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CONTROL DEVICE

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8 Claims. (Cl. 200—84)

In the operation of devices such as oil or stoker fired steam boilers, it is customary to provide safety devices in the nature of switch controls. These are intended to cut off the operation of the oil burner motor or stoker on low water conditions in the boiler. It is also desirable to provide a control wherein on low water conditions, water will be automatically fed to the boiler until a proper water level condition has been reached in the boiler, whereupon water supply is automatically cut off.

Difficulty has been experienced with certain devices now in commercial use due to the fact that sediment accumulating in the apparatus makes it inoperative.

The present invention has for its object the provision of a simple and improved construction for control devices of this character which will not be subject to the disadvantages and defects of previous devices.

A further object resides in the provision of a control device wherein the float which controls the operation is disposed within the free water space of the boiler in such a relation that it will be washed by the turbulence of the water in the boiler whereby sediment will be prevented from accumulating thereon or thereunder as heretofore.

A further object of the present invention resides in the provision of a control device wherein the operating devices for the switching means and the dampening devices therefor are disposed in a liquid containing chamber which is separate from the boiler to the general end that such devices be kept clear of sediment accumulations.

Further and other objects of the present invention will be hereinafter set forth in the accompanying specification and claims and shown in the drawing which shows by way of illustration a preferred embodiment and the principle thereof and what I now consider to be the best mode in which I have contemplated of applying that principle. Other embodiments of the invention employing the same or equivalent principle may be used and structural changes made as desired by those skilled in the art without departing from the present invention and within the spirit of the appended claims.

In the drawing:

Figure 1 is a sectional view of one embodiment of the invention;

Fig. 2 is a detail view taken on line 2—2 of Fig. 1;

Fig. 3 is a view similar to Fig. 1 with a different embodiment of the invention;

Fig. 4 is a plan view of the dampening paddle. The view is substantially a cross-section taken on line 4—4 of Fig. 3; and

Fig. 5 is a diagrammatic view of the electrical circuits of the control device.

Generally, according to the present invention, in lieu of providing a float which is disposed within the boiler and shielded by baffling so as not to be subject to the surging of the water in the boiler as heretofore, a float construction is provided wherein the float is directly open to the boiler so as to be directly subject to the surging of water within the boiler. In this way the float itself and associated parts in contact with the boiler water are maintained in clean condition, being constantly freed of accumulation of sediment by the movement of the water within the boiler.

To prevent oscillation of the float and associated control mechanism, there is provided a dampening chamber which is separate from the boiler. Within this chamber there is provided a suitable liquid dampening medium such as anti-freeze solution or lubricating oil. The operating connections from the float extend through this dampening chamber and within the dampening chamber there is a dampening device such as a paddle which dampens oscillations of the float controlled mechanism. The switch mechanisms are preferably disposed exteriorly of the dampening chamber and such switch mechanisms may be either mechanically or magnetically operated.

With such form and construction the devices do not become inoperative due to accumulation of sediment. Sediment is prevented from reaching the operating connections extending from the float to the switch.

The sealed liquid filled dampening chamber being sealed off from the boiler cannot receive any accumulation of sediment which would interfere with the proper operation of the movable parts of the device. The device is also provided with a switch chamber and there may also be the usual knockout box in proximity to the switch chamber.

Referring to Fig. 1, in more detail in this embodiment, 10 is an annular shell threaded at one end at 11 to fit a tapped opening in the boiler wall 12 at about the normal water line. Secured in any manner as by soldering to the end of the shell is an annular disc 13 which has in turn sealed to it a flexible bellows 14 which in turn is sealed to the hollow float 15. The other end of the shell 10 is sealed off by a closure plate 16 of non-magnetic material. The space 17 within and defined by parts 10, 13, 14, 15 and

16 is filled with any suitable liquid, such as lubricating oil or an anti-freezing liquid. The liquid may be introduced by removing a plug 33. This space is the dampening chamber of the device and within such chamber there are provided switch operating connections and a dampening paddle. In the form shown in Figs. 1 and 2, such switch operating connections include a lever 18 connected to the float and pivoted at 19 to a bracket 20 carried by disc 13. The flexible bellows permit movement of the float from upper to lower position. Such movement is imparted to the operating connections. Suitably attached to the lever 18 is a paddle 21. Such paddle may have the general configuration of the paddle 21a of Fig. 4. The right hand end of lever 18 carries a small permanent magnet 22. Suitably fixed to the end of the shell 10 is a cup-shaped stamping 23 carrying a dividing partition 24 of insulating material. The space to the left of this partition is the switch chamber and the space to the right is the connection chamber. The shell 23 may be provided with the customary knockouts to permit flexible cables to be entered into the connection chamber. The switch may be of any desired form. For example, it may comprise a pair of contacts 25 normally closed and adapted to be opened when the magnet 22 is in upper position upon the float 15 reaching lower position (low water cutoff position). With the float in other positions the contacts 25 remain closed. For opening the contacts, there may be provided a pivoted armature member 26 pivoted upon a bracket supported by the plate 24. This armature member is provided with an insulated contact operating pin 27. It will be understood that when magnet 22 is in the upper dotted line position, the armature 26 will be attracted and the pin 27 will open the normally closed contacts 25.

The switch also comprises another pair of contacts 28 normally closed and adapted to be opened by an insulating pin 29 upon an armature member 30, by and upon the attraction of the armature when the magnet 22 is in lower position with the float in upper position (high water cutoff position).

As diagrammatically indicated in Fig. 5, the normally closed contacts 25 are in the circuit of the oil burner or stoker motor M whereas the contacts 28 are in the circuit of a solenoid 31 adapted to operate a valve. With the solenoid 31 energized, the valve is maintained open, but when the solenoid is de-energized, i. e., upon opening of contacts 28 with the float 15 in upper position the valve is closed and feed water supply to the boiler is closed.

Referring now to the embodiment of the invention shown in Fig. 3, in this form, direct mechanical action is provided for actuating the switch. The contacts 25 and 28 are replaced by the usual mercury switches designated 25a and 28a. Such switches are actuated from an intermediate lever 18b which has a pin and slot connection to lever 18a. Lever 18a is mounted and connected to the float 15 in a similar manner to lever 18 of Fig. 1 and lever 18b has a pivoted mounting in a bracket carried by a disc 13a which is sealed to the shell and to a bellows 14a which bellows in turn is sealed to a disc 32 which in turn is sealed to the end of the lever 18b. A dampening paddle 21a is provided attached to lever 18a.

The operation of the device shown in Fig. 3 will be readily understood. With the float 15

down in low water position, contacts 25a are open. With the float 15 in extreme upper position, high water position, switch 28a is operated to open the circuit.

When installed in a boiler, the operation of either embodiment is substantially the same for circuit controlling purposes. If the water level in the boiler reaches a too low condition, contacts 25 or 25a will open the circuit to the oil burner or stoker motor and prevent possible overheating and damaging of the boiler.

The water supply valve controlled by solenoid 31 will be kept open at all times when the solenoid is maintained energized with contacts 28 or 28a closed. However, when these contacts open, which in the condition established with the float in upper position, the water supply valve will be allowed to close, thus preventing flooding of the boiler.

Durability and reliability of operation is attained with both constructions due to the fact that the float and associated parts exposed to water in the boiler are constantly kept clear of sediment by the surging of the water in the boiler, which is in free access to the float and to such parts. The dampening devices function reliably and by extending the operating connections through the sealed liquid dampening chamber in the manner shown improved reliability of operation is secured, since their action cannot be interfered with by sediment accumulations.

The sealed liquid dampening chamber serves to effectually prevent sediment in the boiler water from reaching the operating connections or accumulating in, around or under them.

With previous devices, shields and baffles were provided adjacent the float. These afforded ledges for the accumulation of sediment which in time interfered with float operation. With previous devices, sediment could accumulate under and around the operating connections and interfere with their proper operations. With the improved construction these difficulties are obviated and enhanced reliability of operation is secured.

What I claim is:

1. A control device of the character described, with a float adapted for disposition within a boiler for operation by the water therein and with switching means controlled by the float, characterized by the fact that there is combined with said float and switching means, a sealed stationary dampening chamber containing liquid and horizontally disposed between the float and switching means, float moved operating connections for the switching means extending through the liquid in said chamber, said connections having dampening means therefor housed within said liquid dampening chamber, whereby the movements of the connections are dampened by the contained liquid, said chamber being sealed off from the boiler whereby sediment accumulations are prevented from reaching and impeding operation of the operating connections.

2. The invention according to claim 1, wherein the operating connections to operate the switching means comprise a magnet carried by the operating means and within the liquid dampening chamber, which magnet influence magnetic means without the dampening chamber for actuating the switching means, said sealed dampening chamber and the liquid therein serving to prevent sediment in the boiler water reaching and impeding the operation of the operating connections and of said magnet.

3. The invention according to claim 1 wherein the switching means is disposed in a switch chamber outside of said dampening chamber.

4. The invention according to claim 1 wherein
5 the switching means comprises switching means mechanically operated by the operating connections to the float, said operating connections at one end extending to the float through a flexible bellows which provides a flexible sealing wall for the liquid dampening chamber and said operating connections at the other end extending to the mechanically operated switching means, through another flexible bellows which forms another sealing wall for the liquid dampening
10 chamber.
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5. A control device including a shell threaded at one end for insertion in a tapped opening in a boiler wall, a float, means including a flexible bellows to seal one end of said shell to said float and afford a passage for operating connections, partitioning means for the other end of said shell to provide a sealed stationary chamber containing a liquid dampening medium, a switch supporting chamber, with switching
20 means supported therein and operating connections movably supported within the dampening chamber and connected with the float and having means to operate the switching means and having dampening means moved thereby and co-
25 operating with the liquid to dampen the oscillations thereof.
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6. The invention according to claim 5 wherein the partitioning means for the other end of the shell, includes a flexible bellows through which the operating connections to the switching means extend, said switching means being of the me-
5 chanically actuated type for direct operation by said operating means.

7. The invention according to claim 5 wherein the means to operate the switching means comprises a magnet carried by the operating means and within the liquid dampening chamber which magnet through the partitioning means influences magnetic means for actuating the switching means, said sealed dampening chamber and the liquid therein serving to prevent sediment
10 in the boiler water reaching and impeding the operation of the operating connections and of the said magnet.
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8. A control device including a float, switching means for operation thereby, a horizontally dis-
20 posed stationary sealed liquid filled dampening chamber intermediate said switching means and float, operating connections for operating the switching means in said dampening chamber with connections to the float, extending through
25 a sealing bellows, and paddle means in said chamber attached to the operating connections, said float being adapted for disposition within a boiler in unshielded free contact with the water therein for scouring by water surges.
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