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LOW-WATER ALARM.

Application filed July 18, 1924. Serial No. 726,711.

This invention relates to low water alarms, and is in the nature of an improvement in low water alarms for steam boilers such as described and claimed in my prior application No. 701,598 filed March 24, 1924. The primary object is to provide a simpler, cheaper and better alarm.

The present invention in common with the above application has a tube leading from the steam space to a cage for a fusible metal plug which is located near the crown sheet. Another tube which is prevented from communicating with the first tube by the fusible metal plug leads from the cage to a steam operated signal. When the plug is melted or fused by reason of the water in the boiler receding to a dangerously low lever, the steam is released to the signal tube, giving the alarm. The primary distinguishing characteristic of the present invention is that the embodiment thereof is more simplified, and more easily manufactured and assembled.

An object is to provide an alarm which obviates the necessity for more than one opening in the boiler wall and which is so designed that only dry steam may enter the alarm passages.

A further object is to provide an alarm having the above characteristics in which the use of elbows and angularly disposed tubes is eliminated.

Other objects will become apparent in the further description of my invention which refers to the accompanying drawings. The essential characteristics will be summarized in the claims.

In the drawings Fig. 1 is a substantially central longitudinal section through the low water alarm, as held in place by the boiler roof and crown sheets; Fig. 2 is a transverse section through the combination packing sleeve and steam dome as indicated by the line 2—2 on Fig. 1; Fig. 3 is a transverse section as indicated by the line 3—3 on Fig. 1; Fig. 4 is a transverse section taken through the plug cage as indicated by the line 4—4 on Fig. 1.

In the earlier and more simplified forms of low water alarms, the cage wherein a fusible plug of metal was contained had perforations exteriorly thereof through which the steam in the boiler might enter the conduit leading from the cage to the signal whistle. This construction resulted in scale formation inside of the cage. By the present construction there is no chance of the boiler water even entering the interior of the alarm passages. The passage to the fusible plug is sealed from the passage of water regardless of how full the boiler may be. Subsequently provision was made for conducting only dry steam from the steam dome into the low water alarm.

I have found that the effect of a steam dome may be had by constructing the packing sleeve which supports the conduit leading from the fusible plug to the signal in such a manner that a chamber is formed therein. Projecting lugs within this chamber support an upwardly extending conduit leading from the fusible plug cage and provides for insuring an open passage for steam through the cavity and into this conduit.

In the drawings, 1 indicates a portion of the usual crown sheet of a steam boiler and 2 is a similar section of the boiler roof sheet. Threaded into the crown sheet from within the fire box, I prefer to provide a cage 3 which cage forms in part the subject of another application namely Serial No. 726,710 filed July 18, 1924, and consists of an exterior shell 6 provided with a closure plug 7 seated at 8 within the shell of the cage and secured therein by threads at 9. Passageway 12 communicates with an upwardly facing cavity in the closure plug and open into the enlarged lower end of a conduit 15. This conduit is secured to the cage as shown and extends above the roof sheet. Interiorly of the cage and disposed centrally of the passages, I prefer to provide a quantity of easily fusible metal 17 in a suitable plug 18 secured within the cage. This fusible metal 17 is coextensive only with the threaded portion of the plug member 18, that is, it is opposite the zone of engagement of the member carrying it and the cage, and thereby has no portion not subject to the most direct conductivity of heat brought thereto from the fire box.

A central upwardly extending pipe 20 within the conduit 15 communicates with the recess normally closed by the plug and is adapted to extend upwardly through the roof sheet of the boiler. A packing sleeve 25, gland 26 and gland nut 27 is provided to secure the pipe in the roof sheet and prevent the egress of steam exteriorly of the pipe. The pipe 20 carries at its outwardly projecting end a whistle 40. I prefer to mount the whistle in an elbow 41 which has
a conical dome 42 opposite the entrance of the pipe. The purpose of this dome is to entrap portions of the fusible metal when it is blown from its seat in the plug 18 upon the actuation of the alarm.

The sleeve 26 has angular faces 28 to facilitate its insertion and removal from the roof sheet. The upper end of the tube 15 extends upwardly into a cavity 29 in the lower portion of the sleeve and is held centrally of the cavity by a plurality of inwardly projecting lugs 30. Entrance for the steam is provided by the open spaces 31 between the lugs. At the top of the cavity I prefer to provide another series of inwardly projecting lugs which extend across the upper rim of the tube 15. The space 33 between these lugs provides a steam passage from the cavity to the tube 15 by preventing the tube from reaching the top of the recess 29. It is therefore impossible to inadvertently cut off the access of the steam from the boiler to the fusible plug when the alarm is secured to the boiler.

It will be seen that I have provided a low water alarm of extremely cheap construction, the parts of which may be easily removed and inspected after the alarm has operated. I have further simplified the construction of an exceedingly sensitive low water alarm and have provided for receiving steam from the steam space over the region of the fusible plug without the likelihood of conducting water therefrom. It will also be apparent that I have provided an alarm which requires drilling but one opening in the outer boiler wall, and which obviates the necessity for bent pipes and elbows.

By the arrangement shown, the entire steam passage to the alarm, is entirely free from water and the passage contains only dry steam, with the result that there will be no scale formation in any part of the passage. This is an important advantage because if scale formation occurred, it would very soon so completely close the passage as to prevent the required operation of the alarm.

Having thus described my invention, I claim:

1. In a low water alarm in combination a hollow member adapted to be secured to the roof sheet of a boiler and in open communication with the interior thereof, a tube projecting into said member and means for separating the exterior surfaces of the tube from the interior of said member to form a passage from the steam space to within the tube, said tube adapted to be secured to the crown sheet of the boiler and to said tube, said tube having a passageway leading to said tube, an upwardly extending pipe communicating with said passageway and extending through said member and adapted to communicate with a signal device, and a fusible plug of metal secured within said passage and normally closing communication between said tube and pipe.

2. In a low water alarm in combination a hollow member threaded into the roof sheet of a boiler, and having a longitudinal cavity located therein, inwardly, and downwardly extending projections carried by said member, a tube arranged to extend within the cavity and to be spaced apart from the interior of said cavity by said projections to provide a passageway from the interior of the boiler to the interior of the tube, said tube extending adjacent the crown sheet and substantially rigid therewith, a pipe adapted to communicate with the inner end of said tube and leading to an alarm device, and a plug of fusible material normally interrupting said communication and positioned to be fused by heat from the fire space when the water in the boiler recedes to a dangerously low level.

3. In a low water alarm, the combination of an alarm device, a passage leading therefrom to from the steam space and including two tubes, one within another, a member rigid with the tubes and secured to the crown sheet affording communication therebetwen, and a fusible plug carried thereby normally interrupting said communication, a member threaded into the roof sheet and having a cavity extending above the same loosely embracing the upper end of the outer tube with means for spacing the tube therefrom to insure steam passage through the cavity to the outer tube, said inner tube extending through said member to the alarm device.

4. In a low water alarm, the combination of a passage leading from the steam space to the alarm device including two tubes one within the other, a cage member threaded into an opening in the crown sheet and threaded to the lower end of both tubes and having a passage for providing communication therebetwen, a fusible member normally interrupting said passage, a hollow member threaded into an opening in the roof sheet and having a cavity surrounding and spaced apart from the upper end of the outer tube forming in effect a local steam dome communicating with the outer tube, the inner tube extending upwardly through said member and a packing gland carried by said member and sealing said hollow member against leakage of steam.

5. In a low water alarm in combination, a sleeve secured to the roof sheet of a boiler extending along the said sleeve, a tube projecting into said sleeve, means for maintaining the exterior surfaces of the tube in separated relation to the interior of the sleeve, whereby a steam space is formed above the roof sheet, means whereby the inner end of the tube is made substantially contiguous.
with the crown sheet of the boiler, an upwardly extending pipe leading from said means through said sleeve and adapted to communicate with said tube through the said means, said pipe substantially closing the upper end of said sleeve and adapted to communicate with a signal device, and a fusible metal plug located within said means and normally closing communication between the inner end of the tube and the inner end of the pipe, said means affording direct heat conductivity from the fire space to the plug to melt the plug when the water in the boiler recedes to a dangerously low level.

6. In a low water alarm, in combination, a crown sheet and a roof sheet, a pair of tubes extending through an opening in said roof sheet, a member secured to the crown sheet and supporting the inner ends of both tubes, said member having a passageway communicating with both tubes, a fusible element normally closing such communication, a hollow member secured in the opening in the roof sheet, surrounding one of said tubes and spaced apart therefrom for a substantial distance above the roof sheet to provide in effect a steam dome, means communicating between said steam dome and one of said tubes whereby steam may be led from the dome to the fusible plug, and an alarm device supported in communication with the other tube, whereby when the fusible material is melted by heat from the crown sheet, steam from the tube connected with the dome escapes through said other tube and actuates the alarm.

8. In a low water alarm in combination a hollow member threaded into the roof sheet of a boiler, and having a longitudinal cavity located therein, a tube arranged to extend within the cavity, members within the cavity arranged to separate the exterior surfaces of the tube from the interior of said cavity to provide a passageway from the interior of the boiler into the interior of the tube, said tube extending adjacent the crown sheet, a metallic connection between the tube and the crown sheet for conducting heat from the crown sheet to the tube, a pipe communicating with the inner end of said tube and leading to an alarm device, and a plug of fusible material normally interrupting said communication and adapted to be fused by heat from the fire space conducted thereto by said means when the water in the boiler recedes to a dangerously low level.

9. In a low water alarm, in combination a housing secured to the shell of a boiler and having a cavity extending a material distance above the shell, projections of said housing extending inwardly within the cavity, a tube positioned by said projections and extending to a point adjacent the crown sheet of the boiler and a second tube leading from a point near the crown sheet and within the first named tube and through the housing for communicating with a signal device, means connecting said tubes and adapted to establish communication between the inner ends thereof, a fusible plug normally interrupting said communication, whereby when the plug is fused, steam is admitted from the boiler through the cavity in the housing and to said last named tube to sound the alarm.

In testimony whereof, I hereunto affix my signature.

HERMAN B. THURSTON.