May 23, 1933. F. D. AUSTIN 1,910,945

SAFETY DEVICE FOR BOILERS

Filed May 16, 1929

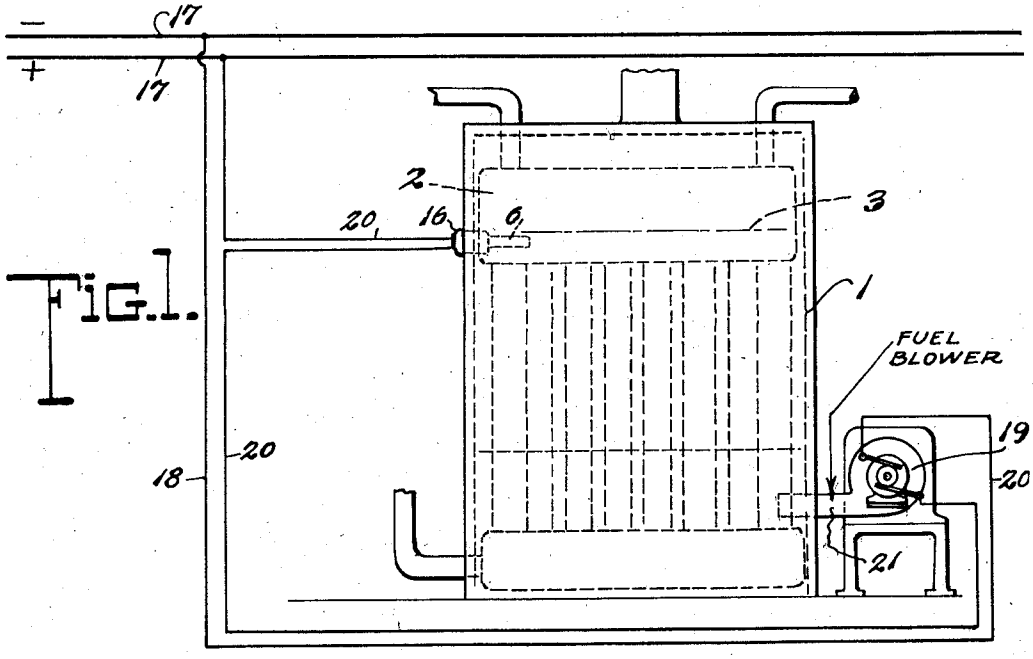


Fig. 1.

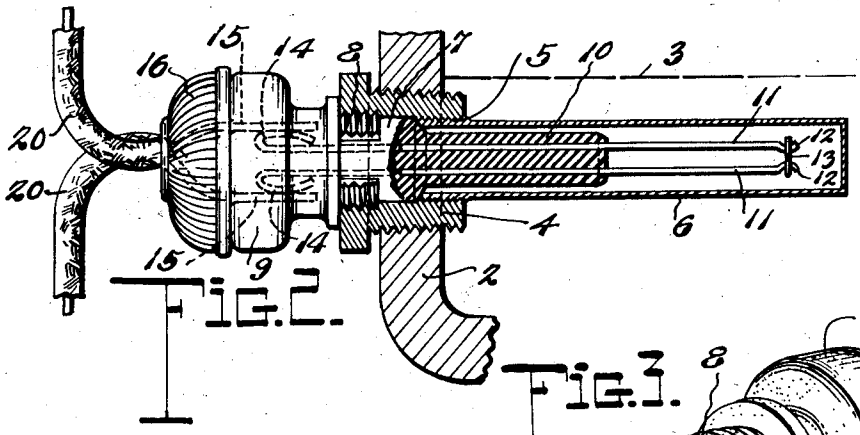


Fig. 2.

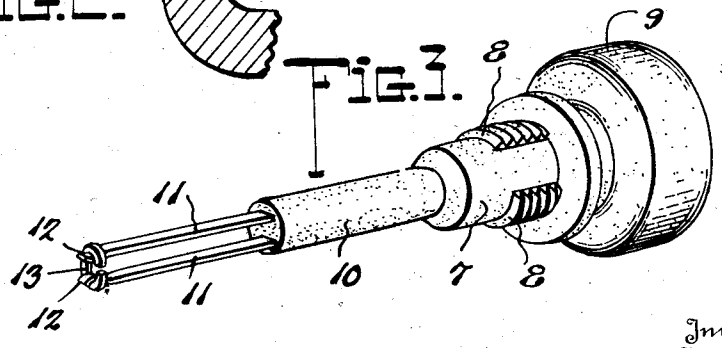


Fig. 3.

Inventor
Frederick D. Austin,
By Edgar M. Kitchin
His Attorney

Patented May 23, 1933 1,910,945

UNITED STATES PATENT OFFICE

FREDERICK DAVID AUSTIN, OF PORT CHESTER, NEW YORK, ASSIGNOR TO AMERICAN SAFETY BOILER CONTROL CORPORATION, OF PORT CHESTER, NEW YORK, A CORPORATION OF NEW YORK

SAFETY DEVICE FOR BOILERS

Application filed May 16, 1929. Serial No. 363,623.

This invention relates to improvements in signal apparatus, and more particularly to that type of signal apparatus designed for itself functioning to insure preservation of safety, and especially to apparatus for insuring against damage to a boiler or other heat transferrence apparatus incident to a too low water level.

The object in view is to stop the operation of the fuel feed for the combustion, and a more detailed object is the accomplishing of this result incident to the thermal action of steam or vapor exposed by the lowering of the water level.

A more detailed object is the provision of simple, efficient, quickly-detachable, and easily-replaceable means for effectively insuring opening the circuit of a fuel operating motor as soon as the water level drops to the minimum elevation of safety.

In still greater detail, the invention has as an object the thermic severance of the circuit line to such a motor when a portion of the circuit is exposed to the excessive heat incident to contact or near approach of vapor or steam with the lowering of the water level.

With these and further objects in view as will in part hereinafter become apparent and in part be stated, the invention comprises apparatus for use in combination with a fuel feeding motor circuit for interrupting the circuit incident to variaton due to a dangerous drop in water level.

The invention comprises certain other novel constructions, combinations, and arrangements of parts as will be hereinafter specified and subsequently pointed out in the appended claims.

In the accompanying drawing,—

Figure 1 is a diagrammatic view of a heating apparatus equipped with an embodiment of the present invention.

Figure 2 is an enlarged, detailed, fragmentary sectional elevation of the heating apparatus and safety device, parts being broken away for the saving of space.

Figure 3 is a detailed, perspective view of the fuse-carrying portion of the safety device detached.

Referring to the drawing by numerals, 1 indicates a heat transferrence apparatus or boiler of any appropriate type of construction having a minimum water level below which the supply of water should not be permitted to drop. The apparatus 1 includes a housing 2 forming a part of the containing capacity for water in which the minimum liquid level is indicated at 3.

A bushing 4 is threaded through the wall of the container 2 just below the plane of the level 3. Preferably detachably threaded, at 5, into the inner end portion of the bushing 4 is a sealed tube or cartridge 6. The cartridge 6 has its detachable engagement 5 with the bushing 4 in the form of a hermetically sealed joint, and the cartridge 6 is preferably of relatively thin sheet material, such as sheet copper, for facilitating heat penetration without allowing water or vapor to enter either the cartridge or the bushing 4.

Extending into and preferably appropriately detachably threaded to the bushing 4 is a plug 7 of electrical insulating material, such as hard rubber, Bakelite, or other appropriate material. For facilitating application and removal of the plug 7, the same may be provided with the breech-block threads 8 cooperating with similar threads within the bushing 4 for easy, quick, and effective assemblage and just as quick detachment. The outer portion of the plug 7 is preferably formed into an operating knob 9 to facilitate manual handling of the parts. The plug 7 is preferably provided with a reduced extension 10 projecting inwardly from the main body of the plug and extending along the cartridge 6 during operation to afford effective support for the circuit controlling plates or blades 11, 11. The blades 11 may be merely sections of flat wire, but are preferably somewhat resilient. The blades 11 are arranged to lie normally parallel and spaced apart and are extended throughout the length of the plug 7 and its extension 10, and are embedded therein so as to be thoroughly insulated and maintained out of contact with contiguous metal parts. The blades 11 project from the in-

ner end of extension 10 for an appropriate distance, and the extended portions are formed to be under a slight tension stressing the blades toward a still further separation, but not sufficient to cause either, when free, to reach a place of contact with the wall of the cartridge 6. The inner, free extremity of each blade 11 is preferably formed into a hook 12, the two hooks 12 facing in opposie directions, and the hooks being connected by a link 13. The link 13 is a fuse, but not particularly resistant to the current flowing through the blades 11, and the fuse 13. The fuse is a fuse in the sense of being thermal responsive, and is formed of soft lead or the like so that, when the temperature is sufficiently raised, the link 13 will melt and allow the blades 11, accordingly, to be free from electrical communication. As a matter of greater sensitiveness, the link 13 may be opened at one side, as indicated in the drawing, and thus leave but one side of the link to be broken down under heat action.

The outer end portions of the electrical leads or flat wires 11 are bent as indicated at 14, 14, in Figure 2, into spring folds or contact prongs for providing resilient contact for the usual parallel contact bars 15, 15 of an ordinary electric plug 16. It will be understood, of course, that the knob 9 is recessed to accommodate ready entry and removal of the contact bars 15 for closing the circuit through the blades 11 and fuse 13.

The circuit for the plug 16 includes any appropriate source of current, such as the lead wires 17, 17, from one of which extends a lead wire 18 to one of the brushes of a motor 19, the other brush of the motor being connected by lead wire 20 to the other lead wire 17 through the plug 16, so that, when the plug 16 is in position as seen in Figure 2 and the fuse 13 is intact, current will be supplied to the motor 19. The motor 19 actuates and thereby controls the fuel supply delivered through the blower 21 for providing the heat for the boiler or other heat transference apparatus 1. Obviously, the circuit for the motor 19 will be provided with the automatic controlling apparatus commonly employed in conjunction with such devices, though such apparatus would necessarily be located somewhere in the circuit 18—20. As such apparatus has no relation whatever to the present invention and the details thereof are well known, further reference thereto is unnecessary.

In operation, so long as the water level remains above the plane indicated at 3 or above the required established level, the motor 19 will be effectively supplied with current. However, just as soon as the water level drops too low and the heat of the contained steam or vapor begins to act upon the shell or cartridge 6, the temperature within such shell or cartridge rapidly rises beyond the melting point of the link 13. As soon as the link 13 is thus caused to melt, the blades 11 lose their electrical communication and the circuit 18—20 is thus broken, so that the dropping of the water level in the boiler or heat transference apparatus results in the automatic stopping of the motor 19, and consequently effects a cessation in the delivery of fuel. Thus, the danger of continued high temperature in the absence of the requisite water supply is entirely eliminated.

Furthermore, the means employed to accomplish this end are simple, inexpensive, and effective. As soon as the boiler 1 ceases to supply the heat or pressure required, the operator is bound to discover that the motor 19 has stopped running. All he needs to do is to pull out plug 16, grasp the knob 9, and give it a half turn, and, when free, pull out plug 7. Then he places a new link 13 on the hooks 12 in the position seen in Figure 3, and inserts the plug 7 back into place. Naturally, the operator will provide the required additional water before re-establishing the circuit of motor 19, and after renewing the link 13 as just described the circuit of motor 19 can readily be re-established by inserting the plug 16. If the operator should be so unwise or thoughtless as to re-establish the circuit of motor 19 without replenishing the water supply, his new fuse link 13 would soon give way with the rising of the temperature and no further harm would be done except that the operator would find it necessary to repeat the supplying of a new fuse link.

What I claim is:

1. In safety devices, a fuse plug for controlling fuel delivery to heat transference apparatus comprising an imperforate cartridge adapted to be detachably inserted in a boiler below the normal liquid level thereof, and a circuit-maintaining fuse within said cartridge and adapted to be introduced in the circuit of the fuel delivery motor of such boiler for breaking the circuit on fusing.

2. In safety devices a fuse plug comprising an imperforate shell adapted to be detachably mounted in a boiler, and a heat responsive fuse detachably carried within and electrically insulated from said shell, said fuse being adapted to be introduced in and form part of the circuit of a fuel delivery motor for maintaining the same closed until fused.

3. In safety devices, a fuse plug comprising an imperforate shell having means of detachable mounting in a boiler, an insulating bar extending into and detachably engaging said shell, electrical leads extending into said bar and spaced apart therein, and a heat responsive fuse connecting said leads

and adapted to fuse to sever electrical connection of said leads under predetermined high temperature, the said leads being adapted to be introduced in a motor circuit.

4. In safety devices a fuse plug comprising a shell having means of detachable mounting in a boiler, an insulating bar detachably engaging said shell, electrical leads extending into said bar and spaced apart therein, said leads extending beyond the bar and spaced apart within said shell, and being tensioned to tend to spring apart, and a heat responsive fuse electrically connecting and retaining said leads under tension.

5. In safety devices, the combination, with heat transference apparatus including a container for water to be heated, and a fuel delivery motor for said apparatus, of an imperforate shell extending into the water area of said container, and a heat-responsive fuse in the circuit of said motor located in said shell to be retained at a sufficiently low temperature to avoid fusing and thereby maintain the motor circuit while the shell is exposed to water, the fuse being sensitive and responsive to heat above the water level sufficient for fusing and breaking said circuit upon lowering of the water level to exposure of the shell.

6. In safety devices, a fuse plug comprising an imperforate shell having means of detachable mounting in a boiler, an insulating bar detachably extending into the shell, electrical leads extending into said bar and spaced apart, said leads extending beyond the bar and being spaced apart in said shell, and being tensioned to spring and move relative to each other when released, and a heat-responsive fuse electrically connecting and retaining said leads under such tension.

7. In safety devices, the combination, with heat transference apparatus including a container for water to be heated and a fuel delivery motor for said apparatus, of a heat-responsive fuse in the circuit of said motor, which fuse is located in the water area of the container in position for being exposed to the heat within the container when not submerged by the water therein, and means guarding the fuse against water contact.

8. The combination of a thermally responsive fuse member, a carrier for the fuse member, and an enclosing housing for the carrier and fuse member, the carrier having means of detachable connection to said housing, and the housing being adapted to be detachably connected to a unit whose heat is to be controlled by said fuse member.

9. In apparatus of the class described, the combination of a housing adapted to be detachably extended into the liquid area of heat transference apparatus, an insulating rod detachably inserted in said housing, spaced electrical leads carried by said rod and extending into said housing, each of said leads terminating at its outer portion in a contact prong within the insulating rod, the insulating rod being recessed for enabling the introduction of the prongs of an electric circuit plug into electrical contact with the prongs of said leads, and a heat responsive fuse connecting said leads within said housing.

In testimony whereof I affix my signature.

FREDERICK DAVID AUSTIN.