Nov. 7, 1933. H. L. VINE 1,933,645

SUCTION CLEANER

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Fig. 1.

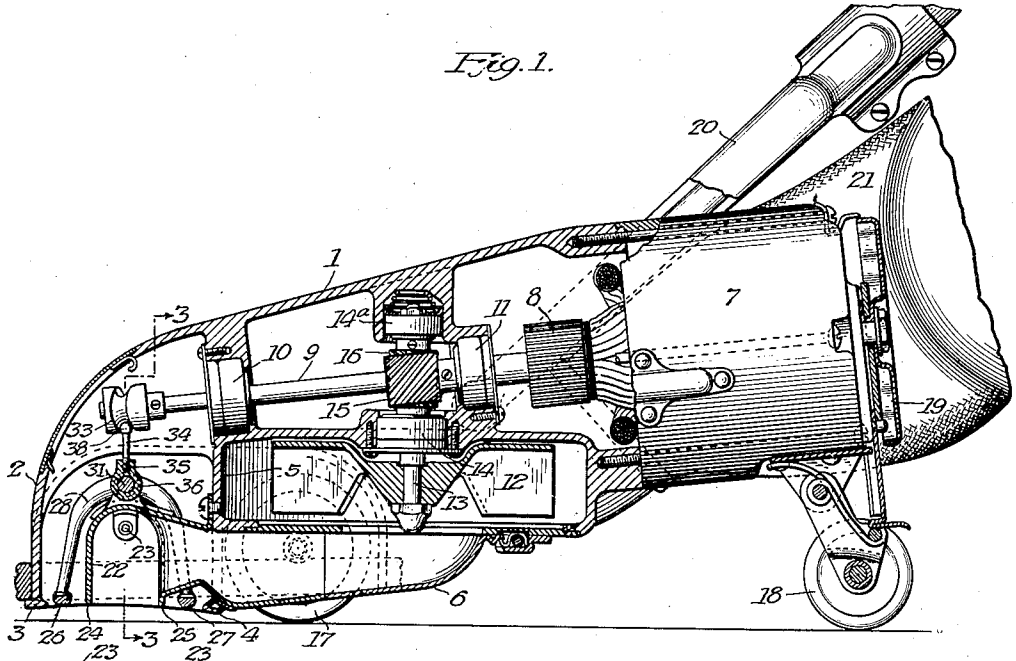
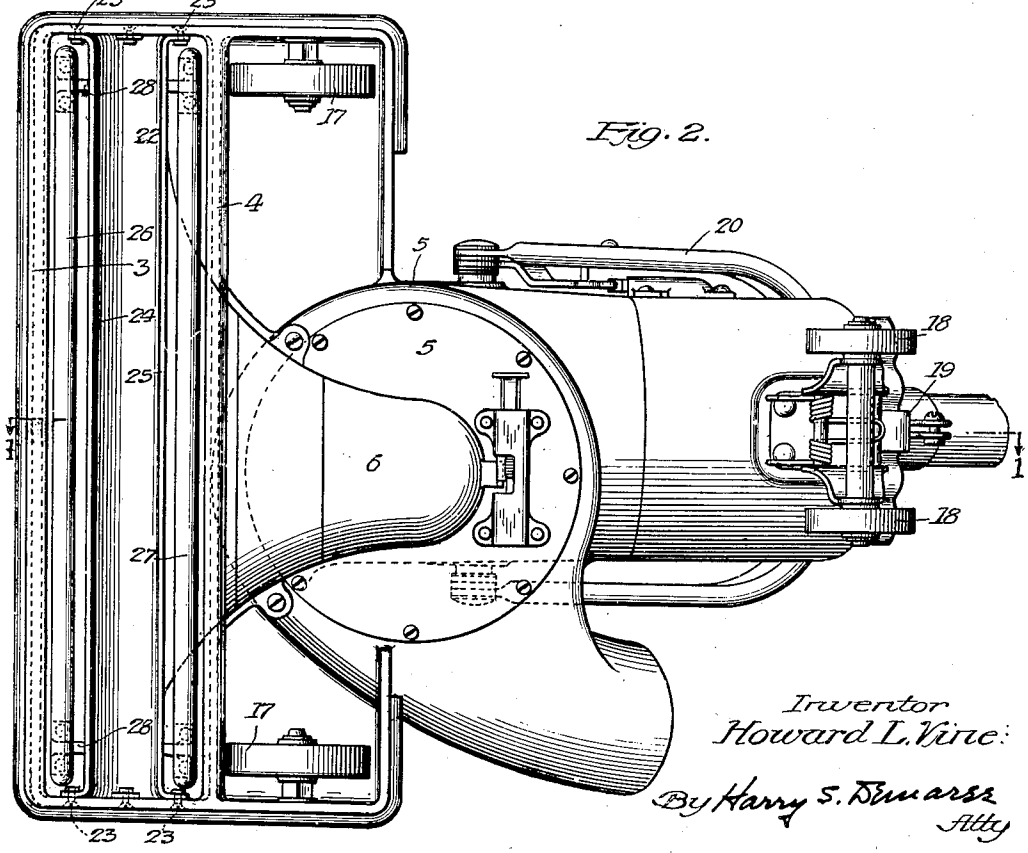


Fig. 2.



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Fig. 3.

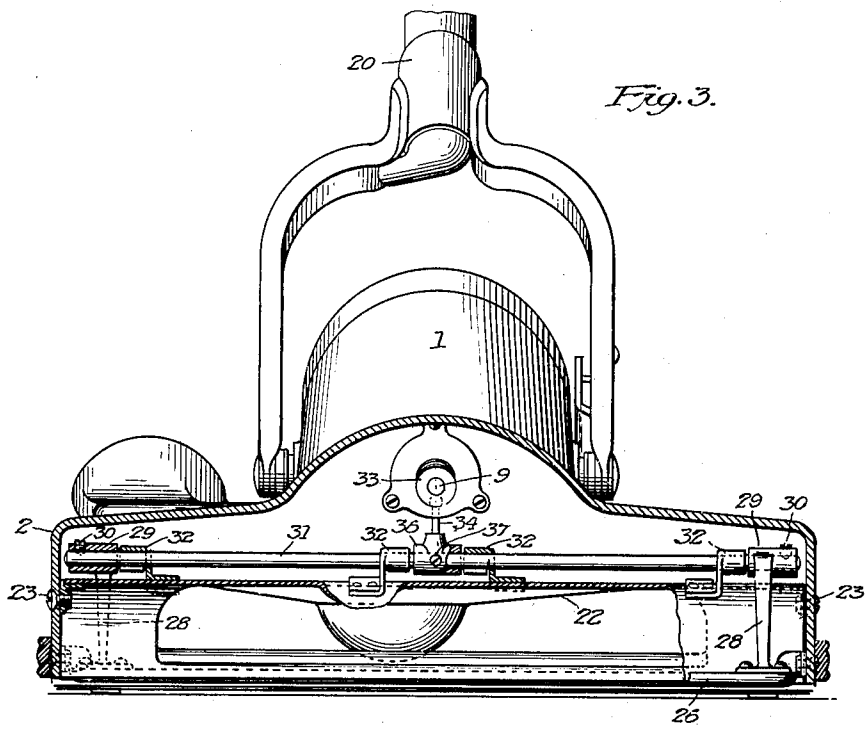
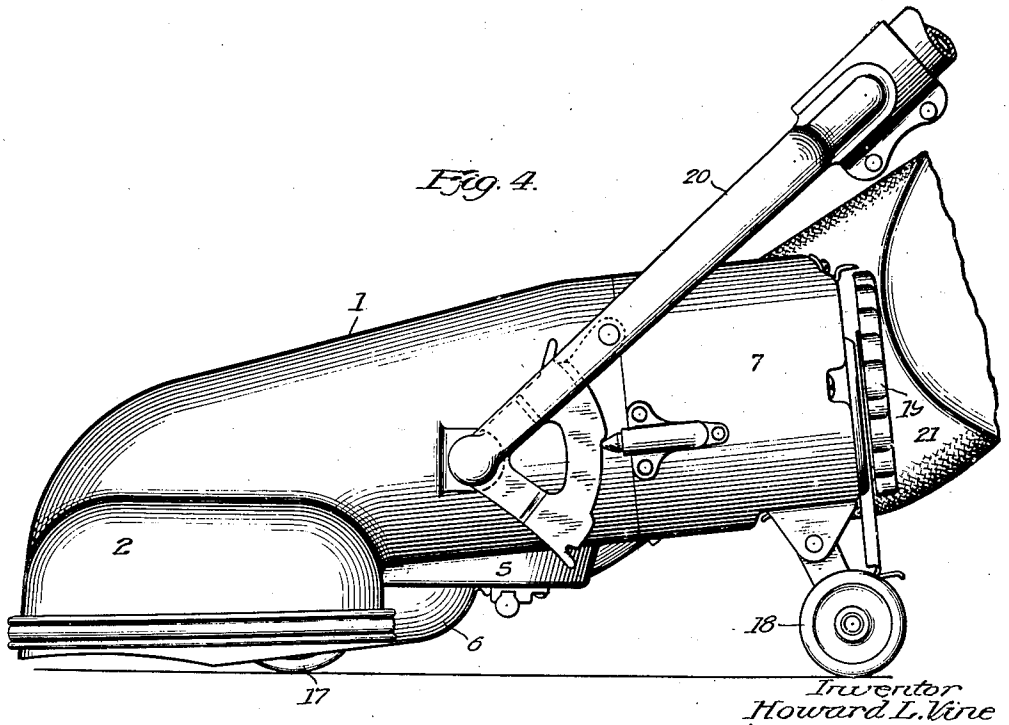


Fig. 4.



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Patented Nov. 7, 1933 1,933,645

UNITED STATES PATENT OFFICE

1,933,645

SUCTION CLEANER

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Application July 25, 1931. Serial No. 553,078

6 Claims. (Cl. 15—13)

The present invention relates to suction cleaners in general and particularly to a new and novel combination of air cleaning and positive beating means in a suction cleaner. More specifically the invention comprises the provision, in a suction cleaner, of new and novel means to effect the suspension of that portion of the surface covering undergoing cleaning while making use of the maximum cleaning ability of the air flow, coupled with the provision of positive beating means which agitate the suspended portion of the surface covering.

It is an object of the present invention to provide a new and improved suction cleaner construction. It is a further object of the present invention to provide, in a suction cleaner, a new and novel combination of air cleaning and positive agitating means. A still further object is the provision, in a suction cleaner, of a main nozzle, a secondary nozzle, and positive beating means. Still another object is the provision, in a suction cleaner, of a main nozzle, a secondary nozzle, and reciprocating beating means which act upon the surface covering undergoing cleaning upon both sides of the transversely extending secondary nozzle yet which is positioned within the main nozzle. A still further object is the provision, in a suction cleaner, of a main nozzle, a transversely extending secondary nozzle positioned within the main nozzle and which is directly connected with the fan chamber, and reciprocating positively actuated beating means in the main nozzle. These and other objects will appear upon reading the following specification and claims and upon considering in connection therewith the annexed drawings to which they relate.

In the drawings, in which a preferred embodiment of the present invention is disclosed and in which the same reference characters refer to the same parts throughout:

In Fig. 1 is shown a side view on line 1—1 of Fig. 2, partly in section, of a suction cleaner embodying the present invention;

Fig. 2 is a bottom view of the cleaner shown in Fig. 1;

Fig. 3 is a section upon the line 3—3 of Figure 1;

Fig. 4 is an exterior side view of the cleaner embodying the present invention.

The suction cleaner embodying the present invention is shown to comprise a body 1, which includes a suction nozzle 2 having relatively broad lips which are surface-contacting and which are indicated by the reference characters 3 and 4; a fan chamber 5 which is positioned rearwardly of the nozzle 2 and interiorly connected thereto by means of the air passageway 6; a motor casing 7 which houses the driving motor 8 of the cleaner, the shaft 9 of which is rotatably mounted in bearings 10 and 11 carried by the cleaner body 1; the fan 12 positioned within the fan chamber 5 and which is carried by the substantially vertical shaft 13 mounted in a bearing 14, positioned in the upper wall of the fan chamber 5, and an upper bearing 14*a* carried by body 1, the shaft being connected, through gears 15 and 16, to the motor shaft 9. The cleaner is movably supported by front wheels 17, 17 and rear wheels 18, 18, the latter being provided with height-adjusting means, indicated generally by the reference character 19, by which the cleaner may be pivoted about the front supporting wheels as an axis to adjust the nozzle height for various surface coverings. A pivoted handle 20 is provided, as in the usual suction cleaner, by means of which the cleaner may be propelled by the operator over the surface covering undergoing cleaning. A suitable dust receptacle 21 is connected to the exhaust outlet of fan chamber 5 and is adapted to receive the dirt-laden air exhausted therefrom in the operation of the machine.

Positioned within the main nozzle 2, which is a closed chamber entirely sealed from the remainder of the interior of the cleaner and open to the exterior atmosphere only through the nozzle mouth defined by the lips 3 and 4, is what is technically described as a secondary nozzle. This nozzle, indicated by the reference character 22, extends transversely across the cleaner in the main nozzle 2, being suitably secured by means 23, 23 etc. at the ends thereof. Nozzle 22 is provided with surface-contacting lips 24 and 25 which extend parallel to the main nozzle lips 3 and 4 and which are adapted to contact the surface covering therebetween in the operation of the machine. Nozzle 22 is interiorly connected to the air passageway 6 and so to the interior of fan chamber 5.

Positioned within the main nozzle 2, one upon each side of the secondary nozzle lips 24 and 25 and extending parallel thereto substantially midway between them and the main nozzle lips 3 and 4, are the rigid beating elements 26 and 27. Elements 26 and 27 are connected, at their extremities by the U-shaped arms 28, 28 which are themselves suspended, through being provided with seat portions 29, 29 and removable set screws 30, 30, on the transversely extended rocking shaft 31 which is mounted in bearings 32, 32 etc. upon the top of the secondary nozzle. The motor shaft 9 is extended within the main nozzle 2 and is provided, immediately over the transversely extending shaft 31, with a cam race 33. A projecting arm 34 is carried by the shaft 31 through being screw-threaded, as at 35, into the socket of a seat member 36 which encloses the shaft 31 and which is non-rotatably mounted thereon and held in place by means of the set-screw 37. At its upper

end the shaft 34 is provided with a rounded head 38 which slidingly seats within the race of the cam 33, which race is so formed that upon the rotation of the shaft 9 the arm 34 is reciprocated or wobbled about the shaft 31 as an axis. It is obvious that upon the reception of the oscillating movement by the arm 34, shaft 31 will be rocked resulting in the alternate raising and lowering, or beating action, of the elements 26 and 27 between the spaced lips of the main nozzle and the secondary nozzle.

In the operation of this new and improved suction cleaner constructed in accordance with the present invention, the rotation of the cleaner motor 8, upon the reception of electric current therein, rotates the shaft 9. Fan 12 within the fan chamber 5, being directly connected to the motor shaft 9 through the shaft 13 and the intermeshing gears 15 and 16, is also rotated resulting in the creation of a reduced pressure in the fan chamber and also in the air passageway 6; secondary nozzle 22 being directly connected interiorly to the air passageway 6 also is affected by the reduced pressure therein and air is drawn between the lips 24 and 25. Upon the reduction of pressure in secondary nozzle 22 that portion of the surface covering which is positioned immediately therebelow is lifted into contact with the lips 24 and 25 and, as the pressure is also reduced in the main nozzle 2 because of the air drawn therefrom under the lips 24 and 25, said covering also contacts the main nozzle lips 3 and 4 resulting in a still greater reduction in the pressure in the main nozzle. The surface covering is then suspended across the mouth of the main nozzle 2 and contacts the nozzle lips 3 and 4. Upon the rotation of the motor shaft 9 a still further action results in that the rotation of cam race 33 results in the oscillation of the transversely extending shaft 31 through the mechanism aforedescribed, resulting in the substantially vertical reciprocation of agitating or beating means 26 and 27. These means being reciprocated at a high rate of speed, beat the surface covering which is suspended between the nozzle lips 3 and 4 functioning to dislodge the embedded foreign matter therein and to make possible its removal into the secondary nozzle 22 under the lips 24 and 25 thereof as the cleaning air enters that member. As in the usual suction cleaner the air which is drawn into the suction-creating fan chamber is exhausted into the dirt receptacle which in this instance is indicated by the reference character 21.

I claim:—

1. In a suction cleaner of the type adapted to lift the surface covering from its supporting surface, a body including a main nozzle having surface-contacting lips, a secondary nozzle having surface-contacting lips positioned in said main nozzle, means movably supporting said body with the lips of said nozzles above the normal plane of the surface covering undergoing cleaning, suction-creating means connected to said secondary nozzle adapted to create a reduced pressure therein which is effective in said main nozzle, the air therefrom being drawn into said secondary nozzle, for the purpose of lifting the surface covering undergoing cleaning into contact with said lips, and surface-agitating means in said main nozzle at the sides of said secondary nozzle.

2. In a suction cleaner of the type adapted to lift the surface covering from its supporting surface, a body including a main nozzle having surface-contacting lips, a secondary nozzle having surface-contacting lips positioned in said main nozzle, means movably supporting said body with the lips of said nozzles above the normal plane of the surface covering undergoing cleaning, suction-creating means connected to said secondary nozzle adapted to create a reduced pressure therein which is effective in said main nozzle, the air therefrom being drawn into said secondary nozzle, for the purpose of lifting the surface covering undergoing cleaning into contact with said lips, and reciprocating agitating means in said main nozzle adapted to contact a surface covering undergoing cleaning between the lips of said main nozzle and the lips of said secondary nozzle, and means to actuate said agitating means.

3. In a suction cleaner of the type adapted to lift the surface covering from its supporting surface, a body including a main nozzle having surface-contacting lips, a secondary nozzle having surface-contacting lips positioned in said main nozzle, means movably supporting said body with the lips of said nozzles above the normal plane of the surface covering undergoing cleaning, suction-creating means connected to said secondary nozzle adapted to create a reduced pressure therein which is effective in said main nozzle, the air therefrom being drawn into said secondary nozzle for the purpose of lifting the surface covering undergoing cleaning into contact with said lips, and reciprocating surface-beating means in said main nozzle upon the opposite sides of said secondary nozzle adapted to exert a force having a vertical component on the surface covering undergoing cleaning between the lips of said main nozzle and the lips of said secondary nozzle, and means to actuate said surface-beating means.

4. In a suction cleaner, a body including a main nozzle having broad sealing lips, a secondary nozzle in said main nozzle having lips which are relatively narrow as compared to the width of said main nozzle lips, suction-creating means interiorly connected to said secondary nozzle and adapted to create a reduced pressure in said nozzles, surface-agitating means in said main nozzle outside said secondary nozzle, and means to actuate said agitating means.

5. In a suction cleaner, a body including a main nozzle having surface-contacting lips, a secondary nozzle having surface-contacting lips positioned in said main nozzle, rigid surface-agitating means in said main nozzle, means pivotally mounting said agitating means, suction-creating means in said body interiorly connected to said secondary nozzle, a driving motor in said body, and means operatively connecting said motor to said suction-creating means and to said agitating means.

6. In a suction cleaner, a body including a main nozzle having spaced surface-contacting nozzle lips, a secondary nozzle in said main nozzle having spaced surface-contacting lips extended substantially into the plane of said main nozzle lips and spaced therefrom, elongated rigid surface-beating elements in said main nozzle, means mounting said elements for movement through the plane of said nozzle lips, suction-creating means interiorly connected to said secondary nozzle, and means to reciprocate said beating elements.

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