May 19, 1953 W. GERSTMANN 2,639,005

LIQUID SUCTION DEVICE

Filed May 12, 1950

Fig. 1.

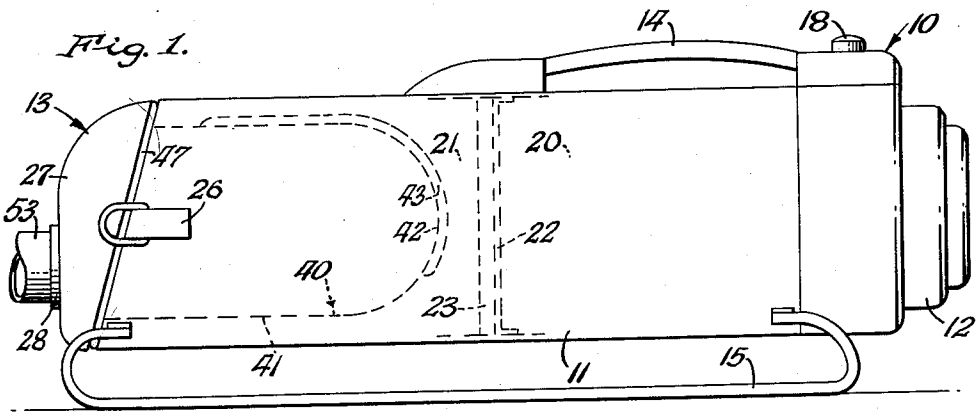


Fig. 2.

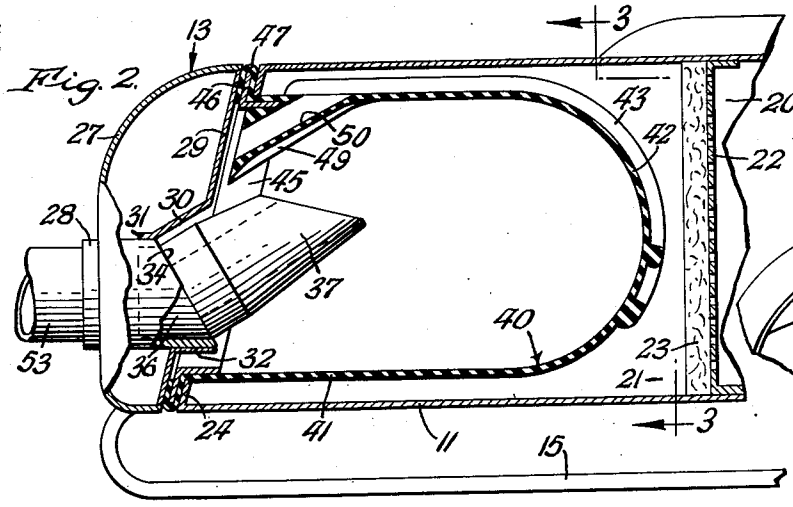


Fig. 4.

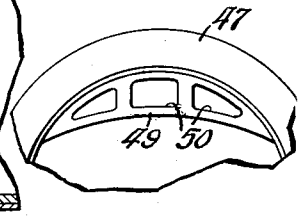
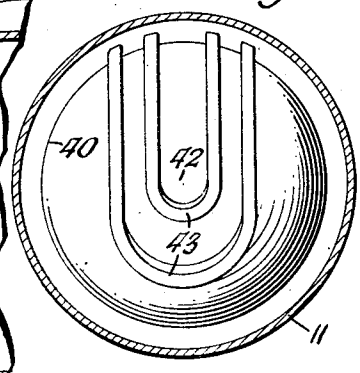


Fig. 3.



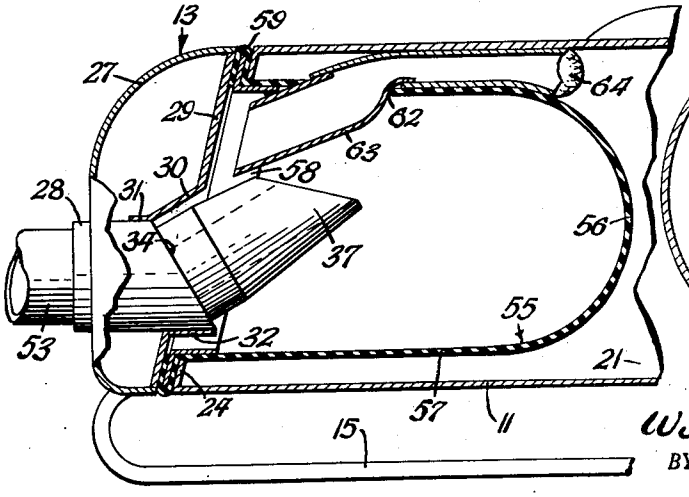


Fig. 5.

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LIQUID SUCTION DEVICE

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5 Claims. (Cl. 183—75)

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This invention relates to liquid-collecting suction devices and more particularly to such devices which may be employed for the removal of liquids from floors, rugs, and the like.

The principal object of the present invention is to provide such a device which is readily portable, is efficient, although inexpensive and simple in construction, and which can be readily used in conjunction with a household vacuum cleaner of a conventional type.

Another object of the invention is to provide a liquid-collecting suction device which can be used to replace the filter bag of a household vacuum cleaner of a conventional type and can therefore be conveniently incorporated directly in the vacuum cleaner body without making any structural changes in the cleaner.

Further objects of the invention are to provide a device of the character described which receives and effectively collects in a container that can be easily removed, emptied and replaced, liquid picked up by the suction head of a vacuum cleaner; and to provide such a device which does not involve the carrying of additional bulky or heavy equipment.

Additional objects and advantages of the present invention will be readily apparent from the following detailed description thereof taken in conjunction with the accompanying drawings in which:

Figure 1 is a side elevation of a vacuum cleaner of a conventional type, showing in dotted lines the liquid-collecting bag comprising a part of the present invention;

Figure 2 is a fragmentary, slightly enlarged, longitudinal sectional view of the cleaner illustrated in Figure 1 showing the arrangement of the liquid-collecting bag, the inlet head of the vacuum cleaner and the inlet nozzle carried thereby;

Figure 3 is a transverse sectional view of the line 3—3 of Figure 2 showing in detail the stiffening or reinforcing ribs on the liquid-collecting bag;

Figure 4 is a fragmentary end elevation of the open end or mouth of the liquid-collecting bag showing the entrance of the air outlet passages or ducts; and

Figure 5 is a fragmentary, longitudinal sectional view similar to Figure 2 showing a modified form of the invention comprising a different type of collecting bag.

The vacuum cleaner illustrated in Figure 1 and generally designated by the numeral 10 is of the conventional horizontal tank type and comprises a tubular, cylindrical, horizontal body 11, an outlet head 12 on one end of the body 11, a removable inlet head 13 at the other end of the

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body, a carrying handle 14, and a pair of spaced, longitudinally-arranged skids or runners 15, the ends of which are curved upwardly and reversely and attached to the body 11. Within the cleaner body 11, but not shown, there is provided an electric motor operatively connected to a fan or blower which is adapted to draw air through the inlet head 13 and the body 11 and expel it through an orifice (not shown) in the outlet head 12. A switch 18 is mounted on the body for use in starting and stopping the electric motor and suitable means (not shown) is provided for connecting the switch and motor with a source of electric power.

The interior of the tubular body 11 of the vacuum cleaner 10 is divided into a pair of adjacent chambers 20 and 21 by a perforated transverse wall 22. The right hand chamber or compartment 20, as viewed in Figure 1, contains the electric motor and blower (not shown), while the left hand chamber 21 is adapted to contain a dust-collecting filter bag. A removable filter pad 23 is provided within the bag compartment 21, the pad resting firmly against the perforated wall 22 and fitting snugly within the cylindrical wall of the body 11. At the open end of the chamber 21, opposite the wall 22, the cylindrical wall of the body 11 is turned inwardly to form an annular flange 24.

The inlet head 13, which is removably secured to the tubular body 11 of the cleaner 10 over the open end of the chamber 21 by suitable means such as a plurality of latches 26, includes a shell 27, which, as shown, is preferably dish-shaped with a rounded surface. The closed end of the shell 27 is provided with an orifice through which there extends an inlet tube 28. The latter is preferably secured in the orifice, intermediate its ends, by welding.

Across the open end of the dish-like shell 27 there is provided a collar 29 the periphery of which is secured by suitable means, such as welding, to the shell. The inwardly-extending end of the inlet tube 28 projects through the collar 29, an orifice or cut out portion 30 being formed in the latter to receive the tube 28. Around the inlet tube 28 portions of the collar 29 are bent, respectively, inwardly and outwardly as shown at 32 and 31 and attached, as by welding or soldering, to the tube 28 which is thus rigidly supported within the shell 27. It is important to provide an air tight seal around the tube 28.

As will be seen from the drawings, the inwardly directed end 34 of the inlet tube 28 is bevelled so that the bottom thereof projects beyond the collar 29 farther than the top and is adapted to receive the reduced, angularly disposed extension 36 of a tubular inlet nozzle 37

which is so placed therein that the nozzle projects diagonally upwardly into the bag compartment 21 of the cleaner 10.

In the preferred embodiment of the present invention a liquid-collecting bag 40 is provided in the chamber 21 instead of the porous dust-collecting cloth bag usually employed. It is preferred to form the bag 40 of a soft, resilient, but impermeable material such as rubber, although other materials having similar characteristics and susceptible of molding in a similar manner, such as various synthetic rubber-like or plastic products, may be used if desired. The distensible bag 40, which is generally cup-like in shape with a cylindrical side wall 41 and with the closed end 42 thereof rounded, is positioned within the chamber 21 horizontally so that its open end faces the inlet head 13 and the closed end 42 is adjacent the filter pad 23. Extending around a portion of the closed end 42 of the bag 40 and along the exterior of the top of the cylindrical wall 41 are a plurality of ribs 43 which are preferably molded integrally with the bag. The ribs 43 function to reinforce and stiffen the bag 40 and prevent its slumping or distortion.

A ring or sleeve 45, preferably of metal or other rigid material, is inserted within the open mouth of the cup-like bag 40. At the outer end of the sleeve 45 there is provided an outwardly-projecting annular flange 46, the mouth of the bag 40 being molded around the flange 46 so as to provide a resilient double flange 47 covering the flange 46. As will be evident from the drawings, when the liquid-collecting bag 40 and the inlet head 13 are in place within the chamber 21 and on the end of the body 11, respectively, the flanges 46 and 47 are clamped between the inwardly projecting flange 24 of the body and the outer portion of the collar 29. The resilient covering of the flange 46 provides a fluid-tight seal and obviates the necessity of providing a separate sealing ring between the inlet head and the body. The flanges 24 and 46 cooperate to properly position the liquid-collecting bag 40 in the bag compartment 21 so that it is substantially coaxial with the body 11, has an annular space surrounding the side wall 41 thereof within the chamber 21 and has its end wall 42 spaced from the filter pad 23.

In the upper portion of the bag 40, as it is mounted within the chamber 21, means is provided to permit escape of air therefrom. Preferably such air outlet means comprises an inwardly extending thickened portion 49 of the cylindrical bag wall 41 adjacent the mouth of the bag, the thickened portion having formed therein during molding a plurality of ports or passages 50 extending from the end of the thickened portion adjacent the mouth or open end of the bag 40 diagonally upwardly through the wall 41. The passages 50 are adapted to provide communication and passage of air from points adjacent to the mouth of the liquid-collecting bag 40 to points on the exterior of the bag between the reinforcing and stiffening ribs 43.

It will be understood that the combined cross-sectional areas of the passages 50 should be at least approximately equal to the cross-sectional area of the passage 38 through the tubular nozzle 37. The thickened portion 49 of the bag wall 41 preferably extends to within a very short distance of the mouth of the bag 40 and the end of the thickened portion is preferably substantially

parallel to the flange 46 of the sleeve 45. Consequently, the entrance of the passages or ports 50 face and are closely adjacent the collar 29.

The liquid separating suction device of the present invention is intended to be used with suction heads of either conventional or special design. In operation a suitable suction head (not shown) is connected to a flexible hose of the type commonly used with vacuum cleaners and the like, the end of which is provided with a coupling member 53 adapted for removable connection with the inlet tube 28 in the inlet head 13. When the blower or fan in the compartment 20 of the body 11 is operating, air will be drawn through the suction head, the tubular hose, the coupling member 53, the tube 28, and the inlet nozzle 37 into the interior of the liquid-collecting bag 40. From the bag 40 the air is exhausted through the passages 50 into the chamber 21 externally of the bag 40. The air then passes through the filter pad 23, the perforated wall 22 and the compartment 20 and is expelled from the cleaner through an opening (not shown) in the outlet head 12.

When the suction head is used on wet or liquid laden surfaces, liquid will be picked up and carried along with the air and discharged through the nozzle 37 into the bag 40 in which it separates from the air and is collected. As will be seen in the drawings, the air and the liquid carried therewith which are picked up by the suction head enter the bag 40 through the upwardly-projecting inlet nozzle 37 by which they are directed against the rounded wall 41 of the bag. The turbulence thus created permits the drops of liquid which are mixed with and carried by the air stream to be deposited and collected in the bag 40 while the air circulates therein before passing out through the passages 50. The deposition of the drops of liquid within the bag 40 is aided by the reduction in velocity of the current of air within the bag which results from the large size of the bag as compared to the cross-sectional area of the passage 38 in the inlet nozzle 37. Accordingly, the air that passes out of the bag through the passages 50 is substantially free of liquid and may safely be passed into the fan compartment 20 without danger of producing corrosion of the blower or motor.

The liquid-collecting bag 40, being impervious and resistant to fluids used in washing or cleaning floors, rugs, furniture and the like which it is intended to remove with the device of the present invention, retains the liquid collected therein without danger of leakage or damage to the bag. When a quantity of liquid has been collected in the bag, the cleaner is turned so as to stand on the outlet head 12 and, after the latches 27 are unfastened, the inlet head 13 is removed. The bag containing the collected liquid may then be removed and emptied. To make the device ready for further use, no operation is required other than the reinsertion of the bag 40 in the chamber 21 and the refastening of the inlet head 13 in position to seal the compartment 21.

A modification of the present invention is illustrated in Figure 5. Although the preferred embodiment illustrated in detail in Figures 2 to 4, inclusive, functions in a highly efficient manner in collecting liquid picked up by a suction head, the bag 40 is not effective to separate dust from the incoming air except insofar as dust may be removed from the air by contact with any liquid that may be present in the bag. The modified

form of the instant invention illustrated in Figure 5 is intended to render unnecessary the replacement of the liquid-collecting bag 30 by a porous filter bag of the kind usually used in vacuum cleaners of the type illustrated when it is desired to use the cleaner temporarily on surfaces where dust and dirt in dry condition will be picked up.

As shown in Figure 5, the cleaner 10 including the body 11 and inlet head 13 are identical with those shown in Figures 1–4. Instead, however, of employing the bag 40 which has the air outlets molded therein, a modified bag 55 is employed. The bag 55 is similar in construction to the bag 40, being cup-shaped and having a closed rounded end 56, a cylindrical side wall 57 and a flanged sleeve or tube 58 inserted within the open end or mouth thereof covered externally by a double flange 59 of the bag material. In the top of the cylindrical wall 57 an opening 62 is provided. Inserted through the opening 62 and projecting outwardly toward the mouth of the bag 55 is a tubular outlet 63. The outlet 63 is attached, preferably by welding, to the inner edge of the reinforcing sleeve or ring 58, which corresponds to and functions like the sleeve 45 in the liquid-collecting bag 40, and projects outwardly through the opening 62 into the annular space within the chamber 21 surrounding the bag 55. Removably connected to the tubular outlet 63 on the exterior of the bag 55 is a porous, dust-collecting bag 64. The exterior of the bag 55 may also be provided with reinforcing or stiffening ribs similar to the ribs 43.

The modified form of the device illustrated in Figure 5 functions in substantially the same manner as the form of the device shown in Figure 2 when a mixture of liquid and air is drawn in through the suction head. If however, it is desired to use the cleaner for the removal of dirt or dust from dry surfaces, no change of the bag is necessary since the dust and dirt carried into the bag 55 through the inlet nozzle 37 will be removed from the outgoing air by the bag 64. Thus clogging of the filter pad 23 with consequent loss in efficiency and overloading of the electric motor will be avoided. The bag 64, being detachably secured to the tubular outlet 63, may be removed for the purpose of disposing of the dust and other debris collected therein.

In the modification as well as in the preferred embodiment, the location of the outlet passage from the liquid-collecting bag at the top of the bag and with its entrance adjacent the edge of the open end or mouth of the bag, at a point out of the path of the air stream entering the bag through the inlet nozzle 37, prevents passage of liquid through the outlet.

It will be seen from the foregoing description that the portable liquid-collecting suction device of the present invention is of very simple construction and is convenient to use since it may be merely substituted for the filter bag in a vacuum cleaner without making any structural changes in the cleaner. Where the removal of liquids such as water, detergent solutions, and the like from floors, rugs and similar surfaces is desired the device functions efficiently and is of great utility.

As previously pointed out, the liquid, collecting bag is preferably formed of rubber or equivalent material. The other parts of the cleaner may be constructed of various commonly used materials. It is preferred, however, to employ a corrosion-resistant metal or other metal suitably covered with a corrosion-resistant coating for any metal parts which may come into contact with liquids.

The invention claimed is:

1. In a liquid-collecting suction device having a body forming a chamber having an open end providing an inlet and having an outlet at its opposite end; an inlet head removably attached to said body and covering said open end of said chamber, an inlet tube extending through said head and having one end adapted for attachment to a suction head, and an inlet nozzle in said chamber carried by the other end of said inlet tube and projecting at an angle to the horizontal upwardly and toward said opposite end of said body, the combination therewith of a means for collecting and holding entrained liquid entering said chamber with air through said inlet nozzle, comprising a flexible, water-impervious dispensable bag having an open end adjacent the open end of said chamber, an opposite closed end and a tubular side wall spaced from the corresponding wall of said chamber, an outward flange around said open end of said bag sealing the inlet end of said chamber and supporting said bag in said chamber, and a conduit projecting in said bag, from the top and adjacent to the open end thereof and terminating intermediate said nozzle and said flange, said conduit having an open ended passage therethrough the outlet end of which is in communication with the space between said bag and body and the inlet end of which is in communication with the interior of said bag and is arranged between said nozzle and said flange whereby said nozzle discharges its stream of air and entrained water upwardly alongside said conduit but from a point intermediate, said inlet end of said conduit and the closed end of said bag.

2. A structure as set forth in claim 1 wherein a pair of integral external ribs are provided on the exterior of said bag and flank said passage and extended toward and over said closed end of said bag thereby to provide a duct in the top of the space between said bag and body to maintain communication between said passage and said outlet of said body and insuring the passage of any entrained water escaping said bag to said outlet of said body.

3. A structure as set forth in claim 1 wherein said passage discharges into a porous bag arranged in the space between said water-impervious bag and said body.

4. A structure as set forth in claim 1 wherein said conduit is in the form of a tube extending through said water-impervious bag.

5. A structure as set forth in claim 1 wherein said conduit is integral with said water-impervious bag.

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