G. E. WHITNEY.

SAFETY DEVICE AND INDICATOR FOR STEAM BOILERS.

APPLICATION FILED DEC. 11, 1899.

907,209. Patented Dec. 22, 1908.

Fig. 1.

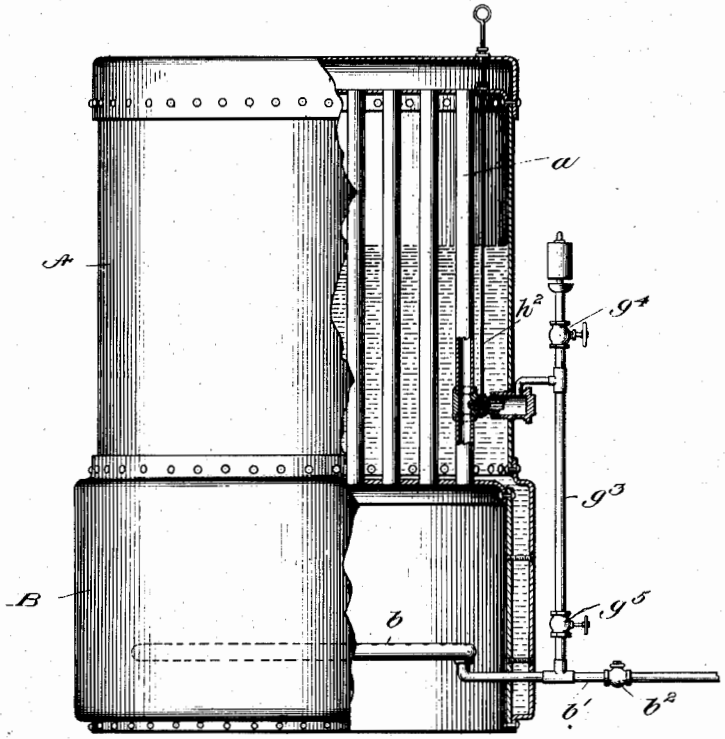


Fig. 2.

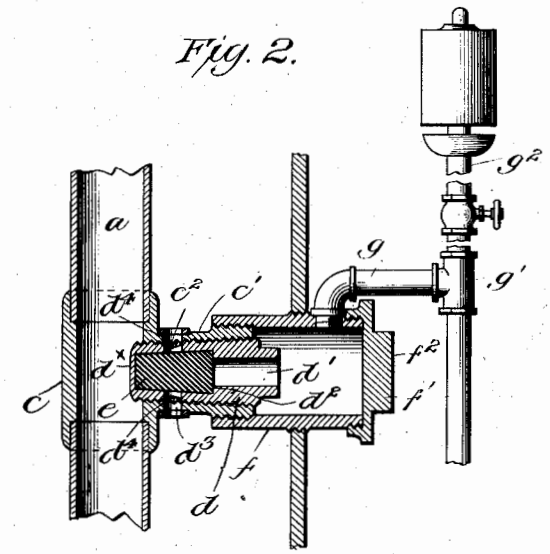
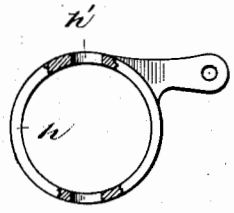


Fig. 3.



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UNITED STATES PATENT OFFICE

GEORGE E. WHITNEY, OF BOSTON, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO STANLEY MOTOR CARRIAGE COMPANY, A CORPORATION OF MASSACHUSETTS.

SAFETY DEVICE AND INDICATOR FOR STEAM-BOILERS.

No. 907,209. Specification of Letters Patent. Patented Dec. 22, 1908.

Application filed December 11, 1899. Serial No. 739,911.

To all whom it may concern:

Be it known that I, GEORGE E. WHITNEY, of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Safety Devices and Indicators for Steam-Boilers, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention has for its object to provide a novel and improved safety device and indicator for steam boilers or generators, the invention being particularly useful in connection with boilers that are used in motor vehicles and the like where frequently inexperienced persons are required to look after the boiler and keep it properly filled with water.

The aim of my invention is to provide a safety device, first that will indicate when the water level has dropped below the safety line; second, to combine such a device in a novel manner with the heating means employed for heating the water in the boiler, and third, to improve a device of this class in various other particulars, all as will be hereinafter described.

In the drawings, Figure 1 in elevation, partial section, shows a boiler equipped with a device in accordance with my invention, and Figs. 2 and 3, enlarged sectional details to be referred to.

Referring to the drawings, in the embodiment of my invention selected for illustration therein, A is an upright boiler of usual type, having tubes *a* beneath which is arranged a combustion chamber B containing suitable heating means, as the burner *b*, but so far as my invention is concerned the boiler may be otherwise constructed and heated by other suitable means if desired.

In carrying out my invention as herein disclosed, one of the tubes, for instance, a tube closely adjacent the barrel of the boiler, is severed, see Fig. 2, and a T-shaped fitting or seat *c* is brazed, welded or otherwise secured in position joining the ends of the separated parts of the said tube, said seat or fitting having a laterally extended neck-portion c'. This neck c' is interiorly threaded to receive the exterior threaded surface of the conical plug *d*, shown as closed at its inner end $d^{\times}$ where exposed to the intense heat of the products of combustion rising within the tube *a*. This plug *d* has drilled or otherwise formed within it a passage d', leading inwardly from the outer end of the plug and terminating adjacent the end $d^{\times}$ of the plug in a wedge-shaped or tapering chamber, which is run full of solder or material *e*, constituting one form of fusible plug, and the said fusible material or plug may be otherwise inserted if desired, it being held in place, as herein shown, by the shoulder d^2, surrounding the passage d' near the end of the fusible plug *e*. Lateral openings d^3 in the plug *d* are normally in register with perforations c^2 in the neck c' of the fitting *c*.

At a point in the shell or barrel of the boiler, axially in line with the axis of the plug *d*, is an interiorly threaded opening, into which is screwed the tube *f*, interiorly threaded at its inner end, so as to be screwed upon the exteriorly threaded end of the neck c', as shown best in Fig. 2. The outer end of this tube *f* is closed by a threaded cap f', or in any other suitable or desired manner, so long as the closure is provided with means, as the lug f^2, by which the closure may be readily unscrewed or removed to expose the chamber formed within the tube *f*. A branch pipe *g* leading outwardly preferably near the top of the chamber within the tube *f* is fitted with a T fitting g', with one side of which is connected the whistle g^2, constituting one form of audible alarm, and with the opposite side of which is connected a pipe g^3 that leads to the feed pipe b' of the burner *b*, Fig. 1. A valve g^4 in the pipe g', and a valve g^5 in the pipe g^3 provide means for positively controlling these pipes, as necessary.

The operation of the device thus far described is as follows: Assuming the boiler to be in normal operation, the water level is considerably above the fusible plug, as clearly indicated in Fig. 1, and when the plug and the fitting *c*, within which it is arranged, are buried in the water, as in Fig. 1, the water protection is such as to prevent fusing of the fusible plug *e* by the action of the heat of the products of combustion within the tube *a*. When, however, the water level by accident or otherwise falls below the level of the plug, the latter will be deprived of the protection theretofore furnished by the water and will fuse or melt under the excess or excessive temperature to which it is now subjected by the products of combustion within the tube, and will flow out through the passage d' into the chamber within the pipe *f*, thereby establishing a connection between

the steam space of the boiler through the openings c^2, d^3, and the passage d' into the said chamber, from whence the steam immediately passes through the pipe g to the whistle g^2, sounding an alarm thereat, and at the same time flows down through the pipe g^3 into the feed-pipe b' of the burner, thereby interrupting the continuous flow of the liquid fuel therethrough to the burner, and extinguishing the flame at the latter. A check valve b^3 in the feed pipe prevents the steam pressure reaching the supply tank from which the fuel supply is taken. Thus while the boiler is in use, if by lack of attention the water level is permitted to drop to or below the danger point, the fusing of the plug sounds an alarm, thereby indicating that the level is dangerously low, and at the same time extinguishes the flame that would otherwise continue to generate steam and drop the water level still lower.

Obviously, either the audible alarm or the cutting off of the fuel to the burner, may be used alone and without the other, the cutting off of the fuel as described constituting one means of controlling the heating means for the boiler. The plug having "blown" in this manner, the valves g^4 and g^5 may be closed, cutting off further escape of the steam, and the boiler filled and continued in use without replacing the fusible plug, since the steam escaping into the chamber f cannot escape into the boiler tube a and thence into the fire-box, because of the closed end of the outer plug d, the plug in this respect differing from any plug for insertion in boiler tubes heretofore known to me. By removing the closure f' access may be had to the chamber f to permit removal of the plug d and insertion of a new plug or to permit the refilling of the plug d with fusible material, so that the plug is in effect arranged within an accessible chamber that is accessible from the outside of the boiler to permit of convenient replacing of the plug, which would not be possible were the accessible chamber omitted. In case the steam within the boiler has not entirely escaped, and to prevent it escaping within the chamber f and outwardly therefrom during the insertion of a new plug, suitable means may be provided for closing temporarily one or the other of the apertures c^2, d^3. One form of means for this purpose is shown in the drawings, Figs. 1 and 3, the same consisting of a ring h encircling the neck c' of the fitting c, and provided with one or more perforations h' that register with the perforations c^2 when the ring is in one rotative position, but which are moved out of register with the said apertures and to close the latter when the ring is partially rotated. This ring may be rotated in suitable manner, as by a rod h^2, rising through a suitable stuffing box in the upper tube sheet of the boiler, as shown in Fig. 1. Thus when it is desired to replace the plug while steam is still in the boiler, the rod h^2 may be depressed, thereby closing the apertures c^2; the closure f' may then be removed and the plug replaced without any difficulty from escaping steam. After the new plug has been inserted, the ring h' is again rotated by raising the rod h^2 to close the apertures c^2 and leave the plug in condition for again indicating the danger level of the water.

Referring to Fig. 2, it will be noticed that the outer plug d' is grooved exteriorly and circumferentially at the point where the apertures d^3 are located, so that in case the operator in inserting a new plug does not turn the same so as to bring the apertures d^3 into exact register with the apertures c^2, steam entering through the latter may still reach the apertures in the plug by traveling around through the groove d^4. Thus it is possible to turn the plug into one or another of its different rotative positions and still have it perfectly operative. In the drawing the plug is shown in position with its apertures d^3 standing vertically, that is, in a vertical plane, the plug being so shown for the sake of clearness, but in practice I prefer to turn the plug into position with its apertures in a horizontal plane one with the other, and also I prefer that the apertures in the neck c' of the tube fitting, be also arranged horizontally instead of vertically, or at least to eliminate the aperture or apertures that lie below the horizontal diameter of the plug, so as to prevent the fused metal of the plug e from escaping through such apertures and forming a deposit at the bottom of the boiler.

While I have herein described my invention in one embodiment thereof, yet my said invention is not restricted to this embodiment alone, for obviously it may be varied within the spirit and scope of the invention here disclosed and set forth in the claims.

As far as I know I am the first to provide a fusible plug that is inserted in a boiler tube, as in this case, yet is inclosed within an outer shell or tube, that permits the plug to receive the full benefit of the heat within the tube, yet prevents any escape of liberated steam into the tube or the products of combustion out from the tube. I am also the first, so far as I am aware, to provide a fusible plug in connection with a boiler tube and arrange said plug in an accessible chamber, that is, a chamber accessible from the outside of the boiler, without opening up the steam space. I am also the first so far as I am aware to provide in connection with a safety device of the character described that is responsive to changes in heat and is normally protected by water within the boiler, an audible alarm and heat controlling means, or either of them.

Having described one embodiment of my

invention and without limiting myself as to detail what I claim and desire to secure by Letters Patent, is:—

1. A boiler having a crown sheet and fire tubes secured therein, one of said fire tubes being provided with an excess temperature indicating device, restrained from operation by the protective action of the water in said boiler, and normally accessible from the exterior of the boiler.

2. A boiler having a crown sheet and fire tubes secured therein, one of said fire tubes being provided at a point above the crown sheet with an excess temperature device normally restrained from operation by the protective action of the water in said boiler; and an alarm device connected with and operated by the action of said excess temperature device.

3. A vertical tubular boiler having a plurality of fire tubes one of which is provided with a safety fluid escape device responsive to the changes in temperature and arranged below the normal water level in the boiler, and an externally accessible chamber for said device at the side of said boiler.

4. A vertical tubular boiler having a plurality of fire tubes one of which is fitted with a fusible plug, and an externally accessible chamber furnishing access to said fusible plug at the side of said boiler.

5. A vertical tubular boiler one of the fire tubes whereof is fitted with a fusible plug, an externally accessible chamber furnishing access to said fusible plug, at the side of said boiler and an external closure for said chamber.

6. A vertical boiler one of the fire tubes of which is provided with an internally arranged excess heat indicating device, and a closed externally accessible chamber furnishing access to said device at the side of said boiler.

7. A tubular boiler having fire tubes, a cup-shaped, exteriorly threaded member screwed into one of the fire tubes and having its inner end closed, said member containing one or more perforations external to the tube, and a mass of fusible material within said member and normally closing the perforation or perforations therein.

8. The combination with a tubular steam boiler of a fusible plug arranged in connection with one of the tubes of said boiler, a chamber into which steam is discharged by the fusing of said plug, a liquid fuel burner to supply heat to said boiler, and a connection between said chamber and the feed for said burner, to operate as described.

9. The combination with a tubular steam boiler, of a fusible plug arranged in connection with one of the tubes of said boiler, a chamber into which steam is discharged upon fusing of said plug, a liquid fuel burner to supply heat to said boiler, a whistle, and connections between said chamber and said whistle and the feed for said burner, to operate substantially as described.

10. The combination with a tubular steam boiler, of a fusible plug arranged in connection with one of the tubes of said boiler, a chamber into which steam is discharged upon fusing of said plug, a liquid fuel burner to supply heat to said boiler, a whistle, and connections between said chamber and said whistle and the feed for said burner, and means controlling said connections and each of them.

11. The combination with a tubular steam boiler, of a fusible plug arranged in connection with one of the tubes of said boiler, a chamber into which steam is discharged upon fusing of said plug, a liquid fuel burner to supply heat to said boiler, a whistle, connections between said chamber and said whistle and the feed for said burner, and a check valve also in said burner feed but at the opposite side of said connection from said burner.

12. The combination with a steam boiler, of a fusible plug arranged therein so as to be acted upon by the heat from the products of combustion and normally cooled by the protective action of the water in said boiler, said plug containing one or more openings through which steam is discharged upon fusing of said plug, means providing access to said plug for renewal of the same, and means to stop escape of steam through said opening or openings while the plug is being replaced.

13. The combination with a tubular steam boiler, of a lateral tubular and perforated extension upon one of the tubes thereof, a fusible plug arranged in said extension, and normally closing the perforation or perforations thereof, and means to close said perforation or perforations to permit renewal of said plug.

14. The combination with a tubular steam boiler, of a lateral tubular and perforated extension upon one of the tubes thereof, a fusible plug arranged in said extension and normally closing the perforation or perforations thereof, and means accessible from the exterior of the boiler to close said perforation or perforations to permit renewal of said plug.

15. The combination with a tubular steam boiler, of a lateral tubular and perforated extension upon one of the tubes thereof, a fusible plug arranged in said extension and normally closing the perforation or perforations thereof, and a closing device surrounding said lateral perforated extension and operable from the exterior of the boiler to close said perforations, to permit renewal of said plug.

16. The combination with a tubular steam boiler, of a fusible plug connected with one of the fire tubes of said boiler and subject to the heat of the products of combustion pass-

ing therethrough, means to heat said boiler and connections between said fusible plug and heating means for rendering the latter inoperative for heating upon blowing of said plug.

17. The combination with a tubular steam boiler of a lateral tubular and perforated extension upon one of the tubes thereof, a fusible plug arranged in said extension and normally closing the perforatoin or perforations thereof by means of the fusible material within said plug and an exterior connection normally closing the perforations in said extension but adapted to uncover such perforations in different rotative positions.

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

GEORGE E. WHITNEY.

Witnesses:

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LAURA T. MANIX.