Oct. 31, 1933. A. A. FORSBERG 1,933,105

VACUUM CLEANER

Filed March 30, 1932 2 Sheets-Sheet 1

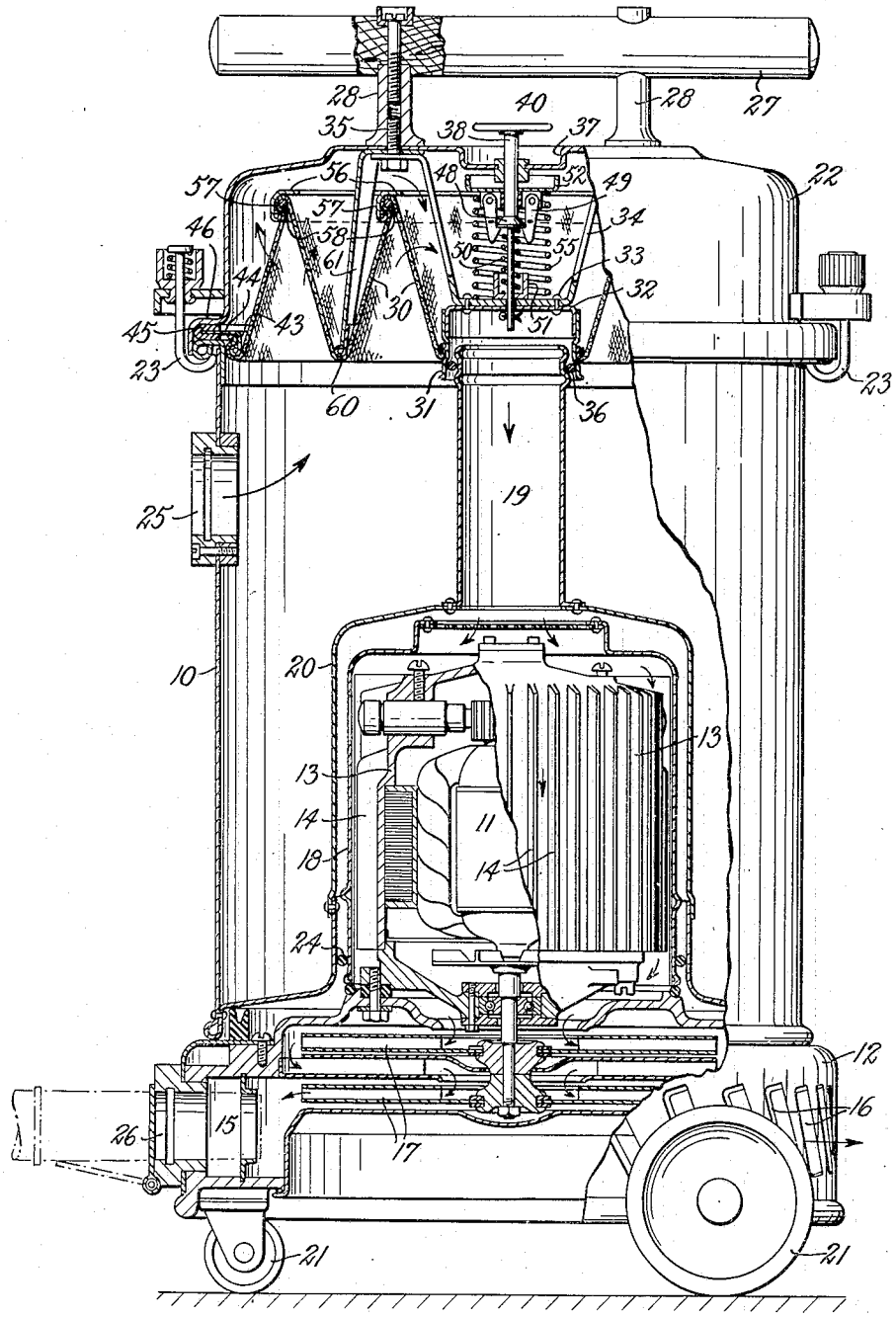


Fig. 1.

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Fig. 2.

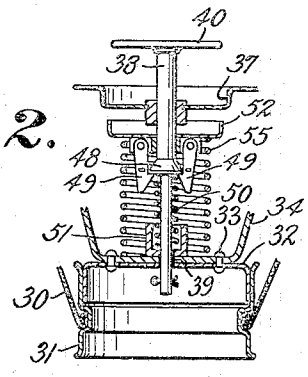


Fig. 3.

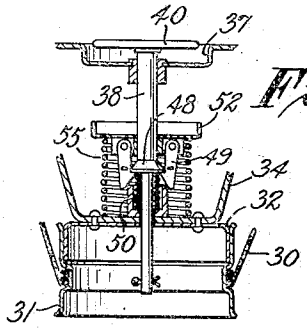


Fig. 4.

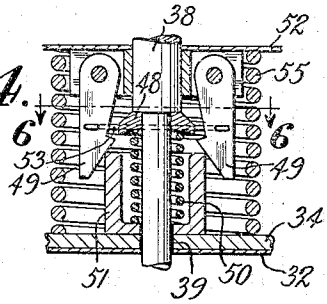


Fig. 5.

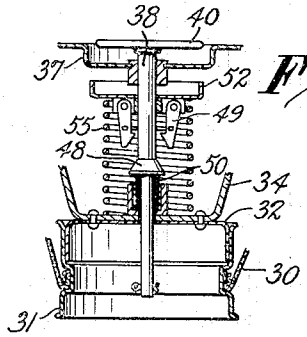


Fig. 7.

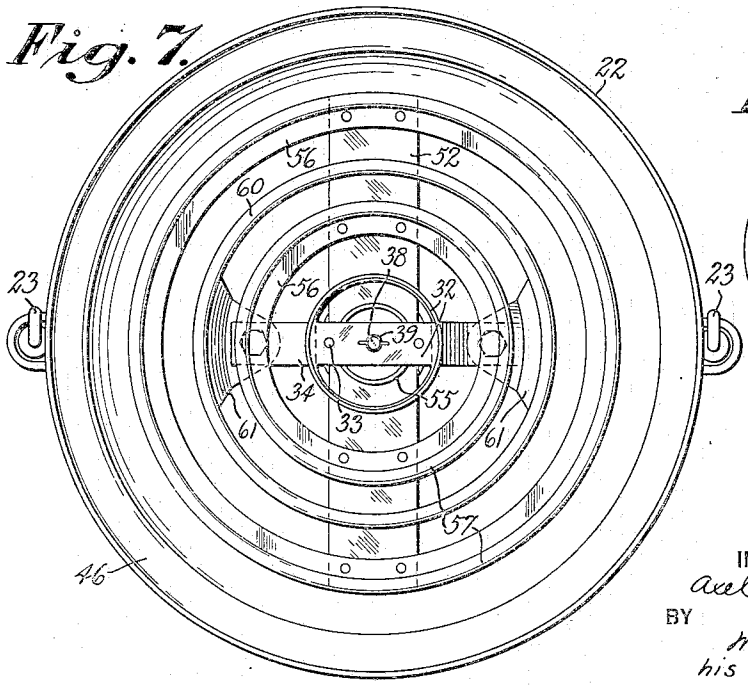
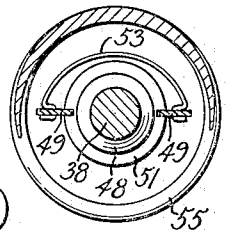


Fig. 6.



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UNITED STATES PATENT OFFICE

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VACUUM CLEANER

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Application March 30, 1932, Serial No. 601,997, and in Germany June 3, 1931

20 Claims. (Cl. 183—58)

This invention relates to vacuum cleaners, and more particularly to dust separators for vacuum cleaners of relatively large size.

An object of the invention is to provide mechanism for effectively cleaning a dust separator without removing the same from the vacuum cleaner.

The invention provides a dust separator which is mounted for limited shaking movement within the casing of the vacuum cleaner. The dust separator is held in normal or operating position by resilient means which is arranged to provide a quick snap-action return of the dust separator to its original position, whereby the maximum shaking force and the maximum compression of air between the dust separator and the casing is obtained. Various other objects and features of the invention will be apparent from the following description taken in connection with the accompanying drawings forming part of this specification, of which:

Fig. 1 is an elevation partly in section of a vacuum cleaner embodying the present invention;

Figs. 2 to 5 are sectional detail views showing various positions of the operating mechanism;

Fig. 6 is a sectional view on line 6—6 of Fig. 4 showing a spring for maintaining certain catches in operating position; and

Fig. 7 is a view looking upwardly into the cover of the vacuum cleaner with the dust separator removed.

In the various figures of the drawings, similar parts are designated by like reference characters. In the following description and in the claims, the various generic terms are employed for purposes of illustration, but it is to be understood that they are to be given as broad an interpretation as the state of the art will permit.

Referring to the drawings more in detail, the invention is shown as particularly applied to a vacuum cleaner of the vertical type having a dust collector 10 which may be made of metal or other air impermeable material, and is so arranged as to be readily removable from the lower frame member 12. A motor 11 mounted in a housing 13 having heat radiating fins 14, is supported on said frame 12 centrally of and coaxially with said dust collector. A plurality of centrifugal fan members 17 are mounted on the motor shaft for drawing air over said housing 13 and discharging the same through a discharge chamber 15 from which air may be discharged through a plurality of louvres 16.

Motor 11 and housing 13 may be enclosed in a shield 18 which is spaced therefrom to provide an air passage for the main air current of the cleaner. A central air tube 19 is mounted within said dust collector, axially thereof, and is provided with an enlarged section 20 which is adapted to pass over the shield 18. A roll packing 24 may be provided between section 20 and shield 18 to form an air and dust seal and to permit the dust collector, including tube 19 and section 20, to be readily removed without exposing the motor. Frame 12 may be mounted on wheels 21 by which the entire cleaner is supported for movement over a surface, such as the floor.

A removable cover 22 is supported on dust collector 10 and is connected thereto by suitable means, such as locking members 23 which may be carried on said cover and engage a suitable flange on said dust collector.

A suction opening 25 is formed in the dust collector 10 and is adapted to receive a suction hose. Discharge chamber 15 may be provided with a blower opening 26 which is similarly arranged to receive an air hose. A handle 27 is mounted on cover 22 and may be secured thereto by spacing members 28, which are sufficiently rigid in construction to permit the entire cleaner to be moved thereby.

Mounted within cover 22 is a cloth dust separator 30 which is preferably of frustro-conical form and is folded back upon itself into zig-zag form. The inner edge of the cloth is carried on an annular member 31 which slidably engages a support 32. Said support is secured as by rivets 33 to a bracket 34 which is carried by cover 22 and is connected thereto as by bolts 35 which engage spacing members 28. A roll packing 36 may be provided between tube 19 and annular member 31 to provide an air and dust seal therebetween, and also to provide a readily separable connection for said annular member 31.

The outer edge of the cloth of the dust separator 30 is secured to a ring 43 which is provided with a lateral flange 44 having a packing member 45 of rubber or other elastic material secured thereon. Said packing member 45 is adapted to seat in a ring-shaped flange or offset 46 of cover 22 and is secured between said flange and the upper part of the dust collector 10. The cloth may be secured to annular member 31 and ring 43 of the dust separator by any suitable means such as string or the like.

The cover is provided with a central depression 37 in which is slidably mounted a rod 38. The lower end of said rod passes through an opening 39 in bracket 34 and in member 32. A disc-like

pressure button 40 is carried on the upper end of rod 38 and is adapted to enter said central depression 37 in cover 22.

Rod 38 carries a flange 48 which is releasably engageable by latches 49. A spring 50 is seated between flange 48 and a cup 51 mounted on bracket 34 and normally holds rod 38 and pressure button or cap 40 in raised position. Latches 49 are pivotally secured to a cross member 52 slidably mounted on spindle 38 and are held in engagement with flange 48 by spring 53 (Fig. 6). Said latches are tapered to engage the upper outside edge of cup 51 and to provide a cam surface by which said latches are separated and released from flange 48 when they are pressed downwardly into engagement with said cup as illustrated in Fig. 4.

Cross member 52 is held in its upper position by spring 55 which is seated between said cross member and said bracket 34. Cross member 52 carries a pair of annular members 56 having flanges 57 which form annular recesses for receiving the folds of filter 30. Said folds are secured in flanges 57 by split retaining rings 58 which may be collapsed and inserted therein and then expanded to bring their ends into engagement and thereby locked in position to firmly clamp the dust separator 30 in place.

Cover 22 also carries stationary ring 60, supported by brackets 61, which are secured to said cover as by bolts 35 which engage spacing members 28. Ring 60 supports one of the lower folds of dust separation member 30 and assists in maintaining the dust separation member in expanded position.

In the above described apparatus, the dust separation member 30 is normally held under tension between rings 56, 60 and 43 and annular member 31, rings 56 being held in their upper position by the action of spring 55 on cross member 52. When the operator pushes downwardly on cap 40, control rod 38 is depressed, thereby depressing cross member 52 and rings 56 and relieving the tension on the dust separating cloth. When the rod reaches its lower position, latches 49 contact cup 51 and are thereby separated and released from flange 48, whereupon cross member 52 is immediately and forcibly snapped back to its original or normal position by the action of spring 55. Cap 40 may then be released and rod 38 will be returned to its original position by the action of spring 50, flange 48 sliding over the cam surface of latches 49 and again becoming engaged thereby.

By the above described action, the upper separator supports are lowered and the air space within the chamber in the cover 22 and the dust separator is increased in size. When the cloth is forcibly returned to its original position, a severe shaking action is obtained and a marked compression of air within said chamber is also obtained, which forces an air current through the cloth in a downward direction, and assists in removing the accumulation of materials from the surface thereof. It is to be noted that the rapidity of the return movement of the cross member 52 and the cloth associated therewith, is entirely independent of the return movement of cap 40 and is accordingly not dependent on the skill of the operator.

When the dust separator is intermittently cleaned by the above described means, the vacuum cleaner may be operated for indefinite periods of time without requiring replacement of the dust separator, the operation being interrupted when necessary to remove the cover and empty the dust container.

It is to be noted that when the cover is thus removed, the tension of the cloth serves to maintain annular member 31 and ring 44 in position against support 32 and against cover 22, respectively.

Although certain preferred forms of the invention have been illustrated for purposes of disclosure, it is obvious that various substitutions and modifications may be made by those skilled in the art, without departing from the broader aspects of the invention, which is to be limited only in accordance with the scope of the following claims.

What I claim is:

1. In combination, a dust separator, a movable support therefor, resilient means for normally maintaining said dust separator in normal position, control means associated with said resilient means for moving said support out of its normal position, means associated with said control means for releasing said support, whereby said support is returned to its normal position by the action of said resilient means, and separate resilient means for returning said control means to normal position.

2. In combination with a dust separator, a movable support therefor, resilient means for normally maintaining said support in normal position, a manual control member for moving said support, means operable when said support is moved out of its normal position for releasing the same from said control member, whereby said support is returned to its normal position by the action of said resilient means independently of said manual control member, and separate resilient means for returning said control means to normal position.

3. In combination with a dust separator, a movable support therefor, a slidable member, releasable means interengaging said support with said slidable member whereby movement of said slidable member causes movement of said support, means operable upon movement of said slidable member for releasing said first means, and resilient means for returning said support to its original position.

4. In combination with a dust separator, a movable support therefor, a control member associated with said support, independent means for maintaining said support and said control member in normal position, means normally interconnecting said support and said control member and means operable upon actuation of said control member for releasing said interconnecting means whereby said support is returned to normal position independently of said control member.

5. In combination with a dust separator, a movable support therefor, a control member associated with said support, independent means for maintaining said support and said control member in normal position, means normally interengaging said support with said control member, and means operable upon actuation of said control member for releasing said interengaging means whereby said support is returned to normal position independently of said control member, and means for reengaging said interengaging means when said control member is returned to operating position.

6. In combination, a dust separator, a movable support therefor, resilient means for normally maintaining said dust separator in a given

position, control means, a latch normally interengaging said support with said control means, and cam means for releasing said latch operable in response to a given movement of said control means.

7. In combination, a dust separator, a movable support therefor, a control member for moving said support having a flange, latch members carried by said support and engaging said flange whereby said support and said control member may be moved as a unit, said latch members having cam surfaces, means acting upon movement of said control member to engage said cam surfaces and release said latch members from said flange, and resilient means for forcibly returning said support to its original position whereby a sudden shaking of said dust separator is obtained.

8. In combination, a dust separator, a movable support therefor, a control member for moving said support having a flange, latch members carried by said support and engaging said flange whereby said support and said control member may be moved as a unit, said latch members having cam surfaces, means acting upon movement of said control member to engage said cam surfaces and release said latch members from said flange, resilient means for forcibly returning said support to its original position whereby a sudden shaking of said dust separator is obtained, and means causing said latches to reengage said flange when said control member is returned to its original position.

9. In combination with a dust separator, a movable support therefor, resilient means for maintaining said support in normal position, a slidable rod associated with said support, latch mechanism interengaging said rod with said support, and means operable when said support is moved out of its normal position for releasing said latch mechanism whereby said support may be returned by the action of said resilient means independently of said rod.

10. In combination with a dust separator, a movable support therefor, resilient means for maintaining said support in normal position, a slidable rod associated with said support, latch mechanism interengaging said rod with said support, means operable when said support is moved out of its normal position for releasing said latch mechanism whereby said support may be returned by the action of said resilient means independently of said rod, and means for reengaging said latch mechanism when said rod is returned to its normal position.

11. In a vacuum cleaner, a casing, a dust separator mounted therein and forming an air chamber, a movable support for said dust separator, a control member extending through said casing and normally in operative connection with said support, means operable upon given movement of said control member for releasing said support therefrom, and means for forcibly returning said support independently of said control member.

12. In a vacuum cleaner having a casing, a dust separator mounted therein and forming an air chamber with a portion of said casing, a control member for causing movement of said dust separator with respect to said casing to enlarge said air chamber, and means for automatically releasing said dust separator from said control member and causing a rapid return of said dust separator for compressing air within said chamber whereby a counter-current of air is caused to flow through said dust separator for cleaning purposes.

13. In a vacuum cleaner having a casing and a cover mounted thereon, a dust separator mounted within said cover and forming an air chamber therein, a control member for causing movement of said dust separator with respect to said cover to enlarge said air chamber, and means for releasing said dust separator from said control member and rapidly returning said dust separator to its original position for compressing the air in said chamber and causing said air to pass through said dust separator for cleaning purposes.

14. In a vacuum cleaner of the vertical type, a dust collector, a cover therefor, a dust separator supported within said cover and adapted normally to be traversed by an upward air current, a movable support for said dust separator, control means for depressing said dust separator with respect to said cover, means for releasing said support from said control means, and means for forcibly returning said dust separator to its original position independently of said control means whereby air is compressed between said dust separator and said cover and is caused to pass downwardly through said dust separator for cleaning purposes.

15. In a vacuum cleaner of the vertical type, a casing, a cover secured to said casing, a dust separator mounted within said cover and bent back upon itself into zig-zag form, said dust separator having a plurality of upper and lower supporting points, stationary means for mounting said lower points with respect to said cover, a movable support for said upper points, and means for normally maintaining said upper movable support in elevated position, a slidable rod extending through said cover, releasable means interengaging said rod with said movable support, and means operable when said rod is depressed to release said releasable means whereby said movable support is returned to its original position independently of said rod.

16. In a vacuum cleaner, a vertical casing forming a dust chamber, an air tube located centrally therein, a cover associated in said casing, a dust separator mounted in said cover, said dust separator comprising an outer ring clamped between said cover and said casing and an inner annular member engaging said central tube and cloth attached to said rings, a movable dust separator support mounted on said cover, resilient means associated with said support for normally holding said dust separator under tension, a slidable rod extending through said cover and engaging said support for releasing said tension, and means for releasing said rod from said support whereby said support is returned to its original position independently of said rod.

17. In a vacuum cleaner, a casing, a zigzag dust separation member mounted therein and providing a dust collecting space on one side thereof and an air chamber on the other side thereof, means for supplying dust-laden air to said dust collecting space, means for withdrawing air from said air chamber, manual means for moving alternate bends of said dust separation member in a given direction to decrease the dust collecting space and increase the size of said air chamber, spring means adapted to be released to snap said alternate bends back to decrease the size of the air chamber and cause flow of air from the air chamber to the dust collecting chamber to shake and blow dust off the dust separation member,

and means operable upon movement of said manual means in said given direction to release said spring means.

18. In a vacuum cleaner, a casing, a dust separation member mounted therein and providing a dust collecting space on one side thereof and an air chamber on the other side thereof, means for supplying dust-laden air to said dust collecting space, means for withdrawing air from said air chamber, means for manually moving said dust separation member to decrease the dust collecting space and increase the size of the air chamber, and means including a latch and a spring adapted to be released to return said dust separation member to decrease the size of the air chamber and cause flow of air from the air chamber to the dust collecting chamber to shake and blow dust off the dust separation member.

19. In a vacuum cleaner, a casing, a zigzag dust separation member mounted therein and providing a dust collecting space on one side thereof and an air chamber on the other side thereof, means for supplying dust-laden air to said dust collecting space, means for withdrawing air from said air chamber, means for manually moving alternate bends of said dust separation member to decrease the dust collecting space and increase the size of said air chamber, and means including a latch and a spring adapted to be released to snap said alternate bends back to decrease the size of the air chamber and cause flow of air from the air chamber to the dust collecting chamber to shake and blow dust off the dust separation member.

20. In a vacuum cleaner, a casing, a dust separation member mounted therein and providing a dust collecting space on one side thereof and an air chamber on the other side thereof, means for supplying dust-laden air to said dust collecting space, means for withdrawing air from said air chamber, manual means for moving said dust separation member in a given direction to decrease the dust collecting space and increase the size of the air chamber, spring means adapted to be released to return said dust separation member to decrease the size of the air chamber and cause flow of air from the air chamber to the dust collecting chamber to shake and blow dust off the dust separation member, and means operable upon movement of said manual means in said given direction to release said spring means.

AXEL ALBERT FORSBERG.