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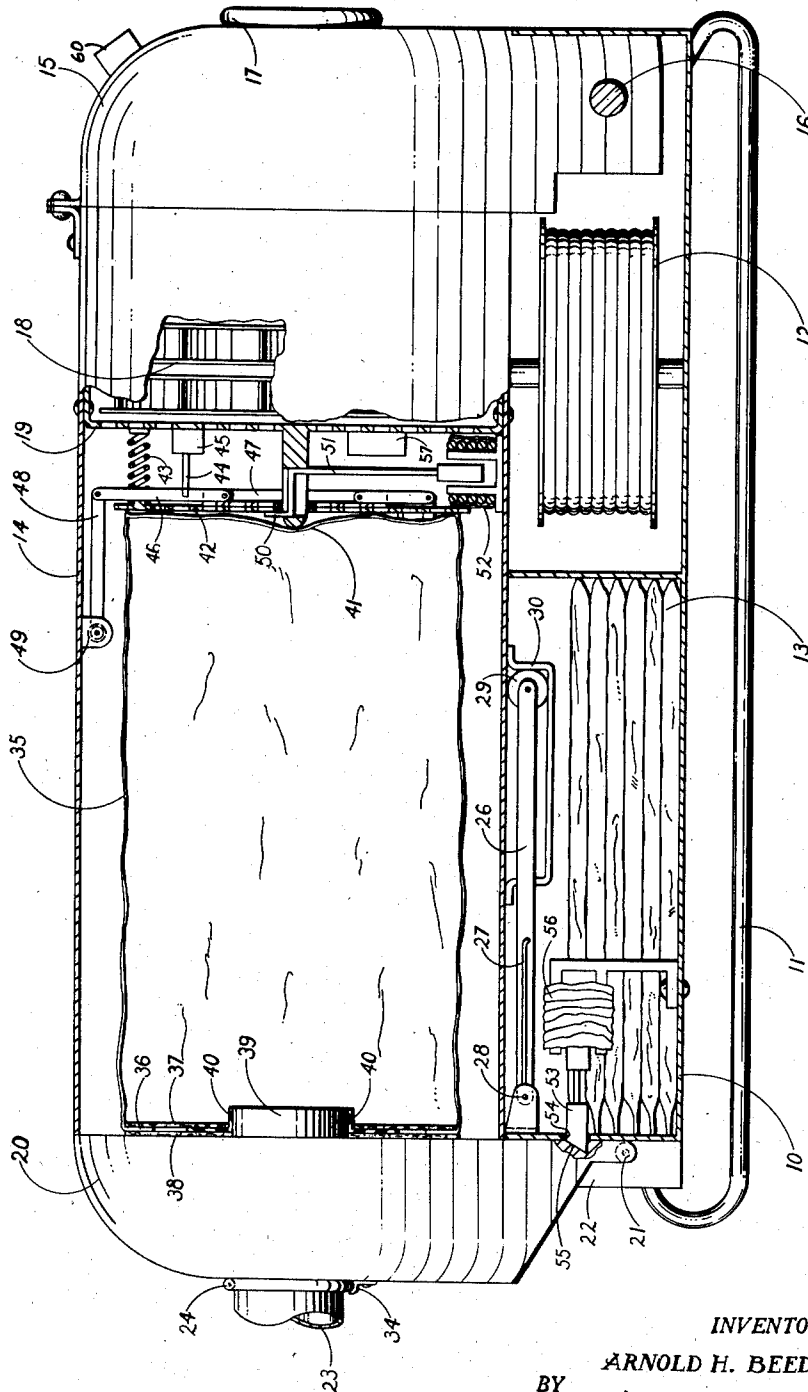
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2,580,642

CONTAINER EJECTING SUCTION CLEANER

Filed April 1, 1946

2 SHEETS—SHEET 1



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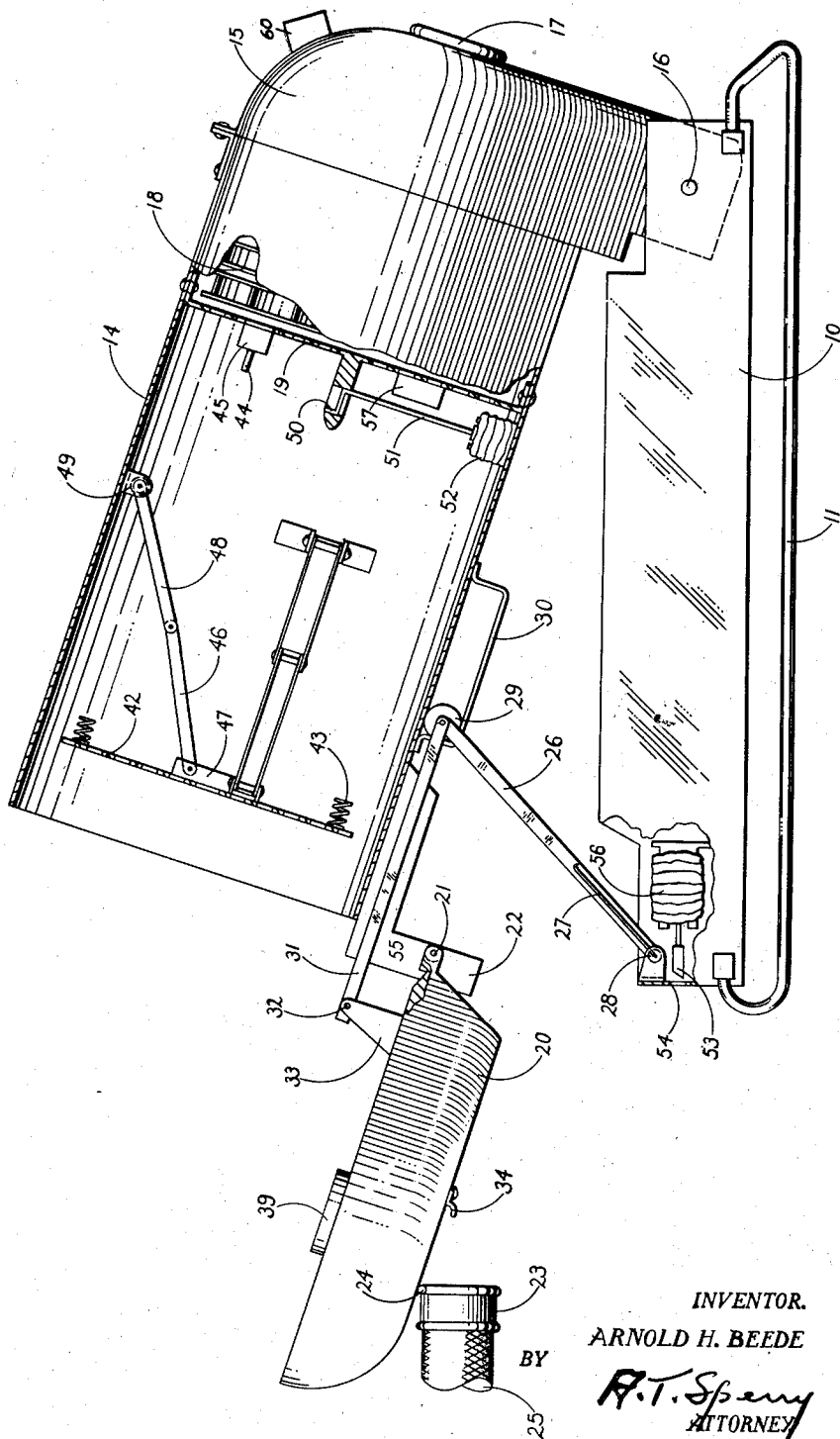
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2 SHEETS—SHEET 2

Fig. 2



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CONTAINER EJECTING SUCTION CLEANER

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22 Claims. (Cl. 183—37)

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This invention relates to vacuum cleaners and is particularly concerned with means for disposing of dust, dirt, and like foreign matter which has been accumulated during cleaning operations. The present invention is also concerned with automatic control means responsive to certain operating characteristics of the device.

While certain aspects of the present inventive concept may be broadly applicable to a wide variety of types of vacuum cleaners, the invention is more particularly concerned with tank type vacuum cleaners in which a relatively stationary casing housing a motor-fan unit and a removable dust collecting bag is provided with an intake opening to which a suction hose is applied. In such tank type cleaners it has been proposed to provide mechanism responsive to an increase in the pressure drop of the air passing through the dust collecting bag for automatically ejecting the bag, or at least making it easily accessible for manual removal. Certain difficulties obtain, however, where such mechanisms are used, these difficulties arising from the necessity of displacing the end cover of the machine to which the suction hose is connected. The hose is relatively heavy and somewhat rigid and consequently impedes the opening movement of the cover relative to the casing. If the cover is not completely or substantially completely open at the time automatic ejection or manual removal of the dust bag is effected, jamming and possible rupture of the bag (where a porous paper bag is used) may well result.

It is accordingly among the objects of this invention to provide an improved vacuum cleaner which obviates the foregoing difficulties in a thoroughly practical and efficient manner.

Other objects and features of the present invention will be apparent from the consideration of the following specification when taken in conjunction with the accompanying drawings in which:

Fig. 1 is a side elevation partly broken away of one embodiment of the present invention; and

Fig. 2 is a similar view showing the device in bag ejecting position.

In general terms, the structure of the present embodiment of the invention may be defined as including a substantially cylindrical normally horizontal body within which is mounted a motor-fan unit for causing a flow of air from the front to the rear therethrough. As distinct from cleaners of this general type which are presently in use and in which the body is rigidly secured to an integral base or sleighs, the body of the pres-

ent device is pivotally mounted upon a base so that it may move with pivotal relation thereto to an upwardly inclined position. A hinged cover is mounted on the front of the machine through which an intake opening extends and to which a hose connection is pivotally mounted. The arrangement is such that when the body is tilted with respect to the base the cover is pivotally moved with respect to the body and the hose connection is pivotally moved with respect to the cover, thus permitting the movements to be accomplished with a minimum of hose displacement. Within the body there is provided a dust bag ejecting plate which is normally in retracted position when the body is in horizontal position and which is releasable to forcibly eject the dust bag when the body is tilted and the cover opened.

An important feature of the invention is the provision of means to co-relate the tilting action of the body, the opening of the cover, and the ejection of the bag so as to provide for a uniform cycle of such operations.

Through provision of the pivotable body or casing, not only is automatic ejection of the bag facilitated, but also the bag is made more readily accessible where manual removal thereof is desired. Furthermore, by pivotally relating the cover to the casing, and by pivoting the hose connection to the cover, complete or substantially complete opening of the cover is assured thus precluding jamming and possible rupture of the bag, all as will be described in detail hereinbelow.

Referring specifically to the drawings which depict one preferred embodiment of the inventive concept, the numeral 10 designates a base preferable of generally rectangular configuration in horizontal cross-section. The base is shown as supported in slightly spaced relation to the floor by sleighs 11. The base may enclose a cord reel 12 through which current is supplied to the motor and forwardly of the reel 12, the base is provided with a space for the reception of a supply of disposable dust receiving receptacles as indicated at 13. The body of the cleaner comprises a casing 14, the rear end of which is closed by an end member 15 which is pivotally supported on the base by a transversely extending pin 16 and is provided with a suitable air discharge port 17. Within the casing 14 there is provided the usual motor-fan unit indicated by the numeral 18, forwardly of which there is provided a perforated bulkhead 19. The front of the casing is provided with a cover 20 which is pivotally mounted as at 21 to a depending portion 22 of the casing and the cover 20 is provided with a hose receiving coupling 23 which is pivotally mounted to the

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cover as at 24. This arrangement is such that the casing may pivotally move with respect to the base and the cover may swing open on its pivot 21, while permitting the suction hose 25 to retain its normal horizontal position.

For pivotally moving the casing with respect to the base 10, there is provided an actuating arm 26 which is biased to the raised position shown in Fig. 2 by an actuator spring 27, the arm 26 being pivoted as at 28 to the base 10. The opposite end of the arm 26 is provided with a roller 29 which is mounted within a depending guide member 30 attached to the lower side of the casing 14, the arrangement being such that when the casing is released, upward outward movement of the roller 29 will thrust the casing upwardly for pivotal movement about the pin 16, the extent of the movement being limited by abutment of the roller 29 against the forward end of the guide member 30.

For actuating the cover so that it will be opened and closed in timed sequence with pivotal movement of the casing, there is provided a cover actuating link 31 which is pivotally secured at the rearward end to the actuator 25 and likewise pivotally secured at its forward end as at 32 to a bracket 33 mounted upon the cover 20. Thus as the roller 29 moves forwardly in the guide member 30 to raise the casing 14, the arm 31 will move rectilinearly in substantial parallelism with the axis of the casing 14 to thrust the cover open by pivotal movement about its pivot point 21. Similarly when the casing is depressed against the tension of the spring 27, the roller 29 will move rearwardly, drawing back the arm 31, thus pivotally moving the cover to closed position. It will be noted that during opening motion the inertia of the hose 25 will cause the coupling 23 to pivot about the point 24, withdrawing it from its spring retaining element 34 so that the movements of the casing and cover may be free from obstruction by the weight and inertia of the hose 25.

The air filtering and dust receiving device preferably used in the present construction is of the type shown in the copending application of Leon P. Borkoski, Serial No. 641,992 filed January 18, 1946. The body 35 of the bag is preferably made from inexpensive porous material such as paper, so that the bag may be disposed of whenever filled with dust without prohibitive expense. The front edges 36 of the body of the bag are secured between inner and outer end members 37 and 38 respectively, both of which are apertured to receive therethrough the air inlet tube 39 of the cover 20. A pair of normally overlapping rubber closure members 40 are stretched across the apertures of the end members, the arrangement being such that when the tube is inserted through the apertures the rubber closure members are separated and engage the tube to seal the bag thereto and to retain the bag thereon during cleaning operations. When the cover is opened, however, the inlet tube 39 will automatically release itself from the receptacle so that the latter may be subsequently discharged.

In the normal operating position of the receptacle its rear wall 41 will be drawn against an ejecting plate 42 which is retained in spaced relation to the bulkhead 19 by yieldable springs 43. As dirt collects in the receptacle, the resistance to air flow therethrough, and hence the pressure drop, increases, thus decreasing the efficiency of the cleaning action, and increasing the force exerted by the receptacle against the plate 42. As the plate moves rearwardly against

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the resistance of springs 43 it will strike an actuator 44 associated with a switch 45 by which circuits hereinafter to be described are energized for releasing the casing and ejecting the dust receptacle.

For ejecting movement of the plate 42 there is provided a plurality of arms 46 which are pivotally secured to a central bracket 47 carried by the plate 42. The opposite end of the arms 46 are pivotally secured to links 48 which are pivotally secured to the casing 14. This arrangement is such that the arms and links form actuating toggles which are biased in the direction of forward movement of the plate by spring 49. During the working cycle of the device, the plate is secured in its innermost position, with the springs 43 abutting the bulkhead, by means of a catch 50 which engages the bracket 47 to retain the plate against the force of the springs 49. The catch is provided with an actuating arm 51 which upon energization of a solenoid 52 is adapted to release the catch from the plate, thus permitting the springs to move the toggle, thrusting the plate forwardly within the casing to forcibly eject the dust receptacle.

For securing the casing in its horizontal operative position there is provided a keeper bolt 53 which is normally biased in a forward direction to extend through an aperture 54 in the base 10 and to engage a keeper 55 formed in the cover 20. The bolt 53 is adapted to be retracted on energization of a solenoid 56. The arrangement is such that with the casing in horizontal position and the cover closed and the solenoid 56 deenergized, the bolt will act to retain the casing in horizontal position against the tension of the spring 27. However, on energization of the solenoid 56, the bolt will be retracted to permit the spring 27 to raise the casing and to open the cover 20.

Since the wiring of the circuit for the device may be of various characteristics in accordance with the specific arrangement elected by designers, no specific diagram is thought required. It will be understood, however, that solenoids 52 and 56 are both under the control of the automatically actuated switch 45. A manually operable switch 60 is also preferably provided so that the casing may be raised independently of the switch 45 where manual removal rather than automatic ejection of the bag is desired. However, it will be noted that the circuit includes a time delay device 57 which may be conveniently mounted on the bulkhead 19, the arrangement being such that upon the closing of the switch 45 the solenoid 56 will first be operated to raise the casing and open the front cover. The solenoid 52, however, is energized through the delay device 57 so that the ejecting mechanism will not be released until such time as the casing is fully raised and the cover opened to permit free ejection of the dust receptacle.

From the foregoing it will be seen that the present invention provides a novel, simple, and compact unit from which a loaded dust receptacle will be automatically ejected when such receptacle has acquired a sufficient load of accumulated dirt. It will be understood, of course, that the invention is not limited to the specific structural details herein set forth and that numerous changes, modifications and full use of equivalents may be resorted to without departure from the spirit or scope of the invention as outlined in the appended claims.

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What I claim is:

1. In a vacuum cleaner, a base portion, a casing tiltably mounted on said base portion, a dust receiving container within said casing, means to produce flow of air through said container, and means for tilting said casing and discharging said container from said casing in response to an increase in the pressure drop of the air passing through said container.

2. In a dust receptacle ejecting device for a vacuum cleaner, an ejecting plate and an actuating means therefor comprising at least one pair of pivotally joined arms, one end of one of said arms being attached to said plate, and spring means biasing said arms towards receptacle ejected position of said arms.

3. In a dust receptacle ejecting device for a vacuum cleaner, an ejecting plate and an actuating means therefor comprising a plurality of pairs of pivotally joined arms, one end of one arm of each pair being attached to said plate, and spring means biasing said arms towards receptacle ejected position of said arms.

4. In a dust receptacle ejecting device for a vacuum cleaner casing, an ejecting plate and an actuating means therefor comprising a plurality of equally spaced pairs of pivotally joined arms, one end of one arm of each pair being attached to said casing and the other arm of each pair being attached to said plate, and spring means biasing said arms towards receptacle ejected position of said arms.

5. In a vacuum cleaner having a pivotally mounted cover, a hose connector for said cover, and means to pivotally mount said connector on said cover, said pivotal mounting of said connector being parallel to the pivotal mounting of said cover, and providing for opposite pivotal movements of said cover and connector.

6. In a vacuum cleaner having a relatively stationary floor supported base, a casing pivotally mounted on said base, means for tiltingly moving said casing with respect to at least one portion of said base, a cover for said casing, and means operable by the first mentioned means for moving said cover with respect to said casing by and with the tilting of said casing.

7. In a vacuum cleaner, a supporting base portion, a casing pivotally mounted on said base portion, said casing having an opening and being adapted to receive a dust receptacle, a cover for said opening movably mounted with respect to said casing, means for pivoting said casing with respect to said base portion, means operable by the first mentioned means for moving said cover with respect to said casing to open said opening upon the pivoting of said casing, and means operative upon the pivoting of said casing and the moving of said cover for displacing said receptacle outwardly through said opening.

8. In a vacuum cleaner, a supporting base portion, a casing pivotally mounted adjacent to one end thereof on said base portion, a dust separating member in said casing, a motor fan unit in said casing adjacent to said one end for producing flow of air through said member, a cover for the opposite end of said casing, means operable to pivot said casing, means responsive to an increase in pressure drop of air flowing through said member to effect operation of said operable means for pivoting said casing with respect to said base, and means operable by said operable means for moving said cover with respect to said casing upon the pivoting of said casing.

9. In a vacuum cleaner, a supporting base por-

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tion, a casing having an opening pivotally mounted on said base portion, a dust separating member within said casing, means for producing flow of air through said member, a cover for said opening movably mounted with respect to said casing, means operable to pivot said casing, means responsive to an increase in pressure drop of air flowing through said member to effect operation of said operable means for pivoting said casing with respect to said base portion, means operable by said operable means for moving said cover with respect to said casing to open said opening upon the pivoting of said casing, and means operative upon the pivoting of said casing and the moving of said cover for displacing said dust separating member outwardly through said opening.

10. In a vacuum cleaner, a supporting base portion, a casing pivotally mounted on said base portion and having an opening, a dust separating member in said casing, means for producing flow of air through said member, a cover for said opening pivotally mounted on said casing, a member movable through at least a portion of said compartment for contacting said receptacle to displace the latter through said opening, means responsive to an increase in pressure drop of air flowing through said member for pivoting said casing with respect to said base portion and for moving said member to displace said receptacle, and means operable by the last mentioned means for pivoting said cover with respect to said casing upon pivoting of said casing.

11. In a vacuum cleaner, a casing having an opening for the insertion and removal therethrough of a dust receptacle, a member pivotally mounted with respect to said casing for retaining the receptacle within the casing, and a hose connector pivotally mounted on said member about an axis substantially parallel to the axis about which said member is pivotally mounted, said member being pivotal in a given direction to release said receptacle and said hose connector being simultaneously pivotal in the opposite direction.

12. In a vacuum cleaner, a casing having an opening for the insertion and removal therethrough of a dust receptacle, a member for retaining the receptacle within the casing, means for pivotally mounting said member with respect to said casing about a substantially horizontal axis disposed below said opening, and a hose connector pivotally mounted on said member about an axis substantially parallel to the first mentioned axis, the pivotal axis of said hose connector being so located that when said member pivots in one angular direction said hose connector pivots in the opposite angular direction.

13. A vacuum cleaner comprising a casing having an opening in a wall thereof for the insertion therethrough of a dust bag, a member hingedly attached to said casing for movement from a position retaining said dust bag within the casing to a position permitting removal of said dust bag, and a hose coupling hingedly attached to said member for hinge movement in the opposite direction to the hinge movement of said member, and means providing communication between said hose coupling and the interior of said dust bag.

14. A vacuum cleaner comprising a base, a hollow casing having an opening in a wall thereof pivotally mounted on said base for movement about an axis spaced from the opening of said casing, a cover pivotally mounted on said casing

for movement about an axis adjacent an edge of said opening, a hose coupling pivotally mounted on said cover for movement about an axis spaced from the pivotal axis of said cover, and means including a spring associated with said base and said casing to pivot said casing about its pivotal axis and simultaneously therewith open said cover while permitting said hose coupling to pivot about its axis whereby said hose may extend in the same general direction before as well as after the pivotal movement of the casing, cover and hose coupling.

15. A vacuum cleaner including a casing having an opening in a wall thereof for the reception of a dust bag, a hose coupling carrying member, means forming a pivotal connection between said casing and said hose coupling carrying member whereby said member may pivot between open and closed positions relative to said casing opening, a hose coupling, and means forming a pivotal connection between said hose coupling and said hose coupling carrying member, the axes of both of said pivotal connections being parallel whereby when said member pivots in one angular direction relative to said opening said hose coupling pivots in the opposite angular direction.

16. A vacuum cleaner including a casing having an opening in a wall thereof for the reception of a dust bag, a hose coupling carrying member, means forming a pivotal connection between said casing and said hose coupling carrying member whereby said member may pivot between open and closed positions relative to said casing opening, a hose coupling, means forming a pivotal connection between said hose coupling and said hose coupling carrying member, whereby when said member pivots in one angular direction relative to said opening said hose coupling pivots in the opposite angular direction, and means effective after opening pivotal movement of said member to eject a dust bag outwardly of said casing.

17. A vacuum cleaner including a casing having an opening in a wall thereof for the reception of a dust bag, a hose coupling carrying member, means forming a pivotal connection between said casing and said hose coupling carrying member whereby said member may pivot between open and closed positions relative to said casing opening, a hose coupling, means forming a pivotal connection between said hose coupling and said hose coupling carrying member, whereby when said member pivots in one angular direction relative to said opening said hose coupling pivots in the opposite angular direction, means effective after opening pivotal movement of said member to eject a dust bag outwardly of said casing, and means responsive to an increase in the pressure drop through a dust bag in said casing to effect operation of said dust bag ejecting means.

18. A vacuum cleaner including a casing having an opening in a wall thereof for the insertion therethrough of a dust bag, a dust bag in said casing having a self-sealing opening in the dust receiving end thereof, a member pivotally related to said casing adjacent the opening therein and movable between open and closed positions relative to said opening, a second member pivotally attached to said first member and movable therewith but in opposite angular direction during the opening or closing movement of said first member, and means forming a hose coupling on one of said members engageable in sealing relation

with said self-sealing opening when said first member is moved to its closed position.

19. A vacuum cleaner including a casing having an opening in a wall thereof for the insertion therethrough of a dust bag, a dust bag in said casing having a self-sealing opening in the dust receiving end thereof, a member pivotally related to said casing adjacent the opening therein and movable between open and closed positions relative to said opening, a second member pivotally attached to said first member and movable therewith but in opposite angular direction during the opening or closing movement of said first member, means forming a hose coupling on one of said members engageable in sealing relation with said self-sealing opening when said first member is moved to its closed position, and means operable after opening movement of said first member for ejecting said bag outwardly of said casing.

20. A vacuum cleaner having a base, a casing, means forming a pivotal connection between said base and said casing, a dust bag in said casing, a motor fan unit in said casing, means associated with said base and said casing operable to pivot said casing away from said base, and means responsive to an increase in pressure drop through said bag to effect operation of said casing pivoting means.

21. A vacuum cleaner having a base, a casing, means forming a pivotal connection between said base and said casing, a dust bag in said casing, a motor fan unit in said casing, means associated with said base and said casing operable to pivot said casing away from said base, said casing pivoting means including a spring, a latch for restraining said spring from pivoting said casing, and means responsive to an increase in pressure drop through said bag to release said latch whereby said spring may pivot said casing.

22. A vacuum cleaner including a casing having an opening in a wall thereof for the insertion therethrough of a dust bag, a dust bag in said casing having a self-sealing opening in the dust receiving end thereof, a member pivotally related to said casing adjacent the opening therein and movable between open and closed positions relative to said opening, a second member pivotally attached to said first member and movable therewith but in opposite angular direction during the opening or closing movement of said first member, means forming a hose coupling on one of said members engageable in sealing relation with said self-sealing opening when said first member is moved to its closed position, means operable after opening movement of said first member for ejecting said bag outwardly of said casing, and means responsive to an increase in pressure drop through said bag to effect opening movement of said first member and operation of said operable means.

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