March 15, 1949. G. M. KELLY 2,464,401

VACUUM CLEANER

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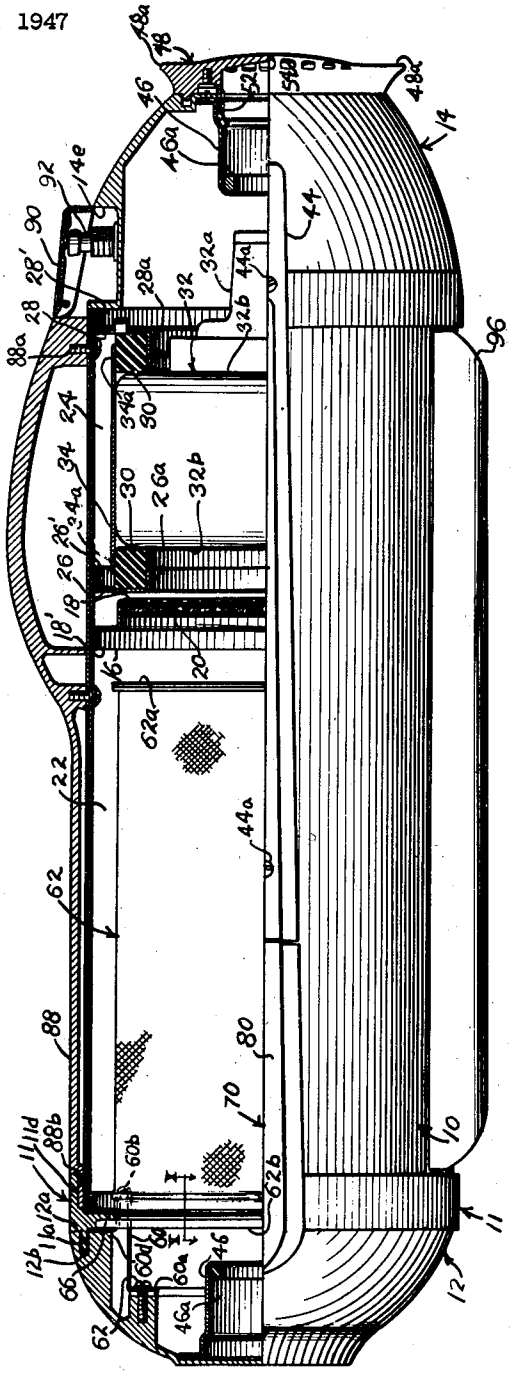


Fig. 1

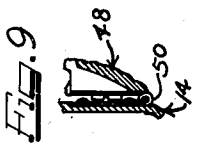


Fig. 9

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Fig. 3

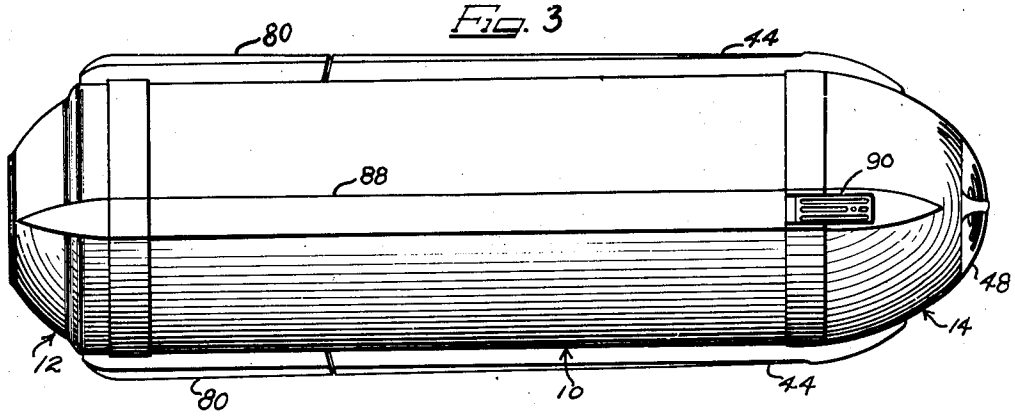
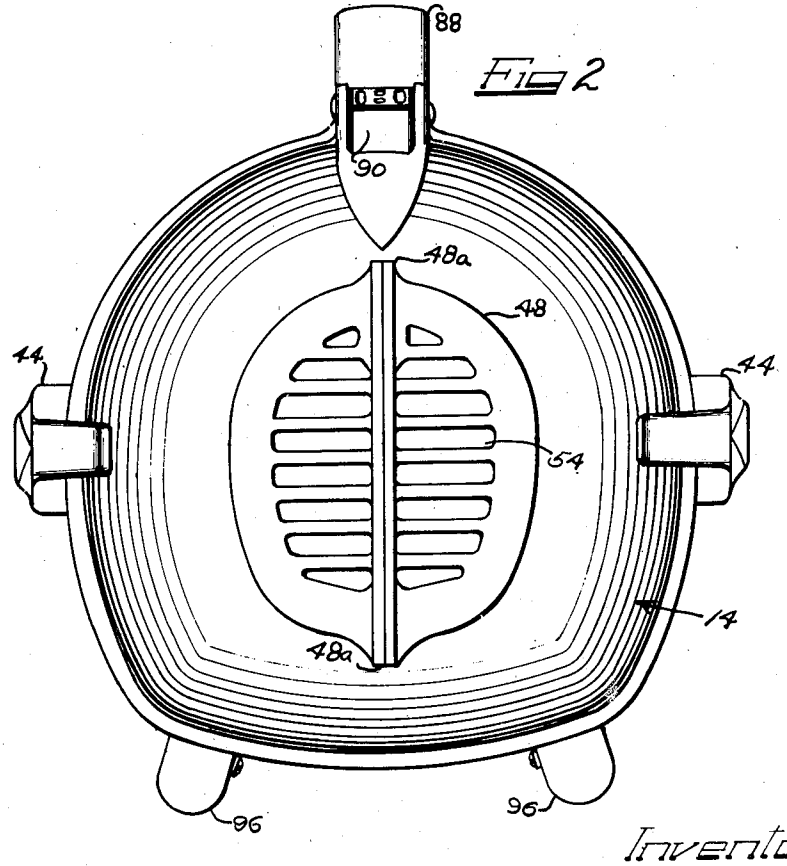


Fig 2



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Fig. 5

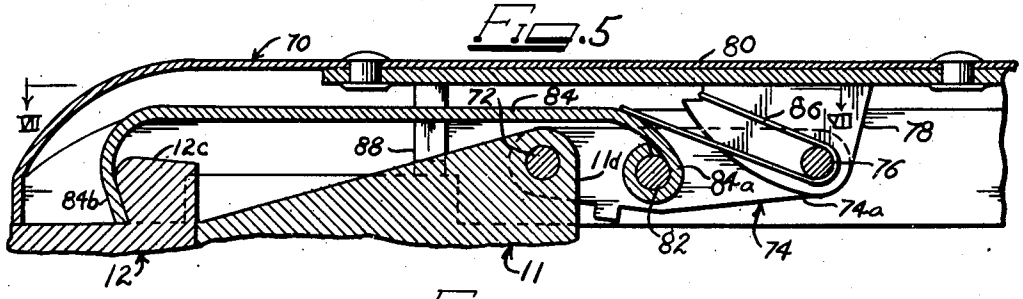


Fig. 6

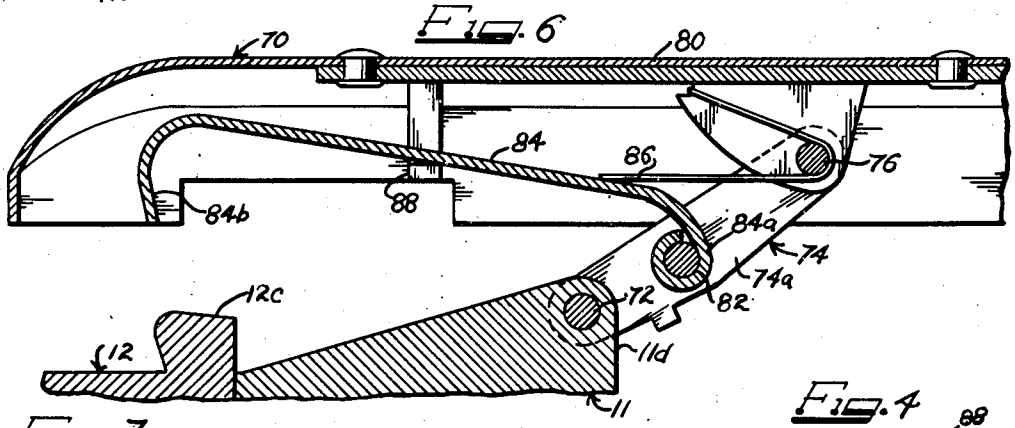


Fig. 7

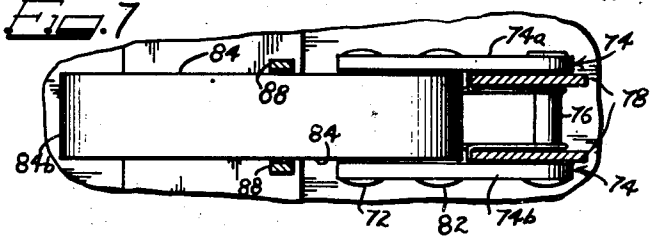


Fig. 4

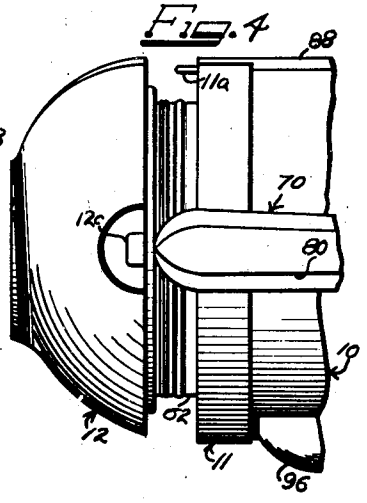


Fig. 8

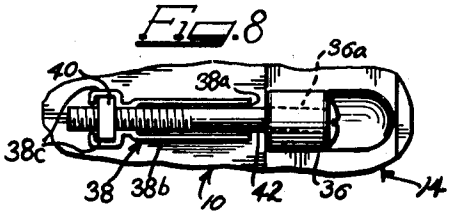
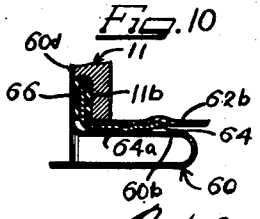


Fig. 10



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UNITED STATES PATENT OFFICE

2,464,401

VACUUM CLEANER

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Application January 20, 1947, Serial No. 723,170

5 Claims. (Cl. 230—117)

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This invention relates to a vacuum cleaner and particularly to an improved construction for a tank-type vacuum cleaner permitting the manufacture of a vacuum cleaner of improved performance and appearance at a substantial reduction in cost over constructions heretofore known in the art.

Since vacuum cleaners of the horizontal axis, tank-type have long been known in the patented art, this invention necessarily relates to improvements in the constructional features of such vacuum cleaners which improve the performance of the vacuum cleaner, improve its appearance, facilitate the handling of the vacuum cleaner in use, and permits a substantial saving in manufacturing cost to be realized.

Accordingly, it is an object of this invention to provide an improved vacuum cleaner of the so called tank-type.

A further object of this invention is to provide an improved mounting for the blower unit of a tank-type vacuum cleaner which will permit such blower unit to be completely cushioned on soft rubber and supported for both radial and axial vibration independently of the main casing of the vacuum cleaner. Such construction provides a substantial reduction in the noise created by the vacuum cleaner during operation and also prolongs the life of the moving parts of the blower unit.

A particular object of this invention is to provide an improved latch construction for effecting the securing of an end cap or casing to the main casing of a tank-type vacuum cleaner, characterized by the inclusion of a latch operating member of elongated, channel-shaped configuration which, in the secured position of such latch, completely conceals all of the other latch elements and provides the pleasing appearance of a trim strip on the exterior of the vacuum cleaner casing.

Another particular object of this invention is to provide improved securing arrangements for an end casing of a tank-type vacuum cleaner constituting a plurality of bracket members secured to the exterior of the main casing of the vacuum cleaner and having means formed thereon for receiving a nut and retaining such nut against both axial and rotative movement so that screws passing through the end casing member and cooperating with such nuts will effect the rigid securing of the end casing to the main casing.

Another object of this invention is to provide an improved tank-type vacuum cleaner construction characterized by the incorporation of a closure member for the air discharge outlet of

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the vacuum cleaner which is mounted on the casing for movement between opening and closing positions with respect to the air discharge aperture, in its opened position, permitting the attachment of a cleaning hose to the air discharge end of the vacuum cleaner, and in its closed position, presenting an exterior surface contoured to the general exterior lines of the vacuum cleaner, hence improving the appearance thereof, and preventing the accidental insertion of foreign objects into the discharge end of the vacuum cleaner where such objects may contact the moving elements of the blower unit and causing damage thereto.

Still another object of this invention is to provide a frictional engagement between the mouth of the bag of a tank-type vacuum cleaner and the end casing commonly associated with the mouth of the dust bag so that the dust bag is removable from the interior of the main casing with the removal of the end casing, thereby preventing the inadvertent spilling of debris from the dust bag upon removal of the end casing.

The specific nature of the invention, as well as other objects and advantages thereof, will become apparent to those skilled in the art from the following detailed description of the annexed sheets of drawings which, by way of preferred example only, illustrate one specific embodiment of the invention.

On the drawings:

Figure 1 is an elevational view, partly in vertical section of an assembled tank-type vacuum cleaner embodying this invention;

Figure 2 is a side elevational view of the discharge end of the vacuum cleaner of Figure 1;

Figure 3 is a top elevational view of the vacuum cleaner of Figure 1;

Figure 4 is a partial side elevational view of the front end of the vacuum cleaner illustrating the removal of the end casing and dust bag;

Figure 5 is an enlarged scale, horizontal sectional view taken through the latch mechanism, showing the elements thereof in secured position;

Figure 6 is a view similar to Figure 5 but showing the latch elements in unlatched position;

Figure 7 is a sectional view taken on the plane VII—VII of Figure 5;

Figure 8 is an enlarged scale elevational view of one of the rear end casing securing mechanisms; and

Figure 9 is a fragmentary vertical sectional view through the hinge mounting of the closure for the air discharge opening of the vacuum cleaner.

Figure 10 is an enlarged scale sectional view taken on a radial plane X—X of Fig. 1.

As shown on the drawings:

Referring to Figure 1, a vacuum cleaner embodying this invention comprises an elongated hollow casing member 10 having opposed open ends. An annular intake end casing member 12 cooperates with the forward open end of the main casing 10 and an annular discharge end casing member 14 cooperates with the rear open end of the main casing 10. While not limited thereto, the main casing 10 is preferably of non-cylindrical, yet arcuate configuration in cross section, the bottom portion of the casing having a larger radius of curvature than the top and side portions. The casing 10 may be conveniently formed by a rolling operation on a metal sheet to bring opposed edges of the sheet into juxtaposition whereupon they are suitably secured together as by riveting or welding.

Near the center of casing 10, an annular bulkhead 16 is mounted within the casing in generally transverse relation thereto and such bulkhead is suitably shaped to define a forwardly facing annular shoulder 18 upon which a conventional filter element 20 is supported. The bulkhead 16 and filter 20 thus effect a division of the interior of casing 10 into two compartments, respectively, a dust bag compartment 22 on the forward side of bulkhead 16 and a blower unit compartment 24 on the rear side of bulkhead 16.

Immediately adjacent the rear side of bulkhead 16, a second annular bulkhead 26 is mounted, being pressed into the casing 10 in generally transverse relationship. Axially rearwardly spaced from bulkhead 26 is a third annular bulkhead 28. Bulkhead 28 is, in fact, disposed adjacent the discharge end of casing 10. While the first and second bulkheads 16 and 26, respectively, are rigidly secured within the casing 10, having peripheral flanges 16' and 26', respectively, disposed in substantially sealing relationship with the interior walls of the casing 10, the third bulkhead 28 has a peripheral flange 28' which is slidably insertable within the casing 10 for assembly purposes. The central opening in bulkhead 26 is defined by an axially projecting annular flange 26*a* which extends toward the discharge or rear end of casing 10. An axially projecting annular flange 28*a* is formed on bulkhead 28 projecting toward the flange 26*a* and preferably of the same exterior diameter. The bulkhead flanges 26*a* and 28*a* are utilized to provide mounting seats for a pair of resilient mounting rings 30 which resiliently support a blower unit 32 so that the blower unit 32 may vibrate both axially or radially independently of the casing 10. The blower unit 32 may constitute any conventional form of electric motor 32*a* and an impeller (not shown) which will produce an axial flow of air through the casing, 10 entering the intake end casing 12 and discharging through the discharge end casing 14. A mounting shroud or housing 34 is provided for blower unit 32 and may conveniently comprise a cylindrical member having axially projecting end portions 34*a* which project beyond radial end walls 32*b* of the blower unit 32. The blower unit 30 may then be resiliently supported within casing 10 by permitting the axial projecting portions 34*a* of the shroud 34 to respectively rest upon the resilient rings 30.

It should be particularly noted that the rings 30 are secured in axial abutment between the radial wall portion of one of the bulkheads and the radial end wall portion 32*b* of the blower unit 32 and concurrently, in radial abutment between the axially projecting flanges 26*a* or 28*a* and the corresponding axial projecting portion 34*a* of the shroud 34. It is therefore apparent that the blower unit 32 is resiliently supported for vibrations in an axial direction and in a radial direction. Accordingly, a minimum of vibration is imparted to the casing 10 and therefore a minimum of noise is created by the operation of the blower unit 32.

It should be further noted that the axially projecting portions 34*a* of the shroud 34 overlap the axial flanges 26*a* and 28*a*, respectively, so that a minimum of shearing force is exerted on the resilient rings 30. By this construction, the resilient rings 30 may be formed from very soft rubber-like material, such for example as the so-called foam rubber. The use of such extremely soft rubber-like material further improves the vibration absorbing characteristics of the mounting and hence improves the noise reduction characteristics.

A novel mechanism is provided in accordance with this invention for achieving the securing of the discharge end casing 14 to the main casing 10. Around the periphery of discharge end casing 14 there are provided a plurality of spaced integral ears 36. In the particular example illustrated, two such ears 36 are provided, being approximately diametrically separated and disposed approximately at the same vertical level. Each of the ears 36 is provided with an axially extending hole 36*a* extending therethrough. At similar positions on the discharge end of main casing 10, a plurality of retainer brackets 38 are suitably secured to the exterior surface of main casing 10 as by welding or riveting. Each of the bracket members 38 is of generally U-shaped configuration having a base portion 38*a* lying flush against and secured to the outer wall of main casing 10 and upstanding and somewhat forwardly projecting finger portions 38*b*. The ends of finger portions 38*b* are each deformed in a somewhat similar fashion so as to define a pair of opposed claw-like members 38*c* between which a square nut 40 hay be inserted by a generally radial movement with respect to the casing 10. The claw-like portions 38*c* of the fingers 38*b* thus not only support the nut 40 but retain such nut against both axial and rotational movement. Accordingly, the insertion of a screw 42 through each of the apertures 36*a* in the ears 36 of discharge end casing 14 and the tightening of such screws into nuts 40 will draw the discharge end casing 14 into rigid engagement with the main casing 10.

Both the retainer brackets 38 and the ears 36 are concealed from view by a pair of trim strips 44. Such trim strips are elongated members of generally channel shaped cross section and are suitably shaped so as to snugly conform to the side walls of main casing 10 and to completely surround the retainer bracket 38 and the ear 36 on the respective side walls. Such trim strips 44 are suitably secured to the side walls of main casing 10 and discharge end casing 14, as by screws 44*a*.

As was heretofore mentioned, the discharge end casing 14 is an annular member and preferably has a tapering arcuate exterior configuration to produce an overall streamlined appearance of the vacuum cleaner. Adjacent the small end of discharge end casing 14 a socket member 46 is mounted in any suitable manner. Socket member 46 is of annular configuration and ex-

tends inwardly into the interior of discharge end casing 14. Socket member 46 is provided to effect a coupling with a conventional air hose member (not shown) and a resilient sealing ring 46a is secured to the innermost end of coupling 46 to effect an air-tight seal engagement with such air hose coupling member. An identical socket member 46 is provided in a corresponding position in the intake end casing 12 and, as will be understood by those skilled in the art, an air hose coupling member may be selectively engaged in either the socket 46 at the intake end of the vacuum cleaner or the socket 46 at the discharge end of the vacuum cleaner, depending upon whether a suction or pressure current of air is desired.

It has heretofore been the common practice to leave the openings in both the intake and discharge socket members uncovered so as to permit the hose coupling members to be quickly inserted in either end of the vacuum cleaner. Such arrangement greatly detracts from the overall appearance of the vacuum cleaner, since a large opening is always apparent at one end or the other and such opening abruptly interrupts the otherwise pleasing exterior contour of the vacuum cleaner casing. Furthermore, it has been observed that when the vacuum cleaner is used for suction cleaning operations, which is its most common usage, the opening in the discharge end casing 14 is a source of attraction for small children, who promptly attempt to insert various foreign objects in such opening. The resulting danger of damage to the moving elements of the blower unit 32, and particularly to the commutator of the motor 32a is readily apparent.

Such defects of construction are eliminated in accordance with this invention by the provision of a closure member 48 which is pivotally mounted to discharge end casing 14 on a hinge 50. Closure member 48 is thus movable between an opening and closing position with respect to the air flow passage in discharge end casing 14. A latch 52 is preferably provided to resiliently secure closure member 48 in its closing position. In such position, the exterior contour of closure member 48 is shaped so as to smoothly conform to the general line of the discharge end casing 14 and hence effect a substantial improvement in overall appearance of the vacuum cleaner. To permit substantially unimpeded airflow through the closure member 48 when in its closed position, a plurality of apertures 54 are provided therethrough. Apertures 54 are nevertheless of sufficiently small size to prevent the possibility of any foreign objects of substantial size being inadvertently inserted therethrough into the interior of discharge end casing 14.

In its open position, closure member 48 swings entirely out of the way of the central opening and discharge end casing 14 and hence permits a hose coupling member (not shown) to be inserted without difficulty into socket 46. If desired, a pair of opposed integral projectitons 48a may be provided on closure member 48 to provide a hand or finger hold for conveniently unlatching closure member 48 to move it to its open position.

Intake end casing 12 is likewise of annular configuration and has an arcuate tapering exterior configuration. The large end face 12a thereof is suitably shaped so as to conform to the configuration of the end face of a band member 11 which is rigidly secured to the intake end of main casing 10. If desired, the intake end casing 12 may be aligned with respect to band 11 by the cooperation of an axially projecting lug 11a provided on the end face of band 11 with a correspondingly shaped recess 12b in intake end casing 12. It has been previously mentioned that an annular socket 46 is suitably mounted within the hollow central portion of intake end casing 12 so as to receive a hose coupling member (not shown) in air sealing relationship. An annular stamping 60 is secured within intake end casing 12 adjacent the large diameter end thereof by a plurality of screws 62 which pass through suitable holes in a generally radial flange 60a of such stamping and are threaded into an annular wall portion 12c integrally formed in the end casing 12. Stamping 60 is provided with an integral axially projecting portion 60b which projects a short distance into the dust bag chamber 22 of the main casing 10. A dust bag 62 is provided which is of the conventional cylindrical construction having the closed end 62a thereof disposed adjacent the filter element 20. The open end 62b of the dust bag 62 is suitably secured to a metallic mounting ring 64 which in turn is snugly engageable upon the axially projecting annular flange 60b of the stamping 60. Preferably a plurality of indentations 64a are provided in the interior surface of ring 64 to produce a definite frictional engagement between the ring 64 and the stamping 60.

With such construction, it is apparent that whenever the intake end casing 12 is removed from assembly with the main casing 10, the dust bag 62 will be carried therealong and will remain in assembly with intake end casing 12 until forcibly separated therefrom. This construction has the advantage that the dust bag 62 may be removed from the vacuum cleaner for emptying without incurring the common annoyance of spilling of debris from the dust bag immediately upon the removal of the intake end casing 12 from assembly with the main casing 10.

The ring 64 is also provided with a radial flange 64b and this flange in turn is covered by a rubber-like gasket member 66. When intake end casing 12 is firmly assembled to main casing 10, the gasket 66 is compressed between a recessed annular end face 11b on the band 11 and an integral radial flange portion 60d provided on the stamping 60. Hence, leakage of air or debris from the periphery of the dust bag is effectively prevented.

Intake end casing 12 is secured in assembly to main casing 10 by a plurality of novel latch units 70 constructed in accordance with this invention. In the particular example illustrated, two such latch units 70 are provided and are respectively located in general longitudinal alignment with the retaining brackets 38 on the rear end of casing 10, which have heretofore been described. A pair of integral brackets 11d are formed on opposite sides of the band 11 and each bracket defines a generally vertical hole for receiving a pivot pin 72. An integral bifurcated support link 74 is provided having both arms thereof 74a and 74b traversed by pivot pins 72. At their other ends, the arms 74a and 74b are each traversed by a pivot pin 76 which in turn is mounted in a bracket 78 suitably secured to the inner base surface of a channel shaped operating member 80. At an intermediate point along link 74, a pivot pin 82 is mounted, being substantially parallel to pivot pins 72 and 76. A keeper link 84 has one end thereof rolled into generally cylindrical configuration indicated at 84a which is traversed by pivot pin 82. The other end of keeper link 84 is

bent to provide a hook or latching portion 84b. It is preferable that hook portion 84b be of cantilever construction and the entire link somewhat arched so that the link 84 is, to at least a limited degree, resiliently extensible.

A pair of locking projections 12c are integrally formed on intake end casing 12 at positions corresponding to the location of the latch units 70 on the main casing 10. The keeper links 84 are of such length as to permit the cantilever hooks 84b to respectively engage behind the locking ears 12c when the link 74 is pivoted outwardly from the wall of main casing 10. In this position, shown in Figure 6 a line drawn between the axis of pivot pin 82 of keeper link 84 and the effective point of engagement of the keeper link hook 84b with the respective locking lug 12c will pass outwardly of the pivot pin 72. In such position, operating member 80 is positioned away from the wall of the main casing 10. However, as operating member 80 is manually moved toward an abutting position with respect to the wall of main casing 10, the keeper link 84 is drawn rearwardly and inwardly. Such movement snugly engages the intake end casing 12 in assembly with band 11 and effects a resilient elongation of keeper link 84. Such elongation reaches a maximum when a line drawn from the axis of pivot pin 82 to the effective point of engagement of keeper hook 84b with the locking lug 12c passes through the axis of pivot pin 72. Further movement of operating member 80 toward an abutting position with respect to the side wall of the main casing 10 moves the keeper link 84 past its dead center position and the resilient tension therein effects a snapping of the latch unit to the secured position shown in Figure 5 wherein a line drawn from the axis of keeper pivot pin 82 to the point of contact of keeper hook 84b with the locking lugs 12c passes on the inner side of pivot pin 72. In this same position, the operating member 80 is pulled by link 74 into abutting engagement with the side walls of main casing 10.

In accordance with this invention, the operating member 80 may be conveniently shaped as an elongated member of channel-shaped cross section corresponding to that of the trim strips 44 which have heretofore been described. Furthermore, the length of operating member 80 is selected so that in the secured position of the latch unit 70, one end of the operating member 80 will lie in abutment with the forward end of the respective trim strip 44 and hence the operating member 80 will to all external appearances, constitute an extension of the trim strip. Moreover the channel shape configuration of operating member 80 permits such member to completely enclose all other elements of the respective latch units 70 and, in addition, the projecting locking lug 12c on the intake end casing 12. Hence, when the intake end casing 12 is assembled to the main casing 11 and the latch unit 70 manipulated by the operating members 80 to their secured position, none of the elements of the latch unit 70 will be visible and the operating member 80 will appear to be a continuation of the trim strip. The resulting improvement in appearance of the vacuum cleaner is deemed to be obvious but it is desired to also point out that the effective enclosure of all the elements of the latch unit completely eliminates the possibility of such elements snagging the clothes or stockings of the operator of the sweeper or other persons who may happen to pass by the sweeper when it is in use or storage.

To facilitate the positioning of the keeper link 84 with respect to the respective locking lug 12c, a torsion spring 86 may be provided which is wrapped around pivot pin 76 and operates between keeper link 84 and operating member 80, tending to urge keeper link 84 out of the operating member 80. The movement of keeper link 84 in its direction of bias by the spring 86 is limited by a pair of hook-like projections 88 which are integrally formed on the bracket member 78.

Along the top of the main casing 10, a combined trim strip and handle member 88 is mounted. Such member is secured to the casing 10 near its discharge end by a screw 88a and near the intake end thereof by a projecting lip portion 88b which extends into an undercut recess 11d formed in the band 11.

An upwardly opening recess 14e is provided in the top portion of discharge end casing 14 in general alignment with the handle member 88. Such recess provides convenient mounting space for a pivotally mounted pedal 90 which is operatively connected to the control switch 92 for the blower motor 32a so as to successively energize and deenergize such motor by successive vertical depressions of the pedal 90. The mounting of the switch pedal 90 in general alignment with the handle member 88 again simplifies the exterior lines of the vacuum cleaner and contributes substantially to the streamlined, yet attractive appearance thereof.

If desired, a pair of longitudinal skids 96 may be suitably secured on each side of the base portion of the main casing 10 so as to permit the entire vacuum cleaner to be readily pulled over a floor or rug surface during cleaning operations.

It is therefore apparent that the aforedescribed vacuum cleaner construction provides a vacuum cleaner of improved performance so far as casing vibration and noise level are concerned; of pleasing and simplified appearance by virtue of the covering of the retainer brackets 38 by the trim strips 44 and the enclosing of the latch elements 70 by the operating members 80 which constitute in effect a continuation of the adjacent trim strip; of improved safety by virtue of the provision of the movable closure member 48 for the air discharge opening of the vacuum cleaner, and capable of being interchangeably manufactured in large quantities at substantial savings in cost over vacuum cleaner construction heretofore known.

It will, of course, be understood that various details of construction may be varied through a wide range without departing from the principles of this invention and it is, therefore, not the purpose to limit the patent granted hereon otherwise than necessitated by the scope of the appended claims.

I claim as my invention:

1. In a vacuum cleaner, a hollow elongated casing, a pair of annular bulkheads disposed transversely of said casing and longitudinally spaced in said casing, each of said bulkheads having an axially projecting flange, said flanges projecting toward each other, a blower unit for producing air flow through said casing disposed between said bulkheads, casing means for said blower units having axially projecting end portions constructed to respectively surround a portion of the adjacent flange, and a ring of soft, rubber-like material disposed between each of said end portions and the adjacent flange, whereby said blower unit is resiliently supported to

vibrate both axially and radially independently of said casing.

2. In a vacuum cleaner a hollow elongated casing, a pair of annular bulkheads disposed transversely of said casing and longitudinally spaced therein, each of said bulkheads having an axially projecting annular flange, said flanges projecting toward each other, a blower unit for producing airflow through said casing disposed between said bulkheads, a cylindrical shroud surrounding said blower unit and having axially projecting end portions constructed to respectively surround a portion of the adjacent annular flange, and a ring of soft rubber-like material disposed between each shroud end portion and the adjacent annular flange, whereby said blower unit is resiliently supported to vibrate both axially and radially independently of said casing.

3. In a vacuum cleaner, a hollow elongated casing, a pair of annular bulkheads disposed transversely of said casing and longitudinally spaced therein, each of said bulkheads having a radial wall portion and an adjacent axially projecting annular flange, said flanges projecting toward each other, a blower unit for producing airflow through said casing disposed between said bulkheads, a housing for said blower unit having radial end wall portions and surrounding axially projecting annular end portions constructed to respectively surround a portion of the adjacent annular flange, and a ring of soft rubber-like material disposed in radial abutment between each axially projecting end portion and the annular flange of the adjacent bulkhead and in axial abutment between said radial end wall portions of said housing and said radial wall portion of the adjacent bulkhead, whereby said blower unit is resiliently supported in said casing to vibrate both axially and radially independently of said casing.

4. In a vacuum cleaner, a hollow casing open at each end, blower means in said casing for drawing air in one open end and discharging air through the other open end, annular socket members disposed in said casing respectively adjacent the intake and discharge end thereof, said socket members being adapted to selectively receive an air hose connection, and a cover member pivotally secured to said casing and positionable in open and closing relationship with respect to said discharge opening of said casing, said cover member having a plurality of apertures therethrough to permit substantially unimpeded discharge of air therethrough in its said closing position.

5. In a vacuum cleaner, a hollow casing open at each end, blower means in said casing for drawing air in one open end and discharging air through the other open end, annular socket members concentrically disposed in said casing respectively adjacent the intake and discharge ends thereof, said socket members being adapted to selectively receive an air hose connection, and a cover member pivotally secured to said casing and positionable in open or closing relationship with respect to said discharge opening of said casing, means for latching said cover member in said closing position, said cover member having an arcuate exterior surface shaped at its edges to conform to the exterior surface of said casing, and said cover member having a plurality of apertures therein to permit substantially unimpeded discharge of air therethrough in its said closing position.

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