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54 Upright vacuum cleaner tank assembly.

57 An upright vacuum cleaner that includes floor engaging housing and an upright handle secured to a mounting bracket pivotally secured to the housing. The handle mounting bracket includes side legs and an upper cross piece having mounting portions that extend outwardly beyond the side legs to which the handle is secured. The bracket is mounted to pivot about a generally horizontal pivot axis oriented perpendicular to the vacuum direction of travel. The handle abuts against surfaces on the mounting portion oriented parallel to the pivot axis, so that pushing forces are applied substantially against the mounting portions.

An elongate cord channel is mounted on the handle. The cord channel includes a base and resiliently deformable sides that separate to allow receipt of an electrical cord between the sides.

A vacuum tank housing with collecting bag support fastened to the handle has a standpipe with a curved upper portion that connects to the top of a collecting bag. The standpipe has an integrally formed flat to maintain the standpipe in the proper position abutting the tank housing. The vacuum motor includes an impeller and an guarded impeller opening which avoids restricting the air flow. The guard includes a screen surrounded by a non-removable mounting ring secured around the impeller opening.

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UPRIGHT VACUUM CLEANER TANK ASSEMBLYBACKGROUND OF THE INVENTION

The present invention relates to floor cleaning devices and more particularly to vacuum cleaners. Upright vacuum cleaners normally have a floor sweeper portion which is rolled over the surface to be cleaned, and an upright handle assembly or tank support assembly pivotally mounted to the sweeper portion. Some upright vacuums have a single rod handle to which is attached a flexible collection bag, while others have two side bars between which is secured a rigid collection tank or bag housing. The handle assembly is pivotally secured to the floor sweeper portion to allow the operator to push the vacuum cleaner along the surface to be cleaned. Within the tank housing is a vacuum motor and a support surface for supporting the dirt collecting bag. A standpipe or hose normally extends from the lower portion of the tank housing to the upper portion and terminates in a curved end so that the dirt is deposited into the top of the collecting bag by the standpipe or hose. Some upright vacuums utilize a wire clip or securing device located on the outside of the tank near the handle grip to prevent the electrical cord from trailing on the floor immediately behind the sweeper portion, thus preventing the sweeper portion from running over the electrical cord.

One problem experienced with previous upright vacuum cleaners is the manner of pivotally joining the handle assembly to the sweeper portion housing. Since the operator of the vacuum cleaner is constantly applying force to the handle to propel and maneuver the vacuum

cleaner, the pivotal joining of the handle assembly to the floor sweeper may become loose through use. This problem particularly occurs where a separate handle is joined to some type of pivot frame or bracket pivotally mounted on the sweeper portion housing. Often this connection is effected by bolts which pass through spaced holes on the side of the handle end portions which work loose due to the forces applied by the operator.

Another problem experienced in prior vacuum cleaners is the unsightly, cumbersome electric cord. Since the cord runs from the sweeper portion housing to the upper portion of the handle, an unsightly length of wire between these points hangs along the side of the handle which may get in the operators way during operation.

Further, some upright vacuum cleaners develop problems relating to the orientation of the upright standpipe in the tank housing. Since the standpipe has a curved "L-shaped" upper portion, the standpipe must be oriented correctly to be connected with the dirt collecting bag. These standpipes are often positioned by a clamp which passes around the standpipe and is secured to the wall of the tank housing. Unfortunately these standpipes have the tendency to twist in use and their short upper leg, in the "L", may wear against the side walls of the collecting bag at the connecting juncture with the bag. Also the opening of the standpipe may become restricted if the pipe is twisted during operation so that the outlet end turns against the side of the bag. During assembly of the tank housing, an assembler is required to correctly orient the standpipe which necessitates manually checking this orientation.

Further, many vacuum motors are protected by a filter with guard covering the aperture leading into the vacuum inducing rotor. When the filter and filter guard

are removed, such as for cleaning, the motor may still be run with the impeller aperture exposed. This presents a hazard to the operator or the service men who may accidentally insert a finger or other object into the impeller aperture.

SUMMARY OF THE INVENTION

In the upright vacuum cleaner of the present invention, a handle mounting bracket, pivotally mounted on floor engaging housing, includes an upper cross piece with mounting portions which extend beyond each of two handle side legs. Each side leg and mounting portion includes means for securing the handle assembly to the mounting portions. The mounting bracket is pivoted about a pivot axis that is oriented generally horizontally and perpendicular to the direction of travel of the vacuum cleaner, while the mounting portions define mounting surfaces that are oriented generally parallel to the mounting bracket pivot axis. Thus the handle side legs abut against the mounting surfaces so that when an operator pushes against the handle the force is applied substantially directly against the mounting portions of the bracket rather than through the mounting means to the bracket. This minimizes the tendency for the mounting means to work loose.

In another aspect of the invention, an elongate cord channel is mounted to one handle side leg and has a base and resiliently deformable sides. The cord channel sides are sufficiently resilient that they may be separated for insertion of an electrical cord which will be maintained in a trapped storage condition between the sides.

In another aspect of the invention, the standpipe has an integrally formed flat that will abut the inner wall surface of the tank housing maintain the curved end

of the standpipe in the proper bag connecting position during the assembly and operation of the vacuum cleaner. The tank housing is maintained between the handle assembly side legs.

5 Finally, the vacuum motor within the tank housing includes an impeller opening guard that protects the impeller opening and which is not removable. It includes a screen and mounting ring. The combined area of all of the openings through the screen grid within the confines
10 of the mounting ring is equal to or greater than the area of the impeller opening to avoid restricting air flow to the impeller. The mounting ring is fixedly secured to the motor so that the guard is nonremovable.

 These and other objects, advantages and features
15 of the invention will be more fully understood and appreciated by reference to the written specification and appended drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a perspective view of an upright
20 vacuum embodying the present invention;

Figure 2 is a fragmentary, rear elevational view of the lower portion of the vacuum shown in Figure 1;

Figure 3 is a fragmentary, rear elevational view of a tank mounting bracket and tank housing assembly
25 embodying the present invention;

Figure 4 is a fragmentary, side elevational view of the tank mounting bracket and tank housing assembly of Figure 3;

Figure 5 is a front elevational view of the
30 interior of the rear portion of a tank housing and tank mounting bracket;

Figure 6 is a fragmentary, perspective view of the upper portion of a standpipe embodying the present invention;

Figure 7 is a fragmentary, rear elevational view of a tank housing and handle side leg embodying the present invention;

5 Figure 8 is an exploded, sectional top view of a handle side leg and cord channel embodying the present invention;

Figure 9 is a sectional top view of the handle side leg and cord channel of Figure 8 with an electrical cord contained within the channel;

10 Figure 10 is a fragmentary, perspective view of the cord and ring strain relief;

Figure 11 is a front elevational view of an impeller opening guard embodying the present invention;

15 Figure 12 is a side elevational view of the impeller opening guard of Figure 11; and

Figure 13 is a perspective view of the vacuum motor with the impeller opening guard in place.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

20 In the preferred embodiment the upright vacuum cleaner 1 (Fig. 1) includes a floor engaging housing 2 and an upright handle assembly 3. A handle mounting bracket 20 (Fig. 2) is pivotally secured to floor engaging housing 2. Mounting bracket 20 includes bracket side legs 22 and a cross beam 28. Cross beam 28 has mounting surfaces 29 that extend beyond bracket side legs 22, to
25 which handle side legs 16 are secured by securing means 31. An elongate cord channel 62 (Figs. 7, 9) is mounted along one of the handle side legs 16. Cord channel 62 has a channel base 64 from which extend channel sides 66 which
30 are resiliently deformed so that channel sides 66 may be separated from each other to receive and maintain an electrical cord 78 in a trapped storage condition between them. A vacuum tank 10 (Fig. 5) with a collecting bag support 44 has a standpipe 46 which transports dirt from

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the base of tank housing 10 to the tank upper region to be deposited in a collecting bag (not shown). Standpipe 46 has a curved top 52 that connects to the top of the collecting bag, and an integrally formed standpipe flat 54 (Fig. 6) near curved top 52, positioned to abut the inside of tank 10 and maintain standpipe 46 in its proper orientation. Vacuum motor 41 (Fig. 13) has an impeller and an impeller opening 43 which is protected by an impeller opening guard 92. Impeller opening guard 92 includes a guard screen 94 and a mounting ring 96, in which the combined area of all of the openings defined by screen 94 and bounded by ring 96 is greater than the area of impeller opening 43. Mounting ring 96 is fixedly secured to motor 41 so as to be nonremovable.

As shown in Figure 1, the upright handle 3 of vacuum cleaner 1 supports a rectangular vacuum tank 10. Vacuum tank 10 is molded of plastic and has a front cover 12, a tank back 14 (Fig. 4) and tank sides 15 (Fig. 5). Generally upright handle side legs 16 (Figs. 2, 5) extends upward along either side of the entire length of tank 10. A handle 18 joins the tops of side legs 16 to provide a somewhat rectangular purchase for propelling vacuum cleaner 1. An upwardly opening storage hook 19 extends laterally to one side of handle 18, just above its juncture with handle side legs 16, and is integrally molded with handle 18. Storage hook 19 allows the vacuum cleaner power cord 78 to be coiled and neatly hung on the side of vacuum 1. Tank back 14 is fastened to side legs 16 by any conventional means which fixedly secures back 14 to side legs 16.

Side legs 16 are secured to floor engaging housing 2 by a handle mounting bracket 20 (Figs. 2-4). Handle mounting bracket 20 has an inverted "U" shape which includes two depending bracket side legs 22 and a connecting bracket top 24. Legs 22 and top 24 are formed

from a single piece of flat stock bent into the desired configuration (Fig. 3). Through the lower end of each bracket leg 22 is a sweeper pivot aperture 26. Bracket 20 is pivotally mounted on floor engaging housing 2 through apertures 26 by any conventional method, so that
5 bracket 20 may be locked in an upright position or pivoted downward for use.

A cross beam 27 (Figs. 3-5) is welded to the upper surface of top 24, with the ends of cross beam 27
10 extending past legs 22 in order to form mounting portions 28. Bracket 20 has a bolt aperture through each mounting portion 28, and has mounting surfaces 29 on the upper surface of each mounting portion 28. A plug 32 is fixed in the bottom end of each side leg 16. A threaded
15 aperture in each plug 32 for receiving mounting bolts 31 is positioned so that the bottom of handle side leg 16 and plug 32 rests on mounting surface 29.

Because the mounting portions 28 extend beyond bracket legs 22, bolts 31 are easily accessible and
20 mounting and dismounting of handle assembly 3 to bracket 20 is facilitated.

Tank front cover 12 is pivotally connected to handle mounting bracket 20 at cover pivot axle 33 (Figs. 3-4). Pivot axle 33 is a rectangular rod which extends
25 between, and is rotatably mounted to, bracket legs 22 at each axle end 34. Tank front cover 12 has a rearwardly extending connecting flange 36 which is bolted to the top of pivot axle 33. Axle ends 34 are spaced from bolts 31 to avoid interference. A resilient gasket 38 is mounted on
30 tank back 14 to contact and seal tank front 12 when it reaches the closed position, as shown in Figure 4. A latch 40 (Fig. 5) selectively secures tank front 12 in a closed position. Disengagement of latch 40 allows access to the dirt bag when it should be emptied or discarded.

35 Mounted within the lower portion of tank back 14

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is a vacuum motor 41 (Fig. 5) which induces a vacuum through the vacuum cleaner. Motor 41 is provided a power source by an electrical conductor 42 (Fig. 2) which extends from floor engaging portion 2 through a strain relief 42a to vacuum motor 41. Motor 41 sucks air through impeller opening 43 (Fig. 13) to produce a vacuum. A guard 92 (Figs. 11-13) covers impeller opening 43 and prevents foreign objects from entering impeller opening 43. Guard 92 includes a guard screen 94 over the opening defined by mounting ring 96. Ring 96 has on its motor facing surface a heat resistant adhesive that fixedly adheres ring 96 to motor 41. Ring aperture 97 has a larger diameter than impeller opening 43, so that the combined area of all the openings defined by screen 94 is equal to or greater than the area of impeller opening 43. Therefore guard 92 does not restrict the air flow through impeller opening 43.

Above motor 41 and within tank back 14 is a collecting bag support 44 (Fig. 5). A standpipe 46 (Figs. 5, 6) has a substantially straight body 48 that extends through the bottom of tank back 14 up to near the uppermost portion of back 14. Standpipe 46 is communicative with a connecting hose 50 (Fig. 2) that transports the dirt from floor engaging housing 2 up to tank 10. Standpipe 46 has a curved top 52 so that standpipe 46 can be connected with a dirt collecting bag to deposit the dirt into the upper portion of the collecting bag. Beneath curved top 52 is a flat 54 that is integrally formed with standpipe 46. Flat 54 has a planar face 56 formed on a shoulder 58 that extends from the side of standpipe 46. Flat 54 is oriented to position curved top 52 for connection to the dirt collecting bag when flat 54 contacts a tank side 15. Flat 54 has two apertures 60 surrounding fasteners which are used to connect flat 54 to a tank side 15.

Mounted on the handle side leg 16 from which storage hook 19 extends is an elongated cord channel 62 (Fig. 7). Cord channel 62 extends for substantially the entire length of side leg 16. Cord channel 62 has a base 64 from which two sides 66 extend to form a roughly triangular shaped channel (Figs. 8-9). Channel sides 66 converge towards each other and terminate in a curved cap 68 separated by a break 70. The side of base 64 that contacts side leg 16 has a concave surface 72 defining shoulders 74 at the transition to sides 66. The relaxed radius of curvature of concave surface 72 is less than the radius of curvature of side leg 16. When cord channel 62 is mounted on side leg 16 by fasteners 76, the stressed radius of curvature of arced surface conforms to that of the side leg 16 for compressing curved cap 68. An electric cord 78 extends downward through cord channel 62 and is trapped in a storage condition between channel sides 66. Electric cord 78 may be readily removed from cord channel 62 since sides 66 are elastically deformable.

Electric cord 78 has a ring strain relief 82 (Figs. 7-10) which is slidably carried on cord 78 and releasably secured to storage hook 19. Strain relief 82 includes an oval plate 84 through which pass a ring aperture 86 and a cord aperture 88. Through ring aperture 86 is a ring 90 which has a diameter sufficiently large to pass over hook 19. Cord aperture 88 is large enough to receive and frictionally engage cord 78, but which will allow cord 78 to slide when sufficient force is applied to cord 78. Thus, strain relief 82 prevents cord 78 from being continually torn from cord channel 62 and also prevents damage to electric cord 78.

OPERATION

The assembly of tank 10 and side leg 16 is secured to handle mounting bracket 20 by two bolts 31. In

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order to service tank 10 separately from floor engaging portion 2, all that is required is that the two bolts 31 be removed, electrical cord 42 be disconnected, and cord 78 removed from its channel 62. The entire rear tank assembly can then be removed from the lower floor engaging portion 2. If necessary, front tank 12 may also be easily removed from handle mounting bracket 20 by disengaging fastener 34a on one end of the pivot axle 33. Handle mounting bracket 20 is pivoted about an axis that is oriented generally perpendicular the direction of travel of the vacuum cleaner. Upper cross beam 28 have mounting surfaces 29 that are oriented generally parallel to this pivot axis so that when an operator pushes on handle 18, side legs 16 are forced directly against mounting surfaces 29. For this reason, a relatively small amount of lateral shear force is applied to bolts 31 since the force is being directed generally parallel to the threaded shank of bolts 31, and to a great degree absorbed by the top of mounting surfaces 29. Although a pulling motion by the operator places bolts 31 in tension, it also is axial and one that the threads are designed to absorb. Bolts and their tightness to securing nuts are less able to withstand shearing forces which exists to a greater degree in prior art devices. This axial loading reduces the tendency of bolts 31 to work loose and side legs 16 remain tightly secured to bracket 20. Since bolts 31 pass through upper cross piece 28 rather than bracket side legs 22, bolts 31 and side legs 16 are mounted away from pivot axle 33. For this reason axle ends 34 are easily accessible for servicing and pivot axle 33 is relatively easily secured to handle mounting bracket 20 by any conventional means.

With elongate cord channel 62 mounted on a side leg 16, the electric supply cord 78 can be carried within cord channel 62 out of the way of the vacuum cleaner

operator and also be hidden from view. To remove cord 78 from channel 62 the operator merely pulls cord 78 away from side leg 16 which opens channel sides 66 allowing the cord 78 to escape. Channel sides 66 retain sufficient resiliency to hold cord 78 in place even after repeated removal and storage. Cord channel 62 also acts as a strain relief in that should sufficient force be applied to cord 78, the cord will be stripped out of channel 62 instead of damaging the cord. Ring strain relief 82 also prevents damage to cord 78. Since oval plate 84 is frictionally carried on cord 78, when sufficient force is applied to cord 78, strain relief 82 will slide on cord 78 and absorb a shock which would otherwise be imparted to the cord 78.

When standpipe 46 is assembled into tank back 14, its flat 54 is placed in abutment with a tank side 15. Since flat 54 is integrally formed on standpipe 46, curved top 52 is automatically properly oriented without requiring the manual orientation of a securing clamp. Flat 54 maintains standpipe 46 in the proper orientation during the use of the vacuum even though it operates in a vibrating environment. Guard 92 is adhered to motor 41 with screen 94 covering impeller opening 43. When a filter (not shown) for impeller opening 43 is removed, impeller opening guard 92 continues to prevent foreign object from accidentally contacting the impeller of motor 41. Further, guard 92 does not restrict air flow to the impeller, and therefore does not decrease the efficiency of motor 41.

It is to be understood that the above is merely a description of the preferred embodiment, that various changes or modifications can be made without departing from the spirit or concept of the invention.

1. An upright vacuum cleaner, comprising:
 - a floor engaging housing;
 - an upright handle assembly;
 - a handle assembly mounting bracket pivotally secured to said floor engaging housing and including two bracket side legs and an upper cross beam, said cross beam including mounting surfaces extending beyond each of said bracket side legs;
 - said handle assembly and said mounting surfaces including mounting means for securing said handle assembly to said mounting surfaces.

2. An upright vacuum cleaner, comprising:
 - a floor engaging housing;
 - an upright handle assembly pivotally mounted on said floor engaging housing; and
 - an elongated cord channel mounted on said handle assembly, said cord channel including a channel base with resiliently deformable channel sides extending therefrom, said channel sides being substantially contiguous to each other at their distal ends, said base and sides forming a tunnel for selectively receiving and storing an electric cord.

3. An upright vacuum cleaner, comprising:
a floor engaging housing;
an upright handle assembly pivotally mounted to said housing;
a vacuum tank housing mounted to said upright handle assembly and including collection means for receiving dirt from said floor engaging housing; and
a standpipe mounted within said vacuum tank housing operably connected to said floor engaging housing for conveying dirt to said collection means, said standpipe including an integral flat for locating and maintaining said standpipe in a proper orientation for depositing dirt into said collection means.

4. An upright vacuum cleaner, comprising:
a vacuum motor including an impeller and having an impeller opening;
a guard comprising a screen and a mounting ring, surrounding said impeller opening said guard being configured so that the combined area of all openings defined by said screen within the confines of said mounting ring are equal to or greater than the area of said impeller opening;
said mounting ring being fixedly secured to said motor so as to be nonremovable.

5. A vacuum cleaner as defined in Claim 1, wherein said mounting bracket is mounted to pivot about a generally horizontal pivot axis oriented generally perpendicular to the direction of travel of said vacuum cleaner; said mounting surfaces are oriented generally parallel to said pivot axis; said handle assembly abuts against said mounting surfaces; whereby vacuum cleaner propelling force is applied substantially directly against said mounting surfaces of said bracket.

6. A vacuum cleaner as defined in Claim 5, wherein said handle assembly includes side legs each of which includes passageway opening at the end thereof and extending upwardly therein at least some distance; and said mounting means include projections extending upwardly from said mounting surfaces, said projections being secured in said passageways to provide a sturdy, secure connection between said handle and said bracket.

7. A vacuum cleaner as defined in Claim 6, wherein said mounting means includes said passageways being threaded passageways, said mounting surfaces of said cross beam having apertures therethrough and bolts received through said mounting surfaces apertures and secured to said threaded passageways.

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8. A vacuum cleaner as defined in Claim 2, wherein, said handle assembly has a mounting surface; and said channel base has a curved surface external to said tunnel, said base curved surface having a radius of curvature less than the radius of curvature of said mounting surface so that said channel sides are urged towards each other when said base is mounted on said mounting surface.
9. A vacuum cleaner as defined in claim 4, wherein said mounting ring is affixed to said motor by heat resistant adhesive.
10. The vacuum cleaner of Claim 1 substantially as herein described with particular reference to Figures 1 to 5 of the drawings.
11. The vacuum cleaner of Claim 2 substantially as herein described with particular reference to Figures 1 and 7 to 10 of the drawings.

12. The vacuum cleaner of Claim 3 substantially as herein described with particular reference to Figures 1, 5 and 6 of the drawings.

13. The vacuum cleaner of Claim 4 substantially as herein described with particular reference to Figures 1 and 11 to 13.

FIG. 1

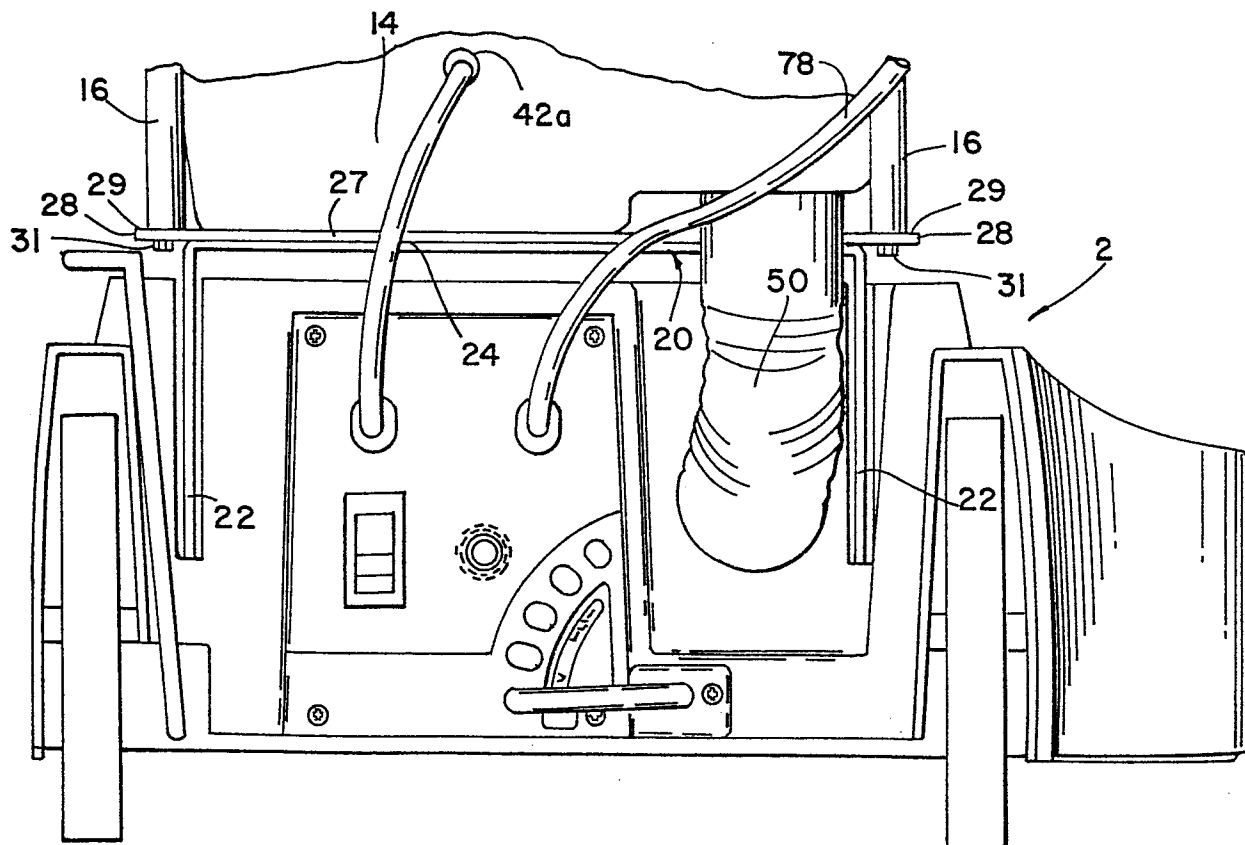
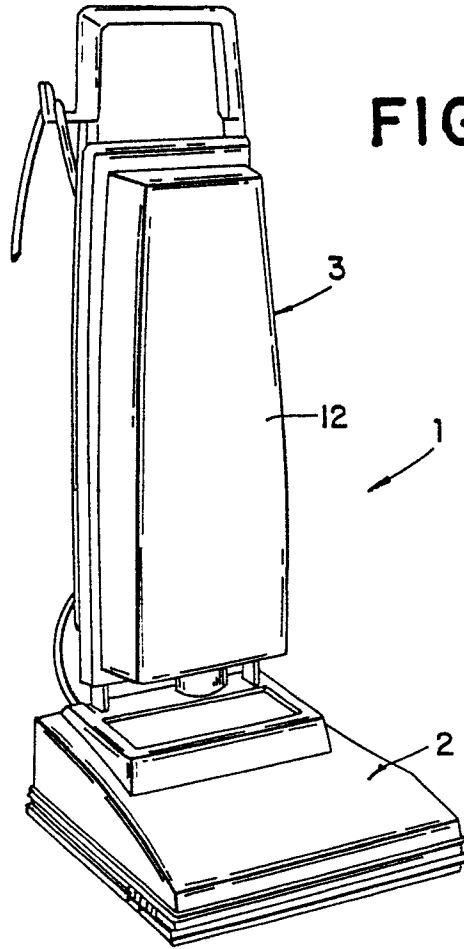


FIG. 2

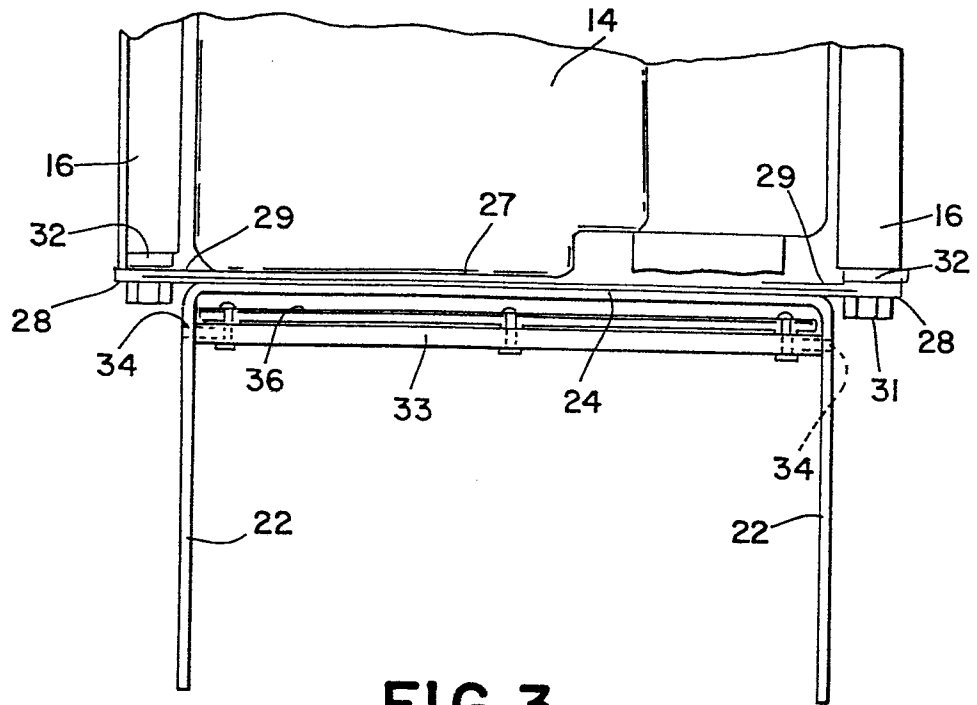


FIG. 3

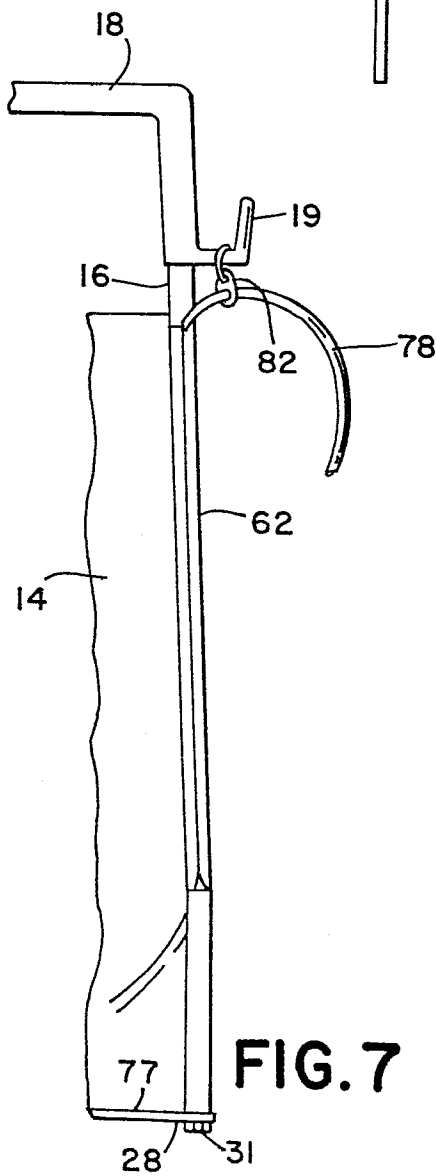


FIG. 7

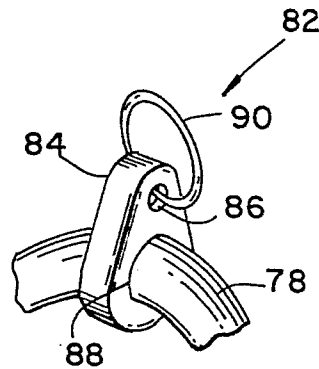


FIG. 10

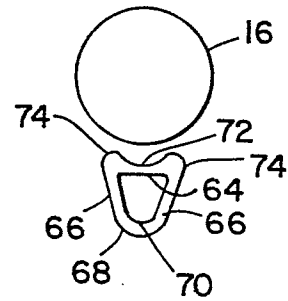


FIG. 8

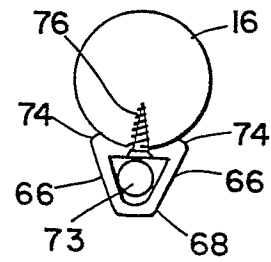


FIG. 9

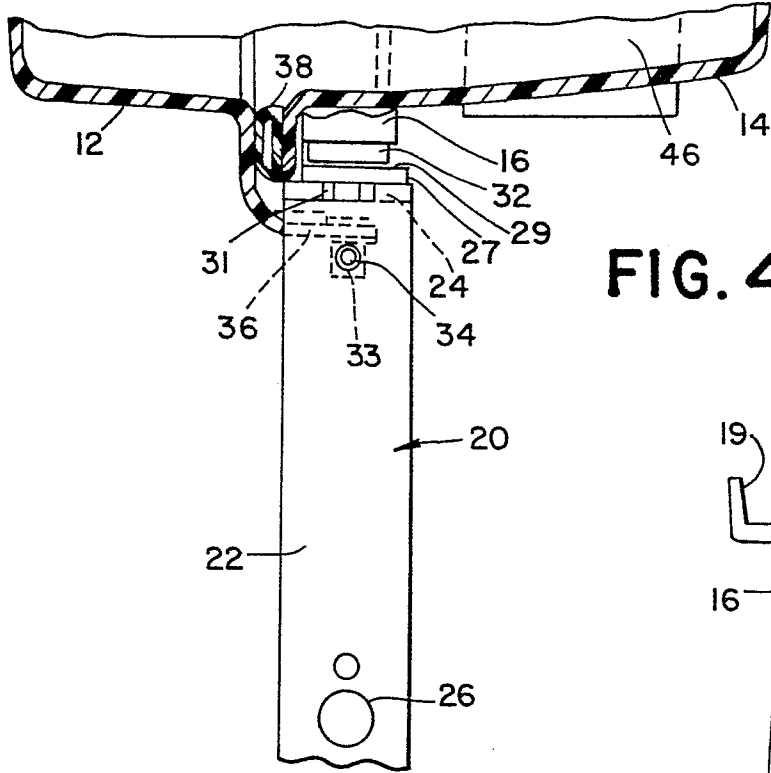


FIG. 4

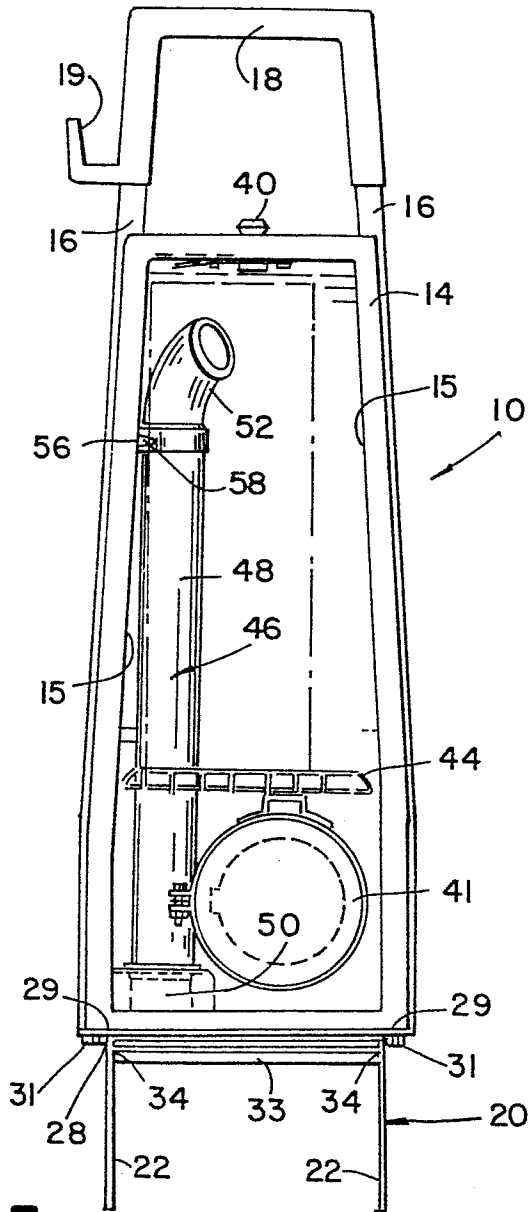


FIG. 5

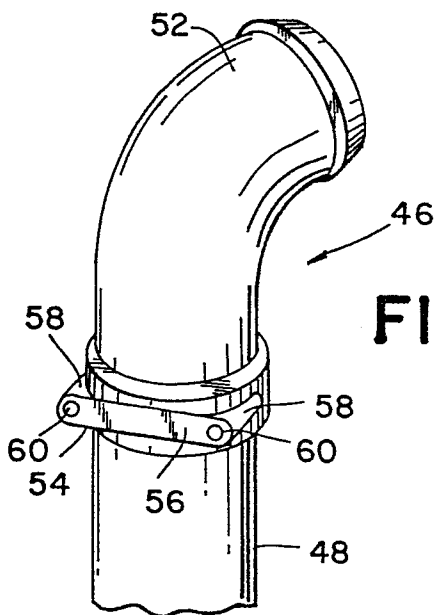


FIG. 6

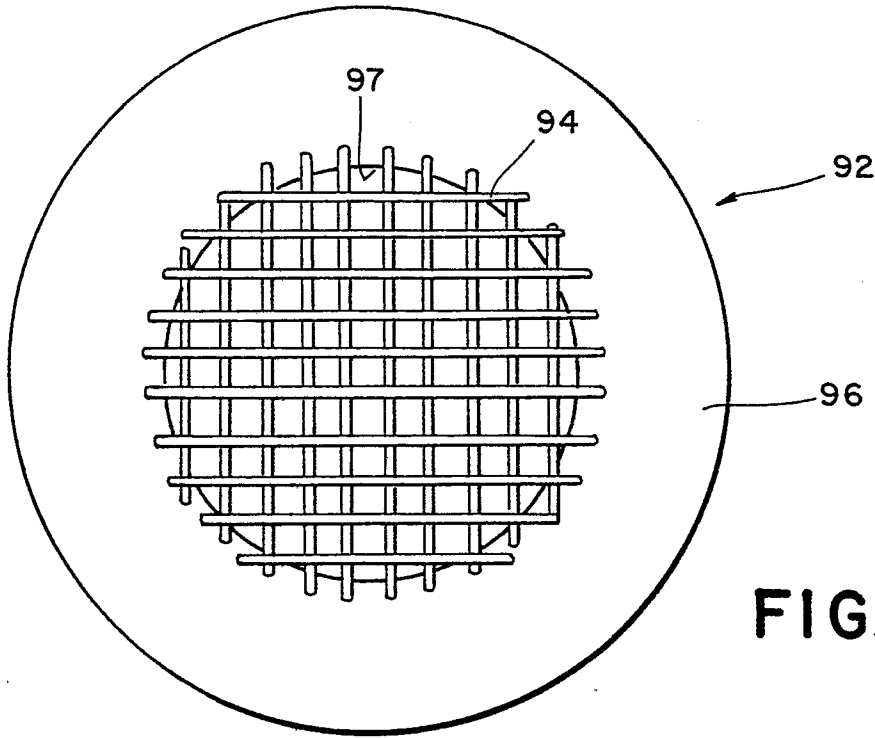


FIG. 11

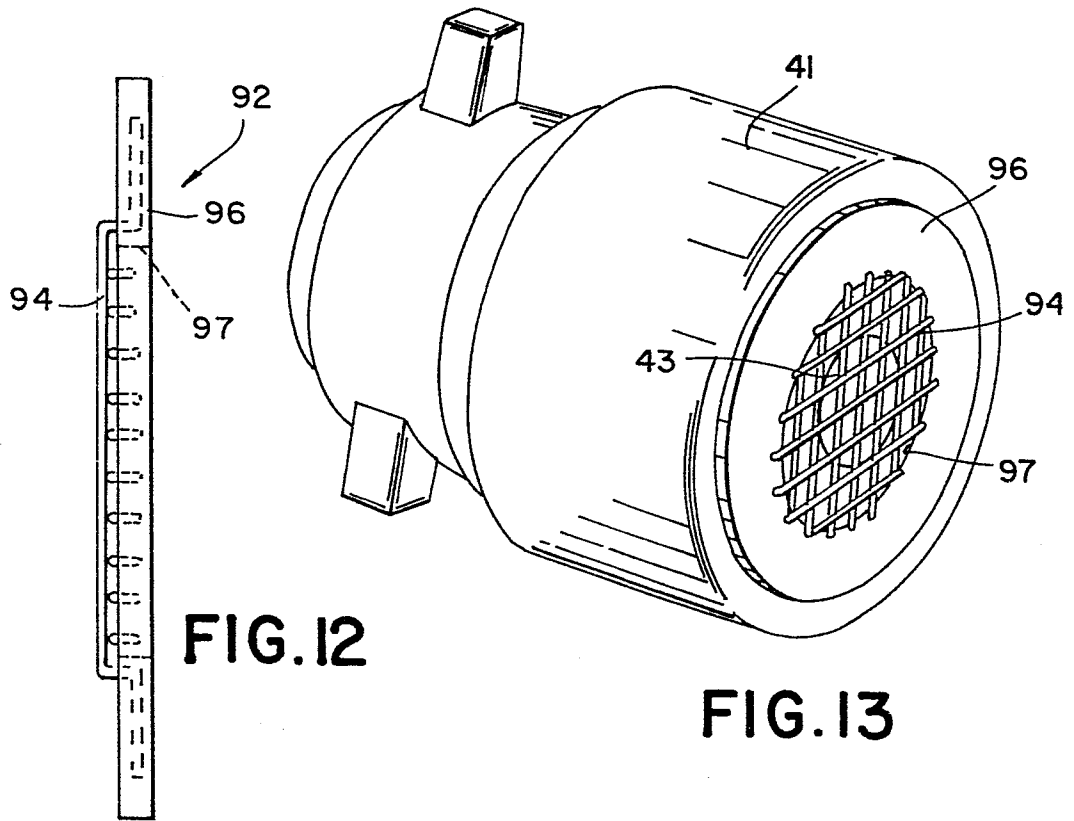


FIG. 12

FIG. 13