July 18, 1933. G. LJUNGQUIST 1,918,764

VACUUM CLEANER

Filed Feb. 28, 1933

Fig. 1.

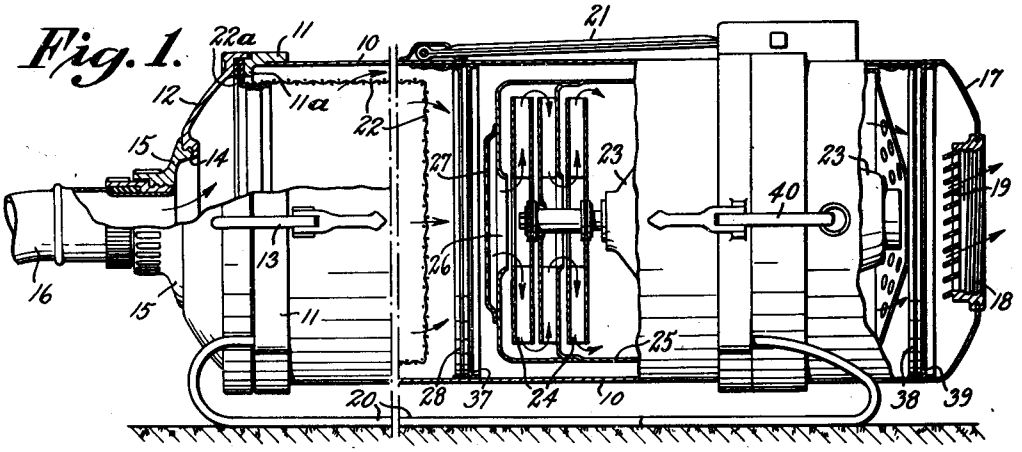
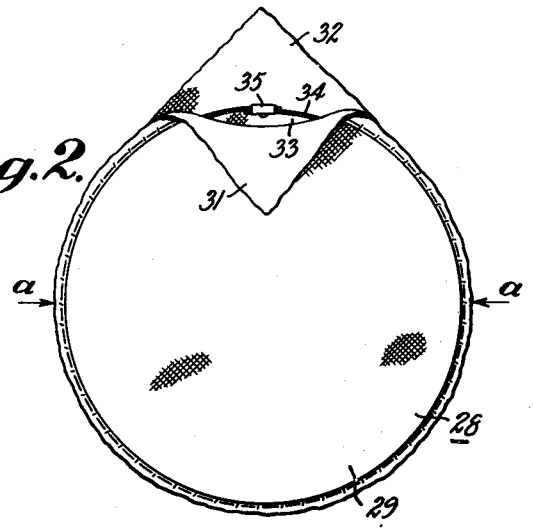


Fig. 2.



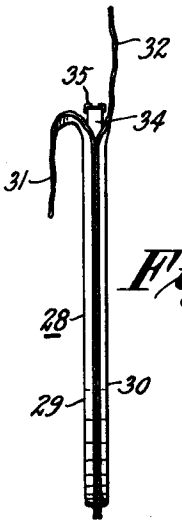


Fig. 3.

Fig. 4.

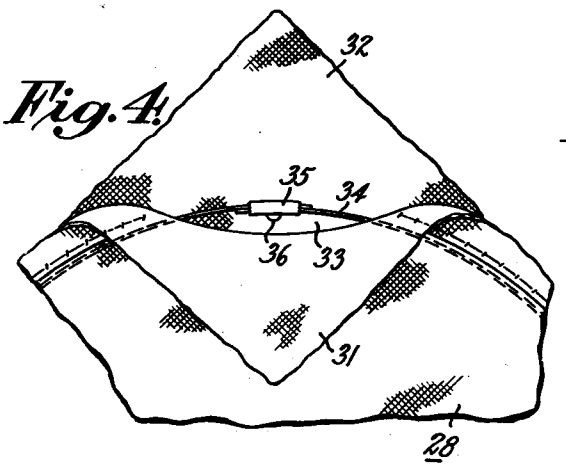


Fig. 5.

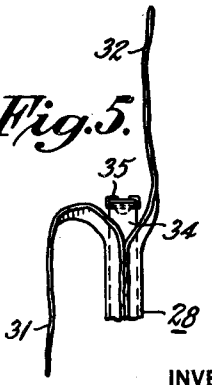
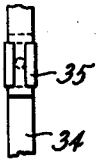


Fig. 6.



INVENTOR
Gustaf Ljungquist
BY
Wm. T. Hedlund
his ATTORNEY

Patented July 18, 1933 1,918,764

UNITED STATES PATENT OFFICE

GUSTAF LJUNGQUIST, OF STOCKHOLM, SWEDEN, ASSIGNOR TO ELECTROLUX CORPORATION, OF DOVER, DELAWARE, A CORPORATION OF DELAWARE

VACUUM CLEANER

Application filed February 28, 1933, Serial No. 658,919, and in Germany March 10, 1932.

My invention relates to vacuum cleaners and particularly to vacuum cleaners of the enclosed bag type. More specifically my invention relates to a filter for use in vacuum cleaners of this type. The purpose of the filter is to further clean and purify air which has passed through the dust bag, or other dust separating member of the vacuum cleaner.

Among the objects of my invention is to provide a filter comprising a cloth member supported on a resilient frame, which frame serves to expand the cloth member against the interior of the cleaner casing, thus holding it securely in place and preventing the leakage of air around the edges thereof, the frame at the same time being readily removable from the cloth member so that a new cloth member may be substituted.

Further objects and advantages of my invention will be apparent from the following description considered in connection with the accompanying drawing, which forms a part of this specification and on which:

Fig. 1 is an elevational view, partially in cross-section, of a vacuum cleaner embodying my invention;

Fig. 2 is an end view of a filter shown in Fig. 1;

Fig. 3 is a side view of the filter shown in Fig. 2;

Fig. 4 is an end view on an enlarged scale of a portion of the filter shown in Figs. 2 and 3;

Fig. 5 is a side view of the filter shown in Fig. 4; and

Fig. 6 is a top view of a portion of the filter.

Referring more particularly to Fig. 1, reference character 10 designates a casing or barrel, preferably cylindrical, and made of rigid material which is impervious to air. One end of barrel 10 is provided with a ring 11 having an annular flange 11*a* to which may be clamped a cap 12 by means of suitable snap fasteners 13. Cap 12 is provided with a centrally located air inlet opening 14 formed with screw threads which is adapted to receive a coupling member 15 provided with similar screw threads. A hose 16 leading from a suitable cleaning implement is adapted to be received in a central opening in coupling 15.

The other end of barrel 10 is provided with a cap 17 which is formed with a central air discharge opening 18. Opening 18 is formed with screw threads and is adapted to receive coupling 15 when the vacuum cleaner is used for blowing, in well known manner. A plurality of upwardly inclined vanes 19 are arranged adjacent to opening 18 and serve to direct air discharged therefrom upwardly and away from the floor or other surface upon which the cleaner may be supported. The cleaner is supported by means of a pair of runners 20, there being one runner on each side of the cleaner. The cleaner is adapted to be carried by means of a handle 21 secured to the upper side thereof.

A dust bag 22 has an open end secured to a ring 22*a*. Ring 22*a* has a flange, preferably provided with a packing ring, which is adapted to be clamped between flange 11*a* of ring 11 and cap 12. The other end of the bag is closed. The bag may be made of cloth or other suitable material which is pervious with respect to air but prevents the passage therethrough of dust. Between the closed end of dust bag 22 and discharge opening 18 within the barrel 10 is suitably mounted an electric motor 23 upon the armature shaft of which is mounted a centrifugal fan comprising one or more rotors 24. Rotors 24 are preferably enclosed within a fan housing 25 having an axially located inlet opening 26 in front of which is a perforated plate 27.

Between plate 27 and the closed end of the dust bag 22 there is located a filter 28. This filter is shown more in detail in Figs. 2 to 6. Filter 28, in its preferred form, comprises two pieces of cloth 29 and 30. As is clearly shown in Fig. 2, these pieces of cloth are cut with a substantially circular outline with the exception of a tab or projecting part 31 and 32, respectively. The two pieces are sewed together around the periphery of their circular part, but are not joined together in the region of the tabs or extensions 31 and 32. There is thus formed a flat bag

member having an opening 33 at one side in its periphery. Preferably, the opening is approximately diagonal to the direction of the threads of the cloth, as is clearly indicated in Fig. 4.

A frame 34 comprising a comparatively thin resilient strip of metal bent to form a closed figure is adapted to be inserted through opening 33 into the flat bag formed by the pieces of cloth 29 and 30. In unstressed state this strip of metal is straight. A sleeve 35 is secured to one end of strip 34 by means of a rivet 36 or the like. The other end of strip 34 is adapted to be slidably inserted into sleeve 35. In order to remove the frame from within the filter cloth, force is exerted by the operator's hands on either side of the filter member in the direction of the arrows *a* in Fig. 2. This causes the end of strip 34 which is free to slide in sleeve 35 to move to the right, as viewed in Figs. 2 and 4, and this free end of the strip extends out through opening 33. In this manner the diameter of the strip 34 within the filter bag is reduced until it is small enough to pass through the opening 33. The strip 34 may then be inserted into a new filter bag.

When removing the filter from within the barrel 10, cap 12 is removed by unfastening catches 13, whereupon bag 22 may be removed from the barrel. Tabs 31 and/or 32 may then be grasped and filter 28 may be moved to the left, as viewed in Fig. 1. When the filter strikes flange 11*a* it is compressed sufficiently, due to its resilient nature, to pass the flange. Thus, it is possible to remove and insert a filter, which normally has the same diameter as the interior of casing 10, through the smaller opening afforded by flange 11*a*, without the provision of any special means, such as slots in the flange or portions of reduced diameter of the filter. When the filter is placed back in the barrel, strip 34, which is resilient and hence tends to take the greatest diameter possible, expands to force the edge of the filter outwardly against the interior of the casing or barrel 10. The filter is thus held securely in place within the barrel and a leakage of air around the edge of the filter is prevented.

An annular ring 37 may be secured to the interior of barrel 10. This ring serves as an abutment against which filter 28 is held due to the passage of air through the barrel or casing and serves to prevent the filter from being drawn against plate 27.

A similar filter to the one just described is preferably placed in cap member 17 between the motor and discharge opening 18. This second filter is designated by reference character 38. An annular ring 39, similar to ring 27, is provided against which filter 38 abuts. In order to replace filter 38, cap member 17 may be removed from the barrel 10 by unfastening catches 40, which may be similar to catches 13.

The operation of the above described device is as follows:

Upon rotation of fan rotors 24, driven by motor 23, a current of air is caused to pass through hose 16 to within dust bag 22. If the cleaning tool attached to the end of hose 16 is passed over a dusty surface, the air drawn into the dust bag is laden with dust. This air passes through the pervious material of which the dust bag is constructed, while the dust is unable to pass through the material and is deposited within the bag. The air then passes through filter 28, through perforated plate 27 and the opening 26 in the fan housing to the rotor 24. From here it is discharged through or around motor 23, thus cooling the motor and thence passes through filter 38 and is discharged upwardly through discharge opening 18.

Filter 28 serves to intercept any exceedingly fine particles of dust which may have passed through the material of the dust bag. Either or both filters 28 and 38 may be impregnated with suitable chemicals to charge the air passing therethrough with vapor thereof or in any other manner condition such air. Also the filter bags may be filled through opening 33 with suitable crystals or other solid substance for treating the air which will then pass in contact with them. The presence of filters 28 and 38 on either side of the fan and motor serves to completely enclose these moving parts and thus to deaden the sound produced by their rotation. The resilient nature of the filters makes it possible to have both filters 28 and 38 alike, although the former has to be capable of being passed through the somewhat smaller opening afforded by flange 11*a*.

While I have described one more or less specific embodiment of my invention, it will be apparent that modifications thereof fall within its scope, which is to be limited only by the appended claims viewed in the light of the prior art.

What I claim is:

1. The combination with a vacuum cleaner comprising a casing having a curved cross-section and formed with an air inlet opening and an air discharge opening, a dust separating member in said casing between said openings, and means for producing flow of air through said casing, of a filter in said casing between said dust separating member and said discharge opening, said filter comprising a flat cloth bag member formed with an opening along a portion of the edge thereof, and a resilient frame adapted to be inserted through the last mentioned opening into said bag member and adapted to expand and force said bag member against the interior of said casing.

2. The combination with a vacuum cleaner

comprising a casing having a curved cross-section and formed with an air inlet opening and an air discharge opening, a dust separating member in said casing between said openings, and means for producing flow of air through said casing, of a filter in said casing between said dust separating member and said discharge opening, said filter comprising a flat cloth bag member formed of two pieces of cloth joined together along the greater part of their edges and having an opening along the remaining part of their edges, and a resilient frame adapted to be inserted through the last mentioned opening into said bag member and adapted to expand and force said bag member against the interior of said casing.

3. The combination with a vacuum cleaner comprising a cylindrical casing formed with an air inlet opening and an air discharge opening, a dust separating member in said casing between said openings, and means for producing flow of air through said casing, of a filter in said casing between said dust separating member and said discharge opening, said filter comprising a flat circular cloth bag member formed of two pieces of cloth, each having a generally circular outline and a projecting portion, said pieces of cloth being secured together along the circular portion of their edges and having an opening adjacent to the projecting portions, and a resilient frame adapted to be inserted through said last mentioned opening into said bag member and adapted to expand and force said bag member against the cylindrical interior of said casing.

4. The combination with a vacuum cleaner comprising a casing having a curved cross-section and formed with an air inlet opening and an air discharge opening, a dust separating member in said casing between said openings, and means for producing flow of air through said casing, of a filter in said casing between said dust separating member and said discharge opening, said filter comprising a flat cloth bag member, and a resilient frame within said bag member, said frame comprising a strip of resilient material bent to form a closed figure, the ends of said strip having sliding engagement with each other whereby said frame is adapted to expand and force said bag member against the curved interior of said casing.

5. The combination with a vacuum cleaner comprising a casing having a curved cross-section and formed with an air inlet opening and an air discharge opening, a dust separating member in said casing between said openings, and means for producing flow of air through said casing, of a filter in said casing between said dust separating member and said discharge opening, said filter comprising a flat cloth bag member formed with an opening along a portion of the edge thereof, and a resilient frame adapted to be inserted through said last mentioned opening into said bag member, said frame comprising a strip of resilient material bent to form a closed figure, the ends of said strip having sliding engagement with each other whereby said frame is adapted to be compressed sufficiently for passage through said last mentioned opening and is adapted to expand and force said bag member against the curved interior of said casing.

6. The combination with a vacuum cleaner comprising a cylindrical casing formed with an air inlet opening and an air discharge opening, a dust separating member in said casing between said openings, and means for producing flow of air through said casing, of a filter in said casing between said dust separating member and said discharge opening, said filter comprising a flat circular cloth bag member formed of two pieces of cloth, each having a generally circular outline and a projecting portion, said pieces of cloth being secured together along the circular portion of their edges and having an opening adjacent to the projecting portions, and a resilient frame adapted to be inserted through said last mentioned opening into said bag member, said frame comprising a strip of resilient material bent to form a circular figure, the ends of said strip having sliding engagement with each other whereby said frame is adapted to be compressed sufficiently for passage through said last mentioned opening and is adapted to expand and force said bag against the curved interior of said casing.

7. A filter comprising a circular cloth bag member formed with an opening along a portion of the periphery thereof, and a resilient frame adapted to be compressed to be inserted through said opening into said bag member and adapted to expand and hold said bag member in extended state.

8. A filter comprising a flat circular cloth bag member formed of two circular pieces of cloth joined together along the greater part of their edges and having an opening along the remaining part of their edges, and a resilient frame adapted to be compressed to be inserted through said opening into said bag member and adapted to expand and hold said bag member in extended state.

9. A filter comprising a flat circular cloth bag member formed of two generally circular pieces of cloth, each piece of cloth having a projecting portion, said pieces of cloth being joined together along the circular part of their outline and having an opening adjacent to the projecting portions, and a resilient frame adapted to be compressed to be inserted through said opening into said bag member and adapted to expand and hold said bag member in extended state.

10. A filter comprising a circular cloth bag member and a resilient frame insertable into

said bag member, said frame comprising a strip of resilient material bent to form a closed figure, the ends of said strip having sliding engagement with each other whereby said frame is adapted to expand and hold said bag member in extended state.

11. A filter comprising a circular cloth bag member formed with an opening along a portion of the periphery thereof, and a resilient frame insertible into said bag member, said frame comprising a strip of resilient material bent to form a closed figure, the ends of said strip having sliding engagement with each other whereby said frame is adapted to be compressed sufficiently for passage through said opening and is adapted to expand and hold said bag member in extended state.

12. A filter comprising a circular cloth bag member formed with an opening along a portion of the periphery thereof, said opening being arranged diagonally with respect to the directions at which extend the threads in said cloth, and a resilient frame adapted to be compressed to be inserted through said opening into said bag member and adapted to expand and hold said bag member in extended state.

GUSTAF LJUNGQUIST.