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AUTOMATIC CUT-OFF FOR FUEL OF OIL BURNING BOILERS

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2 SHEETS—SHEET 2.
To all whom it may concern:

Be it known that I, Perry Homer Gentzel, a citizen of the United States, residing at Newton, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Automatic Cut-Offs for Fuel of Oil-Burning Boilers, of which the following is a specification.

The object of my said invention is to provide a means whereby the flow of fuel to the atomizer burner of an oil-burning boiler will be automatically cut off when the water in the boiler has reached a predetermined low water level, thereby automatically extinguishing the fire and guarding against explosion, burning of boiler tubes, and other damage.

Referring to the accompanying drawings, which are made a part hereof, and on which similar reference characters indicate similar parts,

Figure 1 is a side elevation of an automatic control device embodying my said invention, certain portions being shown in section to illustrate the construction more clearly.

Figure 2, a top or plan view, and

Figure 3, a horizontal section on the dotted line 3—3 in Figure 1.

Figure 4 is a fragmentary view of the upper end of the control device showing the parts in section.

Figure 5 is an organization view showing the control device in relation to the boiler, burner and fuel supply.

In said drawings the portion marked A represents the supporting base, B a head block, and C tie-rods, which several parts constitute the frame of the device.

Secured to head block A is a casting D containing parts and chambers for a purpose to be presently described.

Said head block A has a boss 10 on its upper face, formed with a central perforation, in which is mounted a tube 11, preferably of copper or other metal readily expansible by heat, which tube has a head 14 which fits slidably in a central perforation 14’ formed in the head block B. The central portion of said pipe or tube 11 is surrounded by a jacket 13 of steel or other stiff material for the purpose of maintaining said tube in true alignment and preventing buckling regardless of temperature.

Said head block A is also formed with a transverse port 13 communicating with tube 11 and also with a pipe leading to the boiler as shown at 23 in Figure 5.

The upper end of tube 11 carries the head 14 adapted to press against a diaphragm 15 mounted over a perforation 16 in casing part D which connects with the fuel supply. Another perforation 17 leads from said casing D and connects with the pipe leading to the burner or atomizer. An annular flange 18 within casing D surrounds the lower end of perforation 16, against which the diaphragm 15 is adapted to seat under expansion of tube 11 and close the passage-way from perforation 16 to perforation 17 and cut off the supply of fuel. A coiled spring 19 serves to hold the diaphragm away from said seat and maintain an open passage-way under normal conditions.

In operation the tube 11 is normally filled with water to the normal water level in the boiler and under such conditions the parts are maintained in the relative position shown in Figure 1 with the passage-way for the flow of the liquid fuel open. When, however, the water in the boiler falls to a level on a plane with the opening 13, the water in the tube will fall below said opening permitting the steam from the boiler to pass into the said tube and by reason of its high temperature and the expansive character of the metal will quickly expand said tube, forcing the upper end in an upward direction and closing the diaphragm against flange 18, thus shutting off the flow of fuel and consequently extinguishing the fire, for the purposes before described.

The tie-rods C preferably pass through perforations in the sides of the base block A and have nuts 20 on their lower end, between which and said base block are interposed heavy coiled springs 21, which normally hold said base block against jam nuts 22 on said rod C above said base block, thereby providing a certain amount of elasticity in the operation, which can be regulated by the adjustment of nuts 20, which will vary the tension of said springs 21 and provide for any extra expansion of tube 11, as will be readily understood.

In Figure 5 the legend NWL indicates the normal water level and LWL the lowest water level to which water will normally be permitted to fall prior to automatic replenishment. Should, however, the water level continue to fall below the LWL the
connection between the boiler and the block A will be exposed to steam from the boiler which will cause the control device to operate to cut off the oil supply to the burner as above described.

Having thus fully described my said invention, what I claim as new and desire to secure by Letters Patent, is:

1. A device for automatically cutting off the flow of fuel of an oil-burning boiler when the water reaches a predetermined level in the boiler, consisting of a frame, a head carried by said frame and formed with ports for connection with the oil supply and with the burner, said ports being formed to normally communicate with each other; a diaphragm mounted over the end of one of said ports, a spring for normally holding said diaphragm away from said end to maintain communication between said ports, an expansible tube mounted beneath said diaphragm and arranged to support and operate the same, and a connection from said tube to the boiler at the predetermined low water level therein, whereby when said level is reached steam will enter said tube and expand the same and operate to force said diaphragm against the end of the port and close the fuel passage way to the burner, substantially as set forth.

2. The combination with an oil burning boiler of a device for controlling the flow of liquid fuel to the burner thereof, comprising a thermostatically controlled oil chamber interposed in the fuel oil supply pipe, said oil chamber having a diaphragm which forms a floor for the said oil chamber and means operated by steam to actuate the diaphragm to cut off the oil supply when the water reaches a predetermined low water level in the boiler, substantially as set forth.

3. In combination with a boiler having a predetermined low water level a device for controlling the flow of liquid fuel to the burner thereof comprising a thermostatically controlled oil chamber interposed in the fuel oil supply pipe, said oil chamber having a diaphragm which forms a floor for the said oil chamber and an annular flange against which said diaphragm is adapted to seat, a head adjacent the diaphragm, and steam operated means for operating on the head when the predetermined low water level is reached for forcing the diaphragm against the annular flange to cut off the oil supply, substantially as set forth.

In witness whereof, I have hereunto set my hand and seal at Boston, Massachusetts, this 2nd day of September, A. D. nineteen hundred and nineteen.

PERRY H. GENTZEL. [L. s.]

Witness:

E. W. BRADFORD.