

[54] **SUCTION CLEANER**
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[22] Filed: **Apr. 7, 1972**

Primary Examiner—Bernard Nozick

[21] Appl. No.: **241,910**

[52] **U.S. Cl.**..... **55/362**, 15/327 E, 55/372, 55/379, 55/472
 [51] **Int. Cl.**..... **B01d 46/02**
 [58] **Field of Search** 55/361, 362, 312, 373, 55/374, 375, 378, 379, 472; 15/327 E

[57] ABSTRACT

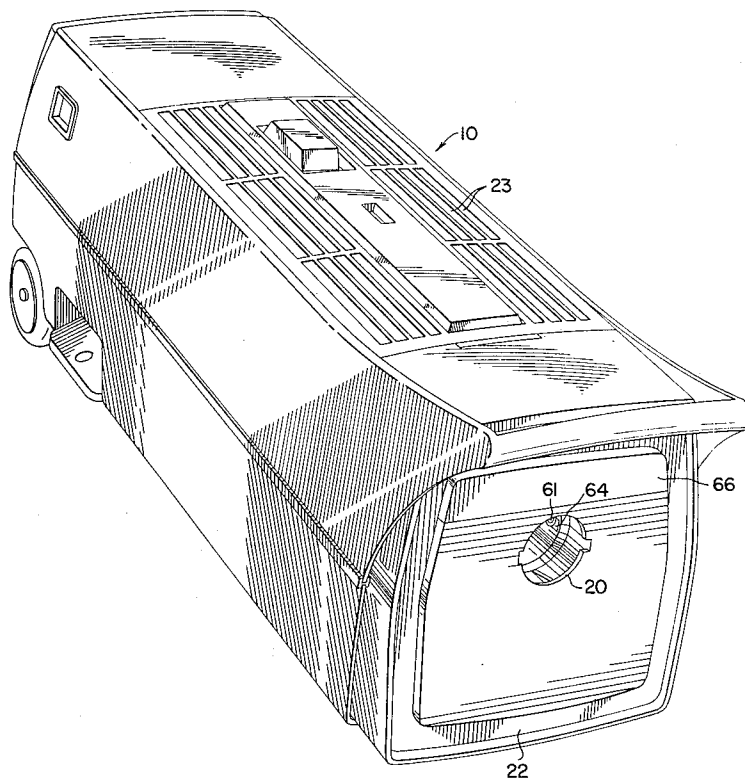
A suction cleaner has a removable bag-supporting body member adjacent its dirt-collecting bag portion. The removable body member supports a dirt-collecting bag when the body member is removed from the suction cleaner. Upon actuation by an operator, a release device built into the body member causes the dirt-collecting bag to be removed, for disposal, from the body member without being touched by the operator.

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9 Claims, 9 Drawing Figures



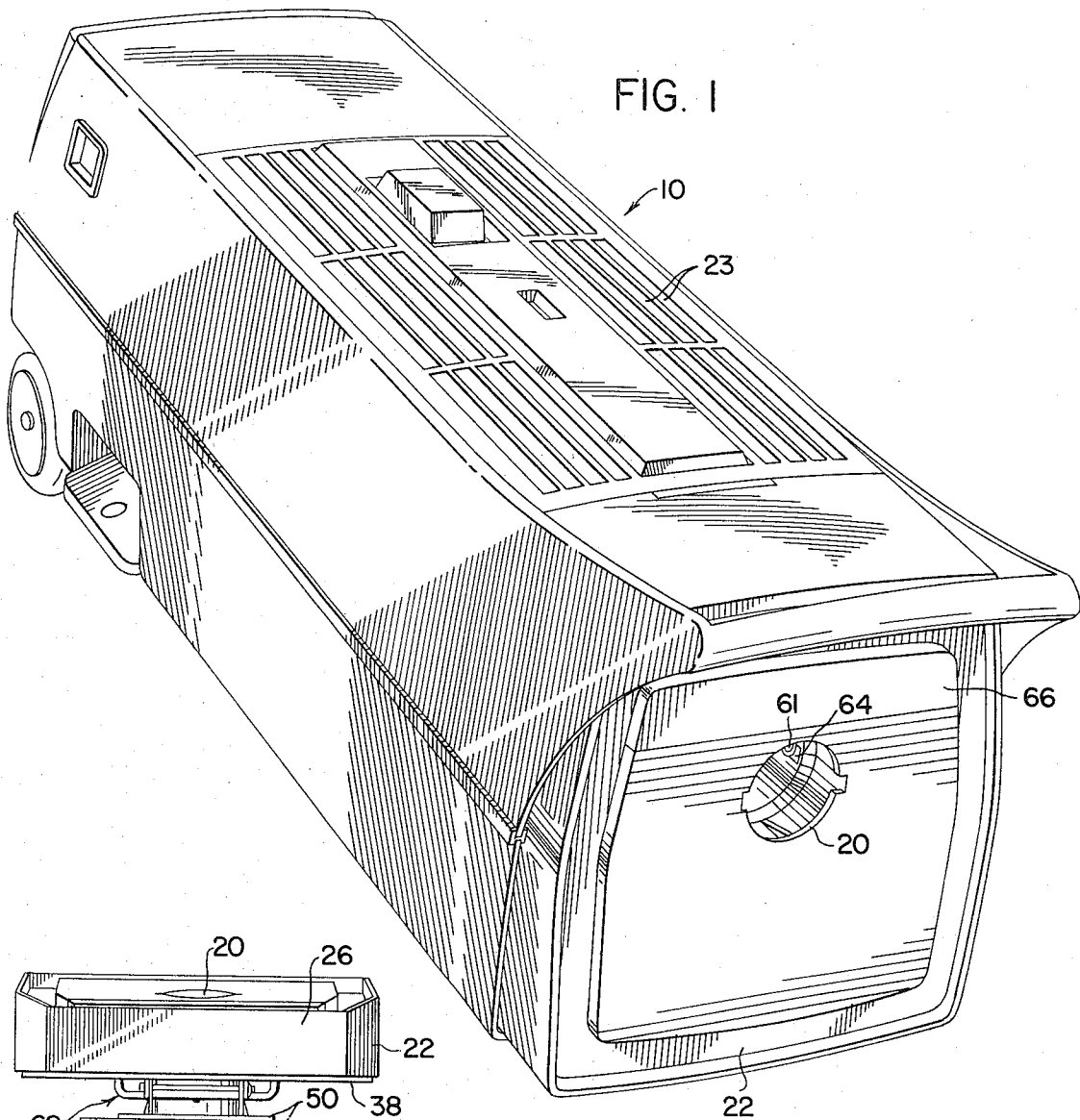


FIG. 9

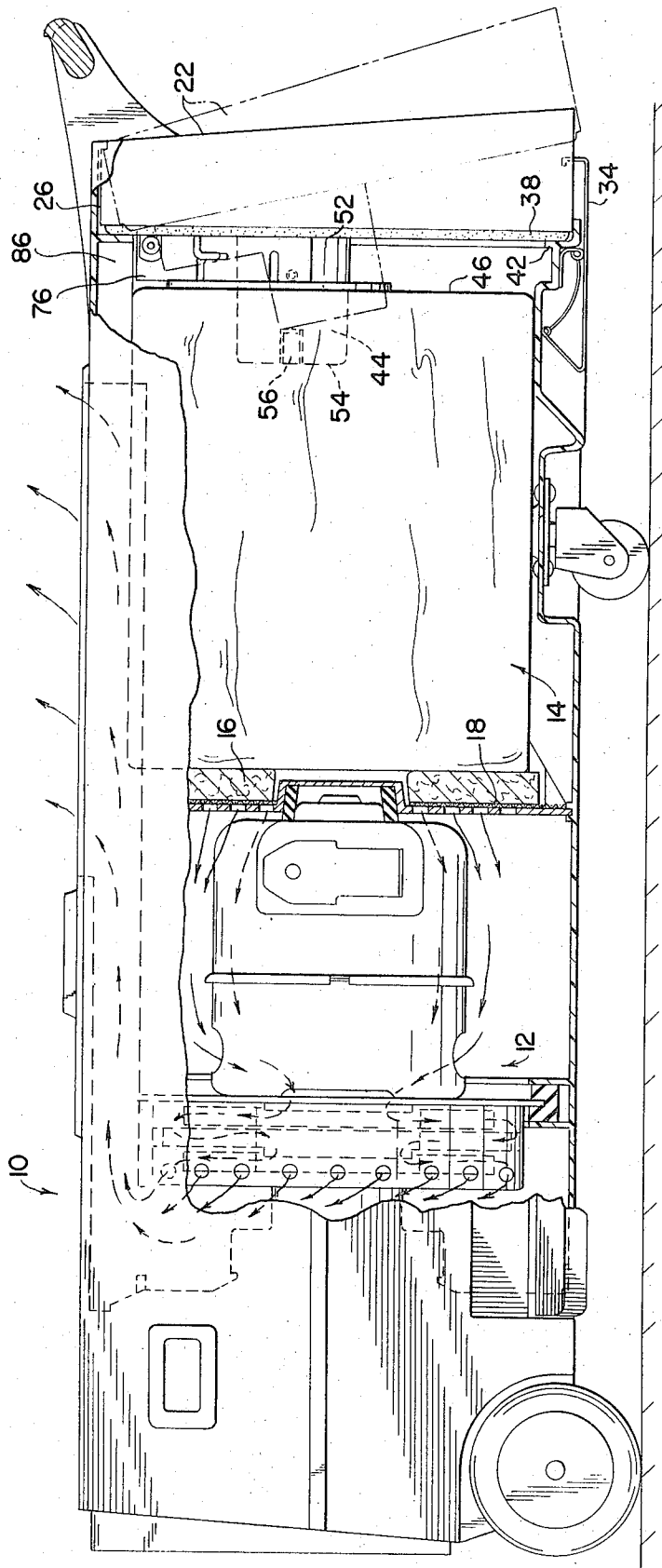
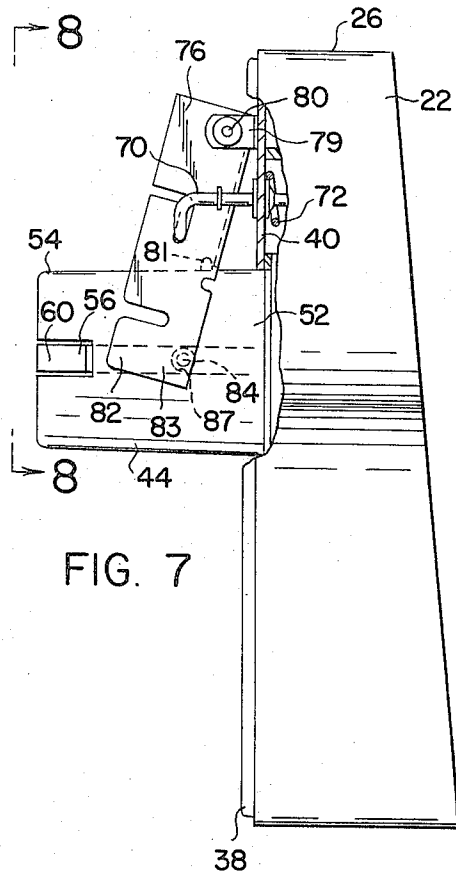
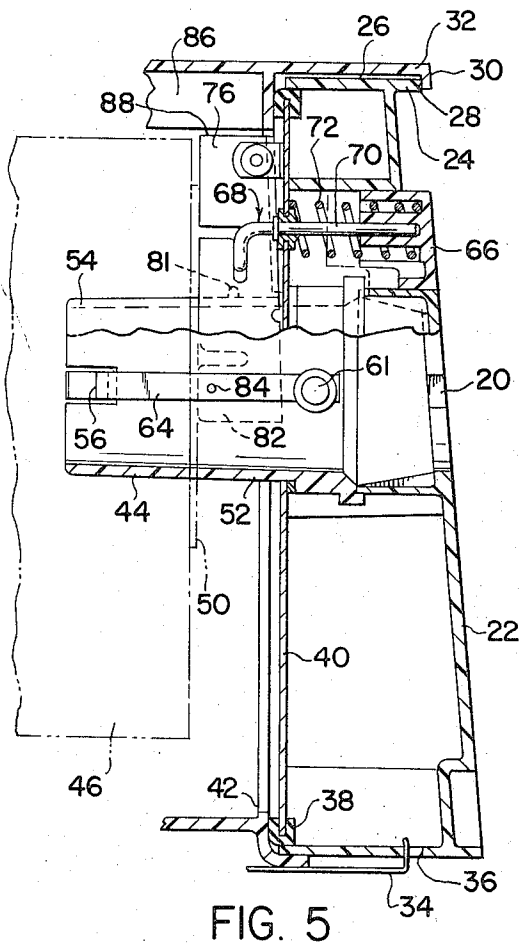
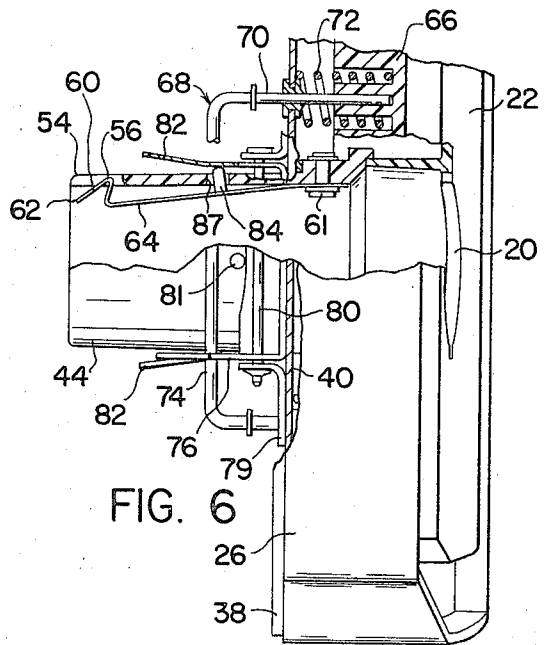
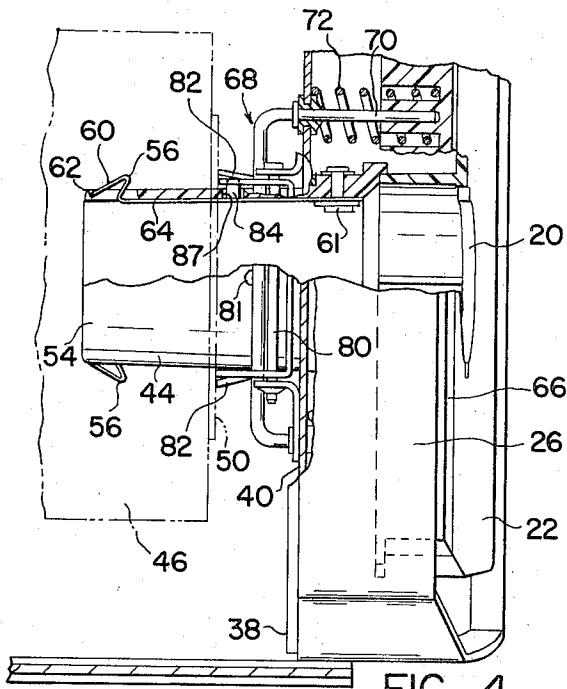


FIG. 2



SUCTION CLEANER

BACKGROUND AND SUMMARY OF THE INVENTION

The instant invention relates to suction cleaners of the type utilizing disposable dirt-collecting bags. Heretofore, if an operator wished to dispose of a dirt-collecting bag he had to grasp the bag, remove it from the suction cleaner and carry it to its place of disposal. This operation necessitated the operator coming into direct contact with the dirt-collecting bag.

In the subject invention a dirt-collecting bag is supported by a removable body member of a suction cleaner for convenient insertion and removal therefrom. An operator can remove a dirt-collecting bag from a suction cleaner equipped with the instant invention and dispose of it without coming into contact with the bag.

The removable body member has a mounting tube for supporting and retaining a dirt-collecting bag thereon. The removable body member is further provided with a releasable bag-engaging device and actuating means for releasing the device to permit a bag to be removed from the mounting tube.

Thus, it is an object of the instant invention to provide a separable body member for a suction cleaner having a dirt-collecting bag supporting device and a releasable retaining means for engaging said bag on the supporting device.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a suction cleaner having a separable body member at one end thereof.

FIG. 2 is a broken view of a suction cleaner equipped with the instant invention.

FIG. 3 is an enlarged perspective view of the invention showing the bag-retaining means in the engaged position.

FIG. 4 is a plan view of the invention showing the bag-retaining means in the engaged position.

FIG. 5 is a side view of the invention showing the bag-retaining means in the engaged position.

FIG. 6 is a plan view similar to FIG. 4 but showing the bag-retaining means in the released position.

FIG. 7 is a side view similar to FIG. 5 but showing the bag-retaining means in the released position.

FIG. 8 is a front view of the actuating device for the bag-retaining means.

FIG. 9 is a side view of the removable body member and bag affixed thereon separated from the suction cleaner and showing in full lines the bag collar wedged on the mounting tube and in dotted lines the bag collar retained on the mounting tube when it is not wedged.

DESCRIPTION OF THE INVENTION

Referring to the drawings, FIGS. 1 and 2 disclose a suction cleaner 10 of the type embodying the instant invention. The suction cleaner 10 has a suction creating motor fan unit 12 located in one portion thereof. The motor fan unit 12 is separated from the dirt-collecting area 14 by a secondary filter 16. The secondary filter 16 has a removable dirt-collecting membrane 18 which catches any dust or dirt particles not trapped inside of the disposable dirt-collecting bag 46 located in the dust-collecting area 14. Thus, the membrane 18 acts as a double barrier to prevent dust or dirt from entering the motor fan unit 12.

A flexible hose, not shown, is normally connected to the aperture 20 formed in a body end member 22 which member is detachably affixed to the suction cleaner 10. In normal operation of the suction cleaner 10, the motor fan unit 12 creates a sub-atmospheric pressure in the dirt-collecting area 14 and hence in the hose normally in communication therewith. Dirt and other particles sucked up by the hose are deposited in the disposable dirt-collecting bag 46 in the dirt-collecting area 14. Air that enters the dirt-collecting bag 46 passes through the porous walls thereof, through the secondary filter membrane 18 and enters the motor fan unit 12. Air exiting from the motor fan unit 12 leaves the interior of the suction cleaner 10 through a series of openings 23 formed in the top surface thereof. The path of air flowing through the suction cleaner 10 is shown by the arrows in FIG. 2.

As best seen in FIGS. 2 and 5, the body end member 22 adjacent the dirt-collecting area 14 is secured to the suction cleaner 10 by having the outward projection 24 of its top wall 26 abut the inside portion 28 of a downward projection 30 of the suction cleaner top wall 32. The bottom portion of body end member 22 is secured to the suction cleaner 10 by means of an over-center clasp 34, one end of which engages the body end member 22 through an aperture 36 formed in the bottom surface thereof. The opposite end of the clasp 34 is secured to the bottom of the suction cleaner. A resilient sealing strip 38 is placed around the outside perimeter of the inner wall 40 of the body end member 22 to provide an airtight seal between the body end member 22 and a transverse wall 42 of the suction cleaner 10 abutted by the body end member 22.

In FIG. 3 it can be seen that the body end member 22 has a bag-supporting mounting tube 44 projecting from its inner wall 40 toward the dirt-collecting area 14. The mounting tube 44 is aligned with the aperture 20 in the body end member 22. A bag 46 is positioned on the mounting tube 44 by pushing the tube 44 through an aperture 48 in the bag collar 50.

As best seen in FIG. 7, the mounting tube 44 is tapered with its larger diameter portion 52 adjacent the inner wall 40 of the body end member 22. The small diameter portion 54 of the mounting tube 44 is sized so as to be freely receivable in the bag collar aperture 48. The larger diameter portion 52 is proportioned to wedge within the bag collar aperture 48 as shown in FIGS. 4 and 5.

When a bag collar 50 is wedged on the mounting tube 44, a pair of projections 56, adjacent the small diameter portion 54 of mounting tube 44, are made to protrude transversely of and radially outward from the tube 44. The projections 56 protrude sufficiently to engage the inside wall 58 of the bag collar 50 and prevent the bag 46 from slipping off of the mounting tube 44. The bag collar 50 is normally securely wedged on the mounting tube 44 and would not slide down the tube to engage the projections 56. However, the weight of the dirt in the bag 46 may cause the bag collar 50 to slide down the mounting tube 44 when the body end member 22 is removed from the suction cleaner 10, to dispose of the dirt bag 46. The bag 46 and body end member 22 are shown detached from the suction cleaner in FIG. 9. The solid lines show the bag collar 50 wedged on the mounting tube 44. The dashed lines show the bag collar supported by the projections 56.

As best seen in FIGS. 4 through 6, the projections 56 are formed at the ends of a pair of leaf springs 64 which are mounted on the inside of the mounting tube 44 and extend in a parallel direction therein. A pair of rivets 61 secure the leaf springs 64 to the mounting tube 44.

The projections 56 have cam surfaces 60 with a base 62 adjacent the free end of the mounting tube and located within the small diameter portion 54 of the mounting tube 44. The purpose of the cam surfaces 60 is to allow a bag collar 50 to be pushed onto the mounting tube 44 even though the projections 56 are protruding beyond the outside diameter of the mounting tube 44 so as to enable the projections 56 to engage the inside wall 58 of the bag collar 50 once the latter is situated between the projections 56 and the inside wall 40 of the body end member 22.

When a bag collar 50 is pushed onto the mounting tube 44 and the projections 56 are protruding, the bag collar 50 first passes over the base 62 of the cam surfaces 60 and then rides therealong, thus biasing the projections 56 radially inwardly toward the interior of the mounting tube 44. After the bag collar 50 has passed over the projections 56, the leaf springs 64 cause the projections 56 to return to the position they occupied immediately before the bag collar passed thereover.

When it is desired to remove the bag 46 from the mounting tube 44, such as when an operator has removed the body end member 22 from the suction cleaner 10 to dispose of the dirt-filled bag 46, the projections 56 must be retracted inside of the mounting tube 44 to allow the bag collar 50 to pass over the projections 56. To move the projections 56 to a retracted or released position, an operator need only push inwardly on the actuator button 66 which projects into the outside surface of the body end member. This movement of the actuator button 66 causes an actuator bar 68, having a pair of parallel arms 70 connected by cross bar 74, to be moved inwardly. A pair of springs 72 mounted between the inner wall 40 and the actuator button 66 biases the latter outwardly.

The cross bar 74 engages slots located approximately at the midpoint of a pair of parallel ejector arms 76. The ejector arms 76 are connected by a support 78 extending therebetween. The ejector arms 76 are suspended from the inner wall 40 of the body end member 22 by being pivotally connected at their upper portions to a pivot shaft 80. The pivot shaft 80 is affixed to the inner wall 40 by means of a pair of brackets 79.

Movement of the actuator bar 68 inwardly causes the ejector arms 76 to be pivoted about the pivot shaft 80. A tab 82, bent away from the mounting tube 44, is formed at the lower portion of each of the ejector arms 76. As best seen in FIGS. 3, 4 and 5, when the actuator button 66 is in its outermost position, the bent tabs 82 are adjacent to, but do not engage, pins 84 which project through apertures 87 in the mounting tube 44. The pins 84 are connected to the leaf springs 64 adjacent their midpoint. When the pins 84 are biased inwardly toward the center of the mounting tube 44, the leaf springs 64 are forced to bend inwardly toward the center of the mounting tube 44.

The pins 84 are pushed inwardly by the lower portion 83 of the ejector arms 76 adjacent the tabs 82 when the ejector arms 76 pivot about the pivot shaft 80. Pivotal movement of the ejector arms 76 is stopped when the lower portion 83 thereof fully engages the pins 84. In

this position, a pin 81 projecting from the top of the mounting tube 44, abuts the support member 78 to prohibit further travel of the ejector arms 76.

The position of the ejector arms 76 after pivoting as above described and the position of the pins 84 is best seen in FIGS. 6, 7 and 8. When the pins 84 are pushed inwardly and the leaf springs 64 are bent inwardly, the projections 56 are caused to move within the outside diameter of the mounting tube 44 in order to allow the bag collar 50 to slide off the mounting tube 44 without interference by the projections 56.

It will be appreciated that replacement or removal of the bag 46 from the mounting tube 44 should only occur when the body end member 22 is separated from the suction cleaner 10. As shown in FIG. 5, the ejector arms 76 are rendered inoperative when the body end member 22 is positioned on the suction cleaner 10 for operation of the latter, by means of ribs 86 located in the top portion of the suction cleaner 10. The ribs are closely adjacent the top surfaces 88 of the ejector arms 76. If the actuator button 66 is moved inwardly, the ejector arms 76 will move only a short distance before striking the ribs 86.

Rendering the ejector arms 76 inoperative when the body end member 22 is positioned on the suction cleaner 10 is desirable as it prevents the projections 56, which insure that the bag collar 50 will not slip off the end of the mounting tube 44, from being moved inside the mounting tube 44 and hence being made ineffective. Furthermore, the body end member 22 cannot be positioned on the suction cleaner 10 when the actuator button 66 is depressed and the ejector arms 76 are rotated about pivot shaft 80, since the ribs 86 and the ejector arms 76 interfere to prevent the body end member 22 from properly locating within the suction cleaner.

If an operator desires to change a bag 46 in the suction cleaner 10 he must first unlatch the clasp 34 from the body end member 22 and pivot the body end member 22 out of engagement with the suction cleaner 10. The body end member 22, with a bag 46 suspended therefrom, is then carried to the disposal area for the bag. Once the disposal area is reached, the operator need only press the actuator button 66 inwardly to dispose of the bag without touching the bag 46.

Pressing the ejector button 66 causes the ejector arms 76 and cross bar 74 to be moved inwardly. The cross bar 74 is connected to the ejector arms 76. As the cross bar moves inwardly, the ejector arms 76 pivot about a shaft 80. As the ejector arms are pivoted, the lower portion 83 of the ejector arms 76 engages the pins 84 affixed to the leaf springs 64. When the pins 84 are depressed, the projections 56 of the leaf spring 64 are moved to a position within the mounting tube 44. This position of the projections 56 permits a bag collar to slide over the projections 56 without interference, thus allowing the bag 46 to drop from the body end member.

If a bag is wedged on the mounting tube 46 when the ejector arms 76 first began to pivot, the ejector arms 76 are pushed against the bag collar 50 to cause the latter to slide down to the small diameter portion of the mounting tube 44.

To place a new bag on the mounting tube 44, the operator merely pushes the bag collar 50 over the end of the mounting tube 44. If the actuator button is not in its depressed position when the bag is pushed on the

mounting tube, the bag collar will simply momentarily bias the projections inwardly as it passes over the cam surface 60.

If the button is in its depressed position when the bag collar is pushed on the mounting tube, the bag collar will not engage the projections. However, as the bag collar is moved up the mounting tube, it will engage the ejector arms. Further movement of the bag on the mounting tube will cause the ejector arms to pivot about the shaft 80 and cause the cross bar 74 and the parallel arms 70 to be moved outwardly. As the arms 70 are moved outwardly, the actuator button 66 will return to its original position.

In view of the foregoing, it will be apparent to those skilled in the art that I have accomplished at least the principal object of my invention and it will also be apparent to those skilled in the art that the embodiment herein described may be variously changed and modified without departing from the spirit of the invention, and that the invention is capable of uses and has advantages not herein specifically described, hence it will be appreciated that the hereindisclosed embodiment is illustrative only and that my invention is not limited thereto.

I claim:

1. A suction cleaner including a suction inlet and a suction outlet and having a housing for partially forming a chamber for receiving a disposable, porous dirt-collecting bag;

a disposable, porous dirt-collecting bag having a rigid collar with an aperture therein mounted on said suction inlet;

a body member separable from said housing for transportation apart from said housing, said body member being adapted to be affixed to said housing to form a portion of said chamber;

a mounting tube carried by said body member projecting its free end into said chamber and through said collar aperture supporting said dirt-collecting bag;

said mounting tube confluent communicating at its other end with an aperture in said body member forming the suction inlet for said suction cleaner; moveable retaining means mounted on said body member having engaged and released positions, said engaged position holding said bag collar on said mounting tube to thereby fix said dirt-collecting bag to said body member;

moveable actuating means mounted on said body member for moving said retaining means from an engaged to a released position to permit removal of said bag collar from said mounting tube;

said actuating means including pushing means simultaneously movable therewith and movably abutable with said rigid collar of said dirt-collecting bag means by movement of said actuating means in a releasing direction to define the released position of said retaining means for pushing said rigid collar towards the free end of said mounting tube to release it from the same.

2. A suction cleaner as described in claim 1, including abutment means in part carried by said cleaner housing and in part carried by said actuating means and wherein said abutment means of said cleaner housing and said actuating means interengage to prevent movement of said actuating means and in turn movement of

said retaining means to said released position when said body member is affixed to said suction cleaner.

3. A suction cleaner as described in claim 2 wherein when said body member is separated from said suction cleaner, said abutment means are in interfering relation to prevent assembly of said body member with said suction cleaner when said retaining means is in said released position.

4. The suction cleaner set out in claim 1 wherein the exterior of said mounting tube is tapered with its major diameter portion adjacent said body member and its smaller diameter free end portion spaced from said body member and wherein the smaller diameter portion of said mounting tube is proportioned to be freely received in said bag collar aperture and said larger diameter portion of said mounting tube is proportioned to wedge within said bag collar aperture to provide for frictional engagement between said tube and bag collar and to provide for easy release between said mounting tube and said bag collar as said pushing means moves said rigid bag collar along said mounting tube.

5. A suction cleaner as described in claim 4 wherein said retaining means includes a pair of projections affixed to said mounting tube adjacent said small diameter portion, which projections, when in said engaged position, project transversely of and radially outwardly from said mounting tube for abutment with the side of said bag collar adjacent the interior of said cleaner bag.

6. A suction cleaner as described in claim 5 wherein a pair of leaf springs extend longitudinally of said mounting tube and are disposed in diametrically opposed relation therein and with one end of each spring being affixed to said tube adjacent said body member, and the opposite end of said springs forming projections aforesaid, a pin affixed to each of said springs and extending radially outwardly through apertures at an intermediate portion of said tube, said pin being adapted to engage with a portion of said pushing means to cause said projections to retract inside said tube when said actuator is operated to move said retaining means from an engaged to a released position.

7. A suction cleaner as described in claim 6 wherein said diametrically opposed springs include cam surfaces having base portions adjacent the free end of said mounting tube, and top portions adjacent said projections; wherein said top portions are diametrically spaced from each other at a distance greater than the diameter of said bag collar aperture when said retaining means is in said engaged position such that said bag collar pushes said cam surfaces radially inward causing said projections to be biased toward the interior of said mounting tube when said bag is being inserted upon said mounting tube.

8. A suction cleaner including a suction inlet and a suction outlet and having a housing for partially forming a chamber for receiving a disposable, porous dirt-collecting bag;

a disposable, porous dirt-collecting bag having a rigid collar with an aperture therein mounted on said suction inlet;

a body member separable from said housing for transportation apart from said housing, said body member being adapted to be affixed to said housing to form a portion of said chamber;

a mounting tube carried by said body member projecting its free end into said chamber and through

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said bag collar aperture supporting said dirt-collecting bag;
said mounting tube confluently communicating at its other end with an aperture in said body member forming the suction inlet for said suction cleaner; 5
spring-biased retaining means mounted on said body member having engaged and released positions, said engaged position holding said bag collar on said mounting tube and thereby fixing said dirt-collecting bag to said body member;
said retaining means having portions extending generally parallel to and along the axial direction of said mounting tube and being spring biased to define the engaged position;
actuating means pivotally mounted on said body 15 member on an axis radially removed from and sub-

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stantially perpendicular to said axial direction of said mounting tube and extending theretowards defining a turning movement at least partially parallel to and extending along said axial direction of said mounting tube in engagement with said portions of said retaining means to move said retaining means against its spring bias and releasing said rigid collar of said dirt-collecting bag.

9. The suction cleaner of claim 8 wherein said body 10 member includes operator-accessible button means, said button means including means for direct engagement with said actuating means for causing said turning movement of said actuating means to provide the aforesaid release of said rigid bag collar from said mounting tube.

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