.

SUCTION CLEANER.

Application filed January 24, 1921. Serial No. 439,386.

To all whom it may concern:

Be it known that I, JAMES B. KIRBY, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Suction Cleaners, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to suction cleaners of the self-contained portable type, comprising a collecting nozzle, fan chamber, and electric motor built together in a compact unitary structure adapted to be moved around a floor so that the nozzle may be presented to all parts thereof. The objects of this invention are the provision of an electric suction cleaner having simplified and improved brush operating mechanism; the provision of a suction cleaner brush which shall require a minimum of power and shall inflict a minimum of injury on floor coverings while possessing very great sweeping qualities; the provision of a suction cleaner brush which shall be regulated in height automatically according to the work performed; the provision of a brush drive which shall be lasting; while further objects and advantages of this invention will become apparent as the description proceeds.

In the drawings accompanying and forming a part of this application I have shown one embodiment of my said invention although without intent to limit myself to the exact constructions therein delineated which are capable of great variation within the scope of my inventive idea. In these drawings Fig. 1 represents a side elevation of my improved cleaner, parts of the casing being broken away; Fig. 2 is a central vertical sectional view through the same cleaner, the motor being shown in elevation; and Fig. 3 is a bottom plan view of the same cleaner.

Describing by reference characters the parts shown in these drawings, 1 represents a hollow cylindrical fan chamber having at one side the central inlet aperture 2 and at the other side the hollow neck 3 in which is rigidly secured the flange 4 of the motor housing 5. Rigidly attached to the end of the fan chamber opposite the motor and surrounding the inlet aperture 2 is the collecting nozzle 6 which flares laterally as it recedes from said aperture and terminates in a narrow elongated inlet mouth 7 of which

the longest dimension is transverse to the axis of the motor housing. The cleaner is maintained in working position by two small rollers 8, located inside the inlet mouth and spacing the same above the floor; in combination with two carrying wheels 9, 9, located at opposite sides of the cleaner and behind its center of gravity. In these views I have shown these wheels as carried by a yoke 10 fastened to the bottom of the motor housing, which also forms a convenient point of attachment for the fork 11 to which the handle 12 is secured. The fan chamber is formed at one side with the outlet neck 13 for the reception of the usual dust bag (not shown).

The motor shaft is illustrated at 15, and carries at its upper end the fan 16 and at its lower end the spiral gear (or worm) 17 which meshes with a second gear 18 on the horizontal shaft 19. Secured to the outer end of this last shaft is the driving wheel for the brush, here shown as a belt pulley 20, which is brought sufficiently low to be belted directly to the brush by a straight belt 21. Also this arrangement brings all the gearing into a single gearbox located at the lowest part of the device, where it can easily be kept supplied with lubricant, and thus being beneath the commutator brushes (whose cover screws are shown at 22) there is no difficulty from oil on the commutator.

While other brushes could be employed in connection with the parts heretofore described and while the brush now to be described can be used in different relations, the brush which I prefer to employ is made and supported as follows:

Immediately above the inlet mouth the nozzle is formed with a brush chamber 25, and in it is movably mounted a supporting device or frame in which the brush is journaled, the brush being so connected to the motor as to float freely upon the working surface and sweep the same with a substantially uniform pressure unaffected by the sinking of the cleaner wheels into the pile of the carpeting material or the elevation of that material into the inlet mouth produced by the suction. This device or frame is here shown as comprising arms 28, journaled to a wall of the cleaner casing by clips 27 and having metal disks 29 secured to their ends formed with slots 30 for the reception of the pins 32 with which the ends of the brush shaft 31 are provided. In the

present embodiment the arms 28 are connected by the rod 26 which causes them to move together. The brush is provided with a driven wheel, which here takes the form of a pulley 33 which is connected to the pulley 21 by a flexible driving connection, here represented by the belt 21, and the latter preferably being of an elastic nature, such as rubber, its action is to hold the brush in place.

When such a brush lies idly upon the floor or carpet its weight is supported, at least in part, by the bristles at the bottom on which it rests, and these bristles, being generally of a flexible nature, are somewhat bent by the load. As soon as the brush is rotated by the motor it rises slightly in the nozzle owing to the fact that it is now supported by all the bristles and it rises still further as a consequence of the carpet being pulled into the inlet mouth by the suction. As a result there is no scouring or scrubbing action such as to wear the carpet but only a gentle flicking of the surface which dislodges lint and like litter without injury to the floor covering or overloading of the motor.

Owing to the high speed of the motor the peripheral speed of the brush is so great as to render its floating action substantially independent of the direction of movement of the cleaner over the carpet. When a belt drive is used the direction of rotation of the brush preferably depends to some degree upon the location of the frame pivots. With the arrangement here shown, the pivots being on the opposite side of the mouth from the driving pulley the best results are obtained when the power run of the belt is lowermost since any impediment offered to the rotation of the brush increases the strain on the belt and creates a tendency to bring the rim of the pulley into line with the frame pivot. It is advantageous to use a straight run belt because its life is longer.

The belt is preferably enclosed in a housing 36 which surrounds the pulley 20 and prevents leakage of air into the suction nozzle. This housing passes beneath the yoke 10 and inside the carrying wheels and the wheels are located inside the limits of the cleaner mouth.

I do not restrict myself to any details of construction or arrangement except as recited in the annexed claims which I desire broadly construed for my beneficial protection.

Having thus described my invention what I claim is:

1. In a suction cleaner, a cylindrical fan chamber having a nozzle overlapping one end and projecting radially beyond its side wall, said nozzle terminating in an inlet mouth, a brush journaled therein, a pulley carried by said brush, a motor housing pro-

jecting from the other end of said fan chamber, a drive shaft journaled in the other end of said housing parallel to said brush, a pulley carried by said shaft, a belt connecting said pulleys and passing by said fan chamber, a fan in said fan chamber, and a motor in said housing having one end of its shaft attached to said fan and the other end geared to said drive shaft.

2. In a cleaner for floors and floor coverings, the combination with a collecting nozzle, means for moving the same to and fro over the floor, and a rotary brush located therein, of means for rotating said brush continuously in one direction regardless of the direction of movement of said nozzle over the floor and for automatically raising said brush relatively to said nozzle by an amount proportional to the resistance to rotation encountered by said brush.

3. In a suction cleaner, a casing comprising a nozzle having an inlet mouth, a brush journaled in said nozzle, a belt pulley carried by said brush, a second pulley at one side of said first pulley, a belt connecting said pulleys, a frame in which said brush is journaled, said frame being pivoted to the cleaner casing at a point to one side of the inlet mouth, an electric motor, and driving connections between said motor and said second pulley.

4. In a suction cleaner, a casing having an electric motor, a fan, and an inlet mouth facing the floor, a brush support pivoted to said casing upon a horizontal axis and having journaled bearings located inside said mouth, a brush journaled in said bearings to rise and fall therewith in accordance with the pressure of the carpet thereagainst, a substantially horizontal driving shaft located between the horizontal planes which include the brush, gearing operatively connecting said driving shaft and motor, and driving connections between said shaft and brush in all the positions of said brush.

5. In a suction cleaner for floors and floor coverings, a casing having a rigid nozzle formed with an inlet mouth, wheels on said casing supporting said nozzle with said mouth at a fixed distance above the surface on which it rests, an electric motor, a pulley located at one side of said mouth and operatively connected to said motor, a frame pivoted to said casing upon an approximately horizontal axis and vertically movable independently of said nozzle, a rotatable brush inside said mouth, said brush being journaled in said frame so as to rise and fall therewith, a pulley carried by said brush, and a belt connecting said pulleys, said first pulley, brush, and pivot axis being located in approximately the same horizontal plane.

6. In a suction cleaner, a casing having

a nozzle formed with an inlet mouth, a supporting device pivoted to said casing at one side of said mouth and movable freely independently of said nozzle, a rotatable
5 brush in said mouth, said brush being journaled to said supporting device so as to be movable vertically independent of said nozzle, a motor, means
10 driven by said motor for producing suction in said mouth, and operative connections between said motor and said brush for rotating said brush continuously during the operation of said motor while leaving
15 said supporting device free to rise and fall whereby said brush may bear with uniform pressure upon the surface being cleaned.

7. In a suction cleaner, a motor, a fan driven thereby, a collecting nozzle communicating with the intake of the fan, a
20 rotary brush inside said nozzle, a pulley connected to said brush, a bearing device comprising a substantially horizontal arm freely pivoted upon a horizontal axis, said
25 brush being journaled to the free end of said arm, a driving pulley in line with said brush pulley, operative connections between the driving pulley and motor, and a belt connecting said pulleys, the free end of said
30 arm being movable independently of said nozzle.

8. In an electric carpet sweeper, the combination of a casing having a fan chamber and a nozzle communicating with the intake of said fan chamber, a suction fan in
35 said chamber, a rotatable brush in said nozzle, an electric motor operatively connected to said fan and brush, and means retaining the said brush in said nozzle while permitting its free movement relative

thereto in a vertical direction through a
40 substantial range of movement without impairing its operative connection to said motor, whereby said brush may automatically assume a degree of elevation depending upon the pressure of the carpet
45 thereagainst.

9. In a suction cleaner, a casing, wheels supporting said casing, a nozzle at the foremost part of said casing, a frame movable
50 vertically inside said nozzle, a rotatable brush in said nozzle journaled to said frame, and an electric motor operatively connected to said brush adapted always to revolve the same in one direction, said frame
55 being mounted for free vertical movement relative to said nozzle whereby said brush may yield vertically in proportion to the displacement of the surface being cleaned from the plane defined by the wheels.

10. In a device for cleaning floors and
60 floor coverings, in combination, a casing having at one margin a downwardly facing inlet mouth, a vertically movable frame pivoted to said casing, a horizontal rotatable
65 brush located in said mouth and journaled to said frame, a suction fan carried by said casing, an electric motor connected to said fan, and operative connections between said motor and brush adapted to drive said brush
70 continuously in one direction, said last named connections extending from said brush at such an angle as to permit said
75 brush to rise and fall freely and thereby bear upon the surface being cleaned with a substantially uniform pressure.

In testimony whereof, I hereunto affix my signature.

JAMES B. KIRBY.