

Jan. 6, 1959

W. GERSTMANN

2,867,231

LIQUID SEPARATOR

Filed March 11, 1954

Fig. 1.

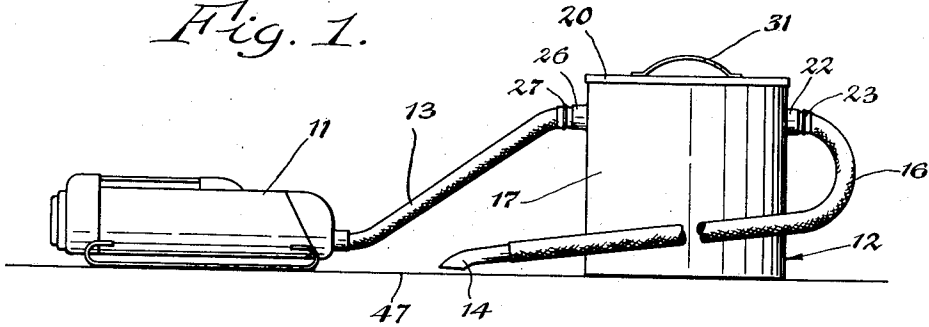


Fig. 2.

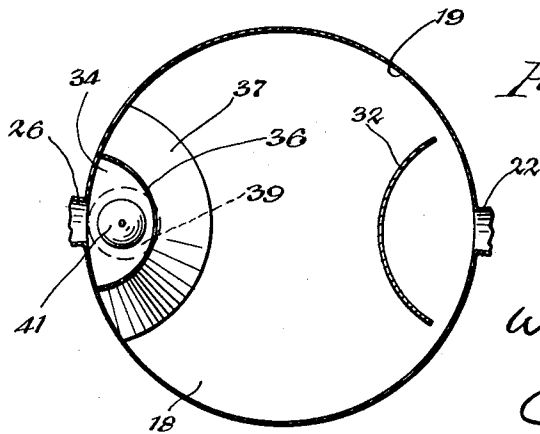
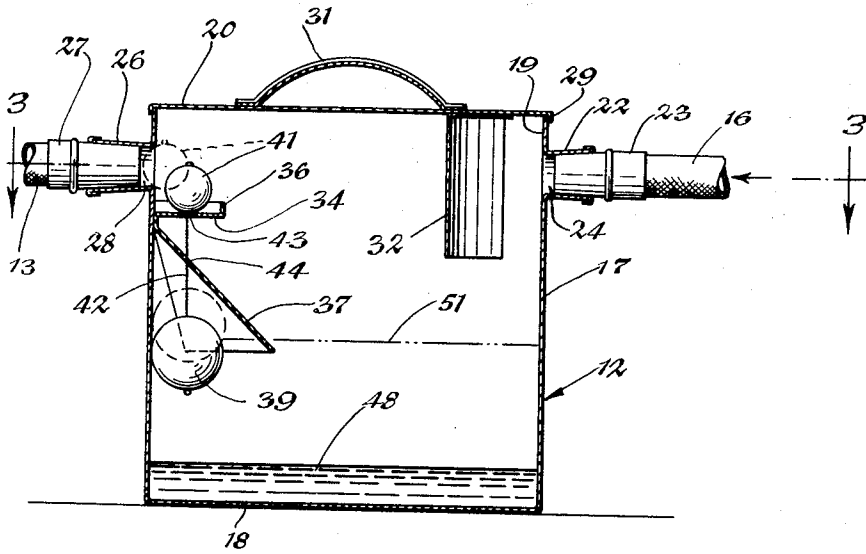


Fig. 3.

INVENTOR.
William Gerstmann
BY
Popp and Sommer
Attorneys.

1

2,867,231

LIQUID SEPARATOR

William Gerstmann, Buffalo, N. Y.

Application March 11, 1954, Serial No. 415,670

6 Claims. (Cl. 137—202)

This invention relates to attachments or accessories for suction devices and is concerned particularly with liquid separating attachments which may be employed in conjunction with such devices for removing liquids, such as cleaning fluids and the like, from floors, carpets and similar surfaces or objects.

In washing floors, or in shampooing rugs or carpets in place it is convenient to pick up the water, detergent solutions and the like with a vacuum cleaner since less work is involved than in using a mop and, in the case of rugs and carpets, much more water may be removed. Obviously, however, liquids must not be permitted to enter the vacuum cleaner since the electric motor therein might be seriously damaged. Accordingly, there has been need for practical and efficient means to separate entrained liquids from the air stream drawn into a vacuum cleaner.

It is an object of the present invention to provide a liquid separating attachment of the character described which may be conveniently used in conjunction with a suction device such as an ordinary, household vacuum cleaner.

Another object of the present invention is to provide an attachment of the character described which is so constructed as to efficiently separate liquids entrained with the air entering the nozzle of a suction cleaning device from such air and collect such liquids in a container which may be readily carried and emptied.

A further object of the invention is to provide an attachment or accessory of the character described which is provided with means preventing the passage of liquid therefrom into the suction device.

Still another object of the invention is to provide a liquid separating attachment of the character described which is of simple, durable and inexpensive construction.

Other objects and advantages of the present invention will be apparent from the following description taken in conjunction with the accompanying drawing in which:

Figure 1 is a side elevational view showing a liquid separator according to the present invention in conjunction with a household vacuum cleaner of conventional type;

Figure 2 is a vertical sectional view of the attachment or separator shown in Figure 1; and

Figure 3 is a horizontal sectional view of the separator taken on line 3—3 of Figure 2.

In Figure 1 the reference numeral 11 indicates a vacuum cleaner of the conventional, horizontal tank type which contains a motor driven fan as a source of suction. The reference character 12 designates generally a liquid separating attachment according to the present invention. Joining and providing communication between the vacuum cleaner 11 and the separator 12 is a flexible hose 13. Another flexible hose 16 extends between and provides communication between the separator and a suction nozzle 14.

As best shown in Figure 2, the separator 12 comprises

2

a cylindrical, upright tank 17 having a bottom 18 and a cylindrical wall 19. A cover 20 is provided for the tank 17. Both the tank 17 and the cover 20 are preferably formed of metal. Any desired metal may be used, due care being taken that if a metal likely to be corroded by any of the liquids with which it may come in contact is employed the metal surfaces are protected by a suitable coating of non-corrodible material.

The liquid separator 12 is provided with a pair of outwardly extending nipples 22 and 26 adjacent the top of the cylindrical wall 19 of the tank 17. The inlet nipple 22 is tubular, with a passage 24, and is adapted to receive the tubular fitting 23 provided on one end of the flexible hose 16. Similarly, the outlet nipple 26 is provided with a passage 28 adapted to receive the tubular fitting 27 on one end of the flexible hose 13, thereby establishing communication between the nozzle 14 and the vacuum cleaner 11 through the separator 12. While it is not necessary for the nipples to be diametrically disposed, as shown, such an arrangement is preferred as less strain will then be placed on the hoses and their connections.

The cover 20 of the separator 12 is provided with a depending circumferential flange 29 which fits over the upper edge of the cylindrical wall 19 and is also provided with a handle 31 projecting from the upper face thereof. An arcuate shield or deflector 32 is attached by welding, brazing or the like to the under face of the cover 19 adjacent one edge thereof. When the cover 19 is in place the shield 32, therefore, projects downwardly into the separator tank 17.

Attached to the wall 19 of the separator tank 17 below the outlet nipple 26 is a shelf 34, substantially semicircular in shape and having a peripheral upwardly extending rim 36. Below the shelf 34, and preferably formed integrally therewith, is a deflector or float guide 37, open at its bottom and having a wall which tapers inwardly from the bottom like a cone. The edges of the guide 37 engage and may be attached, by suitable means, to the wall 19 of the tank 17. The shelf 34 provides a rest for a cut-off ball or check 41 which is connected to a float 39 that passes through vertically aligned holes 43 and 44 within the deflector or guide 37 by a cord or cable 42 in the shelf 34 and the float guide 37, respectively.

The operation of the liquid separator of the present invention is simple and effective. As pointed out above, the separator is intended for use as an attachment or accessory with vacuum cleaners or other suction devices when it is desired to remove liquids, such as cleaning solutions, from surfaces such as floors, rugs, furniture and the like. In using the separator with a vacuum cleaner of the type shown, the motor driven fan (not shown) within the body of the vacuum cleaner is caused to operate by connecting the motor thereof to a suitable source of electric power. A reduced pressure is thus established in the intake end of the cleaner and in the remainder of the system comprising the hose 13, the separator 12, the hose 16, and the nozzle 14. When, therefore, the nozzle 14 is placed, as shown, in close proximity to the surface 47, air pressure forces the liquid on the surface 47 into the nozzle and through the hose 16 into the separator. It will be understood that the cover 20 of the separator is placed on the tank 19 in such position that the depending shield 32 is adjacent the intake passage 24 of the separator. Air entering the separator is, therefore, deflected downwardly into the tank 17 so that no liquid carried thereby may pass directly into the outlet passage 28. The liquid entrained with the air passing through the separator collects in the bottom, as shown by the reference numeral 48, while the air passes out of the separator through the outlet passage 28 and the hose 13 to the vacuum cleaner.

Since liquid drawn into the vacuum cleaner would be very likely to cause damage thereto, a shut-off is provided

for the outlet passage 28 which will prevent liquid in the separator from rising to such a height that it may carry over into the cleaner. Such a shut-off is provided by the flow-responsive ball or check 41. As described above, the check 41 is connected by a cord or cable 42 to the level-responsive float 39. As shown in full lines in Figure 2, the check rests on the shelf 34 and the float is supported, by the cord from the check, above the normal level of the liquid 48 in the separator. When, however, the liquid level in the separator rises to a predetermined point, as indicated by the dash and dot line 51 in Figure 2, the float 39 is displaced upwardly by the liquid to the position shown in broken lines in Figure 2. The upward movement of the float 39 provides slack in the cord or cable 42 and thereby permits movement of the ball 41. The latter when free to move will be drawn by the flow of air into or against the end of the outlet passage 28 to the position shown in broken lines in Figure 2, thus shutting off or blocking the passage 28 and preventing further air and liquid from being drawn into the separator 12.

The float 39 may be constructed of any suitable light material such as cork but is preferably hollow and formed of plastic, rubber or other water-resistant material. The check ball 41 must be comparatively light in weight and is preferably also made as a shell of plastic or rubber. The cord or cable 42 should be quite flexible and may conveniently be formed of nylon which is resistant to attack by mildew even in a damp atmosphere like that in the interior of the separator 12.

Fasteners (not shown) of any suitable and desired type may be provided for holding the removable cover 20 on the tank 17. The handle 31 may then be employed for carrying the separator. Further, in the event that the separator is overturned, the cover will remain in place and liquid will not be spilled therefrom. The arrangement of the float 39 and check ball 41 is such that if the tank should be overturned there will be sufficient slack in the cable or cord 42 to permit the outlet passage 28 to be closed by the check. The rim 36 of the shelf 34 will prevent dislodging of the ball 41 from the shelf during normal movement of the separator.

From the foregoing description it will be evident that liquid separators according to the present invention are simple and inexpensive in construction and dependable in use. The outlet shut-off arrangement is so constructed as to prevent debris, such as threads, hair, small sticks, dried soap, and the like, carried into the separator with the air or water from interfering with its action or clogging the outlet. Furthermore, the presence of foam in the separator does not prevent the proper operation thereof. Since the outlet passage is near the top of the tank, it is quite unlikely that sufficient foam would accumulate in the tank to give trouble with carryover before the liquid level rises to such height that the outlet will be closed.

It will also be apparent that liquid separators according to the invention are not limited in their use to serving as accessories for ordinary vacuum cleaners. They may likewise be used with other suction producing devices or with permanent suction lines such as are provided in many stores, office buildings and the like. The size of the separator may, of course, be varied with the conditions of use and the convenience of the user. The length and character of the hoses employed are also matters of choice.

While there has been described above and illustrated in the drawings, a preferred form of separator, it will be understood that numerous modifications of and variations in the construction thereof may be made without departing from the spirit of the invention. Thus, for example, the shelf 34 and float guide 37 may, if desired, be formed in two pieces instead of one. Accordingly, it is intended that the invention shall not be considered as limited to the details of construction shown and described but shall, instead, be interpreted as broadly as permitted by the appended claims.

I claim:

1. A liquid separator for suction devices comprising a tank, a cover for said tank, an intake passage for said tank having a deflector adjacent thereto, an outlet passage from said tank, a float within said tank responsive to the liquid level therein, a guide for said float, and a check for said outlet passage, said float being connected to said check and being supported thereby within said guide above the normal liquid level in said tank and said check being responsive only to flow in said outlet passage to close said passage when said liquid level reaches a predetermined height.

2. A liquid separator for suction devices comprising a tank, a cover for said tank, an intake passage for said tank having a deflector adjacent thereto, a float within said tank responsive to the liquid level therein, a guide for restraining movement of said float, an outlet passage from said tank, and a flow-responsive check for said outlet passage, said check and said float being connected by a flexible cable, said float being supported within said guide by means of said cable above the normal liquid level in said tank, and said check being free to move in response to flow in said outlet passage to close said passage only when said float is raised above a predetermined level by liquid in said tank.

3. A liquid separator for suction devices comprising a tank, a cover for said tank, an intake passage for said tank, having a deflector adjacent thereto, a float within said tank, a guide for said float, an outlet passage from said tank, and a flow-responsive check for said outlet passage, said check and said float being connected by a flexible cable of such length that said float is supported by said check above a predetermined liquid level in said tank, said float being responsive to an increase in liquid level in said tank above said predetermined level to permit said check to close said outlet passage only in response to flow therein.

4. A liquid separator for suction devices comprising a tank, a removable cover for said tank, said tank having an intake passage and an outlet passage, a flow-responsive ball check supported adjacent said outlet passage, a float within said tank, said float being connected to said ball check by a flexible cable and being supported thereby above a predetermined liquid level in said tank, said float being adapted to be raised by liquid in said tank when said predetermined level is exceeded, said ball being movable into said outlet passage, thereby to cut off flow there-through, only when said float is raised and in response to flow in said passage, and a deflector carried by said cover adjacent to said intake passage for diverting downwardly air and liquid entering said tank.

5. A liquid separator for suction devices comprising a cylindrical tank, a removable cover for said tank, said tank having, adjacent the upper end thereof, an intake passage and an outlet passage, a shelf adjacent said outlet passage, a flow-responsive ball check supported on said shelf in proximity to said outlet passage, a float, a guide for said float, said float being connected to said ball check by a flexible cable and being supported thereby within said guide above a predetermined liquid level in said tank, said float being adapted to be supported by and raised by liquid in said tank when said predetermined level is exceeded, said ball check being movable into said outlet passage only when said float is supported by liquid and in response to flow in said passage, and a deflector carried by said cover and projecting downwardly into said tank opposite said intake passage.

6. A liquid separator for suction devices comprising a cylindrical tank, a removable cover for said tank, said tank having, adjacent the upper end thereof, diametrically arranged intake and outlet passages, a rest adjacent said outlet passage, a ball check supported on said rest in proximity to said outlet passage, a float, a guide for said float, said guide being open at its lower end and having a greater cross-section at said end than above said end,

5

said float being supported within said guide above a predetermined liquid level in said tank by a flexible cable connecting said float and said ball check and being adapted to be supported and raised by liquid in said tank when said predetermined level is exceeded, said ball check being movable, only when said float is supported by liquid and in response to flow in said outlet passage, to close said passage, and a deflector carried by said cover and project-

6

ing downwardly into said tank opposite said intake passage.

References Cited in the file of this patent

UNITED STATES PATENTS

1,890,126	Moore -----	Dec. 6, 1932
2,404,795	Garretson -----	July 30, 1946
2,534,808	Bevington et al. -----	Dec. 19, 1950