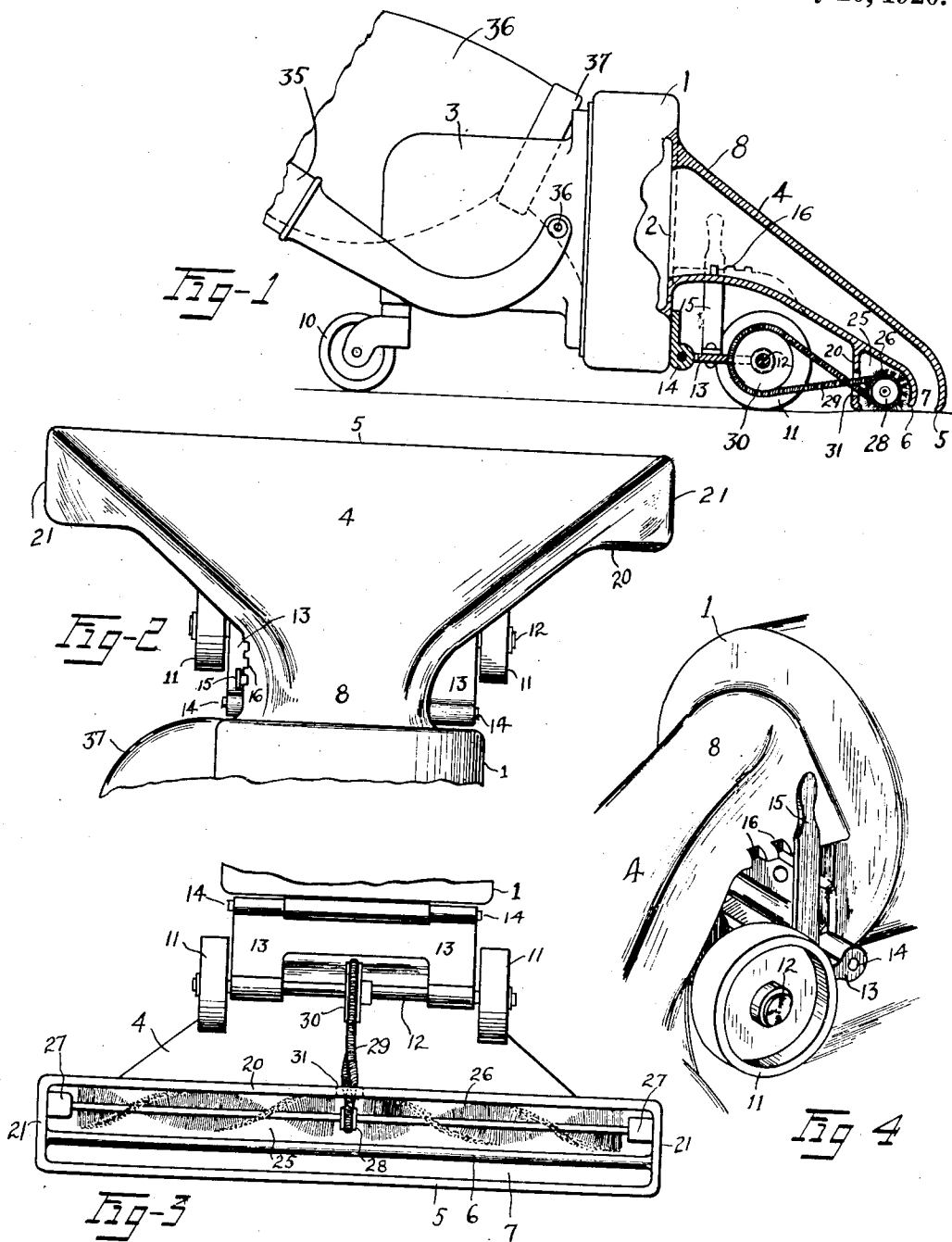


J. B. KIRBY,
 SUCTION CLEANER.
 APPLICATION FILED JULY 12, 1917.

1,347,167.

Patented July 20, 1920.



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UNITED STATES PATENT OFFICE.

JAMES B. KIRBY, OF CLEVELAND, OHIO, ASSIGNOR TO ELECTRIC VACUUM CLEANER COMPANY, INC., A CORPORATION OF NEW YORK.

SUCTION-CLEANER.

1,347,167.

Specification of Letters Patent.

Patented July 20, 1920.

Original application filed July 9, 1915, Serial No. 38,862. Divided and this application filed July 12, 1917. Serial No. 180,057.

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.

10 This invention relates to suction cleaners of the portable type wherein an electrically operated suction device having a collecting nozzle carried rigidly thereby is moved around over the floor or other surface to be cleaned so as to suck the dust and dirt therefrom and eject it into a bag or other separator which retains the dirt and allows the escape of the air. Experience shows that different floor coverings are best cleaned with the suction nozzle arranged at varying heights; also that lint, threads, dressmakers' scraps, and certain other material can be dislodged only by means of some moving type of brush or agitating device. Accordingly the objects of this invention are the provision of a new and improved elevation adjuster; the provision of a new and improved construction and arrangement of the nozzle and brush chamber; the provision of a new and improved means for operating the brush; the provision of means whereby the brush can be operated by the traction of the supporting wheels without impeding the vertical adjustment of the cleaner by the movement of the same wheels; while further objects and advantages will appear as the description proceeds.

This application is a division of my former application filed July 9, 1915, Serial No. 38,862. One embodiment of my said invention is illustrated in the drawings accompanying and forming a part of this application, although it will be understood that the same constitutes only one out of numberless operative constructions in which my invention may be utilized. In these drawings Figure 1 represents a side elevation of my improved cleaner, the nozzle being illustrated in longitudinal section; Fig. 2 is a top plan view of the nozzle and fan chamber shown in Fig. 1; Fig. 3 is a bottom plan view of the portion of the machine shown

in Fig. 2; and Fig. 4 is a perspective view of a part of my improved machine showing the elevation adjuster.

Describing the parts by reference characters, 1 represents the fan chamber, consisting of a hollow cylindrical shell having a central axial inlet 2 in one face and having a motor casing 3 secured to its opposite face. Projecting forwardly and downwardly from the forward face of the fan casing is the collecting nozzle 4 terminating at its lower end in a pair of spaced parallel lips 5, 6 defining between them the elongated suction slot or inlet mouth 7. Viewed from above said nozzle is of generally triangular or fan shape as shown in Fig. 2, being of its greatest breadth at the mouth 7, which therefore runs transversely of the machine, and becoming narrower as it progresses rearwardly until it reaches the neck 8 whereby it is joined to the fan casing 1.

The rearward portion of the machine is supported by means of a suitable roller or caster 10 secured to the motor shell, while the forward end of the same is supported upon rollers 11, 11 secured rigidly to the ends of a shaft 12 which is journaled in a movable frame 13 hinged to the fan casing at 14. Rigidly connected to the frame 13 is a lever 15 which projects upwardly past one side of the neck 8 and engages notches 16 in said neck whereby the frame 13 is held in adjusted position. The lever 15 is made slightly flexible or resilient so as to permit it to be sprung from one notch to the next.

The lips 5 and 6 are parallel to the shaft 12 the lip 5 lying close to and slightly above the horizontal plane which is tangent to the bottom of the wheels 10 and 11 when the nozzle is in its lowest position as shown in Fig. 1. It is merely necessary that this lip do not fall beneath that plane otherwise it would scrape upon the floor; it is obvious that adjustment of the lever 15 in a forward direction will elevate the nozzle above the location shown. The lip 6 is disposed at a slightly higher level than the lip 5 so as always to leave a narrow opening therebeneath, and at the rear of the lip 6 is a depending wall 20 parallel to both lips and extending from one side of the nozzle to the other so as to define an elongated brush

chamber. The ends of the wall 20 are joined to the corresponding ends of the lips 5, 6, by means of end walls 21, 21.

The chamber defined between the wall 20 and lip 6 constitutes a brush chamber and in this space 25 I mount a rotatable brush 26, its ends being journaled in bearings 27, 27 of the usual or any suitable type. At some point between these bearings, preferably at the center of the brush I provide a belt pulley 28 connected by means of a crossed belt 29 with a belt pulley 30 carried by the shaft 12. The belt 29 is preferably longitudinally elastic such as a coil spring (although I do not limit myself to this material, since rubber and leather are also elastic), and passes through an aperture 31 formed in the wall 20. This crossing of the belt, in addition to the advantages of giving a more perfect hold upon the wheels and of rotating the brush 26 against the motion of the sweeper, permits the aperture 31 to be made of a minimum size, the diameters of the pulleys 28 and 30 and the location of the wall 20 being so chosen that the two sides of the belt cross at or near the plane of this opening.

The casing is moved about the floor by means of a suitable handle 35 pivoted thereto upon a transverse axis 36 parallel to the shaft 12, and the dust removed by the suction is delivered to a porous bag 36 secured to the outlet neck 37 which projects from the side of the fan chamber 1. The collecting nozzle and brush chamber are elevated slightly above the floor level under all conditions of operation, the effect of the suction being to elevate the carpet or floor covering into contact with the lip 5 and brush 26. Vertical adjustment of this nozzle and brush chamber is permitted without impeding the operation of the belt owing to the fact that the shaft 12 in all positions of adjustment lies approximately upon the straight line joining the axes of the pivot 14 and brush 26, so that the vertical adjustment of the wheels 11 is accompanied by a minimum change in the distance between the wheels and brush. The elevation of the carpet by the suction causes some air to penetrate the fabric and to prevent the lodgment of dirt therein; additional air enters the brush chamber through the aperture 31 and passes along the top of the carpet and underneath the lip 6 which is at such a height as never to come in contact with the fabric. The relation of the brush to this air slot prevents refuse from being drawn into the brush body and entangled with the bristles thereof, but rather tends to make the brush self-cleaning, the particles displaced by the brushing being caught in the rapid rush of air beneath this lip and so swept without stopping directly into the collecting nozzle. The vertical adjust-

ment at the front of the machine rather than at the rear affords a larger range of adjustment while maintaining the plane of the suction mouth at a fixed angle relative to the floor. The matters of detail which I have described are not invariable but large changes may be made in the construction, arrangement and design of parts, wherefore I do not limit myself to the details here set forth except as the same are recited in the claims hereto annexed or rendered necessary by the prior state of the art.

Having thus described my invention what I claim is:—

1. In a suction cleaner, a collecting nozzle having a narrow, elongated, downwardly-facing suction mouth, transversely arranged, a rotatable agitating device journaled to said nozzle parallel to said suction mouth and in operative relation therewith, a bracket pivoted to said casing upon an axis parallel to said agitating device, a rotatable shaft journaled to said bracket upon an axis parallel with such pivot, movement-transmitting mechanism operatively connecting said shaft and agitating device, and means for adjusting said bracket angularly about its pivot, said agitating device, bracket pivot, and shaft being substantially in the same plane.

2. In a suction cleaner, a collecting nozzle having a narrow elongated downwardly-facing suction mouth transversely arranged, a rotatable agitating device journaled to said nozzle parallel to said suction mouth and in operative relation therewith, a pair of traction rollers located one at each side of said casing with their axes substantially parallel to said agitating device, said rollers being located rearwardly from and outside of said nozzle, a pulley rotatable with said rollers, a belt embracing said pulley and connected with said agitating device, and means for adjusting said rollers transversely of the direction of said belt, whereby said nozzle can be raised or lowered.

3. In a suction cleaner, a casing having a fan chamber and a suction nozzle, said nozzle having a narrow, elongated, downwardly-facing suction mouth, transversely arranged, a rotatable agitating device journaled beside said suction mouth, a depending wall located on the opposite side of said brush from said mouth and coöperating with the nearer lip of said suction mouth to form a brush chamber, supporting rollers arranged one at each side of said casing between said mouth and fan chamber and having their axes in alinement with each other and parallel to said agitating device, floor engaging supporting means carried by said casing upon the opposite side of said rollers from said suction mouth, a pulley rotatable with said rollers, a second pulley rotatable

with said agitating device, and a belt connecting said pulleys, the wall of said nozzle being discontinuous for the passage of said belt and the nearer lip of said suction mouth being elevated above the farther lip so as to give communication between the brush chamber and suction mouth.

4. In a suction cleaner, a casing having a fan chamber and a suction nozzle, said nozzle having a narrow elongated, downwardly-facing suction mouth, transversely arranged, and a brush chamber adjacent to said suction mouth, a rotatable agitating device journaled inside said brush chamber, a pair of supporting rollers arranged one at each side of said casing between said mouth and fan chamber and having their axes in alignment with each other and parallel to said agitating device, a pulley rotatable with said rollers, a second pulley carried by said agitating device inside said brush chamber and a crossed belt connecting said pulleys, the wall of said nozzle being apertured for the passage of said belt and the sizes and positions of said pulleys being so chosen that said belt crosses substantially at such aperture.

5. In a suction cleaner, a casing having a fan chamber and a suction nozzle, said nozzle having a narrow elongated downwardly facing suction mouth transversely arranged, a rotatable agitating device journaled to said nozzle upon an axis parallel to said suction mouth and in operative relation therewith, a supporting frame hinged to said casing upon a transverse axis parallel to said suction mouth, a pair of supporting rollers journaled to said frame one at each side of said casing between said mouth and fan chamber and having their axes in alignment and parallel to said agitating device, pulleys rotatable with said rollers and agitating device respectively, a belt connecting said pulleys and means for adjusting said frame angularly about its hinge axis whereby said nozzle can be raised and lowered

relatively to the floor, said hinge, and pulleys lying approximately in a straight line when said rollers are in their mid position of adjustment.

6. In a suction cleaner, a casing having a fan chamber and a collecting nozzle carried thereby, said nozzle having a downwardly facing elongated suction mouth spaced from said casing, and a brush chamber adjacent to said suction mouth, the plane of the edges of said suction mouth being parallel to the axis of said fan chamber and its maximum dimension being transverse to the axis of said fan chamber, a rotatable agitating device journaled inside said brush chamber, a bracket hinged to said casing at a point between said fan chamber and suction mouth, a rotatable shaft journaled in said bracket, traction wheels secured to said shaft, one at each side of said casing, pulleys carried by said shaft and said agitating device, a belt connecting said pulleys, the wall of said brush chamber being apertured for the passage of said belt, and means for securing said bracket in a plurality of adjusted positions about its hinge, the mean position of said shaft being substantially in the plane defined by said bracket hinge and agitating device.

7. In a device of the character described, a casing having a floor tool formed with a brush chamber, a rotatable agitating device therein, suction devices connected to said tool, a pulley carried by said agitating device, a driving pulley carried by said casing outside of said tool, means for rotating said last pulley, and a crossed belt connecting said pulleys, the wall of said tool being apertured for the passage of said belt and the sizes and positions of said pulleys being so chosen that said belt crosses substantially at said aperture.

In testimony whereof I hereunto affix my signature.

JAMES B. KIRBY.