No. 850,751. PATENTED APR. 16, 1907.

W. S. G. HARRIS.

AUTOMATIC SAFETY DEVICE FOR BOILERS.

APPLICATION FILED NOV. 3, 1906.

Fig. 1.

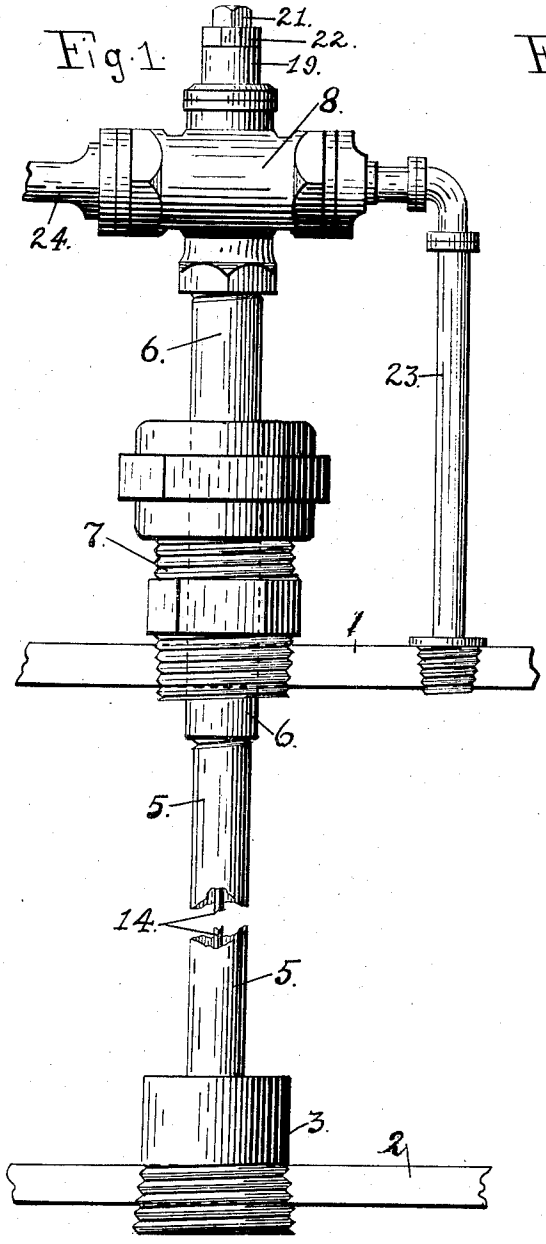
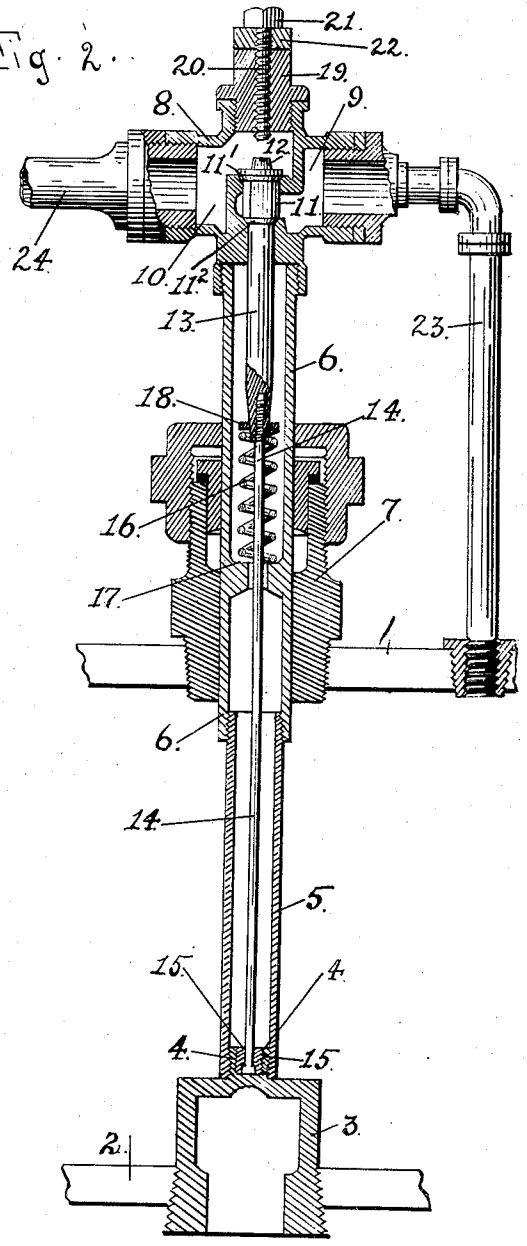


Fig. 2.



Witnesses.
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UNITED STATES PATENT OFFICE.

WARNER S. G. HARRIS, OF SAN LUIS OBISPO, CALIFORNIA.

AUTOMATIC SAFETY DEVICE FOR BOILERS.

No. 850,751. Specification of Letters Patent. Patented April 16, 1907.

Application filed November 3, 1906. Serial No. 341,855.

To all whom it may concern:

Be it known that I, WARNER S. G. HARRIS, a citizen of the United States, residing at San Luis Obispo, in the county of San Luis Obispo and State of California, have invented certain new and useful Improvements in Automatic Safety Devices for Boilers, of which the following is a specification.

My invention relates to that class of safety appliances for boilers in which low water or danger-level is indicated in some suitable manner by the release under undue heat of a valve-holding rod, whereby steam or water from the boiler is allowed to pass in order to secure whatever indication of the existing condition may be desired. Such indication may be in the nature of an alarm, as in my previous patent, No. 747,420, December 22, 1903, or it may be, as I now specially intend, the cessation of furnace heat caused either by stopping the supply of fuel, as where liquid fuel is used, or by putting out the furnace fire when solid fuel is used by water or steam from the boiler thrown upon it.

My present invention has for its object the provision of a simple safety device of the type mentioned, the construction of which is such as to make it easy to be put in place in the boiler or reset therein after use and capable of such adjustment and regulation as to make it practical under all the circumstances of its use.

To these ends my invention consists in the novel construction and combination of parts, which I shall hereinafter fully describe by reference to the accompanying drawings, in which—

Figure 1 is an elevation of my safety device, and Fig. 2 is a vertical section of the same, the parts being shown in a set position ready for use.

1 is the crown-plate of a boiler, and 2 is the crown-sheet of the furnace. These parts may be of the usual or any desired construction, as they form no part of the invention.

3 is a hollow plug which is tapped through the crown-sheet of the furnace and extends above said sheet an appreciable distance, so that its cavity rises well within the boiler-space, and said plug will thus have its top exposed above the water when said water has not reached its real danger-level, but is low enough to make the operation of the device desirable. The upper end or top of the hollow plug 3 has a nipple 4, which is both externally and internally threaded, as shown in Fig. 2. Screwed externally to the nipple 4 is a tube 5, which rises through the boiler nearly to the crown-plate 1. Screwed to the upper end of this tube is a connecting-tube 6, which passes through the crown-plate 1 in a suitable stuffing-box, (indicated by 7.)

Screwed upon the upper end of the connecting-tube 6 is the valve-body 8 of the ordinary differential type, said body having an inlet 9 and an outlet 10. In the body is seated the valve 11, having a head 12 and a stem 13. The stem 13 extends downwardly into the connecting-tube 6, and its lower end is tapered and provided with an internally-threaded socket which screws upon the upper end of a rod 14. This rod passes down through the connecting-tube 6 and into the tube 5 to its lower end. Screwed into the nipple 4 of the hollow plug 3 is a nut 15 of some suitable readily fusible material. In this fusible nut is secured the lower end of the rod 14.

Within the connecting-tube 6 is a spring 16, the lower end of which is seated upon a shoulder 17 in said tube, and the upper end is seated against a collar 18, fitted to the tapering end of the valve-stem 13. This spring is normally under compression, so that its tendency is to lift the valve 11 from its seat; but this it cannot do as long as the rod 14 is embedded in the fusible nut 15 below.

In the top of the valve-body 8 is screwed a cap 19, through which is threaded a set-screw 20, between the head 21 of which and the top of the cap is a lead nut 22, the purpose of which I shall presently explain.

Suitably tapped through the crown-plate 1 of the boiler is a steam-pipe 23, which is coupled to the inlet 9 of the valve-body. Suitably coupled to the outlet 10 of the valve-body is a pipe 24, which is to carry the steam or water to do whatever work it is intended to do. For example, it might lead the steam to a whistle, such as I have shown in my former patent above referred to, or, as I now intend, it may lead to a check-valve in the pipe which conducts the liquid fuel to the burner of the furnace in order to cause the steam to close said check-valve and cut off the supply of fuel, or, again, it may lead to a sprinkler in the furnace to enable the water it would then conduct to put out the fire in the furnace.

The valve 11 is a double-seated valve, its upper flange 11′ resting on an upper seat in the valve-body and its lower flange 11² rest-

ing on a lower seat. The valve-seat opening is round, while the sides of the valve are flattened or hexagonal, as shown in Fig. 2, so as to admit the steam-pressure from the boiler against the under side of the top flange 11'; but the steam is prevented by the lower seated flange 11² from passing downwardly into the protecting tubular casing and injuring the parts therein. Thus the boiler-pressure is always on the valve 11, with a tendency to lift it from its seat; but the valve cannot rise as long as the rod 14 is anchored in the fusible nut 16. This fusible anchor, though here shown as a nut, is not essentially of this form. It may be any kind of a fusible anchor.

Describing the device as one to check the supply of liquid fuel, the operation is as follows: When the level of the water in the boiler is low enough to expose the top of the plug 3, the furnace heat will melt the fusible anchor 15, thereby releasing the rod 14. Thereupon the boiler-pressure will lift the valve 11 from its seat. Steam will then pass from the boiler through pipe 23, past the open valve, and through the pipe 24 to operate the check-valve in the fuel-supply pipe, thereby cutting off the fuel and saving the boiler. The engineer being now aware of the condition and having remedied it must set the valve back to its seat to cut off the no-longer-needed steam-pressure. He does this by cutting out the lead nut 22 from under the head of the set-screw 20, whereupon by turning said screw down he can cause it to bear upon the head of the valve 11 and force said valve down to its seat and hold it there until such time as the whole device can be conveniently reset by putting in another fusible anchor below.

The object of the lead nut 22 is to prevent the engineer from tampering with the set-screw in order to throw the device out of use without detection. If he cuts the nut away, he must explain the necessity which impelled him to do so.

The object of the spring 16 is to effect the operation of lifting the valve in case there is no boiler-pressure—as, for example, if the furnace is fired up when there is little or no water in the boiler. In such a case as soon as the fusible anchor is melted and rod 14 thereby released the spring will throw the valve up.

From the described construction of the device it will be seen that it can be readily placed in the boiler and can be reset with facility. The plug 3, with the tubes 5 and 6 secured to it and the rod 14 anchored in it, is first placed in the furnace crown-sheet, with the tube 6 projecting up through the boiler-crown-plate. The stuffing-box is screwed to place and then the remaining parts are easily fitted in and upon the tube 6. The valve is dropped down into the valve-body and its socketed stem, with the collar 18 upon it, reaches down to the upper ends of the spring and rod. Now by turning the valve by means of an instrument, such as a screw-driver, applied to its head the stem of the valve screws upon the rod 14. Continued turning of the valve finally brings it down to its seat and forces the spring to compression, and both valve and spring are there held. Finally, the cap 19 is screwed into the top of the valve-body, and the device is ready for use when the steam-pipe connection is made.

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

1. An automatic safety device for boilers, comprising a hollow plug fitted through the crown-sheet of the furnace; a valve-holding rod passing from said plug through the boiler to its exterior; a readily-fusible anchor securing the lower end of the rod to the top of the plug; a valve-body having an inlet and an outlet; a valve therein controlling the passage through said body, and arranged to receive the fluid-pressure of the body-inlet under it, to lift it from its seat; a connection between said valve and the anchored holding-rod, to hold said valve down against said fluid-pressure; a suitable fluid-pressure connection with the inlet to said valve-body; and a delivery connection with the outlet of said valve-body.

2. An automatic safety device for boilers, comprising a hollow plug fitted through the crown-sheet of the furnace; a casing secured at its lower end to the top of said plug and extending upwardly through the crown-plate of the boiler to the exterior; a valve-body secured upon the upper end of said casing, having an inlet and an outlet, said body having an upper valve-seat and a lower valve-seat; a double-flanged valve fitted to said seats, to control the passage through the body, and arranged to receive the fluid-pressure of the body-inlet under its upper flange to lift said valve; a rod in the casing; a readily-fusible anchor securing the lower end of the rod to the hollow plug in the furnace crown-sheet; a connection between the upper end of the rod and the valve to hold said valve down against the fluid-pressure; a suitable fluid-pressure connection with the inlet to said valve-body; and a delivery connection with the outlet of said valve-body.

3. An automatic safety device for boilers, comprising a hollow plug fitted through the crown-sheet of the furnace; a valve-holding rod passing from said plug through the boiler to its exterior; a readily-fusible anchor securing the lower end of the rod to the top of the plug; a valve-body having an inlet and an outlet; a valve therein controlling the passage through said body, and arranged to receive the fluid-pressure of the body-inlet under it, to lift it from its seat; a connection between said valve and the anchored hold-

ing-rod, to hold said valve down against said fluid-pressure; a suitable fluid-pressure connection with the inlet to said valve-body; a delivery connection with the outlet of said valve-body; and a set-screw passing through the top of the valve-body, adapted to reset the valve against its lifting pressure.

4. An automatic safety device for boilers, comprising a hollow plug fitted through the crown-sheet of the furnace; a casing secured to the top of said plug, and tapped through the crown-plate of the boiler to the exterior; a valve-body secured upon the upper end of the casing, having an inlet and an outlet; a valve seated in said body to control the passage through it, and arranged to be lifted by fluid-pressure through the inlet; a stem of said valve extending downwardly into the casing; a rod to the upper end of which the valve-stem is secured; said rod extending downwardly in the casing to the hollow plug; a readily-fusible anchor securing the lower end of the rod to said plug whereby the valve is normally held down; a pipe connecting the inlet of the valve-body with the boiler; and a delivery-pipe from the outlet of said valve-body.

5. An automatic safety device for boilers, comprising a hollow plug fitted through the crown-sheet of the furnace; a casing secured to the top of said plug and tapped through the crown-plate of the boiler to the exterior; a valve-body secured on the upper end of the casing, having an inlet and an outlet; a valve seated in said body to control the passage through it, and arranged to be lifted by fluid-pressure through the inlet; a stem of said valve extending downwardly into the casing; a rod to the upper end of which the valve-stem is secured, said rod extending downwardly into the casing and to the hollow plug; a readily-fusible anchor securing the lower end of the rod to said plug, whereby the valve is normally held down; a spring in the casing tending to lift said valve; a pipe connecting the inlet of the valve-body with the boiler; and a delivery-pipe from the outlet of said valve-body.

6. An automatic safety device for boilers, comprising a hollow plug fitted to the crown-sheet of the furnace, and having a nipple on its top; a tube screwed to said nipple; a connecting-tube screwed to said nipple-tube and tapped through the crown-plate of the boiler to the exterior; a valve-body screwed to the connecting-tube and having an inlet and an outlet; a valve seated in said body to control the passage through it, and arranged to be lifted by fluid-pressure through the inlet; a stem of said valve extending downwardly into the connecting-tube; a rod upon the upper end of which the valve-stem is screwed, said rod extending downwardly to the nipple of the furnace-plug; a readily-fusible anchor securing the lower end of the rod to said plug-nipple; a spring in the connecting-tube tending to open the valve; a pipe connecting the inlet of the valve-body with the boiler; and a delivery-pipe from the outlet of said valve-body.

7. An automatic safety device for boilers, comprising a hollow plug fitted through the crown-sheet of the furnace, and having a nipple on its top; a tube screwed to said nipple; a connecting-tube screwed to said nipple-tube and tapped through the crown-plate of the boiler to the exterior; a valve-body screwed to the connecting-tube and having an inlet and an outlet; a valve seated in said body to control the passage through it, and arranged to be lifted by fluid-pressure through the inlet; a stem of said valve extending downwardly into the connecting-tube; a rod upon the upper end of which the valve-stem is screwed, said rod extending downwardly to the nipple of the furnace-plug; a readily-fusible anchor securing the lower end of the rod to said plug-nipple; a spring in the connecting-tube tending to open the valve; a set-screw passing through the top of the valve-body to reset the valve against the lifting pressure; a pipe connecting the inlet of the valve-body with the boiler; and a delivery-pipe from the outlet of said valve-body.

8. An automatic safety device for boilers, comprising a hollow plug fitted through the crown-sheet of the furnace; a casing secured to the top of said plug and tapped through the crown-plate of the boiler to the exterior; a valve-body secured to the top of the casing and having an inlet and an outlet; a valve seated in said body to control the passage through it and arranged to be lifted by fluid-pressure through the inlet; a stem of said valve extending downwardly into the casing; a rod to the upper end of which the valve-stem is secured, said rod extending downwardly to the furnace-plug; a readily-fusible anchor securing the lower end of the rod to said plug; a spring in the casing tending to open the valve; a set-screw passing through the top of the valve-body to reseat the valve; a lead nut under the head of the set-screw; a pipe connecting the inlet of the valve-body with the boiler; and a delivery-pipe from the outlet of said valve-body.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WARNER S. G. HARRIS.

Witnesses:
N. A. ACKER,
L. E. WILKINS.