

March 24, 1942.

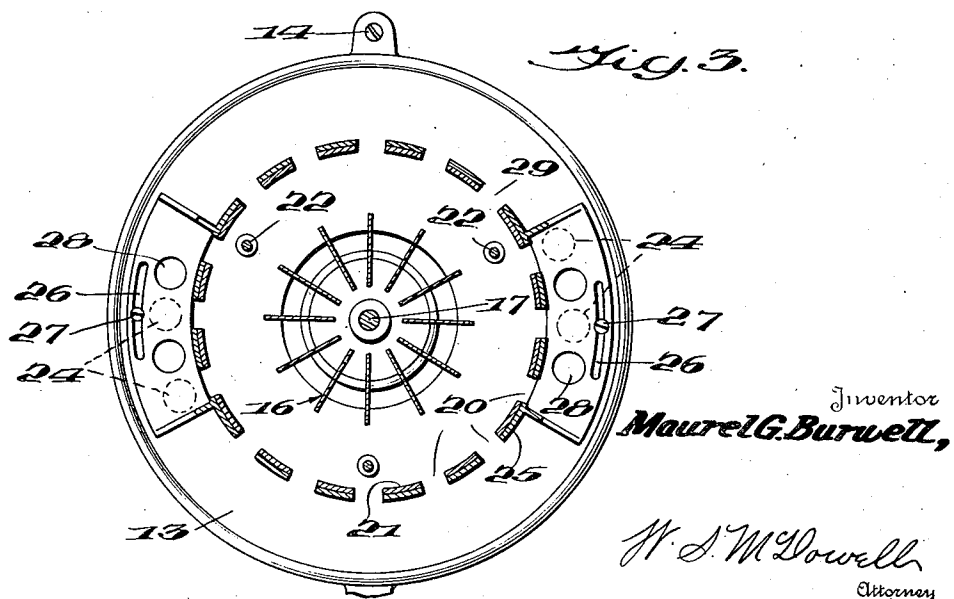
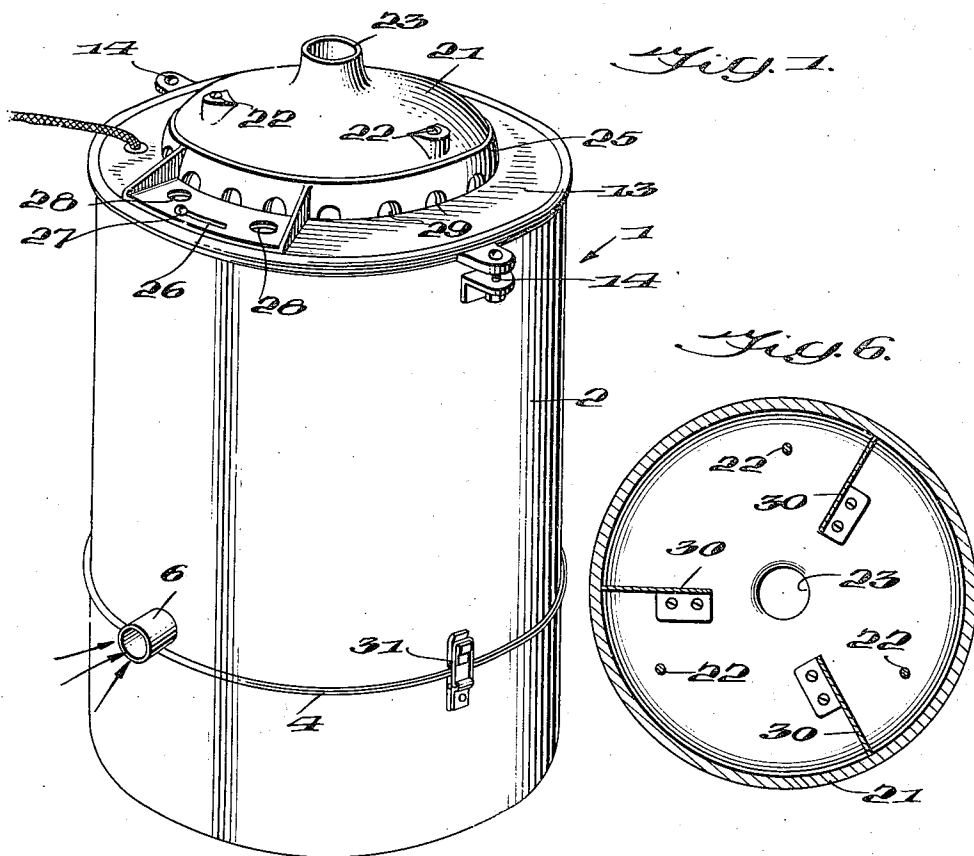
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2,277,069

VACUUM CLEANER

Filed March 31, 1939

3 Sheets-Sheet 1



March 24, 1942.

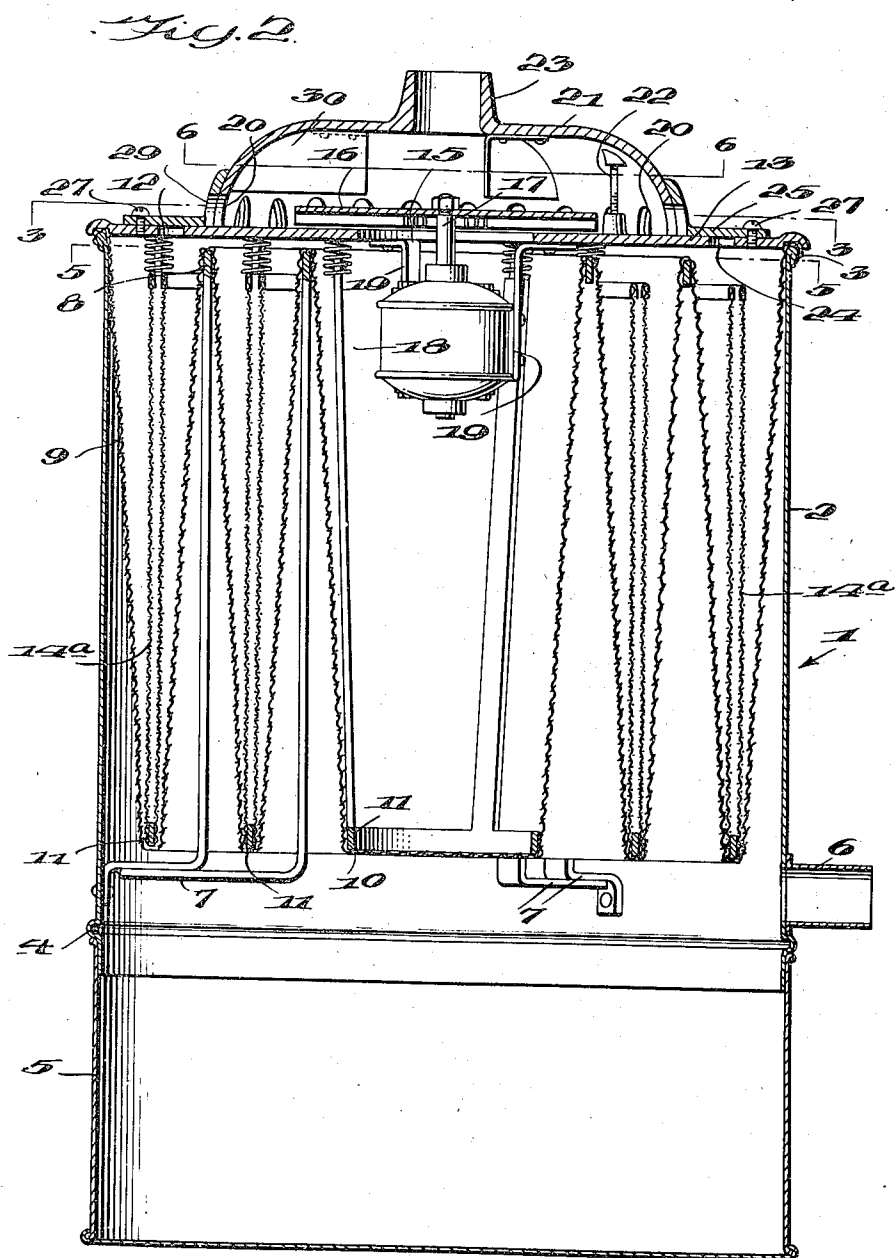
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Fig. 4.

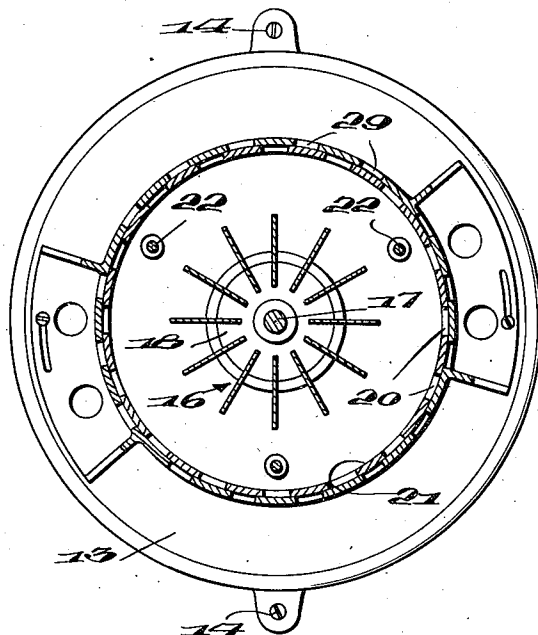
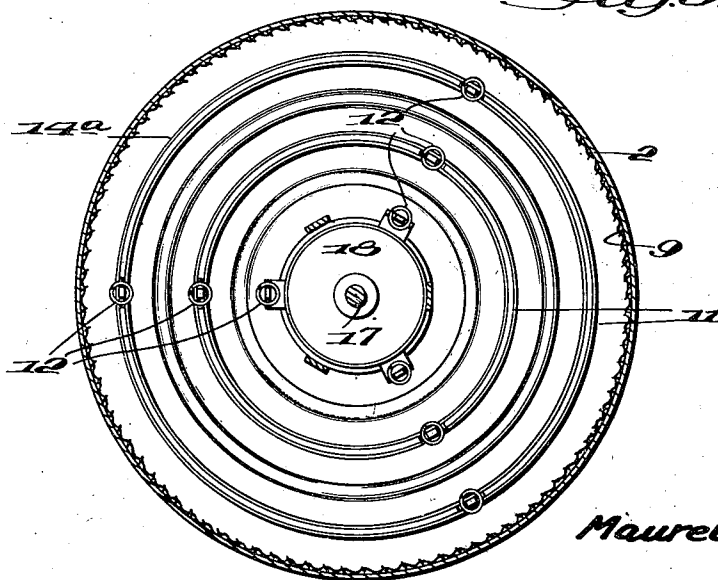


Fig. 5.



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UNITED STATES PATENT OFFICE

2,277,069

VACUUM CLEANER

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Application March 31, 1939, Serial No. 235,318

7 Claims. (Cl. 183—37)

This invention relates generally to vacuum cleaners and is particularly directed to a cleaner for use in hotels, business establishments and office buildings or by cleaners of air conditioning systems. The primary object resides in the provision of a compact portable unit having a high cleaning capacity which is due to the employment of a relatively large air filter.

Another object of the invention resides in the formation of a cleaner from which the soil may be removed without dismantling the machine or removing the filter therefrom. The filter is vibrated and the dirt falls from the filter by gravity.

A further object resides in the employment of a conical fabric filter and means for supporting the filter to cause it to be arranged in a plurality of telescoped sections. This novel arrangement reduces the size requirements of the casing and provides a large area for the filtering of the air passing through the cleaner.

A still further object resides in the formation of a cleaner having means connected therewith whereby the device may be readily converted from a vacuum machine to a blower without requiring the removal or substitution of additional parts.

Other objects will be apparent from the following description and the accompanying drawings in which the invention has been illustrated in its preferred form.

Fig. 1 is a perspective view of a vacuum cleaner formed in accordance with the present invention;

Fig. 2 is a vertical longitudinal sectional view taken through the machine shown in Fig. 1;

Fig. 3 is a horizontal sectional view taken on the plane indicated by the line 3—3 of Fig. 2 and shows the mechanism in a normal position;

Fig. 4 is a similar view showing the mechanism in an adjusted position to convert the cleaner into a blower;

Fig. 5 is a horizontal sectional view taken on the plane indicated by the line 5—5 of Fig. 2;

Fig. 6 is a horizontal sectional view taken on the plane indicated by the line 6—6 of Fig. 2.

Referring more particularly to the drawings, the numeral 1 designates the cleaner in its entirety. The body 2 of the cleaner is formed from a cylindrical section of metal and is provided with a rolled bead 3 at its upper end and an enlargement 4 spaced slightly from the lower end. The enlargement 4 engages the upper edge of a pan-shaped receiver 5 in which the dirt gathered by the cleaner settles as the cleaner is being used. Immediately above the enlargement 4, the side wall of the body 2 is formed with an opening

through which the dirt enters the cleaner. On the outside of the body, a nipple 6 is provided for the purpose of attaching a flexible hose to the machine. The side wall 2 is also provided at spaced intervals with bracket members 7 projecting inwardly and upwardly and terminating at their upper ends in concentric filter supporting rings 8.

Extending over the head 3 is the large end of a frusto-conical fabric filter 9, the small end of which is closed as at 10. The intermediate portion of the filter extends over the rings 8 and is forced downwardly therebetween by tensioning rings 11. These rings have upwardly extending bars secured thereto which engage compression springs 12. The closed end of the filter is held down in the casing 2 in the same manner as the intermediate portions. This method of supporting the filter provides a plurality of concentrically arranged sections which are frusto-conical in form and are connected to one another at their upper and lower ends. It also permits the use of a large filter in a comparatively small casing. The springs 12 engage the under surface of a top plate 13 secured by screws 14 to the casing 2.

The concentric sections of the filter are held in spaced relationship by cylindrical spacers 14^a which are formed of wire netting and are placed on either side of the bars which hold the tension rings 11 in engagement with the filter. The plate 13 has a large opening 15 formed at its center and a centrifugal-type impeller 16 is disposed above the plate in registration with the opening. The impeller is secured to the armature shaft 17 of an electric motor 18 mounted to the under side of the plate 13 by supporting straps 19. The external diameter of the impeller is slightly greater than the diameter of the opening and when the impeller is rotated by the action of the motor, the vanes thereon will withdraw air from the interior of the casing 2 through the opening 15.

The air thus withdrawn will be replaced by air passing into the casing through the nipple 6. This air will be cleaned as it passes through the filter and the dirt thus removed will drop from the filter into the receiver 5. The air discharged by the fan or impeller is thrown by centrifugal force through peripheral openings 20 provided in a dome-shaped cover 21 secured to the top plate 13 by screws 22. At the center of the cover, there is provided an upwardly directed tubular extension 23 through which air passes when the device is employed as a blowing mechanism. Beyond the periphery of the cover 21, the plate 13 is

formed with circumferentially spaced openings 24 which are closed when the machine is operated as a cleaner by a valve ring 25. The latter member has a pair of diametrically opposed wing sections which register with the openings 24 and are provided with slots 26 through which screws 27 extend to hold the ring in connection with the plate 13.

When the ring is adjusted from the position shown in Fig. 3 to that shown in Fig. 4, the openings 28 in the wings will register with the openings 24 and provide for the passage of air into the casing above the filter 9. The valve ring is also provided with spaced openings 29 for registration with the openings in the periphery of the cover member when the valve ring is in position to close the openings 24. When the openings 28 register with the openings 24, the openings 29 will be out of registration with those in the periphery of the cover member and the air issuing from the fan will be prevented from passing therethrough. This air must then find another outlet which will be the outlet in the extension 23.

To prevent the air from churning around in the cover when the openings 20 are closed, a plurality of baffles 30 are secured to the under side of the cover and project toward the impeller. These baffles, by preventing the air from churning within the cover, cause it to be directed toward the outlet in the extension 23 and permit the impeller to draw more air from the interior of the casing. The diameter of the opening in the extension 23 is substantially equal to the diameter of the nipple 6 so that the same flexible conduit may be attached to either the inlet or the outlet and a second conduit will not be required. As the device is being operated as a vacuum cleaner, the air passing through the filter tends to draw the concentric sections taut and a force is applied to the springs 12 tending to compress them. After the flow of current to the motor is discontinued, the spring compressing force will be interrupted and the springs permitted to expand. This sudden expansion causes a vibration of the filter and any adhering dirt will be loosened and drop into the receiver 5. The operator may turn the motor on and off several times to increase the vibration of the filter to further loosen the dirt.

After the cleaning operation has been completed, the casing may be released from the receiver by the manipulation of the clips 31 employed in securing these elements and the receiver conveyed to a point where the soil may be deposited. By providing the filter which is self cleaning, it need not be removed from the casing since it will always be maintained in a clean condition. This is especially desirable in cleaners of this type.

From the foregoing, it will be seen that a vacuum cleaner has been provided which is compact, yet possesses a large cleaning capacity and may be readily converted from a cleaner into a blower without the employment of tools or the removal of parts. The device is self cleaning and the soil may be removed therefrom without inconvenience or requiring the removal of the entire cleaner to the point where the soil is to be deposited.

What is believed to be new and it is desired to secure by Letters Patent is set forth in the following claims.

I claim:

1. In a vacuum cleaner of the type having a

casing formed with an air inlet, air filtering means comprising a substantially conical fabric element, means for securing the larger end of said element to said casing, sets of concentric ring-like members disposed in longitudinally spaced relation in said casing, said fabric element extending around said ring members to form a plurality of concentrically disposed frusto-conical sections, a pair of cylindrical foraminated members between certain adjoining frusto-conical sections, and means for maintaining the foraminated members of said pairs in spaced relation.

2. In a vacuum cleaner of the type having a casing formed with an air inlet, air filtering means comprising a substantially conical fabric element, means for securing the larger end of said element to said casing, a set of concentric ring members supported by said casing adjacent to the point of connection of said fabric element thereto, a second set of concentric ring members disposed in closer relationship to the air inlet, means for resiliently maintaining the position of the rings of said second set, said fabric element being trained around said ring members to form a plurality of nested frusto-conical sections, and foraminated cylindrical spacer elements disposed in sets and cooperating with said resilient position maintaining means to prevent contact between adjoining sections of said filter when said cleaner is in operation.

3. A vacuum cleaner of the type having a vertically disposed cylindrical casing having an inlet adjacent to the lower end and an outlet at the upper end and motor driven means adjacent to the upper end for causing air to flow into the casing through the inlet and out through the outlet, comprising filter means for the air having a frusto-conical fabric element having its large end secured to the casing, means for forming and holding the element in a plurality of concentric upright and inverted frusto-conical sections, and a pair of re-iculated cylindrical spacer elements disposed in spaced order between each inverted section and the upright section disposed immediately inwardly thereof, the cylindrical elements of each pair being spaced.

4. A mechanism for converting a vacuum cleaner of the type having a casing formed with primary air inlet and outlets and a motor driven fan for establishing a flow of air through said casing into a blower, comprising secondary air inlet and outlets, and valve means normally closing the secondary air inlet, said valve means being movable to a position to close the first air outlet and open the secondary air inlet.

5. A mechanism for converting a vacuum cleaner of the type having a casing formed with primary air inlet and outlets, a filter between the inlet and outlet, and a motor driven fan for establishing a flow of air through said casing into a blower; comprising secondary air inlet and outlets disposed on the same side of said filter as the motor driven fan, and valve means normally closing the secondary air inlet, said valve means being movable to a position to close the first air outlet and open the secondary air inlet whereby air may enter said casing and flow from the secondary outlet without passing through said filter.

6. In a vacuum cleaner of the type having a casing formed with an air inlet, air filtering means comprising a substantially conical fabric element, means for securing the larger end of said element to said casing, spaced sets of concentric ring-like

members supported in said casing, said fabric element being trained around said members to produce a plurality of oppositely arranged frusto-conical sections disposed in concentric relationship, and cylindrical spacer members positioned between certain of said frusto-conical sections to prevent contact therebetween when the cleaner is in operation, said spacer members having double foraminated walls.

7. In a vacuum cleaner of the type having a cylindrical casing with an air inlet, a cover with an air outlet, and a motor driven blower carried by the cover, filter means comprising a conical fabric element secured at its larger end to the casing, a set of concentric ring members sup- 15

ported by said casing adjacent to said cover, the intermediate portion of said fabric element extending over said ring members, a second set of ring members engaging the fabric element between the ring members of the first set, bar means engaging the rings of said second set and extending toward said cover, compression springs between the ends of said bar members and said cover, said springs serving to maintain the fabric element taut at all times, and foraminated cylindrical members positioned on the inner and outer sides of said bars, said members serving to maintain the adjacent folds of said fabric element in spaced relation.

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