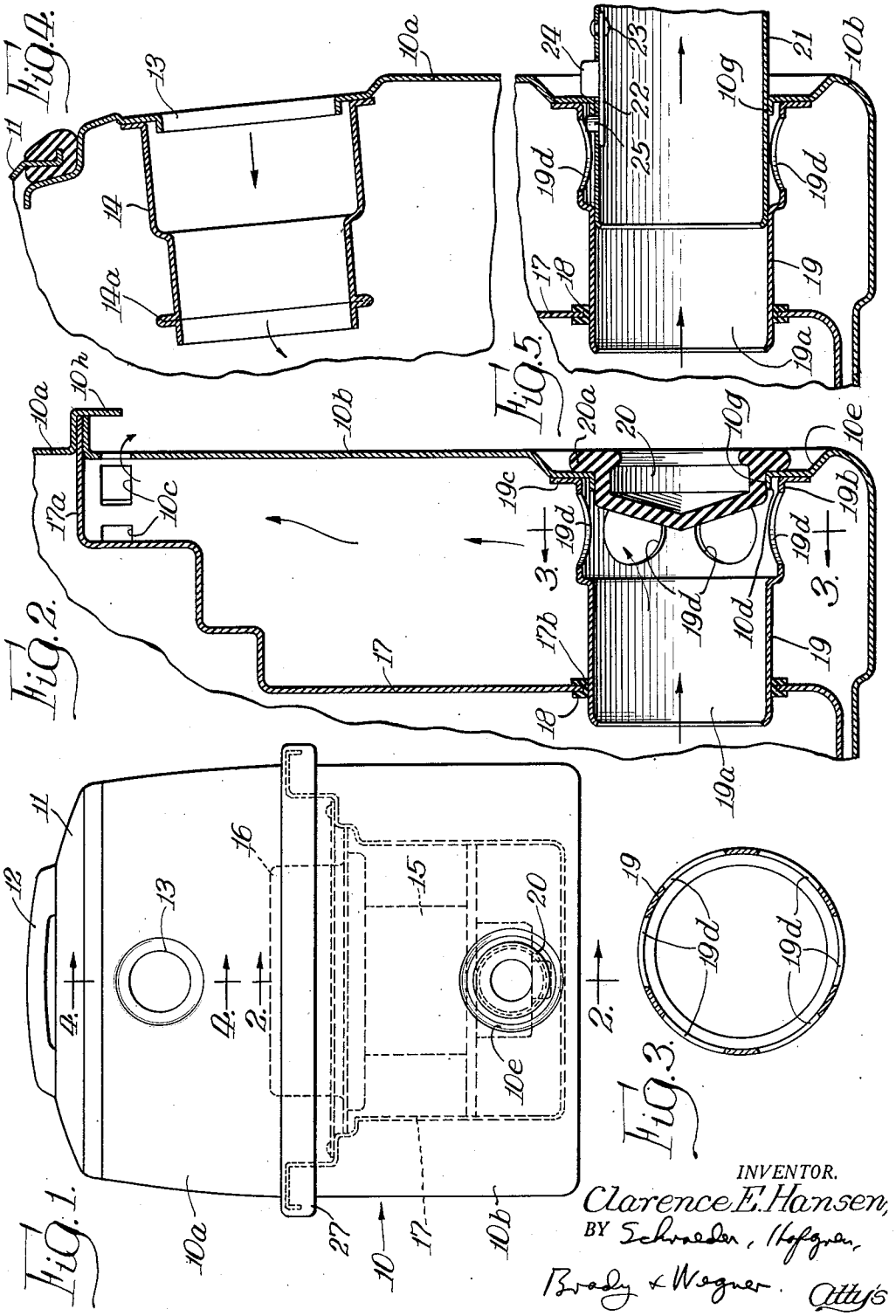
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AIR FLOW APPARATUS

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# AIR FLOW APPARATUS

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1 Claim. (Cl. 230—47)

This invention relates to an air flow apparatus capable of operation either as a vacuum cleaner or as a blower.

Air flow apparatus has long been constructed so as to be capable of drawing a suction to operate as a vacuum cleaner and for exhausting a stream of air so as to operate as a blower. In the normal construction a motor and fan assembly is located in a casing, with one portion of the casing including an inlet opening through which a dirt-laden air stream can be drawn and another portion of the casing containing another opening through which the clean air stream is capable of being exhausted. When a conduit is connected to the intake opening, cleaning tools can be attached to the conduit so that the apparatus will operate as a vacuum cleaner. When the conduit is attached to the exhaust opening, paint sprayers and other air-operated instruments may be attached to the conduit for operation by the blast of air issuing therefrom. Thus, air flow apparatus of this type is capable of selective operation either as a suction cleaner or as a blower.

In the preferred apparatus of this type, a plurality of air exhaust openings are provided in the casing with air flowing through this plurality of openings when the apparatus is operating as a vacuum cleaner in order that the exhaust air will be diffused over a relatively wide area. A separate air exhaust opening is then provided for receiving the blower tube portion of the conduit when the apparatus is operated as a blower. It is obvious that means must be provided for blocking off some of these exhaust openings when the apparatus is used as a blower so that substantially all of the exhaust air will be directed through the blower tube and thus into the conduit.

The invention here is concerned with an improved air flow apparatus of the above described type having simplified and improved means for diverting the exhaust air into the blower tube when the apparatus is used as a blower.

The invention will be described as related to the embodiment shown in 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 transverse section, taken substantially along line 3—3 of Fig. 2.

Fig. 4 is a fragmentary section, taken substantially along line 4—4 of Fig. 1.

Fig. 5 is a view similar to the lower portion of Fig. 2 but showing a blower tube in place for operation of the apparatus as a blower.

The vacuum cleaner shown in the accompanying drawings comprises an outer casing **10** having an upper portion **10***a* and a lower portion **10***b* and a removable cover **11** provided with a handle **12**. The upper casing portion **10***a* is provided with an inlet opening **13** substantially concentrically arranged to an inwardly extending sheet metal tube **14**. The inner end of this tube is provided with an outwardly extending annular flange **14***a*. The



metal tube is adapted to receive the end of a dirt separating filter bag (not shown) that is normally retained within the upper casing portion **10***a* so that all the air drawn in through the inlet opening **13** is passed through this filter. This use of a filter is purely conventional and the flange **14***a* is adapted to aid in retaining the neck of the bag on the inner end of the tube **14**.

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 **10***b* and the multi-stage fan **16** located at the bottom of the upper casing portion **10***a* and the top of the lower casing portion **10***b*.

Located in the bottom casing portion **10***b* 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 **17***a* positioned between and attached to the adjacent edge portions of the upper and lower casing portions **10***a* and **10***b* in the customary manner. The upper casing portion **10***a* is adapted to have a depending flange **10***h* 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 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 **17***b* 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 **17***b*.

In the upper part of the lower casing portion **10***b* there is provided a plurality of first exhaust openings **10***c* through which air is exhausted when the apparatus is operating as a suction cleaner. The lower casing portion **10***b* is also provided with a second exhaust opening **10***d* that is substantially aligned with the shell opening **17***b*. Air is exhausted through this second opening **10***d* when the apparatus is operated as a blower.

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

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

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 displaceable closure, here shown as a removable flexible plug **20** of generally concavo-convex shape. The plug is provided with a rim portion **20***a* adapted to be located within the recessed part **10***e* of the casing with the concave portion of the plug facing outwardly.

When the plug **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 the tube **14**. The clean air is then exhausted through the tube **19**, through the circumferential openings **19***d* and through the first exhaust openings **10***c* into the atmosphere.

When the apparatus is operated as a blower, the plug **20** is removed and a conventional blower tube **21** is inserted. This blower tube may be the metal tube on the end of the usual flexible air conduit which when attached

to the inlet opening **13** serves to convey air into the apparatus and when attached to the opening **10***d* serves to convey air away from the apparatus.

As shown, the blower tube **21** is provided with a releasable latch mechanism comprising a leaf spring **22** attached at one end by means of a rivet **23** to the inner surface of the tube **21** and including an outwardly projecting thumb piece **24** and a catch **25** spaced inwardly thereof. The catch **25** is adapted to engage the inner surface of the portion of the casing defining the opening **10***d* to hold the tube in place.

When the blower tube **21** is in position as illustrated in Fig. 5, the tube bears against the inwardly extending flange **10***g* defining the opening **10***d* and the extreme inner end of the tube bears against the outer end of the first conduit portion **19***a*. Thus, the tube is supported on two spaced apart circumferential lines of contact. This serves to hold the tube steady whlie reducing the danger of the tube binding within the apparatus.

When the tube is in place as shown in Fig. 5, the inner end of the tube blocks the conduit opening **19***d* and thus diverts the air flowing through the conduit **19** into the blower tube **21**. Substantially no air, therefore, flows through the first exhaust opening **10***c* so that the entire air flow is used for blowing purposes and the apparatus operates as a blower.

The air flow apparatus of this invention has a number of new and unobvious advantages. Thus, this construction provides a support for the blower tube **21** at two spaced apart circles of support. One of these, as is shown in Fig. 5, is at the flange **10***g* while the other is at the extreme inner end of the blower tube **21**. This serves to support the blower tube **21** and the attached flexible hose securely and also prevents binding that would interfere with the withdrawal of the blower tube.

The construction described and claimed herein also permits easy insertion of the blower tube **21** as it is not necessary now that this tube extend all the way to the shell **17** and make engagement with the hole therein. In the present construction, the conduit **19** provides a path of travel for the insertion and withdrawal of the blower tube **21**.

Another important advantage of the present construction is that the blower tube is itself used to block off the exhaust air openings **19***d*, therefore avoiding the necessity of having a separate part for this blocking. Furthermore, the parts forming the path of air flow and the blocking members may be easily constructed of ordinary sheet metal and avoids the use of complex swinging doors and hinges and of springs or other operating members.



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

I claim:

Air flow apparatus capable of selective operation as a vacuum cleaner and as a blower, comprising: an outer casing having a first exhaust opening through which air is exhausted during operation as a cleaner and a second exhaust opening spaced from the first opening through which air is exhausted during operation as a blower; an inner shell spaced inwardly of said casing and subjected to internal air pressure when the apparatus is operating both as a cleaner and as a blower, the inner shell having an opening therein adjacent to said casing second opening; an air conduit connecting said shell opening and said casing second opening and substantially concentric to said openings, the conduit including a first portion adjacent to said outer casing having a plurality of openings circumferentially arranged therein and a second portion adjacent to said inner shell, the first portion being of larger diameter than said second portion and both portions being substantially concentric, the conduit being capable of receiving a blower tube through said casing second opening to make connection therewith and block said conduit openings so that air flows through said shell opening into said tube for operation of the apparatus as a blower, said air conduit including first and second concentric inner annular surface sections of substantially the same diameter and of small area on opposite sides of said enlarged first portion of the air conduit for supporting said blower tube at said spaced annular surface sections and the section of blower tube between said annular sections bridging said first portion openings.

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