Feb. 3, 1959 L. POLO 2,871,975

VACUUM CLEANERS

Filed Sept. 23, 1955 2 Sheets-Sheet 1

Fig.1.

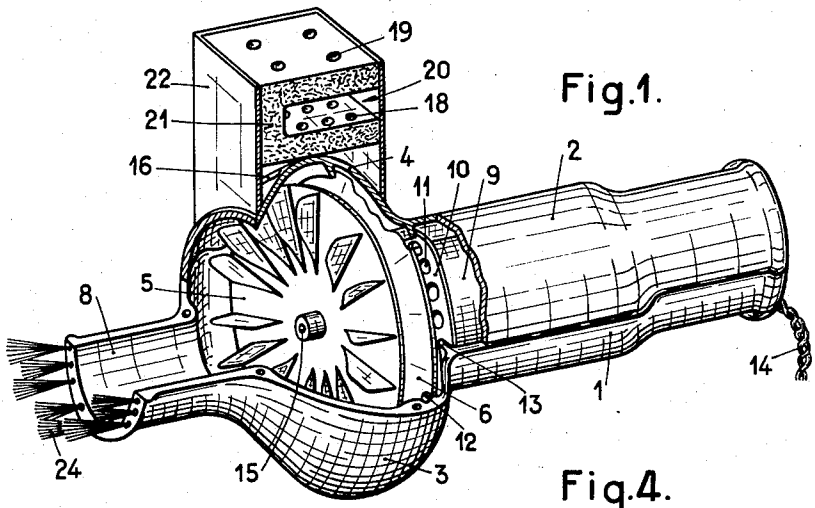


Fig.2.

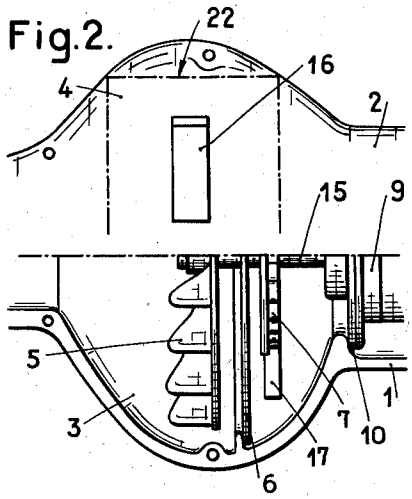


Fig.3.

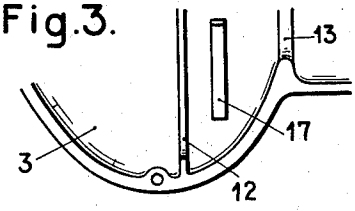
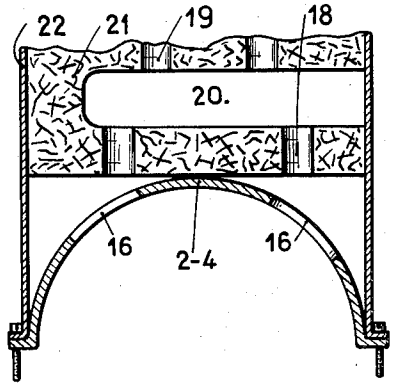


Fig.4.



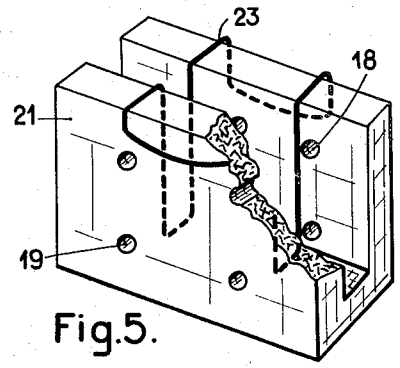


Fig.5.

Inventor:
Louis Polo
By:
Michael S. Striker
agt.

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VACUUM CLEANERS

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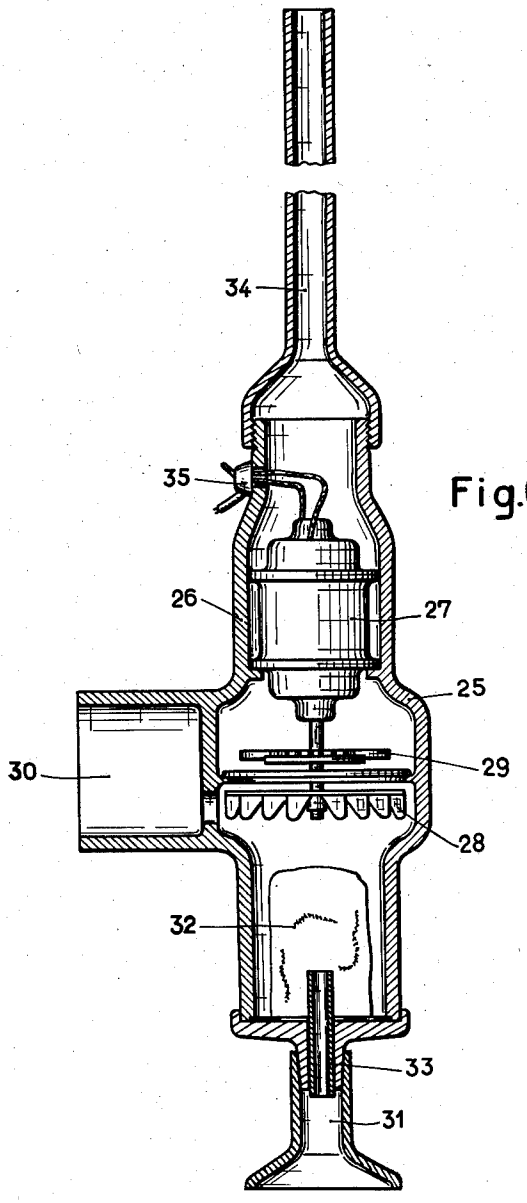


Fig.6.

Inventor:
Louis Polo
By:
Michael S. Striker
agt.

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2,871,975

VACUUM CLEANERS

Louis Polo, Annemasse, France, assignor to Radios S. A., Bellegarde (Ain, France), a corporation of the French Republic

Application September 23, 1955, Serial No. 536,257

Claims priority, application Switzerland October 8, 1954

2 Claims. (Cl. 183—21)

The vacuum cleaners known hitherto comprise, principally, a motor, a screw designed to set the air in motion and a filter bag the purpose of which is to retain the dust from the air current passing through it.

It is quite obvious that great difficulties are encountered in the realization of such an arrangement owing to the fact that the better the bag retains the dust, the less it allows the air to pass through it. Thus all vacuum cleaners are a compromise beween the power limits imposed on the motor and the filtering conditions still permissible for the bag. As the latter allows the finest particles of dust to pass through, traces of them are found not only in the motor, which is harmed by this dust, but also in the air escaping from the apparatus, which air is laden with the particles and returns them to the surrounding atmosphere. As evidence of this we would mention only the fine flour-like layer which is particularly visible on polished wood after each cleaning with the vacuum cleaner.

The bag and the relatively powerful motor of such vacuum cleaners, moreover, render them bulky.

The vacuum cleaner according to the present invention remedies these drawbacks in that at least part of an air current passing through the apparatus and containing at least the finest particles of dust is conveyed at a given moment through deflecting means which are arranged in a material capable of retaining moisture and designed to fix the dust in the manner of certain mucous membranes of the human body.

A spongy, vegetable or synthetic material will be chosen for this purpose, by way of example the so-called vegetable sponge or other kinds of sponge used primarily in the household or else for washing the bodywork of automobiles. The more the said material retains moisture a long time, the better qualified it is to fulfill the purpose just mentioned.

The annexed drawing illustrates two embodiments of the invention, given by way of example.

Fig. 1 is a general view of the vacuum cleaner according to the first embodiment, shown in perspective, without a bag and with portions broken off.

Fig. 2 shows that part of the said vacuum cleaner which contains the suction rotor and an auxiliary motor cooling rotor.

Fig. 3 is a partial view of a shell of the vacuum cleaner body.

Fig. 4 is a cross-section through the element for extracting dust from the air.

Fig. 5, finally, shows in perspective, with portions broken off, that member of the said element which is capable of retaining moisture.

Fig. 6 is a longitudinal section of the second embodiment, comprising a bag.

The vacuum cleaner according to Fig. 1 comprises a body of generally cylindrical shape, formed by two shells 1 and 2 which have a wider portion 3 and 4 respectively

located approximately one third of the distance along the said body.

In this wider portion the following are arranged coaxially and on a motor shaft common to the revolving parts: a suction rotor with centrifugal action 5, a disk 6 (partially broken off) forming a dividing wall, a rotor 7 for circulating cooling air for the motor, the said rotor also having a centrifugal action and being visible only in Fig. 2.

The suction rotor 5 faces the mouthpiece 8 forming the first third of the apparatus' length and the air circulation rotor 7 faces the part shaped like a handle which forms the other two thirds of the apparatus and contains the electric motor 9 which is partly supported by the disk 10 perforated with holes 11.

The position of the disk 6, like that of the disk 10, is determined in the body 1—2 by internal circular ribs 12 and 13 of the shells (see Figs. 1 and 3).

The motor 9 is supplied with electric power by the flex 14 which enters the apparatus through the opening at the opposite end from the mouthpiece 8.

The circuit-breaker may be located on the flex outside the apparatus or form a part of the latter. It has not been illustrated to avoid overloading the drawing unnecessarily.

The shaft common to the motor 9 and the two rotors 5 and 7 is found at 15; it merges into the shaft of the whole apparatus.

The two shells 1 and 2 have slots in their wider portion, two slots 16 for the shell 2 being located in the plane of the suction rotor and one lateral slot 17 for the shell 1 located in the plane of the cooling air rotor 7 (see Figs. 1 and 2, and 2 and 3 respectively).

Thus the air sucked in by these two rotors, either through the mouth piece 8 or through the motor 9 and the holes 11, is expelled radially through the slots 16 on the one hand, and through the slot 17 on the other.

As this air emerging through the opening 17 has become heated by contact with the motor, it should be noted that it forms a warm current enabling the apparatus to be used, additionally, to dry the hair for instance.

The other current, laden, as will be seen, with the dust which the apparatus is designed to absorb, passes on the other hand through deflecting means in the form of holes 18 and 19, as well as through an intermediate chamber 20, foreseen in a piece of vegetable or synthetic sponge 21 which is held facing the slots 16 by a metal frame 22 (see its position in Fig. 2).

Deflection occurs owing to the fact that the holes 18 and 19, either by their number or by their arrangement or by their number and arrangement are disposed so as not to be opposite each other, with the result that the air can not pass through this element of the apparatus without changing direction in the chamber 20, that is, by eddying there.

The sponge is preferably soaked in water beforehand, then wrung out just sufficiently to prevent a surplus of water dripping from it. It should be made of a material capable of retaining the most moisture possible.

Fig. 5 shows this sponge in perspective and illustrates how its profile can be kept invariable by means of a brace 23 made of a wire bent in a suitable manner.

The apparatus described in the foregoing operates as follows:

The mouth piece 8, which is equipped with small brushes 24 for the purpose, is passed over the objects to be cleaned. In view of the reduced dimensions of the apparatus, it is thus possible to brush various ornamental mouldings, knick-knacks and small objects which one does not want to be constantly moving, furniture, particularly parts of the latter difficult of access, furs, fabrics,

clothes, and to suck in the detached dust caught up by the air driven by the rotor 5.

This air, expelled through the openings 16, passes through the deflecting means in the damp sponge 20. Both in the holes 18 and 19 and in the chamber 29 the dust suspended in this air settles and sticks to the sponge. Once the latter is laden with dust, it need merely be washed and soaked again in clean water so that the operation can be repeated.

It could also be impregnated with a disinfectant, deodorant or even a perfume for instance.

In view of the fact that the apparatus does not develop great power, it is suitable for the cleaning of furs, the hairs of which are pulled out by too powerful vacuum cleaners. The apparatus thus forms an excellent and practical clothes brush and is very handy to use for its weight can be reduced to about 500 gm. Also it consumes very little power.

It is to be noted that the brushes 24 do not all have the same length, but that long ones alternate with short ones. This crenellated arrangement has the advantage of allowing a current of air, needed to carry along the dust, to pass between the free ends of the said brushes.

It is obvious that this dust absorbing process could not be applied in its entirety to large vacuum cleaners, but on the other hand it is suitable for the better retention of flour-fine dust which has not yet been mastered by any brush or vacuum cleaner since it even passes through vacuum cleaner bags which then return it to the surrounding air.

To remedy this latter drawback a special application of the present invention has been envisaged for large vacuum cleaners.

In this case, and without dispensing with the bag designed to retain coarse dust and refuse, at least one moist sponge is attached to the vacuum cleaner, the air already pre-filtered by the bag being passed through the deflecting means in the said sponge so as to deposit there all that has not been retained by the bag.

The suggestion has already been made to fit vacuum cleaners with filters located behind the bag so as to protect the motor from fine dust. These filters, however, apart from the fact that they act in exactly the same way as the bag, but in a finer degree, check the flow of air considerably and thus cause a drop in pressure which renders the suction ineffective.

In the case of the present invention there is never any filtering; there are, however, open deflecting means which offer virtually no resistance to the passage of air.

Thus, the apparatus described and illustrated only requires a low-powered motor, while the addition of an absorbant, moist element to a large vacuum cleaner will in no way reduce its effectiveness.

It is moreover possible to construct relatively small vacuum cleaners with a bag, as is shown by the second embodiment in Fig. 6 which is merely a modification of the first embodiment just described.

Here, too, there are two shells 25 and 26 containing the motor 27 together with the suction rotor 28 and the air circulation rotor 29, as well as the housing 30 for the damp sponge through which the air sucked in through the mouthpiece 31 is blown. Here, however, the air, instead of passing directly from the mouthpiece through the rotor 28 to the sponge—which, though not illustrated, is arranged at 30—first passes through a filter bag 32.

The purpose of this bag is to retain coarse dust and its mesh can therefore even be larger than that of conventional vacuum cleaner bags. It would even be possible to use wire netting.

Once the air has passed through the bag, it will deposit the remaining dust, i. e. the fine particles, in the sponge. As the latter does not act as a filter, it provides no additional resistance to that offered by the bag 32. On the contrary, the result will be air which is perfectly clean owing, firstly, to the fact that it is filtered by the bag and, secondly, to the fact that all the fine particles of dust are retained in the damp sponge.

As the bag 32 here opens directly into the mouthpiece 31, a tube 33 is provided which penetrates into the bag so as to prevent the dust falling back into the mouthpiece. A valve made of little strips of fabric or leather might also be provided.

Finally, a sleeve 34 is envisaged which can be screwed on to the body of the vacuum cleaner, on the outside of which is arranged the circuit-breaker 35 for the motor 27.

It is obvious that as the embodiment described and illustrated is only given by way of example, the invention may be realized in many other ways without departing from its framework.

What I claim is:

1. A vacuum cleaner adapted to be carried with one hand of the operator comprising, in combination, an elongated housing having a pair of end portions extending in opposite directions and being each formed with an air suction opening, one of said end portions forming a handle for holding said vacuum cleaner, said housing having intermediate said end portions an outwardly bulging portion aligned with said end portions on a common axis and being formed with a pair of spaced air outlet openings; a wall located between said spaced air outlet openings, extending substantially normal to said axis transversely through said bulging portion of said housing and dividing said housing into a first and a second compartment each having an air suction opening and an air outlet opening; a chamber open at one end and being attached at the other end thereof to said outwardly bulging portion of said housing so that the air outlet opening of said first compartment communicates with the interior of said chamber; sponge means located in said chamber intermediate the ends thereof and being formed with air passages therethrough, said sponge means being adapted to be moistened with dust-absorbing liquid; first impeller means located adjacent said wall in said first compartment for sucking air through said air suction opening of said first compartment and expelling said air through said air outlet opening of said first compartment into said chamber and through said air passages in said sponge means into the atmosphere; second impeller means located adjacent to said wall in said second compartment for sucking air through said suction opening in said second compartment and expelling said air through said air outlet opening in said second compartment; drive means located in said second compartment between said air suction opening and said air outlet opening formed therein and being connected by a shaft extending through said wall through said first and second impeller means for driving the same, so that dust contained in the air sucked in by the first impeller means will be absorbed by the dust-absorbing liquid as said air passes through said passages in said sponge means so that the air sucked in by the first impeller means will be expelled from the vacuum cleaner substantially dust-free, whereas the air sucked in by the second impeller means will pass over said drive means to cool the same and whereby the two air streams moved by said first and second impeller means are completely separated from each other.

2. A vacuum cleaner adapted to be carried with one hand of the operator comprising, in combination, an elongated housing having a pair of end portions extending in opposite directions and being each formed with an air suction opening, one of said end portions forming a handle for holding said vacuum cleaner, said housing having intermediate said end portions and outwardly bulging portion aligned with said end portions on a common axis and being formed with a pair of spaced air outlet openings; a wall located between said spaced air outlet openings, extending substantially normal to said axis transversely through said bulging portion of said housing and dividing and housing into a first and a second compartment each having an air-suction opening and

an air outlet opening; a chamber open at one end and being attached at the other end thereof to said outwardly bulging portion of said housing so that the air outlet opening of said first compartment communicates with the interior of said chamber; a U-shaped sponge located in said chamber with the legs of said U-shaped sponge extending between the walls of said chamber, said legs being formed with a plurality of air-passages therethrough and the air passages in one of said legs being offset relative to said air passages in the other of said legs, said sponge being adapted to be moistened with dust-absorbing liquid; first impeller means located adjacent said wall in said first compartment for sucking air through said air suction opening of said first compartment and expelling said air through said air outlet opening of said first compartment into said chamber and through said air passages in said sponge means into the atmosphere; second impeller means located adjacent to said wall in said second compartment for sucking air through said suction opening in said second compartment and expelling said air through said air outlet opening in said second compartment; drive means located in said second compartment between said air suction opening and said air outlet opening formed therein and being connected by a shaft extending through said wall through said first and second

impeller means for driving the same, so that dust contained in the air sucked in by the first impeller means will be absorbed by the dust-absorbing liquid as said air passes through said passages in said sponge so that the air sucked in by the first impeller means will be expelled from the vacuum cleaner substantially dust-free, whereas the air sucked in by the second impeller means will pass over said drive means to cool the same and whereby the two air streams moved by said first and second impeller means are completely separated from each other.

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