J. A. DU LANEY.

ELECTRICALLY OPERATED FLOAT GOVERNED LIQUID CONTROL.

APPLICATION FILED MAY 1, 1919.

1,376,519. Patented May 3, 1921.

Fig-1

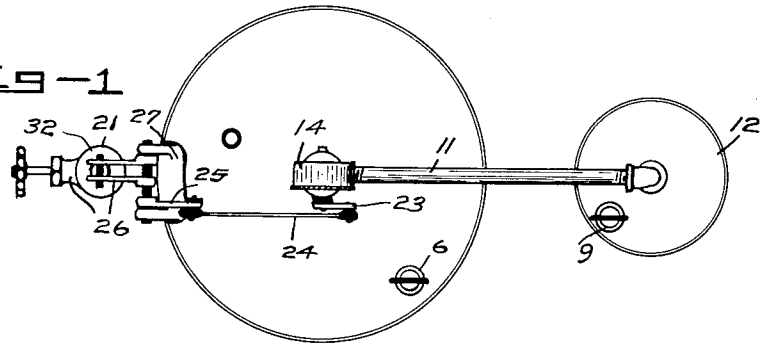


Fig-2

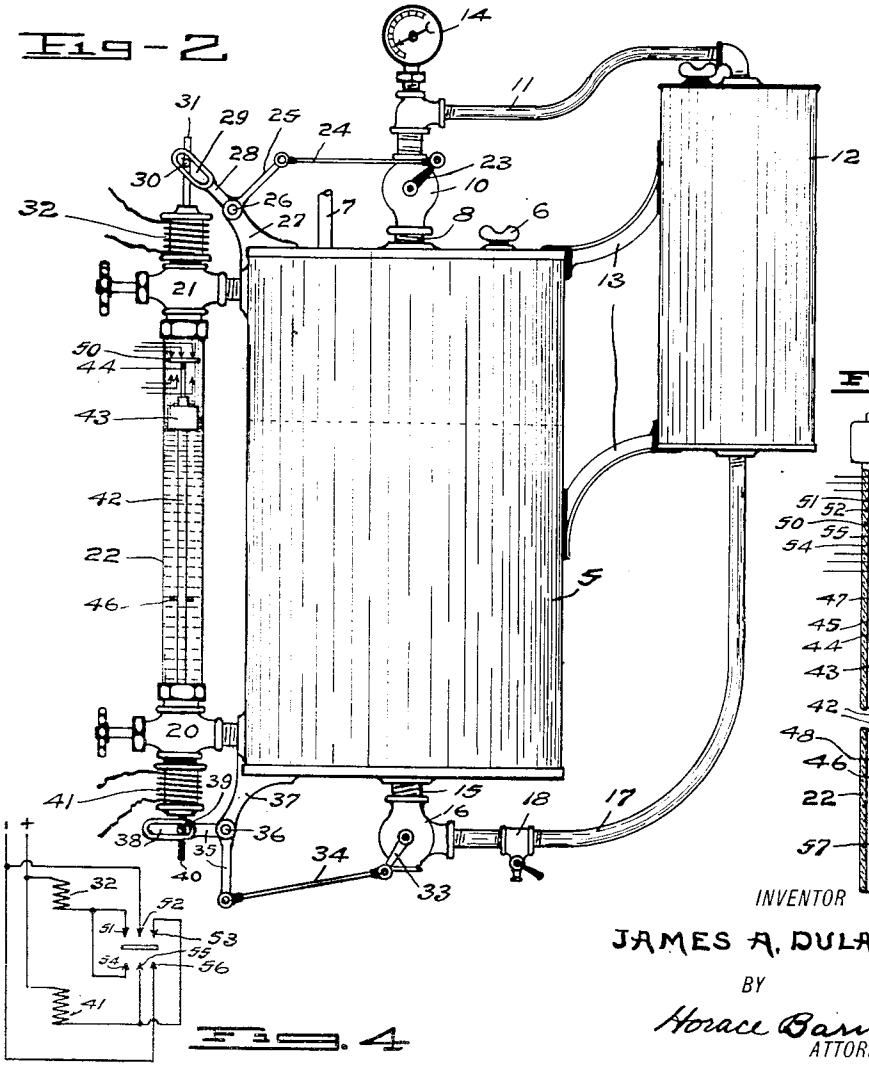
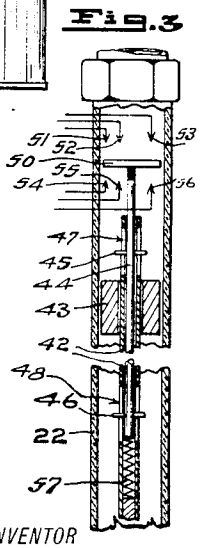


Fig. 4

Fig.3



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ELECTRICALLY-OPERATED FLOAT-GOVERNED LIQUID CONTROL.

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To all whom it may concern:

Be it known that I, JAMES ALLEN DU LANEY, a citizen of the United States, and residing in Seattle, in the county of King and State of Washington, have invented certain new and useful Improvements in Electrically-Operated Float-Governed Liquid Controls, of which the following is a clear and exact specification.

My invention relates to improvements in devices for controlling the level of a liquid in a receptacle and more particularly to improvements in float governed, electrically operated devices for controlling the level of water in a boiler.

The object of my improvement is to provide a device of simple and cheap construction that will operate in a reliable and efficient manner to open and close valves that control the inlet of water to a boiler.

A further object is to provide a device of this nature which includes a boiler and a steam tight reservoir or supply tank that are connected with each other both at their top and bottom ends by valve controlled conduits so that when the valves are opened the steam pressure will be equalized in the boiler and in the supply tank thereby permitting water to flow by gravity from the supply tank to the boiler.

The invention consists in the novel construction, adaptation and combination of parts as will be more clearly hereinafter described and claimed.

In the accompanying drawings Figure 1 is a plan view of apparatus constructed in accordance with this invention. Fig. 2 is a view in elevation of the same. Fig. 3 is a fragmentary sectional view illustrating the float controlled contact making devices and Fig. 4 is a wiring diagram on a small scale.

Like reference numerals designate like parts throughout the several views.

Referring to the drawings the numeral 5 designates a boiler which may be provided with a suitable water inlet opening that is normally closed by a plug 6 and which may be further provided with a steam outlet pipe 7 that may lead to any desired source to which steam is to be delivered.

The top end of the boiler 5 is connected by a pipe 8 with a valve 10 which, in turn, is connected by a pipe 11 with the top end of a water storage tank 12 that may be supported from the boiler 5 by brackets 13 or that may be supported in any other convenient manner at a slightly higher elevation than boiler 5.

A suitable water inlet opening arranged to be closed by a plug 9 may be provided in the top of the storage tank 12.

If desired a pressure gage 14 may be connected with the pipe 11 or with the top of the boiler 5 for recording the steam pressure therein.

The bottom end of the boiler 5 is connected by a pipe 15 with a valve 16 and the valve 16 is connected by a pipe 17 with the bottom end of the storage tank 12. If desired a pet cock 18 may be interposed in the pipe 17 so that the boiler 5 and storage tank 12 may be drained.

The boiler 5 is connected by a suitable gage fitting 20 located near the bottom thereof and by another suitable gage fitting 21 located near the top thereof with a glass water gage 22 wherein the water may rise to the same level as the water in the boiler 5.

The valve 10 on the top of the boiler 5 is arranged to be opened and closed by the oscillation of a crank arm 23 that is connected by a link 24 with one arm 25 of a bell crank which is pivoted as at 26 to a bracket 27 and has its other arm 28 slotted as at 29 and connected by a pin 30 with the top end of the plunger 31 of an electromagnet 32 which, if desired, may be secured to the top of the gage glass fitting 21.

The valve 16 at the bottom of the boiler 5 is arranged to be opened and closed by the oscillation of a crank arm 33 that is connected by a link 34 with one arm of a bell crank 35 which is pivoted as at 36 to a bracket 37 and whose other arm is slotted as at 38 and is connected by a pin 39 with the plunger 40 of an electromagnet 41 that may, if desired, be secured to the lower gage glass fitting 20.

Disposed within the gage glass 22 is a centrally arranged, tubular, guide member 42 upon which is a slidably mounted float 43 that is arranged to be moved upwardly and downwardly by the rise and fall of water within the gage glass 22 and movable vertically within the guide member 42 is a bar 44 that is provided adjacent its upper and lower ends respectively with transverse pins 45 and 46 that project outwardly through vertically arranged slots 47 and 48 in the sides of the tubular guide member 42 and

are adapted to be engaged by the float 43 for the purpose of moving the bar 44.

The top end of the bar 44 is secured to a switch blade 50 that is arranged to make contact between three switch terminals 51, 52 and 53 when the bar 44 is raised by the float 43 to the limit of its upward movement as shown in Fig. 2 and that is arranged to make contact between three other switch terminals 54, 55 and 56 when the float 43 engages with and rests upon the lower pin 46 of the rod 44.

The lower end of the bar 44 is adapted to engage with and rest upon a spring 57 when the switch blade 50 is in the neutral position shown in Fig. 3, the bar 44 being arranged to be lifted off of the spring 57 by the upward movement of the float 43 as the water rises in the gage glass thereby causing the blade 50 to engage the contacts 51, 52 and 53, and such bar being of sufficient weight to break the contact between the blade 50 and contacts 51, 52 and 53, when the float 43 is lowered thereby permitting the bar to return to the neutral position.

When the water in the gage is lowered and the float 43 rests upon the lower pin 46 the weight of such float will be sufficient to compress the spring 57 and move the blade 50 downwardly into contact with the terminals 54, 55 and 56. When the float is lifted off of the pin 46 the spring 57 will again lift the bar 44 into the neutral position shown in Fig. 3.

The electromagnets 32 and 41 may be connected with the terminals 51 to 56 inclusive in the manner shown in Fig. 4 so that both of such electromagnets will be energized when either the upper or lower limit switch is closed.

In operation the circuits to the electromagnets 32 and 41 will normally both be open and the valves 10 and 16 will be closed. When the water in the boiler 5 is lowered so that the water in the gage 22 permits the float 43 to engage with and rest upon the pin 46 the contacts 54, 55 and 56 will be bridged thereby closing the circuit to both electromagnets 32 and 41 and causing a movement of the plungers of such magnets that will open the valves 10 and 16. When the valves 10 and 16 are opened steam pressure in the top ends of the boiler 5 and storage tank 12 will be equalized and water will be permitted to flow by gravity through the pipe 17 from the storage tank 12 into the boiler 5. As soon as the water begins to rise in the gage 22 the float will be lifted off of the pin 46 and the spring 57 will lift the bar 44 and break the circuits to the electromagnets but the valves will remain open until the float reaches the upper limit of its movement, engages the upper pin 45 and lifts the bar 44 so that the contacts 51, 52 and 53 are connected thereby completing another circuit to the electromagnets 32 and 41 and causing the plungers of such electromagnets to be moved in the proper directions to close the valves 10 and 11.

Obviously the pins 45 and 46 may be located close together or far apart to give either a small or a great variation between the maximum and the minimum water levels in the boiler 5.

If desired a single solenoid may be used for actuating both of the valves 10 and 16.

It will be understood that changes in the form of construction and arrangement of the various parts of this device may be resorted to within the scope of the claims.

What I claim is:

1. Apparatus of the class described comprising a boiler, means for admitting water to said boiler, valves controlling the supply of water to said boiler, electrical devices for opening and closing said valves, a water gage communicating with the upper and lower portions of said boiler to register the level of the water therein, a bar movable axially within said water gage, means for limiting the movement of said bar, a float movable within said water gage independently of said bar, means on said bar for engaging with said float near the upper and lower limits of the movement of said float whereby said float may move said bar and switch mechanism disposed within said water gage and arranged to be operated by movement of said bar to control the flow of electrical current to said electrical valve operating devices.

2. A device of the class described comprising a boiler, a water supply tank located above said boiler, conduits connecting the upper and lower portions of said boiler with the upper and lower portions of said water supply tank respectively, valves in said conduits, a liquid gage communicating with the upper and lower portions of said boiler, a float movable within said liquid gage, a tubular guide member for said float, said guide member being arranged axially of said gage and having slots extending longitudinally thereof, a bar slidable within said guide member and projecting from the upper end thereof, pins on said bar, said pins projecting outwardly through the slots in said guide member whereby they may be engaged by said float, electrical devices for opening and closing said valves and switch mechanism disposed within said water gage and arranged to be operated by vertical movement of said bar to control the flow of electrical current to said electrical devices.

Signed at Seattle, Washington, this 25th day of April, 1919.

JAMES ALLEN DU LANEY.