Dec. 26, 1950 W. F. OLIVER 2,535,226

WATER INLET AND VACUUM RELEASE FOR COLLAPSIBLE BAG TYPE WASHERS AND EXTRACTORS

Filed June 15, 1948 3 Sheets-Sheet 1

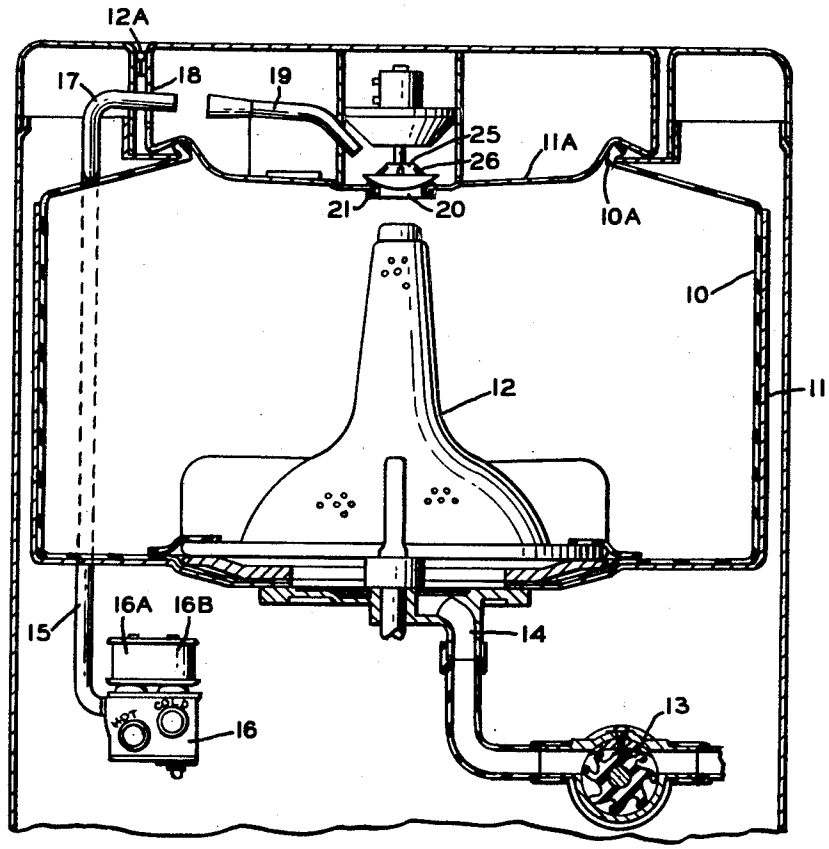


Fig. 1.

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Filed June 15, 1948 3 Sheets-Sheet 2

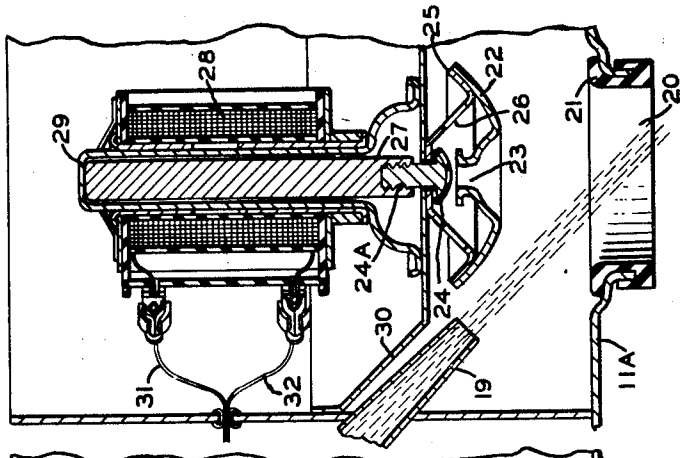


Fig. 4.

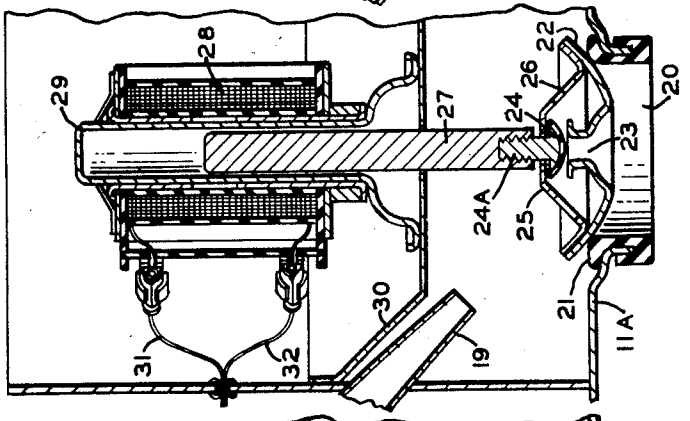


Fig. 3.

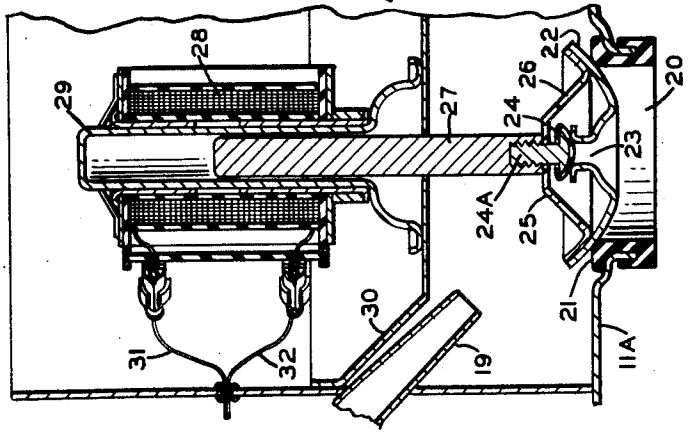


Fig. 2.

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Filed June 15, 1948 3 Sheets-Sheet 3

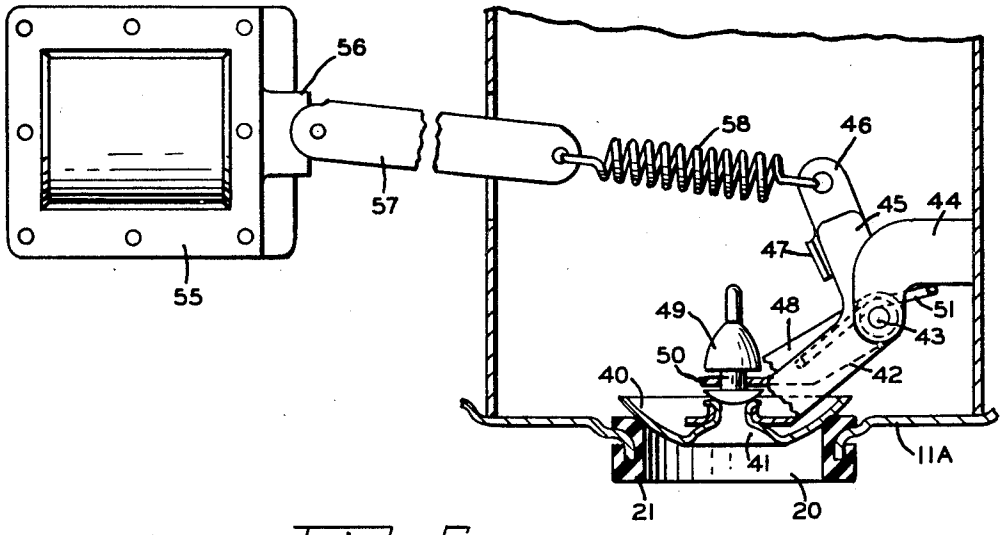


Fig. 5.

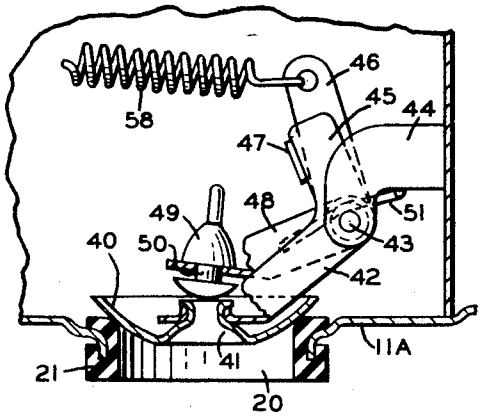


Fig. 6.

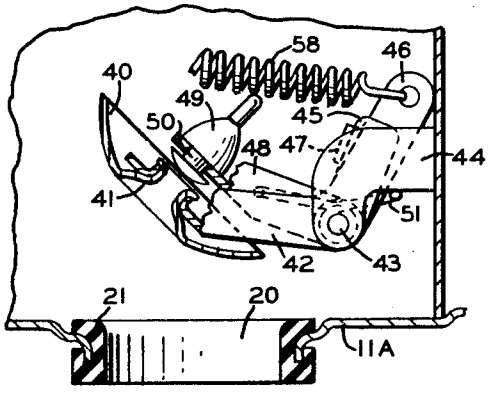


Fig. 7.

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Patented Dec. 26, 1950 2,535,226

UNITED STATES PATENT OFFICE

2,535,226

WATER INLET AND VACUUM RELEASE FOR COLLAPSIBLE BAG TYPE WASHERS AND EXTRACTORS

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Application June 15, 1948, Serial No. 33,184

7 Claims. (Cl. 68—21)

1

This invention relates to water inlet and vacuum release mechanism for combined washer and extractor of the type employing a rubber bag collapsed on clothing contained therein, by extraction of water and air from within the bag, and which clothing has been previously washed inside the bag by provision of washing liquid and agitating means inside the bag.

It is a primary object of the present invention to provide means to efficiently break the vacuum, or pressure substantially less than atmosphere, by a mechanism operable by a small electrical solenoid, and to provide after such breaking an opening of sufficient size to allow injection of liquid into the opening.

It is a further object to provide a water inlet system for a collapsing bag type washer extractor, wherein water inlet provided will satisfy plumbing code requirements and still make it possible to satisfactorily seal the bag for extraction of liquid and air therefrom, necessary for collapsing the bag for extraction.

Other objects of the present invention will be apparent from the accompanying drawings and description, and the essential features will be set forth in the appended claims.

In the drawings:

Figure 1 is a central sectional view through a washing machine having the vacuum breaking valve and water inlet system attached thereto.

Figure 2 is a sectional view of a valve and solenoid showing the valve in closed position.

Figure 3 is also a cross section of the valve and solenoid, but with the solenoid initially actuated to break the vacuum through the smaller opening and before the larger primary valve has moved away from the seat.

Figure 4 is also a cross section of the valve and solenoid, but with both primary valve and secondary valve members pulled away from the seat thus leaving an opening sufficiently large to allow washing liquid to be injected to the opening from an inlet spaced adjacent to the opening.

Figure 5 shows a modified form of the invention employing a solenoid to hold the valve closed and providing a spring for release. The parts are shown in their closed position.

Figure 6 is a view of the same mechanism as shown in Figure 5 but in this view the smaller secondary valve has been opened and the spring is tending to pull the larger principal valve away from the seat but has not as yet done so.

Figure 7 also shows the same parts as Figure 6 but in this case both the secondary and primary

2

valves have been pulled away and the device is shown in the full open position.

The washing machine shown in Figure 1 comprises a flexible bag 10 which is supported within a suitable wall 11. An oscillatable agitator 12 located centrally of the bag is provided for effecting a washing action on laundry and washing liquid carried in the bag 10. The bag 10 has an open neck 10A through which laundry and detergent materials may be introduced when the cover assembly 11A is removed by swinging upwardly on a hinge 12A adjacent an edge thereof. The cover 11A seals against the neck opening 10A in such a manner as to produce an air tight joint when a near vacuum is produced within the bag. This reduction in pressure within the bag and removal of air from the interior of the bag is accomplished by the rotation of a pump 13 which extracts water and air through a bottom opening 14 which communicates with the interior of the bag underneath the agitator. The general arrangement of the bag and extraction means used in connection therewith for combining washing and liquid extraction by the collapsing of the bag on the clothes is discussed in copending applications filed in the name of Henry J. Rand and particular reference is made to application Serial No. 682,322 filed July 9, 1946, now Patent No. 2,472,682 issued June 7, 1949, and application Serial Number 12,761 filed March 3, 1948.

In order to accomplish injection of water into the machine to conform to plumbing codes it is necessary that a suitable gap be provided so that water injected under pressure can jump this gap and thus it will be assured that no water can be taken back into the supply line, if the supply line pressure should become less than the pressure in the container. In order to accomplish this result a water inlet tube 15 from a thermostatically controlled mixing valve 16, which mixes hot and cold water from ordinary house supply lines under normal water pressure is provided. The inlet tube 15 extends from the thermostatic valve 16 to an injection tube end 17 at the top of the machine. This end 17 extends into the cover 11A as shown in Figure 1. Opening 18 in the cover being so positioned that when the cover 11A is swung to an open position the projecting end 17 will remain in position and will not be interfered with by the cover. Spaced from the end 17 of the inlet tube is a water directing tube 19 positioned to catch liquid injected under pressure from the tube 17 and to direct it toward the center of cover 11A toward

an opening 20 positioned centrally on the cover. This opening 20 preferably provided with a sealing gasket 21 is closed by a hemispherical primary valve closure member 22 (see Fig. 2). This primary valve closure member 22 has a centrally located relatively smaller opening 23 provided therein which is closed by a rubber gasket covered closure member 24. The primary closure member 22 has a bracket 25 attached thereto provide with suitable openings 26 in the sides thereof. The small secondary closure member 24 has a shaft portion 24A which extends upwardly through an opening the bracket 25, the shaft 24A having a freedom of sliding movement in this bracket 25 as shown by comparison of Figures 2 and 3. The end of the shaft portion 24A is threaded to a solenoid armature member 27. This solenoids armature member 27 extends upwardly into the core of a solenoid winding 28. The interior of this solenoid winding 28 is provided with a guide member 29 of non-magnetic material closed at the top as shown. This guide member 29 is supported above the opening 20 by a bracket 30 and as will be noted on reference to Figures 2 to 4 inclusive this provides a support for the solenoid coil 28. The solenoid coil 28 has provision for an electrical circuit thereto through lead wires 31, 32 as shown which lead to suitable source of current and switch connections for actuating the solenoid.

Adjacent the opening 20 and sufficiently above it and set at an angle to direct a stream of water into the opening 20, is the projecting end of the water directing tube 19. Water from this tube is thus enabled to flow into the opening 20 as shown in Figure 4.

In operation assuming that a near vacuum has been induced inside of the ba[illegible] 10 by operation of the pump 13, this vacuum may be released by closing the circuit to the solenoid winding 28 thru the leads 31, 32, and before this electrical circuit is closed the condition of the parts of the valve mechanism are as shown in Figure 2. In Figure 2 it appears that closure member 22 is in position against the inlet gasket 21 of the opening 20 and also the closure member 24 is in position to close the smaller opening 23 in the center of the main valve 22. However, on the actuation of the solenoid 28 the solenoid armature 27 is immediately induced to move upwardly in direction to lift the closure member 24 away from the seat of the smaller opening 23 as shown in Figure 3. The top portion of the closure member 24 contacts the bracket 25 and the solenoid continues to exert a pull upwardly. The initial movement however, of the solenoid armature 27 and the closure 24 has opened small opening 23 and has allowed air to enter through the opening 23. The continuing pull exerted by the solenoid armature 27 provides for movement of the large closure member 22 away from the opening 20 as soon as the pressure outside and inside of the opening 20 is sufficiently equalized to allow the member 22 to be pulled away from the opening by the pull exerted by the solenoid. The lifting of the member 22 is accomplished by contact of member 24 on bracket 25. When the closure 22 is lifted the parts come to the position shown in Figure 4 where the closure 22 is sufficiently pulled away from the opening 20 so that the water directing tube 19 is now in line to inject the water into the tub if so desired. Such injection may be accomplished by suitable mixing valve mechanism 16. Such control may be effected by the closing of a circuit to either the hot water solenoid 16A or the mixed water solenoid 16B attached to the mixing valve 16. On actuation of either of these solenoids the water tube 17 will direct water into the water directing tube 19 and then out directly into the opening 20 as shown in Figure 4.

It is apparent from the above description that the mechanism shown therein provides for a breaking of the vacuum by a relatively small solenoid positioned directly above the opening with a valve opening centrally positioned and the solenoid having an initial pull sufficient to open a small central opening and the solenoid continuing to exert a pull to open a larger opening, thus to provide a satisfactory break of vacuum and also to provide sufficient opening to allow washing liquid to be injected.

Figures 5, 6 and 7 show a modified form of my invention. In this arrangement a hemispherical shaped primary valve closure member 40 is provided, which is of a size adaptable to seat against the gasket 21 of the opening 20 and which has a smaller central opening 41. The primary closure member 40 has secured thereto an arm 42 which is pivoted on a pin 43 carried by a bracket 44. The arm 42 has an upwardly extending portion 45 which contacts a secondary arm 46 having a stop member 47 attached thereto which causes the arm 46 to carry the arm 45 therewith as the arm 46 moves in a clockwise direction. The arm 46 is also pivoted at 43 and has a downwardly extending lever portion 48 which is slidably mounted to carry a secondary valve closure member 49. The lever 48 surrounds a cylindrical portion 50 of the member 49 which is of such size as to allow sliding movement relative to the arm 48 with definite limitation of this sliding movement because of the length of the slot as shown. The member 49 is preferably made of rubber so that it may be inserted into an opening in the arm 48. The arm 46 has a spring 51 attached thereto which normally forces the arm in clockwise direction as shown in Figure 5 and which will therefore normally cause upward movement of both the primary valve member 40 and the secondary closure member 49. Assuming the closure members as shown in the Figure 5 the spring 51 will first lift the secondary closure member 49 through the action of the lever 48. The stop member 47 also carried clockwise by spring 51 will contact arm 45 of lever 42 and exert a force tending to lift closure 40 but will not lift closure 40 until pressures are sufficiently equalized. The condition with the secondary valve open is shown in Figure 6. As soon as the vacuum is released sufficiently to allow the force exerted by the spring 51 to lift the primary closure member 40 away from the seat, the parts will assume the position as shown in Figure 7 with a complete opening of both members. Therefore unless there is some force moving the end of an arm 46 in a counterclockwise direction to hold the valve closure members down the result will be an opening of the closure members by the spring 51. In order to provide means for holding the valve members closed an electrical solenoid 55 is provided. This solenoid is shown in Figure 5, with its armature 56 in the maximum activated position. The link 57 is connected to a spring 58 which is hooked to the end of the lever 46 and holds the valve members closed as shown in Figure 5.

It is noted that the above described modifica-

tion provides for normally open valve members and when it is desired to have the valve members closed it is necessary to close an electrical circuit to the solenoid 55 whereas within the first described and preferred form of the invention the actuation of the solenoid opens the valve.

I claim:

1. In a vacuum breaking and water inlet system for a washing machine having a liquid container with an opening to receive water, a water inlet tube positioned to direct water into said opening, a primary closure member for said opening, a lifting unit for lifting said primary closure member away from said opening a distance sufficient to leave a clear path for water from said water inlet tube into said opening, a secondary smaller opening in said primary closure member, a secondary closure for said secondary opening, and connections from said lifting unit to said secondary closure providing opening of said secondary closure on initial lifting movement of said lifting unit whereby vacuum in said container will be broken by initial lifting movement and opening of said secondary closure followed by opening of said primary closure leaving said liquid container opening free to receive water from said inlet tube.

2. In a vacuum breaking and water inlet system for a washing machine having a liquid container, a water inlet tube positioned to direct water into an opening in said container, a vacuum breaking valve member comprising a primary closure member for said opening having a central opening therein, a bracket forming a part of said primary closure member and adapted to lift said primary closure member, a secondary closure member for closing said central opening and positioned to open said central opening by sliding movement relative to said primary closure member and to lift said primary member on further movement in the same direction as said sliding opening movement of said secondary closure member, and a lifting unit connected to said secondary closure member having a movement sufficient to first move said secondary closure member to an open position and subsequently on further movement to lift said primary closure member to open position a distance sufficient to leave a clear path for water from said water inlet tube into said opening.

3. In a vacuum breaking and water inlet system for a washing machine having a liquid container, a water inlet tube positioned to direct water into an opening in said container, a vacuum breaking valve member comprising a primary closure member for said opening having a central opening therein, a secondary closure member for closing said central opening and positioned for sliding movement relative to said primary closure member, a bracket above said primary closure member and having a stop contacting said secondary closure member, a solenoid armature connected to lift both said closures, a solenoid winding around said armature whereby initial movement of said solenoid armature will open said secondary opening and will continue exerting a pull on said primary closure member thereby to provide opening of said primary member after initial opening of said secondary closure member and moving said closure members a distance sufficient to provide a clear path for water from said water inlet tube into said opening.

4. In a vacuum breaking and a water inlet system adapted for use with a washing machine of the type utilizing a clothes container having an opening therein and in which there is induced a partial vacuum for the purpose of extracting water from the clothes contained therein; a vacuum breaking valve member comprising a primary closure member for closing the opening in said clothes container, said primary closure member having an opening therein, a water inlet tube directed toward said opening in said clothes container, a secondary closure member for closing said opening in said primary closure member, an arm connected to said closure members in such a manner that a pull on said arm will first remove said secondary closure member and then remove said primary closure member to permit said water inlet tube to discharge water into said clothes container through the opening therein.

5. In a vacuum breaking and water inlet system adapted for use with a washing machine of the type utilizing a clothes container having an opening therein and in which there is induced a partial vacuum for the purpose of extracting water from the clothes contained therein, a vacuum breaking valve member comprising a primary closure member for closing the opening in said clothes container, said primary closure member having an opening therein, a seat for said primary closure, a water inlet tube directed toward said opening in said clothes container, a secondary closure for closing said opening in said primary closure member, a seat for said secondary closure member, an arm connected to said closure member in such a manner that a pull on said arm will first remove said secondary closure member and then remove said primary closure member to permit said water inlet tube to discharge a stream of water into said clothes container through the opening therein.

6. In a vacuum breaking and water inlet system adapted for use with a washing machine of the type utilizing a clothes container having an opening therein and in which there is induced a partial vacuum for the purpose of extracting water from the clothes contained therein, a vacuum breaking valve member comprising a primary closure member for closing the opening in said clothes container, said primary closure member having an opening therein, a stop member mounted on said primary closure, a seat for said primary closure, a water inlet tube directed at said opening in said clothes container, a secondary closure for closing said opening in said primary closure, a seat for said secondary closure member, an arm directly connected to said secondary closure in such a manner that a pull exerted on said arm will first unseat said secondary closure and then unseat said primary closure by contact with the stop mounted thereon.

7. In a vacuum breaking and water inlet system adapted for use with a washing machine of the type utilizing a clothes container having an opening therein and in which there is induced a partial vacuum for the purpose of extracting water from the clothes contained therein, a vacuum breaking valve member comprising a primary closure member for closing the opening in said clothes container, said primary closure member having an opening therein, a stop member mounted on said primary closure, a seat for said primary closure, a water inlet tube directed at said opening in said clothes container, a secondary closure for closing said opening in said primary closure, a seat for said secondary closure member, a solenoid armature connected directly to said secondary closure, a solenoid winding

around said armature to move said armature to first unseat said secondary closure and then unseat said primary closure by contact with the stop mounted thereon.

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