Nov. 24, 1959 W. E. O'SHEI 2,914,256

WINDSHIELD CLEANING APPARATUS

Filed May 9, 1955 2 Sheets-Sheet 1

Fig. 1.

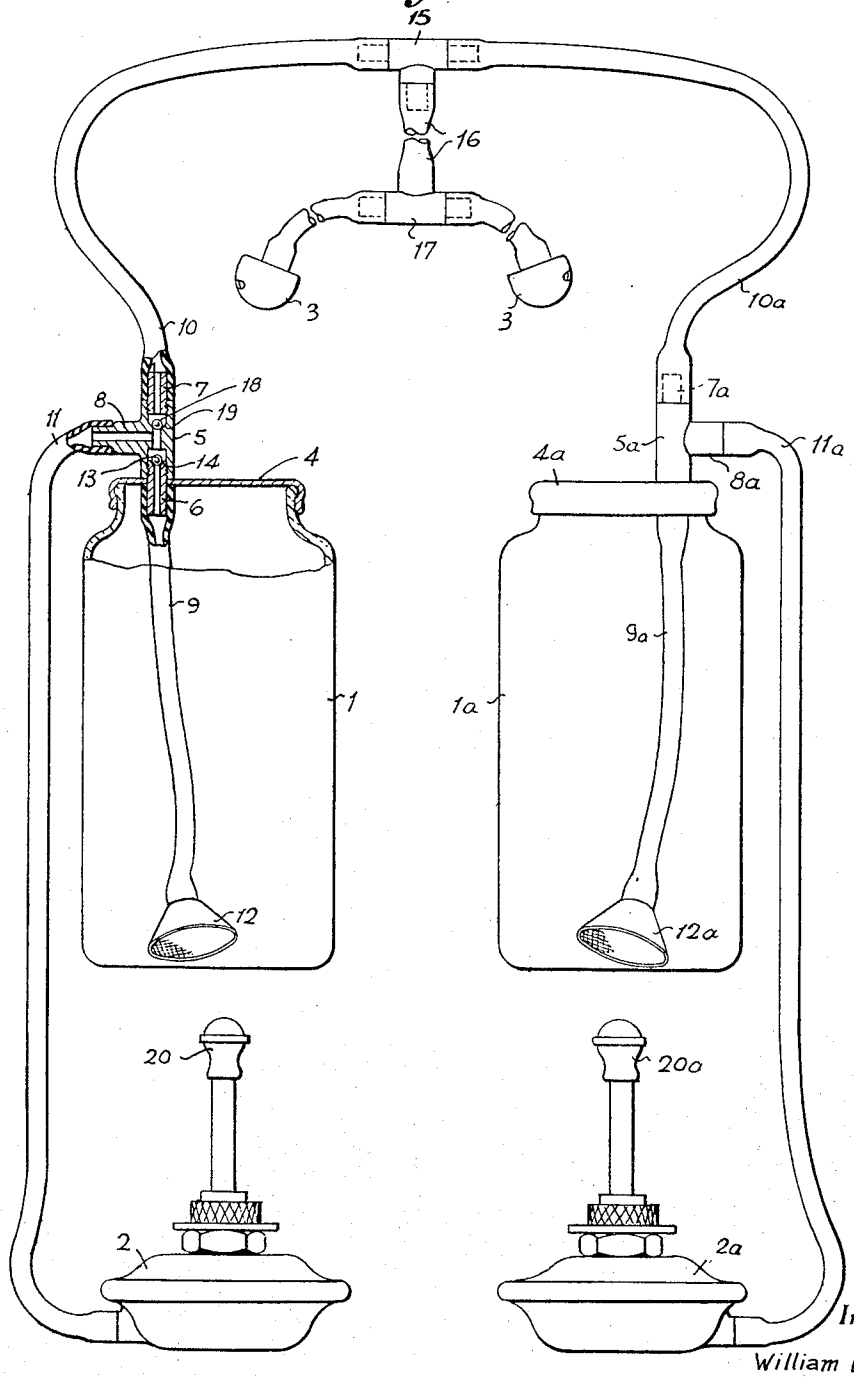

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Fig. 2.

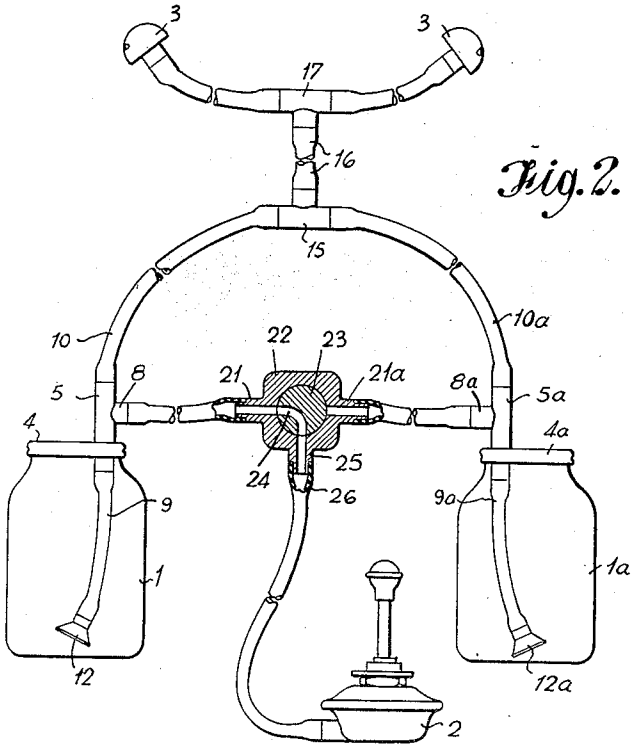
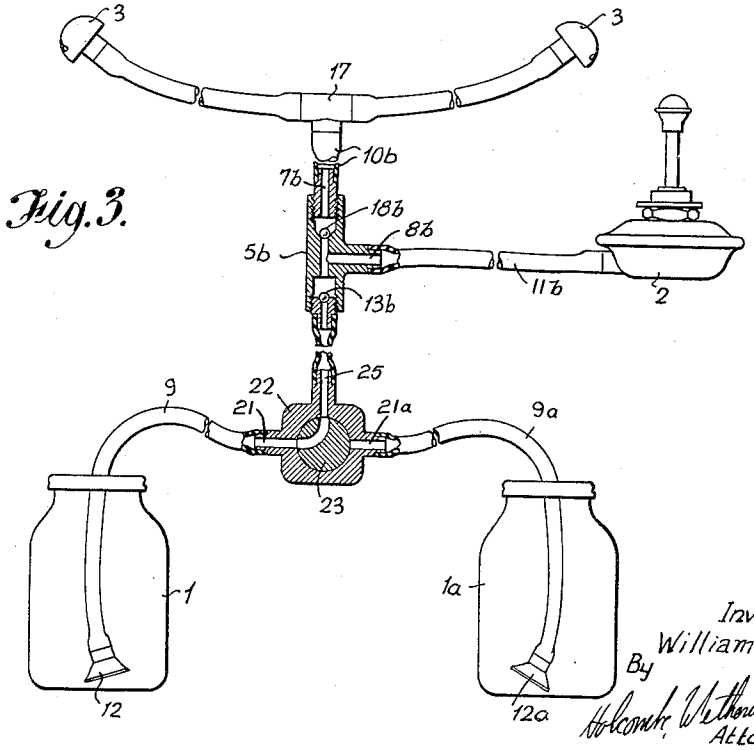


Fig. 3.



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WINDSHIELD CLEANING APPARATUS

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7 Claims. (Cl. 239—305)

The present invention relates to windshield cleaning apparatus of the kind comprising one or more nozzles through which water or other liquid may be discharged on to the windshield in the path of movement of the windshield wiper blades in order to clean mud and dirt from the windshield. The cleaning liquid, which sometimes comprises a dilute solution of a detergent, is stored in a container from which it may be discharged through the nozzle or nozzles by a pump, plunger or the like.

According to the present invention, a windshield cleaning apparatus comprises two separate liquid containers with means for separately discharging liquid contained therein through a common nozzle or nozzles.

According to one embodiment of the invention, liquid is discharged from the two containers by two liquid pumps respectively associated with the containers, the two pump outlets being connected to the common nozzle or nozzles through two non-return valves respectively.

The two containers may be constituted by separate vessels or by two separate compartments of a common vessel.

In another embodiment of the invention, a common discharge pump or the like is used in association with a changeover valve for selecting the liquid to be sprayed.

Alternatively, non-return valves may be connected in the passages between the two containers and the common nozzle or nozzles, means being provided for selectively feeding the contents of the containers to the common nozzle or nozzles. The container may comprise a flexible walled bottle, for example a polyethylene bottle, from which the contents can be discharged by compressing the bottle.

In operation the concentrated detergent is first discharged on to the windshield and after a few strokes of the wiper blade the normal cleaning solution may be discharged if this should be necessary.

The discharging means may be so constructed or arranged that the concentrated detergent and the normal cleaning solution will be automatically discharged in the correct sequence at each operation of the discharge means.

The apparatus according to the invention enables two different liquids to be separately and selectively discharged on to the windshield through the same nozzle or nozzles. According to a feature of the invention, one of these liquids comprises a strong or concentrated solution of a detergent, and the other liquid comprises water or a dilute cleaning solution. I have found that a concentrated detergent solution not only more readily loosens the film of mud and grease on the windshield than does water or a dilute solution, but that it also loosens the mud and grease which adheres to the wiping edge of the wiper blade squeegee element, so that by first discharging the concentrated detergent on to the windshield the mud and grease on the screen and squeegee element is quickly loosened so that the subsequent discharge of water or dilute solution will more easily wash away the mud and

grease and a clear wipe will be more quickly obtained than is possible by the use of water or a dilute solution alone. The cleaning of the wiping edge of the squeegee element itself by the concentrated detergent, which is not easily effected by water or a dilute solution alone, enables the squeegee element better to adhere to the glass and thus effect a cleaner wipe.

In order that the invention may be more clearly understood, reference will now be made to the accompanying drawings, in which:

Fig. 1 is a view of one embodiment of the invention.

Fig. 2 is a view showing a modification.

Fig. 3 is a view showing a further modification.

Referring to the embodiment shown in Fig. 1, the apparatus comprises two liquid containers **1**, **1***a* from which the liquids may be discharged by pumps **2**, **2***a* respectively through nozzles **3** which are common to both systems. As both systems are identical only one will be described in detail, corresponding elements of the other system being indicated by the same reference numbers but with the suffix *a*.

The container **1** is provided with a cover **4** which carries a check valve fitting **5** having three tubular connections **6**, **7** and **8** for rubber tubes **9**, **10** and **11** respectively. Tube **9** depends from the fitting **5** into the container **1** and is provided with a strainer **12** at its lower end. The passage into the fitting **5** from the connection **6** is controlled by a non-return ball valve **13** resting on the seating **14**. Tube **10** connects with a T-piece **15**, to which is also connected the corresponding tube **10***a* of the other system, which in turn is connected by a rubber tube **16** to a second T-piece **17** which feeds the two nozzles **3** which are mounted in front of the vehicle windshield and so disposed that the liquid discharged therefrom will be sprayed on to the windshield in the paths of movement of two wiper blades. The passage from the fitting **5** to the connection **7** is controlled by a non-return ball valve **18** resting on the seating **19**.

The space in the fitting **5** between the two ball valves **13** and **18** leads to the connection **8** which is connected by the tube **11** to the pump **2**. The pump **2** may comprise a diaphragm which may be actuated by depressing the knob **20** by the hand or the foot, the diaphragm being returned by a spring.

Operation of the pump **2** causes the liquid in the container **1** to be sucked up, during the return movement of the pump, through the tube **9**, valve **13** and tube **11** into the pump **2** (the valve **18** being closed at this time) and to be discharged, during depressing the knob **20**, through the tube **11**, valve **18**, tube **10**, T-piece **15**, tube **16**, T-piece **17** and the nozzles **3**. The valve **13** remains closed at this time, and the liquid is prevented from being forced back into the container **1***a* by the column of liquid in the tube **10***a* which is retained therein by the valve **18***a*.

Liquid in the container **1***a* can be similarly discharged through the same nozzles **3** by operating the pump **2***a*, the valve **18** and the column of liquid in the tube **10** preventing the liquid from the container **1***a* from being forced back into the container **1**.

The containers **1** and **1***a* are respectively partially filled with a concentrated solution of a detergent and clear water or a dilute cleaning solution as normally used in windshield cleaner apparatus. In using the apparatus, pump **2** is first operated to discharge concentrated detergent on to the windshield, and after a few strokes of the wiper blade pump **2***a* is operated to discharge water or the normal cleaning solution on to the windshield.

If desired, non-return valves may be incorporated in or associated with the T-piece **15** to prevent liquid forced up one of the tubes **10**, **10***a* from being forced into the other tube; these valves may be additional to or instead

of the valves **18**, **18***a*. Further, the pumps **2** and **2***a*, or equivalent discharge means, may be so inter-associated that the concentrated detergent and the normal cleaning solution will be automatically discharged in the correct sequence at each operation of the discharge means.

Fig. 2 shows a modification of Fig. 1 in which only a single pump is provided and arranged for selectively discharging the liquid from both containers.

The arrangement comprises the two jars **1**, **1***a* and associated check valve fittings **5**, **5***a*, which are connected to the nozzles **3** in the same way as described with reference to Fig. 1. The connections **8**, **8***a* of the two check valve fittings are, however, connected by rubber tubes to two connections **21**, **21***a* of a changeover valve **22** which may be conveniently in the form of a plug cock, the rotary element **23** of which is provided with a right-angle connecting passage **24** whereby, by turning the member **23** through a right angle, the connections **21**, **21***a* may be selectively connected to a connection **25** which is connected by a rubber tube **26** to the common pump **2**.

When the plug cock member **23** is in the position shown in the drawings, operation of the pump **2** will suck up liquid from the container **1** and discharge it through the nozzles **3**. By turning the member through a right angle to connect the connection **21***a* to the connection **25**, operation of the pump **2** will suck up liquid from the container **1***a* and discharge it through the nozzles **3**.

Fig. 3 shows a modification of Fig. 2, in which the check valve fittings **5**, **5***a* are dispensed with and the pipes **9**, **9***a* are directly connected to the connections **21**, **21***a* respectively of the changeover valve **22**. The connection **25** leads to a check valve fitting **5***b* which is in all respects similar to the check valve **5** and contains ball valves **13***b* and **18***b*, the connection **8***b* leading via the rubber tube **11***b* to the pump **2** and the connection **7***b* leading via the rubber tube **10***b* directly to the T-piece **17** leading to the nozzles **3**. With this arrangement, the liquids in the containers **1** and **1***a* will be selectively discharged upon operating the pump **2** depending upon the position of the plug cock member **23** of the changeover valve **24**.

Whilst particular embodiments have been described, it will be understood that various modifications may be made without departing from the scope of the invention. Thus, for example, the container for the concentrated solution may be of smaller capacity than that of the container for the normal cleaning solution. Further, the quantity of concentrated detergent discharged at each operation may be less than the quantity of normal cleaning liquid discharged at each operation.

In another embodiment, the concentrated and normal cleaning fluids may be accommodated in a container made of a resilient or flexible plastic material and provided with a partition for dividing the container into two compartments for containing respectively the concentrated and normal cleaning solutions. The container may conveniently be constructed in the form of a flexible bag, somewhat resembling a rubber hot-water bottle in shape, the interior of which is divided into two compartments with separate outlets through the neck for the concentrated and normal cleaning solutions. The two outlets may be provided with shut-off valves. The liquids can be selectively ejected from the two compartments either by compressing the walls of the container with one or the valves closed or by a manual or foot-operated pump device for selectively discharging the liquids from the compartments, for example in any of the manners above described.

I claim:

1. Windshield cleaning apparatus comprising two separate liquid containers each having only one liquid outlet, at least one common discharge nozzle adapted to be mounted in front of a windshield, manually-operable means for selectively discharging liquids contained in both said containers through said at least one discharge nozzle and means operative upon the discharge of liquid from either one of said containers through said at least one common discharge nozzle for sealing-off the other of said containers from said at least one common discharge nozzle.

2. Windshield cleaning apparatus comprising two separate containers for liquids, each having a liquid outlet pipe extending from a point adjacent the bottom of the inside of the container upwardly through the top of the container, manually-operable means for discharging liquid under pressure from said first container through its outlet pipe, manually-operable means for discharging liquid under pressure from said second container through its outlet pipe, means for selectively feeding the liquids discharged through both outlet pipes to at least one common discharge nozzle and means operative upon the discharge of liquid from either one of said containers through said at least one common discharge nozzle for sealing-off the other of said containers from said at least one common discharge nozzle.

3. Windshield cleaning apparatus comprising two separate containers for liquids, each container having a tube extending from a point adjacent the bottom thereof to a non-return check valve which is connected by a passage to a second non-return check valve, the outlet from the two second non-return check valves being connected together and leading to at least one common discharge nozzle, connections respectively leading to the two passages between the associated pairs of check valves, and two pumps connected respectively to said connections.

4. Windshield cleaning apparatus comprising two separate containers for liquids, each container having a tube extending from a point adjacent the bottom thereof to a non-return check valve which is connected by a passage to a second non-return check valve, the outlets from the two second non-return check valves being connected together and leading to at least one common discharge nozzle, connections respectively leading to the two passages between the associated pairs of check valves, a changeover valve having first and second ports connected respectively to said connections and a third port, the changeover valve being movable from a position in which it connects the said first and third ports and closes off said second port to a position in which it connects said second and third ports and closes off said first port, and a pump connected to said third port.

5. Windshield cleaning apparatus comprising two separate containers for liquids, a changeover valve having first, second and third ports, the changeover valve being movable from a position in which it connects the said first and third ports and closes off said second port to a position in which it connects said second and third ports and closes off said first port, two tubes each respectively extending from a point adjacent the bottom of one of the containers and connected respectively to said first and second ports of the changeover valve, a check valve connected to said third port and connected by a passage to a second check valve, a pipe connecting the outlet from said second check valve to at least one discharge nozzle, and a pump connected to the passage between said two check valves.

6. Windshield cleaning apparatus comprising two separate containers for liquids, each having a liquid outlet pipe extending from a point adjacent the bottom of the inside of the container upwardly through the top of the container, manually-operable means for sucking liquid through the outlet pipe from said first container, manually-operable means for sucking liquid through the outlet pipe from said second container, means for selectively discharging the liquids sucked through both outlet pipes through at least one common discharge nozzle adapted to be mounted in front of a windshield, and means operative upon the discharge of liquid from either one of said containers through said at least one common discharge nozzle for sealing-off the other of said containers from said at least one common discharge nozzle.

7. Windshield cleaning apparatus comprising two separate containers for liquids, each having a single liquid outlet pipe extending from a point adjacent the bottom of the inside of the container upwardly through the top of the container, manual unitary pump-operated means for sucking liquid through the outlet pipe from said first container and through the outlet pipe from said second container, manually-operable selection means for selectively discharging the liquids sucked through both outlet pipes through at least one common discharge nozzle adapted to be mounted in front of a windshield, and means operative upon the selective discharge of liquid from either one of said containers through said at least one common discharge nozzle for preventing said liquid from entering the other of said containers.

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