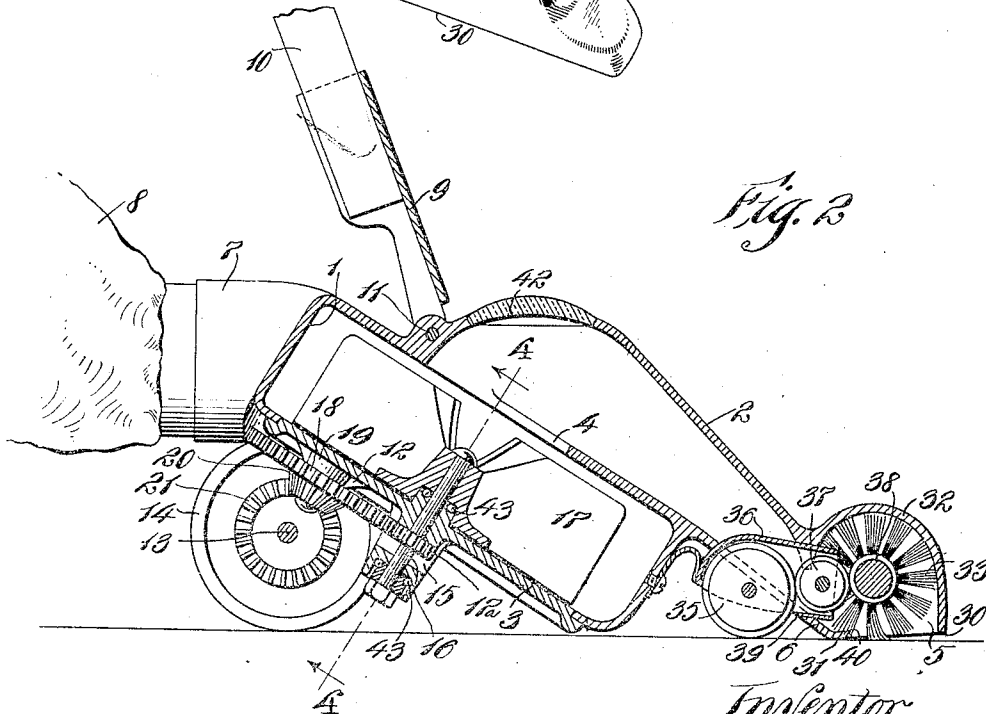
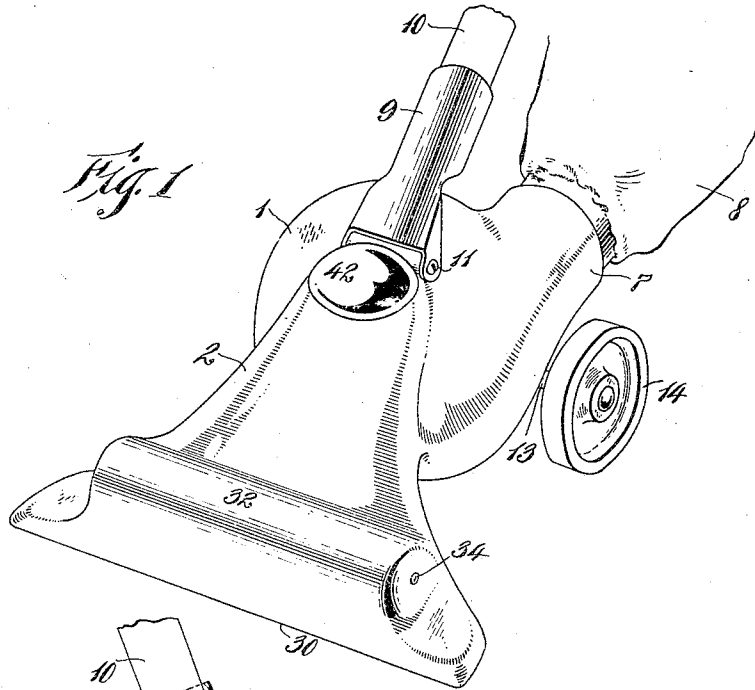


J. B. KIRBY.
 SUCTION CLEANER.
 APPLICATION FILED OCT. 2, 1916.

1,257,288.

Patented Feb. 19, 1918.
 2 SHEETS—SHEET 1.

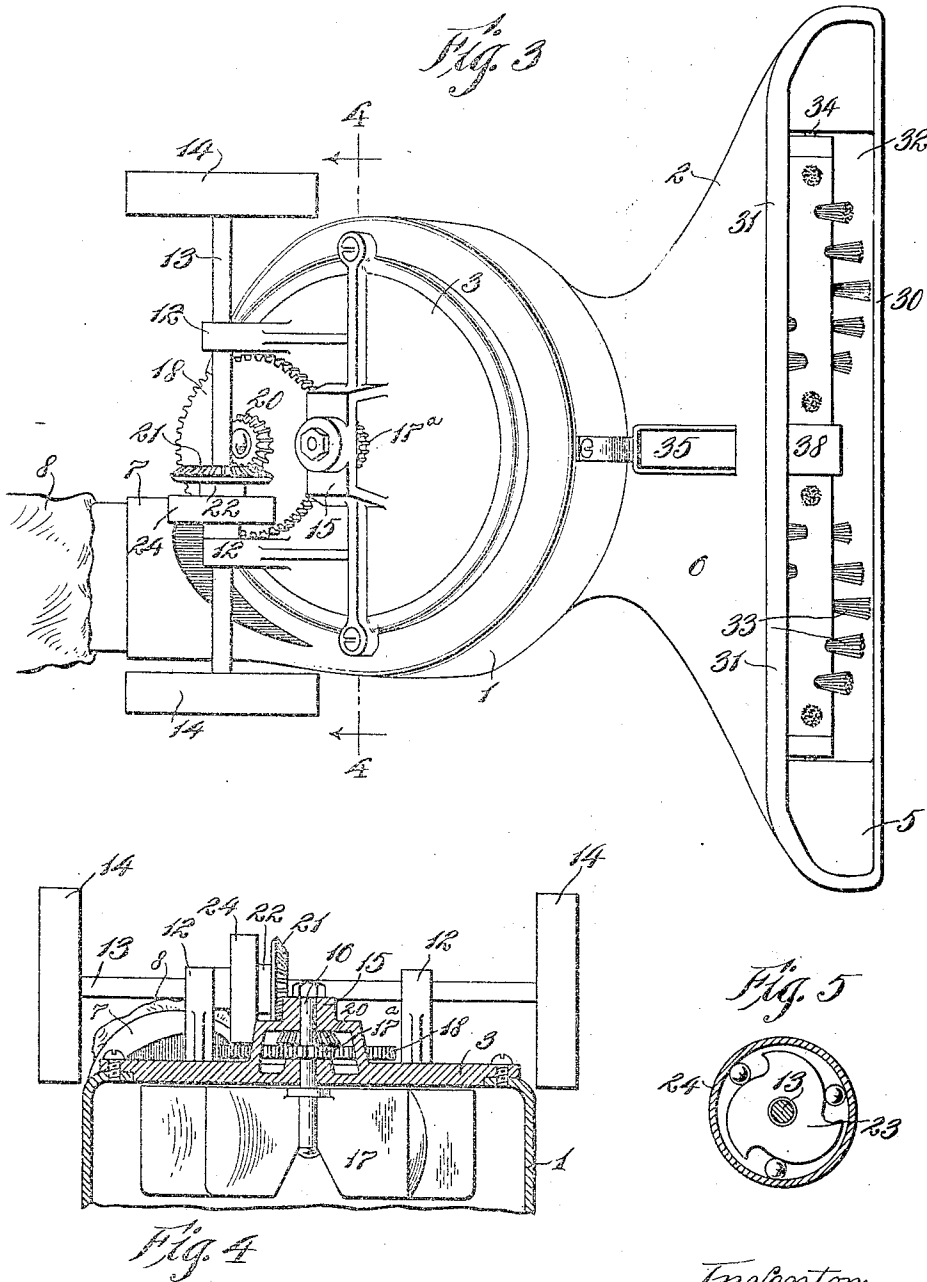


Inventor
 James B. Kirby.
 By Hull, Smith, Brock & West
 Attys.

J. B. KIRBY.
SUCTION CLEANER.
APPLICATION FILED OCT. 2, 1916.

1,257,288.

Patented Feb. 19, 1918.
2 SHEETS—SHEET 2.



Inventor
James B. Kirby.
By Hall, Smith, Brock & West
Attys.

UNITED STATES PATENT OFFICE.

JAMES B. KIRBY, OF CLEVELAND, OHIO.

SUCTION-CLEANER.

1,257,288.

Specification of Letters Patent.

Patented Feb. 19, 1918.

Application filed October 2, 1916. Serial No. 123,221.

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 and has for its object the provision of a light, small, inexpensive and efficient device whereby floors and floor coverings can be easily and rapidly freed of dust, litter, and light refuse; the provision of new and improved driving expedients whereby a device of this character may be effectively operated from driving wheels traversing the surface to be cleaned without obstructing the passage of the cleaner under the usual articles of furniture found in living rooms; the provision of a new and improved type of cleaner casing; the provision of a new and improved brush operating device; while further objects and advantages will become apparent as the description proceeds.

In the drawings accompanying and forming a part of this application wherein is illustrated one embodiment of my invention, Figure 1 is a perspective view of a cleaner constructed in accordance with my invention; Fig. 2 is a vertical, longitudinal, sectional view of the same; Fig. 3 is a bottom plan view of the cleaner; Fig. 4 is a central sectional view shown upon the line 4-4 of Figs. 2 and 3 and looking in the direction of the arrows; and Fig. 5 is a detail view of the clutch.

Describing by reference characters the separate parts illustrated in these drawings, 1 represents the fan chamber and 2 the nozzle of my improved cleaner. The former is of general cylindrical shape with its diameter considerably greater than its axial length, one of the flat walls of said chamber being removable as shown at 3, and the opposite flat wall having a substantially central inlet opening 4. This fan chamber is normally supported with its flat walls making an oblique angle with the horizontal and with its aperture 4 uppermost, while the nozzle 2 is disposed above and overlapping the lower part of said fan chamber. Said nozzle is preferably of a flaring

or fan shape, its narrowest part surrounding and inclosing the opening 4 and broadening with increase of distance from said opening to its extremity where it is formed with a longitudinal inlet mouth 5 whose plane is substantially parallel with the horizontal. The lower wall of the nozzle is formed by the upper wall of the fan chamber throughout the overlapping portions of these parts, and throughout the portion where the nozzle extends beyond the fan chamber a separate bottom wall 6 is provided which is preferably substantially flush with the fan chamber wall.

At the side opposite said nozzle the fan chamber is provided with a substantially tangential outlet-neck 7 to which is attached in any suitable or convenient manner the porous dust bag 8. To the upper part of the device is secured a fitting 9 in which is secured the handle 10 whereby the device is operated, said fitting in the present instance being pivoted at 11 in the angle between the nozzle and fan chamber. The bottom plate 3 of the fan chamber is formed with brackets 12-12 in which is journaled the shaft 13 having secured to its ends the carrying wheels 14-14 whereby the casing is supported.

The bottom plate 3 is also formed with the integral frame 15, in which is journaled a rotatable shaft 16 to which the fan 17 is secured. This shaft carries a pinion 17^a between the bottom and top of this frame and with this pinion meshes a spur gear 18 journaled on a stud 19 also carried by the plate 3. Rotatable with the gear 18 is a bevel pinion 20 which in turn meshes with the bevel gear 21 sleeved upon the shaft 13, the hub 22 of the last named gear being connected to the inner member 23 of a ball clutch shown in Fig. 5, whose outer member 24 is rigidly secured to the shaft 13.

The forward end of the nozzle terminates in spaced parallel lips 30 and 31 defining an inlet mouth, and above this mouth the upper wall of the nozzle is preferably recessed or chambered as shown at 32 for the reception of a brush 33 whose shaft is journaled in the ends of said chamber as shown at 34. For driving the said brush I preferably provide a floor-engaging roller 35 journaled in a narrow housing 36 which is inset in the bottom wall 6 of the nozzle. Motion

is transmitted from this roller to the brush by means of an idle wheel 37 journaled inside the housing and making frictional contact both with the surface of the roller 35 and with a friction surface 38 carried by the brush shaft. The housing 36 is cut away as shown at 39 sufficiently to permit the free operation of the wheel 35, but embraces the idler 37 closely on all sides so as to prevent the leakage into the nozzle of sufficient air to obstruct the operation of the cleaner. The rearward lip 31 is also preferably formed with a substantially horizontal ledge 40 closely adjacent or even substantially touching the bristles of the brush 33, thus facilitating the picking up of heavy objects, lint, and the like. The topmost part of the nozzle is preferably provided with a concavo-convex inspection window 42 located at the point where the dust stream changes its direction.

The bearings of the shaft 16 are preferably provided with anti-friction rollers such as the balls 43, 43, and the fan itself is preferably made of a heavy metal such as cast iron and with thick blades so as to operate as a fly wheel. With the construction above described, the operation of the machine in a forward direction will cause the clutch to engage and rotate the fan at high speed, the clutch becoming disengaged upon the rearward stroke of the cleaner while the fan continues to revolve with great velocity. Owing to the fact that the operating parts are all secured to the single plate 3, the cleaner can be taken apart for inspection or repair with the greatest possible facility and without the necessity of disengaging gears. Reference to Fig. 2 will show that the forward lower edge of the fan chamber barely escapes touching the floor, the operating mechanism being located entirely beneath the rearward or elevated portion of the fan chamber, thus rendering the machine extremely compact and of small height so that it will pass beneath all ordinary articles of furniture. The plane of the inlet mouth is substantially, though not necessarily exactly, tangent to the wheels 14.

In the present embodiment I have shown the forward lip 30 as slightly elevated, partly to minimize danger of catching in carpets or against the edges of rugs and partly to permit a draft of air therebeneath which may blow across the nap of the floor covering and toward the ledge 40.

It will be obvious that the brushing mechanism herein described may be employed in connection with other driving mechanisms than those here employed, or even omitted altogether upon occasion. It will also be obvious that many changes in construction, design and arrangement of these and other parts of the cleaner can be made without departing from the scope of my inventive

idea or from the terms of the claims hereto annexed, all of which modifications and embodiments I claim as within my invention excepting as the same may be limited by the prior art.

Having thus described my invention, what I claim is:

1. In a suction cleaner, a fan chamber having an inlet opening in its upper wall and a fan shaft projecting through its lower wall, a collecting nozzle overlapping said upper wall and inclosing said opening, said nozzle having a mouth whose plane lies below said lower wall, and operating mechanism disposed beneath said lower wall and connected to said shaft.

2. In a suction cleaner, a fan chamber supported in an inclined position and having an inlet opening in its upper wall, a collecting nozzle overlapping said fan chamber and inclosing said opening, said nozzle extending past the limits of said fan chamber at its lowermost part and formed with an inlet mouth having its forward lip slightly above the horizontal plane through the rearward lip floor-engaging supporting means carried by a part of said fan chamber removed from said mouth.

3. In a suction cleaner, a fan chamber having an inlet opening in its upper wall and a fan shaft journaled in its lower wall, a collecting nozzle inclosing said opening and extending radially therefrom past the limits of said fan chamber, said nozzle terminating in spaced lips defining an inlet mouth whose plane is oblique to the axis of said fan chamber, floor engaging wheels carried by said fan chamber and having their peripheries approximately tangent to the horizontal plane through one of said lips, and driving connections between said wheels and shaft.

4. In a suction cleaner, an inclined fan chamber having a portion of its lower end wall removable, and having an axial inlet opening through the opposite wall, an axial shaft journaled in said removable portion, a transverse shaft journaled to said removable portion, carrying wheels on said transverse shaft, driving connections between said transverse and axial shafts, a suction fan carried by said axial shaft on the opposite side of said removable portion from said transverse shaft, and a collecting nozzle inclosing said inlet opening and having an inlet mouth in substantial alignment with the peripheries of said wheels and the lower edge of the fan casing.

5. In a suction cleaner, an inclined fan chamber having opposed axial openings, a collecting nozzle inclosing the upper opening and a removable plate closing the other opening, an axial shaft journaled to said plate, a suction fan secured to said shaft inside of said plate, a pinion secured to said shaft outside of said plate, a gear jour-

70

75

80

85

90

95

100

105

110

115

120

125

130

naled upon the exterior of said plate and meshing with said pinion, a bevel pinion rotatable with said gear, a transverse shaft journaled to said plate, a bevel gear sleeved upon said transverse shaft and meshing with said bevel pinion, a one-way driving connection between said bevel-gear and transverse shaft, and carrying wheels on said transverse shaft, said nozzle having an inlet mouth in substantial alinement with the peripheries of said wheels and the lower edge of the fan casing.

6. In a suction cleaner, an inclined fan chamber of approximately cylindrical shape having its diameter greater than its axial length, an axial shaft journaled in the lower end wall, a fan secured to said shaft inside of said wall, a gear secured to said shaft outside of said wall, brackets carried by said wall at one side of said shaft, a transverse shaft journaled in said brackets, a gear carried by said transverse shaft and operatively connected to said first gear, floor-engaging wheels carried by said transverse shaft, the end wall of said fan chamber opposite said first shaft having an inlet opening, and a collecting nozzle communicating with said opening and extending past the edge of said fan chamber upon the side removed from said transverse shaft, the plane which is tangent to said wheels and touches the inlet mouth of said nozzle being substantially horizontal and passing close to the lowest point of said fan chamber.

7. In a suction cleaner, a fan chamber whose axis diverges from the vertical by less than 45° , the upper wall of said chamber having an inlet opening, and a flaring nozzle overlapping said fan chamber with its narrowest portion covering said opening and its widest portion extending beyond the wall of said chamber, said nozzle having a

mouth whose plane lies below the lower wall of the fan chamber.

8. In a suction cleaner, a fan chamber whose axis makes an oblique angle with the vertical, the upper wall of said chamber having an inlet opening, a flaring nozzle overlapping said fan chamber with its narrowest portion covering said opening, and its widest portion extending beyond the wall of said chamber, said nozzle having a mouth whose plane lies below the lower wall of the fan chamber, a fan in said chamber, and operating means for said fan located between the lower wall of said chamber and the plane of said inlet mouth.

9. In a suction cleaner, a casing having a cylindrical fan chamber, floor engaging carrying rollers journaled to said casing and supporting the same with the axis of said chamber obliquely inclined, a collecting nozzle overlapping the upper wall of said fan chamber and having a floor engaging inlet mouth, and fan operating means located beneath the lower wall of said fan chamber.

10. In a suction cleaner, a nozzle, a rotatable brush therein, a housing inset in the nozzle wall, a wheel journaled in said housing and substantially filling the same, and driving connections between said wheel and brush, said wheel being adapted and arranged to be rotated upon the movement of the cleaner over the floor.

11. In a suction cleaner, a nozzle, an agitating device therein, the wall of said nozzle having a slot therein, a floor roller journaled in said slot and substantially filling the same, and driving connections between said roller and agitating device inside said wall.

In testimony whereof, I hereunto affix my signature.

JAMES B. KIRBY.