

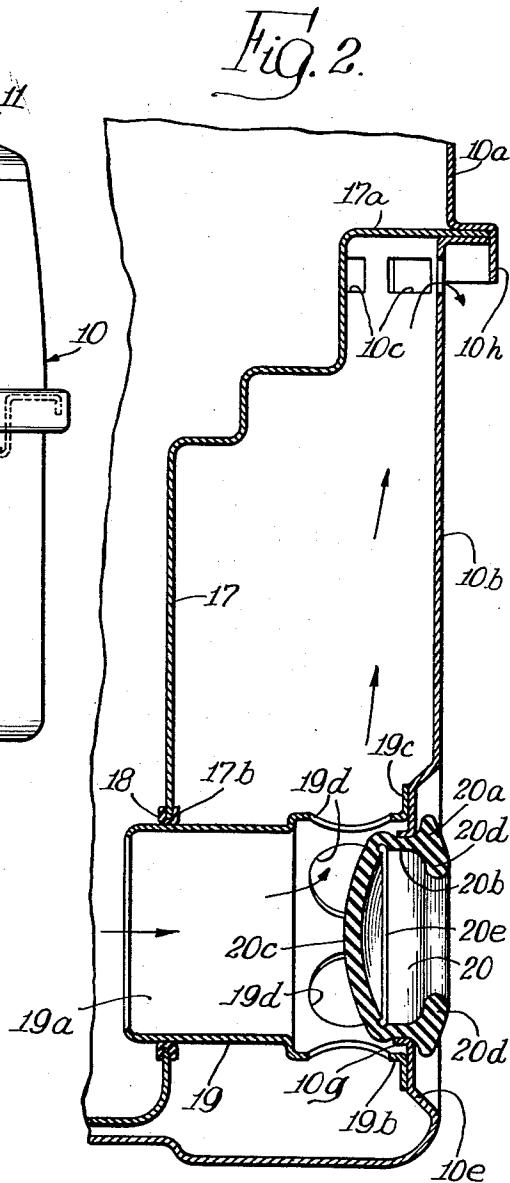
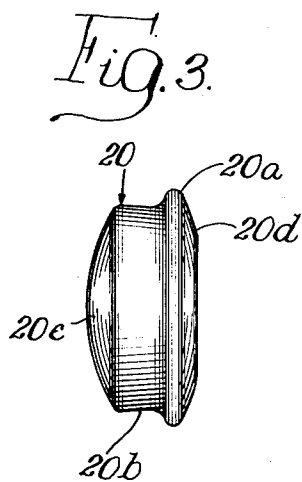
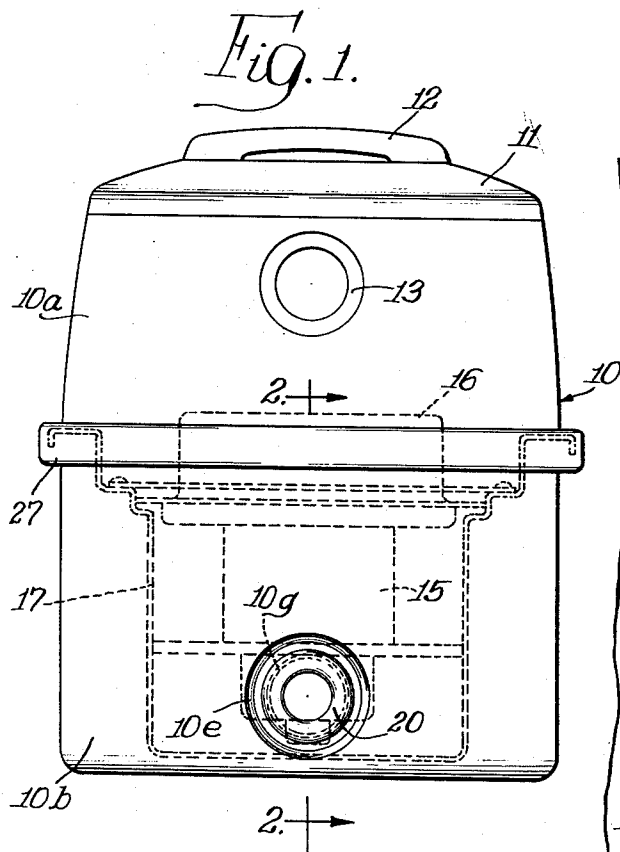
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VACUUM CLEANER

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VACUUM CLEANER

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1 Claim. (Cl. 220—24)

This invention relates to a removable closure member for an exhaust opening in a vacuum cleaner.

Vacuum cleaners of the tank or canister type customarily have an exhaust air opening in one wall portion of the cleaner that is adapted to receive the end of a hose when the cleaner is used for blowing purposes. When the cleaner is used to perform its normal cleaning function, this opening is preferably closed and the air exhausted through a series of diffusing openings in order to avoid a strong concentrated blast of exhaust air.

The closure member for this exhaust opening is often difficult to remove as it must be tightly held in place so that the internal air pressure will not accidentally force the closure member from the opening when the apparatus is functioning as a vacuum cleaner. It must not only be securely held in position, but must also be easily removable when it is desirable to operate the cleaner as a blower.

The principal feature of this invention is to provide an improved closure member for such an exhaust opening that is easily inserted in place, is firmly held in place at least partially by the force of the internal air pressure, and is easily removed when such is desired.

Other features and advantages of the invention will be apparent from the following description of one embodiment thereof taken in conjunction with the accompanying drawings.

Of the drawings:

Fig. 1 is a side elevational view of a canister type vacuum cleaner embodying the invention.

Fig. 2 is a fragmentary sectional elevation, taken substantially along line 2—2 of Fig. 1.

Fig. 3 is a side elevational view of the closure member of this invention.

The vacuum cleaner shown in the accompanying drawings comprises an outer casing 10 having an upper portion 10a and a lower portion 10b and a removable cover 11 provided with a handle 12. The upper casing portion 10a is provided with an inlet opening 13 of the customary type.

In order to draw air in through the inlet opening 13, the apparatus may be provided with a conventional motor and fan unit illustrated by the motor 15 located within the lower casing section 10b and the multi-stage fan 16 located at the bottom of the upper casing portion 10a and the top of the lower casing portion 10b.

Located in the bottom casing portion 10b and surrounding the motor 15 is an inner shell 17 having essentially the shape of an inverted cup. This shell 17 has an outwardly extending annular rim 17a positioned between and attached to the adjacent edge portions of the upper and lower casing portions 10a and 10b in the customary manner. The upper casing portion 10a is adapted to have a depending flange 10h for retaining a rubber bumper 27. The shell 17 is adapted to support the motor and fan unit in the customary manner and during normal operation of the apparatus the interior of the shell is under air pressure due to air drawn in through

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the inlet opening 13, into the fan 16 and exhausted through and around the motor 15.

In order to vent this air pressure within the shell 17, the shell is provided with an opening 17b with the edge of this opening covered by a resilient gasket 18. Thus, during the operation of the apparatus air will flow from within the shell 17 through the opening 17b.

In the upper part of the lower casing portion 10b there is provided a plurality of first exhaust openings 10c through which air is exhausted when the apparatus is operating as a suction cleaner. The lower casing portion 10b is also provided with a second exhaust opening that is substantially aligned with the shell opening 17b. This second exhaust opening is defined by the inwardly extending flange 10g and air is exhausted through this second opening when the apparatus is operated as a blower.

Extending between the shell 17 and lower casing portion 10b is a conduit tube 19. The inner portion 19a of this conduit tube extends inwardly through the opening 17b and is sealed to the shell 17 by means of the gasket 18. The outer portion 19b of the conduit 19 is of larger diameter than the inner portion 19a and is arranged substantially concentric thereto. This outer portion 19b is provided with an outwardly extending annular flange 19c which is fastened to the inner surface of the lower casing portion 10b. The lower casing portion at the area surrounding the opening 10d is recessed as indicated at 10e.

The outer conduit portion 19b is provided with a plurality of openings 19d, each of relatively large diameter and substantially circumferentially arranged around the outer conduit portion 19b.

In order to close the outer end of the conduit 19 when the apparatus is being used as a vacuum cleaner, there is provided a removable closure member, here shown as a removable flexible elastic body 20 of generally concavo-convex shape. The flexible body is provided with an outwardly extending annular flange 20a adapted to be located within the recessed part 10e of the casing with the concave portion of the closure member facing outwardly.

When the closure member 20 is in place the apparatus is operable as a vacuum cleaner. Thus, dirt-laden air may be drawn in through the opening 13 and clean air from which the dirt has been separated in the customary manner exhausted through the tube 19, through the circumferential openings 19d and through the first exhaust openings 10c into the atmosphere.

When the apparatus is operated as a blower, the member 20 is removed and a conventional blower tube (not shown) is inserted. This construction is disclosed in the copending application of Clarence E. Hansen, Serial Number 486,431, filed February 7, 1955, now Patent No. 2,759,659.

The closure member 20, which is a flexible elastic body of generally cup-shape, has a side 20b adapted to engage the wall portion 10g defining the exhaust opening, and a normally inwardly extending flexible concavo-convex bottom portion 20c located inwardly of the side 20b with the convex side of this bottom being adjacent to the interior of the cleaner. This side 20b is preferably essentially cylindrical, as is illustrated in Figure 2.

The closure member 20 has an outer edge provided with the annular flange 20a which is adapted to be located adjacent to the outer surface of the wall portion of the cleaner that defines the opening. In the embodiment shown, this flange 20a is adapted to be located within the recessed wall portion 10e. The closure member is also provided with an inwardly extending annular flange 20d that is opposite to the flange 20a. This inner flange 20d assists in removing the closure member as it may be

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easily grasped by curling the tip of a finger around this inner flange 20d and into the space between the flange 20d and the side 20b. The interior of the closure member is provided with an annular groove 20e located at the corner formed by the juncture of the bottom 20c and the side 20b. This serves to make the closure member more flexible at this area.

The closure member, which is preferably made of a rubbery material, either natural or synthetic in nature, such as ordinary vulcanized natural rubber, is flexible yet is strong enough to be self-supporting. The closure member has a number of new and unobvious advantages. Thus, by locating the concavo-convex portion 20c inwardly of the side 20b with the convex surface facing the interior of the cleaner, the usual internal air pressure serves to lock the closure member more firmly in place. This is true because the internal air pressure tends to urge the bottom portion 20c into a plane, thereby urging the side 20b of the closure member outwardly and holding it firmly against the surface 10g. Thus, the internal air pressure helps lock the closure member in place.

The closure member being distortable can be inserted quite easily merely by pushing on the inner surface of the portion 20b. This tends to distort the bottom toward the interior of the cleaner and thus to draw the side 20b inwardly. The advantages of the closure member of this invention have been found to be particularly useful when used in exhaust openings of relatively large size. With these large openings, it has been found that an ordinary plug, such as a solid stopper, is completely unsatisfactory as either it fails to remain in place when subjected to the internal air pressure or fits so very tightly that it is difficult to remove after a period of time.

The conduit tube 19 and associated structure disclosed herein also are disclosed and specifically claimed in the copending application of Clarence E. Hansen, Serial Number 486,431, filed February 7, 1955, now Patent No. 2,759,659.

Having described my invention as related to the embodiment shown in the accompanying drawings, it is my intention that the invention be not limited by any of the details of description, unless otherwise specified, but

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rather be construed broadly within its spirit and scope as set out in the accompanying claim.

I claim:

A removable closure member for an exhaust opening defined by a wall portion of a vacuum cleaner subjected to internal air pressure, comprising: a flexible elastic body of generally cup-shape having a generally cylindrical side adapted to engage the wall portion defining said opening and a normally inwardly extending flexible concavo-convex bottom located inwardly of said side with the convex side being adjacent to the interior of the cleaner, said bottom being of substantial thickness throughout to maintain its concavo-convex shape when subjected to said internal air pressure, the force of the air pressure within the cleaner when said closure member is in place thereby urging the flexible bottom outwardly toward but not to a flattened position to transmit said force to press said side firmly into sealing engagement with said wall portion yet permit easy removal of said closure member, the inner surface of said cup-shaped closure member being provided with an annular groove adjacent to the juncture of said side and said bottom, thereby reducing the thickness and increasing the flexibility of the closure member in the area of said groove, the outer peripheral edge of said side of the elastic body on the end thereof opposite to said bottom being provided with an annular outwardly directed flange adapted to seat against the outer surface of said wall portion and an annular inwardly directed flange located outwardly beyond the said peripheral annular flange and of substantial width for aid in grasping the closure member with a finger tip for ready removal thereof.

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