

March 29, 1960

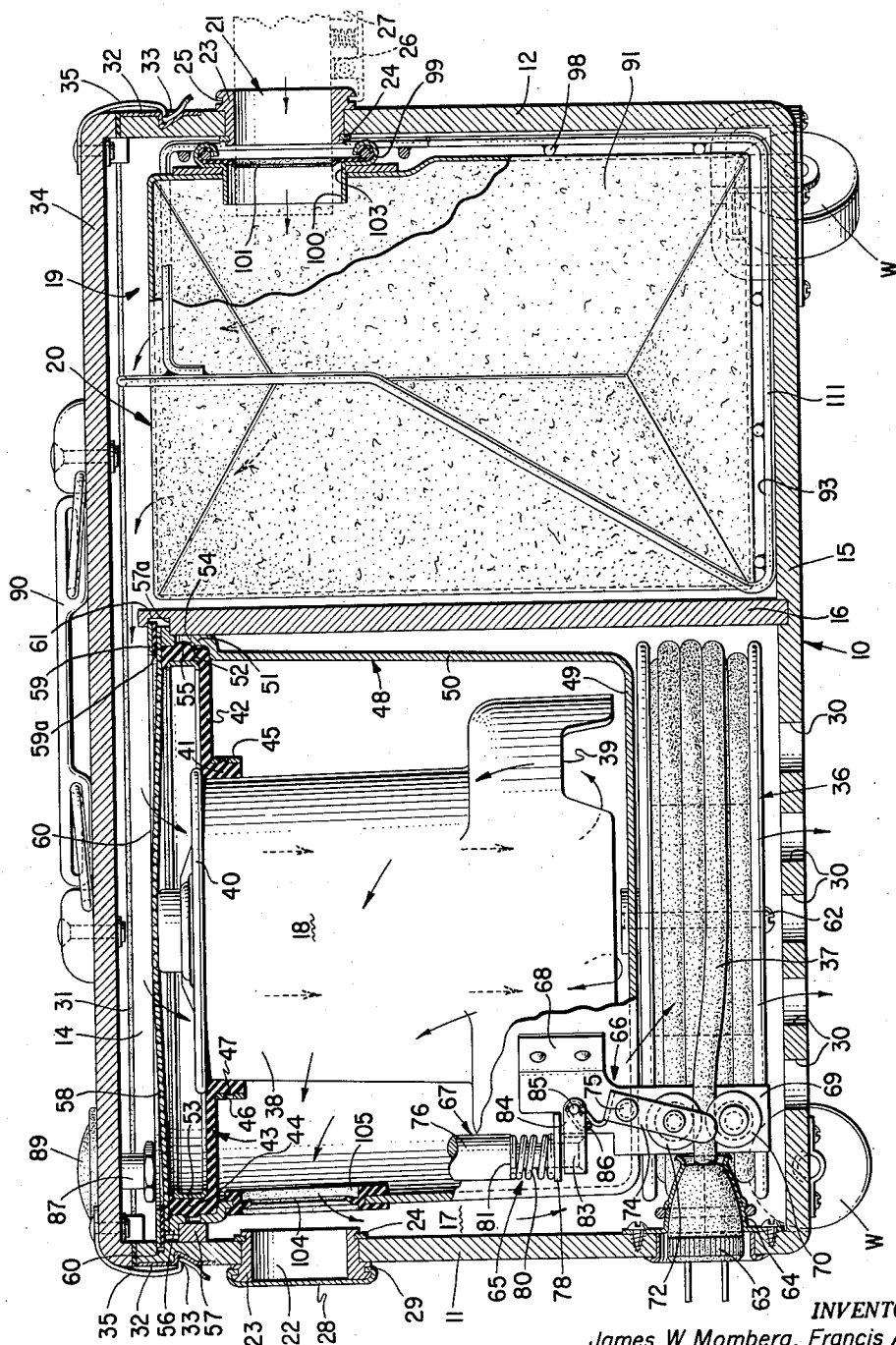
J. W. MOMBERG ET AL

2,930,446

CANISTER TYPE VACUUM CLEANERS

Filed March 18, 1957

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

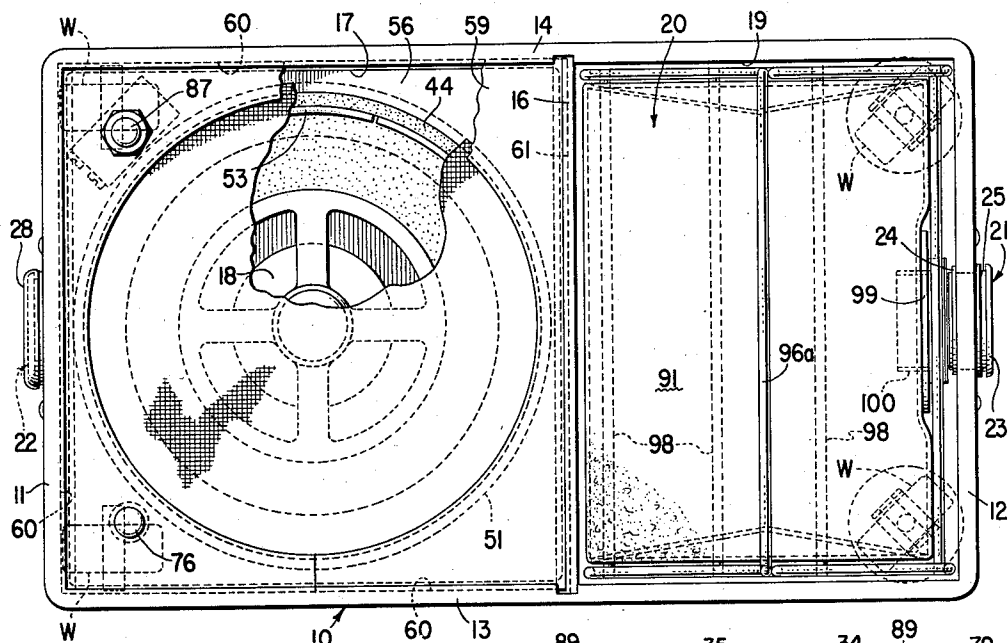


Fig. 2.

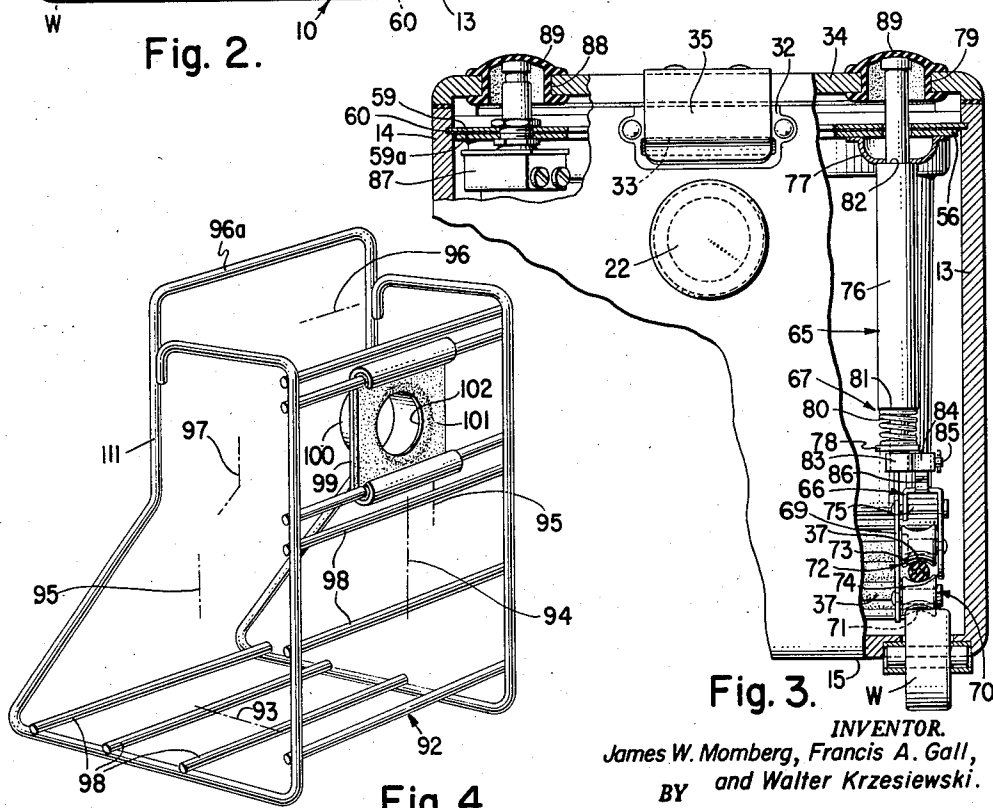


Fig. 3.

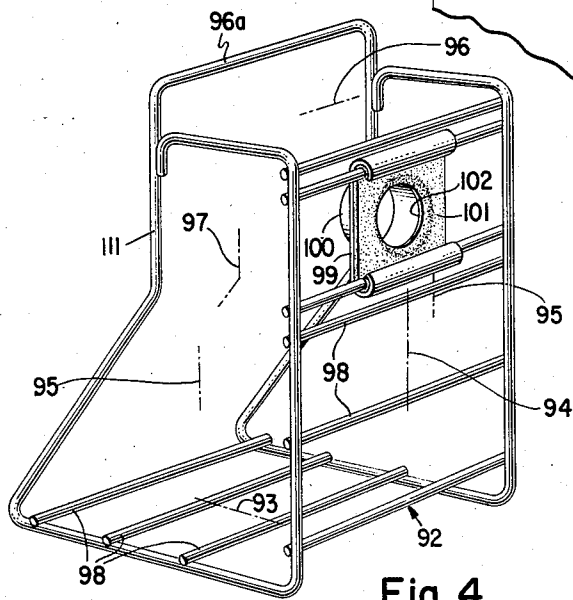
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Fig. 4.



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2,930,446

CANISTER TYPE VACUUM CLEANERS

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Application March 18, 1957, Serial No. 646,868

1 Claim. (Cl. 183—37)

The present invention relates to vacuum cleaners and more particular to vacuum cleaners of the canister type.

It is an object of the present invention to provide a vacuum cleaner of the canister type in which the various components are arranged in a compact unit while at the same time being arranged in a manner which permits ready accessibility to the main operating components thereof.

It is another object to provide a novel and improved mounting for the power driven fan unit, whereby the unit may be easily detached and removed from the cleaner casing to facilitate servicing of the fan unit.

It is a further object of the invention to provide an improved carrying arrangement for the dust filter bag, whereby the bag may be easily removed from the cleaner casing for emptying without collapsing the bag or spilling dust collected therein as is oftentimes encountered in prior vacuum cleaners.

Further objects and features will hereinafter appear.

In the drawings, Fig. 1 is a longitudinal vertical sectional view of the improved vacuum cleaner.

Fig. 2 is a top view of the cleaner with the cover removed and with some of the parts broken away to show details of underlying structure.

Fig. 3 is a fragmentary left end view of the cleaner with some of the parts broken away to show details of the power driven fan unit.

Fig. 4 is a perspective view of the dust filter bag carrier unit.

Referring now to the drawings, particularly Figs. 1 and 2, the vacuum cleaner comprises a casing 10 in the form of an open-top rectangular parallelepiped having a left end wall 11, a right end wall 12, a front wall 13, a rear wall 14 and a bottom wall 15 on the exterior of which are secured transporting wheels W. Located intermediate the end walls 11 and 12 and extending upwardly from the bottom wall is a solid central partitioning wall 16, the upper edge of which is disposed slightly below the upper edges of the top edges of the walls of the casing 10. The partitioning wall 16 separates the casing into a compartment 17 in which is located the power operated device including a motor fan unit 18 for creating the suction necessary to collect dust and a second compartment 19 in which is carried the dust filtering and collecting unit 20.

The end walls 11 and 12 are provided with port openings 22 and 21 respectively, each port opening being in the form of a sleeve 23 secured to the end wall by a split ring clamp 24. The sleeve 23 on the right end wall 12 projects outwardly from the casing and is formed with a circumferential groove 25 which is adapted to receive therein a spring pressed detent 26 of a hose coupling tube 27 slidably receivable by the sleeve 23. The port 21 on the right end wall 12 serves as an intake port permitting air containing dust to be circulated through the cleaner while the other port 22 on the opposite wall 11 functions as an exhaust outlet through which air is circulated under

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pressure directly from the power operated suction creating device to the outside atmosphere.

During normal operation of the cleaner as a dust collector, the port 22, as shown in Fig. 1, is closed by a cover plate 28 having a curled flange 29 which resiliently seats within the groove 25 of the sleeve 23. With the exhaust port 22 thus sealed, the air being circulated through the cleaner and drawn in through the intake opening 21 is exhausted through relief openings 30 formed in the bottom 15 of the compartment 17.

Secured to the top edges of the walls 11, 12, 13 and 14 by a suitable adhesive is a compressible gasket 31 such as rubber or the like.

Seated upon the gasket 31 and closing the open top of the casing and accordingly both of the compartments 17 and 19 is a unitary cover 34 having secured thereon quick releasable latches 35 in the form of spring clips which are adapted resiliently to interlock with the notches 33 on the end walls 11 and 12, respectively, to hold the mating edges of the cover 34 and casing 10 in air tight relationship. The notches 33 may be provided with wear plates 32.

From the foregoing, it is readily apparent that when the cover 34 is removed the power operating devices and the dust filter unit 20 are accessible for servicing. Under some circumstances, however, the power operating devices may require checking and servicing which cannot be readily performed while the devices are housed within the casing 10. For this reason, it is desirable that the power devices be quickly and easily detachable from the casing. By the present invention there is provided an arrangement whereby all of the components forming the power operating device may be removed from the casing as an assembly without the removal of screws or fastening elements of similar character. This feature is advantageous, since all of the components may be mechanically and electrically checked for defects in their assembled state at a work bench or other location where the checking and servicing, if necessary, can be more readily accomplished than when the power operating device comprises separate components each being individually secured in the casing.

As shown, the power operating device comprises the motor fan unit 18 and a spring biased cord reel 36 upon which is wound a rubber cord covered electric cord 37 for connecting the motor fan unit to a source of electrical power.

The fan unit 18 is of conventional structure and includes a motor mounted in the upper end 38 of the shell and a fan (not shown) carried adjacent the enlarged open lower end 39. Fitting over the motor end 38 of motor fan unit 18 and snugly embracing the exterior surface below the beaded edge 40 of the shell is a cylindrical collar 41 projecting downwardly from the inner periphery of an annular disc 42 of a supporting diaphragm 43. The supporting diaphragm 43 is preferably made from a semi-rigid plastic or hard rubber and is formed along its outer periphery with an upwardly extending flange 44. Encircling the collar 41 and constricting the opening thereof to hold the motor fan unit 18 in the supporting diaphragm 43 is a split clamping ring 45 having a plurality of spaced openings 46 in which complementary spaced projections 47 formed on the exterior surface of the collar are adapted to seat.

The above described sub-assembly of the motor fan unit 18 is carried in the supporting diaphragm 43 is detachably and vertically suspended in an inverted hat-shaped housing 48 such that the fan end 39 extends downwardly and is spaced from the enclosed bottom 49 of the crown 50. The housing 48 may be made from a rigid material such as plastic or metal which may be

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impregnated or coated with a sound absorbing material, as for instance, fibre glass. The crown 50 is of substantially uniform circular cross-section and is formed adjacent its open top with an enlarged concentric flange 51 forming an annular seat 52 snugly receiving the upwardly extending flange 44 of the diaphragm 43. Detachably fitting within the inner diameter of the upwardly extending flange 44 is a split expansion ring 53 which maintains spaced projections 55 on the outer periphery of the flange 44 seated within complementary spaced openings 54 in the flange 51.

Projecting outwardly from the upper edge of the flange 51 is a horizontal brim 56 having a rectangular contour substantially conforming to the open top of the compartment 17. The brim 56 rests along its left and right hand edges on a ledge 57 secured to the left end wall 11 and on a shelf 57a formed on the central partitioning wall 16. Covering the open top of the housing 48 is a filter 58 which serves to prevent any dust which may not be entrapped by the filter unit 20 from entering into the motor fan unit 18. Superposed over the edges of the filter 58 is a sealing gasket 59a upon which rests an open-center split rectangular retaining plate 59, the edges of which are seated within grooves 60 formed on the front, rear and side walls respectively, and in a notch 61 formed on the partitioning wall 16.

Disposed between the housing bottom 15 and the bottom 49 of the crown 50, and axially secured to the latter as by a stud 62, is the cord reel 36 upon which is wound the rubber covered extension cord 37. The cord reel 36 may be of any of several well-known types but in the preferred form, as shown, it is of the spring-biased type which, in the absence of any pulling force to withdraw the cord 37 from the reel 36, is effective to rotate the reel and wind the cord thereon. At its free end the cord 37 has an electrical plug 63 which, when the cord is fully retracted, seats within a shielded opening 64 provided in the end wall 11 and thereby hiding the cord from view when the cleaner is not in use. Associated with the cord reel 36 and carried by the housing 48 is a cord control mechanism 65 which is selectively effective to maintain the cord 37 at a desired withdrawn length or to permit the cord 37 to be retrieved upon the reel 36.

The cord control mechanism 65 comprises a cord-gripping unit 66 for maintaining the cord withdrawn from the reel at the length desired and a cord releasing unit 67 for inactivating the former and permitting the reel 36 to retrieve the withdrawn length.

The gripping unit 66 is mounted on the crown 50 of the housing 48 adjacent the cord opening 64 and comprises a supporting bracket 68 having a depending vertical leg 69 parallel to the front wall 13 and spaced slightly inwardly from the axis of the cord opening 64. Rotatably carried upon the leg 69 is a guiding roller 70 having formed on its outer periphery a substantially semi-elliptical grooved surface 71 which engages and guides the cord axially through the shielded opening 64. Cooperating with the guiding roller 70 and engaging the upper side of the cord 37 is a rotatable presser roller 72 also formed with a substantially semi-elliptical grooved surface 73.

The presser roller 72 is rotatably carried on the lower end of a yoke member 74 which is pivotally carried on a stud 75 secured to the vertical leg 69, the stud 75 being located inwardly and above the axis of rotation of the guiding roller 70 such that when the presser roller 72 is in engagement with the cord 37 the yoke 74 is inclined toward the cord opening 64. In this position the yoke 74 tends to pivot counterclockwise and to carry the presser roller 72 into closer proximity to the guiding roller 70, thereby to restrict the opening formed by the grooved surfaces 71 and 73 and firmly grip the cord 37 therebetween.

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When it is desired to withdraw a length of the cord from the reel 36 the cord 37 is pulled with sufficient force to overcome the opposing action of the biasing spring of the reel, whereupon the cord 37, as it passes between the rollers 70 and 72, rotates the presser roller supporting yoke 74 clockwise about the stud 75. This movement of the yoke 74 moves the presser roller 72 further from the guide roller and thereby enlarges the passageway defined by the grooved surfaces 71 and 73, permitting the cord 37 to pass between the rollers 70 and 72 substantially unimpeded. Upon release of the pulling force of the cord, after the desired length has been withdrawn, the presser roller yoke 74 swings counterclockwise to bring the presser roller 72 into closer proximity to the guide roller 70 to grip the cord in the manner above described.

The cord grip releasing mechanism 67 comprises a vertically movable plunger 76 supported intermediate its ends by a cup-shaped bearing 77 secured on the brim 56 of the housing 48 and a horizontal flange 78 projecting from the cord-gripping supporting bracket 68. The plunger 76 is normally urged upwardly through an opening 79 in the cover member 34 by a compression spring 80 encircling the lower end of the plunger between the shoulder 81 formed thereon and the horizontal flange 78. Formed on the plunger and engageable with the lower surface of the bearing cup 77 is a shoulder 82 which limits the upward movement of the plunger 76.

Attached to the lower end of the plunger 76 is a collar 83 having projecting therefrom a horizontal limb 84 carrying, adjacent its free end, a transverse pin 85 lying above and in substantial vertical alignment with the stud 75. As best shown in Fig. 1, the pin 85 is received in a control loop 86 formed integral with the presser roller yoke 74, which control loop 86 is inclined such that when the plunger 76 is in its normal raised position the loop 86 will ride over the pin 85 and thereby permit the presser roller yoke 74 to pivot about the stud 75 without raising the plunger 76. To release the presser roller 72 from its gripping engagement with the cord, the plunger is depressed thereby moving the pin 85 downwardly toward the presser roller yoke stud 75 and into engagement with the lower limb of the loop 86. Hence, the yoke 74 carrying the presser roller 72 swings clockwise and away from the guide roller 70 and out of engagement with the cord 37 whereupon the spring-biased means in the reel is free to retrieve and rewind the cord 37 on the reel 36.

Secured to the brim 56 of the housing 48 is a conventional electrical push-button type start-and-stop switch 87 which is electrically connected to the cord and motor fan unit by conventional means (not shown). The switch 87 is arranged to be accessible from the exterior of the casing with the actuating plunger extending through an opening 88 provided in the cover member 34. In order to maintain the interior of the cleaner substantially air tight each of the openings 79 and 88 on the cover member is provided with a depressible rubber cap 89 firmly seated around the edge defining the opening, as shown.

From the foregoing description, it is readily apparent that when the cover 34, which may be provided with a collapsible handle 90, is removed all of the individual components comprising the power operating device are removable as an assembly. This is made possible by the provision of the housing 48 which supports the motor fan unit 18 within its interior, the cord reel 36 on bottom wall 49, the cord control mechanism 65 on the side of the crown 50, and the electrical switch on the brim 56. Thus, when the retaining plate 59 overlying the brim 56 and which locks the housing 48 in the compartment 17 is removed, the housing 48 carrying all of the operating elements may be lifted from the compartment 17 simultaneously and removed to another location for inspection and servicing, if necessary. To remove the motor fan unit 18 from the housing 48, the

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snap ring 53 engaging the flange 44 of the diaphragm 43 within the annular seat 52 is detached and the sub-assembly including the diaphragm 43 and motor fan unit 18 may easily be lifted from its suspended position within the housing 48. Removal of the diaphragm 43 from the motor fan unit 18 is accomplished by detaching the snap ring 45 embracing the collar 41 and thereafter forcing the motor end 38 through the diaphragm opening. It is to be observed that the entire assembly does not include a fastening element such as a screw or the like. This feature is extremely desirable particularly from the point of view of manufacturing economy.

Positioned in the other compartment 19 is the dust collecting filter unit 20 including a filter bag 91 carried in a frame or cage 92 adapted to be inserted through the open top of the compartment. The cage 92 is generally box-like in form having walls defining a bottom 93, front 94, sides 95, top 96, an open rear 97 and a horizontal handle 96a extending between the opposite sides 95 and over the top 96. While the cage 92 may be constructed in various ways, in the preferred form as shown in Fig. 4, it is of an economical wire frame construction including a single wire 111 which is bent to form the top, front, bottom and back reaches of both sides 95 of the cage as well as the handle 96a connecting the two top rear corners of the two sides 95. To facilitate the insertion of the filter bag within the cage the rear end reaches on each of the sides 95 are inclined upwardly from the rear end of the bottom reach to a point substantially midway between the front and rear and then assume a vertical position. This increases the effective handling space of the filter bag 91 at the open rear 97, while at the same time adequately supporting the bag within the cage.

Extending transversely across the bottom and the front reaches and having their ends secured thereto, as by welding or the like, are spaced wires 98 which define the bottom 93 and front 94 of the cage 92. Secured to the front 94 of the cage 92, as by curling the upper and lower edges over two of the spaced wires, is a square plate 99 having a central opening with an inwardly projecting throat in alignment with the intake port 21 and which receives the hose coupling tube 27. Adhesively secured to the outer face of the square plate is a resilient air sealing member 101 having a central opening 102 coaxial with the throat 100 and having a lesser diameter than the hose coupling tube 27 such that edges defining the opening 102 curl about the outer periphery of the hose coupling tube 27 and form an air-tight seal, as shown in Fig. 1.

The filter bag is preferably formed of a foldable and inexpensive porous paper in the shape of a rectangular parallelepiped conforming substantially to the interior dimensions of the cage 92. The front face is formed with an opening 103 reinforced about its edges and sized snugly and slidably to fit over the inwardly projecting throat 100 which, in addition to serving as an air intake passage into the filter bag 91, also assists in maintaining the bag positioned in an expanded state in the cage 92.

From the foregoing, it can readily be seen that the dust collecting unit 20 of the present invention has many advantages. Primarily, the cage 92 and the filter bag 91 are detachably maintained within the compartment only by the separable hose coupling tube 27. Thus, when the hose coupling tube is detached, the filter bag 91 carried in cage 92 which merely rests on the bottom of the compartment 19 may be lifted as a unit from the cleaner casing. The filter bag 91 carrying the accumulated dust and dirt may thus be carried to a disposal receptacle at which location the filter bag may be easily detached from the cage 92 and discarded. This eliminates the inadvertent spilling of the dust from the filter bag into the cleaner casing or surrounding atmosphere such as oftentimes occurs in prior vacuum cleaner structures wherein the filter bag must be removed unsupported from cleaner casing resulting in the bag collapsing or

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tearing due to the necessary handling required during the detachment of the bag from the cleaner housing.

The operation of the above described vacuum cleaner is as follows:

5 The cage 92 loaded with a filter bag 91 is inserted through the open top of the compartment 19 and is positioned such that the bottom 93 rests on the bottom wall 15 of the casing 10 and cage front wall 94 faces the end wall 12. The cover is then snapped into position 10 and the vacuum cleaner may then be operated to perform its normal cleaning function or serve as a blower to exhaust air therefrom under pressure.

When the cleaner is used to perform its normal cleaning function the exhaust port 22 is closed by the cap 15 28 and the end of the hose coupling tube 27 inserted through the intake port 21 and into the filter bag 91 through the cage throat 100. Hence, upon starting the motor fan unit 18, by actuation of the switch 87, the fan will draw air through the hose coupling tube 27 directly into the interior of the filter bag, wherein the dust or dirt entrained in the air will be trapped within the confines of the bag. The air thereafter, as shown, is drawn upwardly toward the cover 34 and between the air passage defined by the top edge of the partitioning 25 member 16 and the inner surface of the cover 34 and into the motor fan unit compartment through the filter 58 which prevents any dust or dirt not entrapped by the filter bag from entering the motor fan unit.

As shown in Fig. 1, the side of the housing crown 50 30 is provided with an opening 104 coaxial with the exhaust port 22 through which the air drawn over the motor end is dispelled and forced around the housing and discharged through the relief openings 30 in the bottom 15. The opening 104 and relief openings 30 permit a complete 35 circulation of the air through the cleaner housing 10 and thereby assuring that cool air is drawn over the motor end 38 of the motor fan unit 18 to maintain the motor within desirable operating temperatures.

To operate the cleaner as a blower, the intake port 21 40 is left unobstructed and the hose coupling tube 27 inserted through the exhaust port 22 into the housing 48 through the crown opening 104 which, as shown, is bounded by a washer 105 having an opening of lesser diameter than the hose coupling tube 27 such that the 45 edge of the washer frictionally engages the outer periphery of the tube to form an air-tight seal. When the hose coupling is thus inserted the air can only be exhausted through the coupling tube 27 since circulation about the housing 48 is prevented by the hose coupling tube 27 and the air cannot be dispelled through the relief openings 30.

Having thus described the nature of the invention, what we claim herein is:

A canister type vacuum cleaner comprising a casing in the form of an open topped rectangular parallelepiped 55 having a left wall, a right wall provided with an intake port, a front wall, a rear wall, a bottom wall provided with an exhaust port, and a solid partition wall separating said vacuum cleaner casing into two compartments, the upper edge of said partition wall being disposed slightly 60 below the upper edges of said left, right, front and rear walls; a unitary cover releasably latched to the top of said casing, and providing communication between said two compartments over the top of said partition wall; a plurality of wheels adapted to support said casing on a floor; a hat shaped housing comprising an open topped 65 crown extending into one of said compartments and having a bottom and a brim, said brim radiating from said crown adjacent to the open end thereof; a fan unit; means detachably supporting said fan unit upright within the crown portion of said housing; an extension cord; a 70 spring biased cord reel adapted to retain the cord wound thereon; means rotatably mounting said cord reel below and on the bottom of the crown of said housing; means detachably securing said brim adjacent to the open 75

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top of said compartment to position said crown carrying said fan unit and said cord reel within said compartment; a dust filter bag carrier insertable and removably positioned within the other of said two compartments; a dust filter bag detachably supported on said carrier and forming a filter bag unit, said filter bag being provided with an air intake mouth; and an air intake throat provided on said carrier adjacent to said port in said right wall, said throat detachably receiving said filter bag mouth and adapted slidably to receive a hose coupling tube whereby, when said filter bag unit is positioned within said compartment and a hose coupling tube is inserted through said port and into said throat, an air intake passage is provided into said filter bag.

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