C. E. ROBISON.

HIGH AND LOW WATER ALARM FOR STEAM BOILERS.

APPLICATION FILED FEB. 16, 1911.

1,045,892.

Patented Dec. 3, 1912.

2 SHEETS—SHEET 1.

Fig. 1.

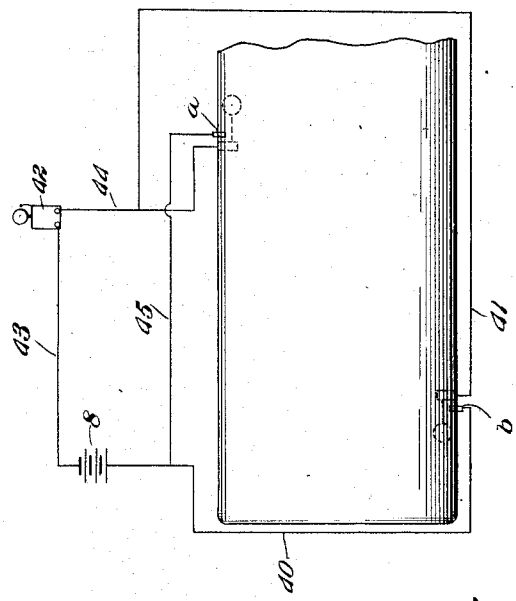
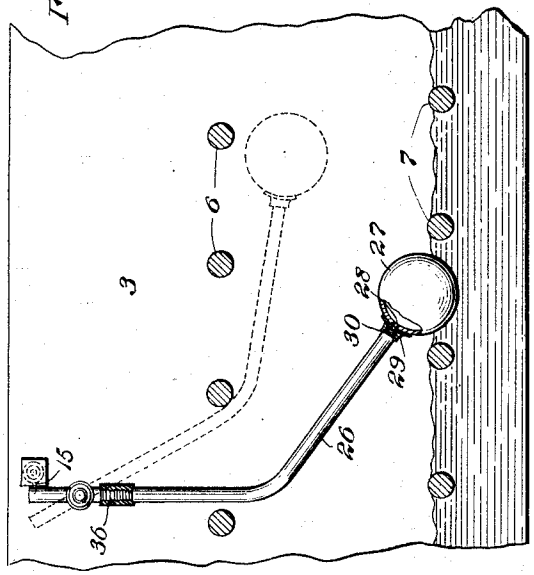


Fig. 2.



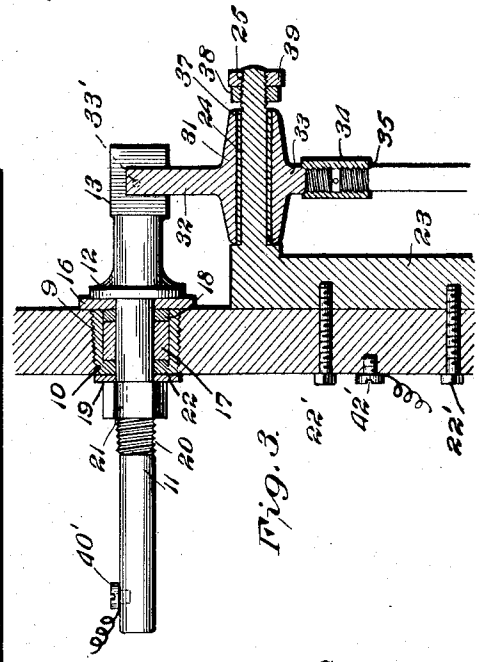


Fig. 3.

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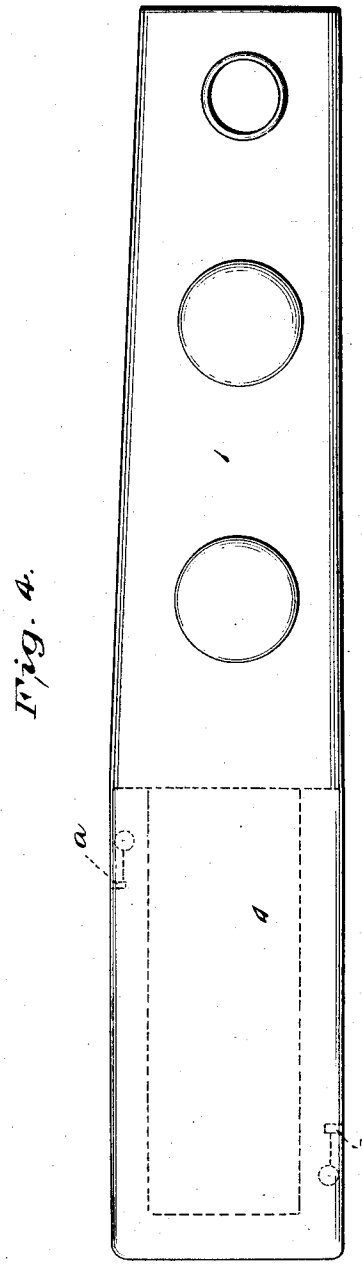

Fig. 4.

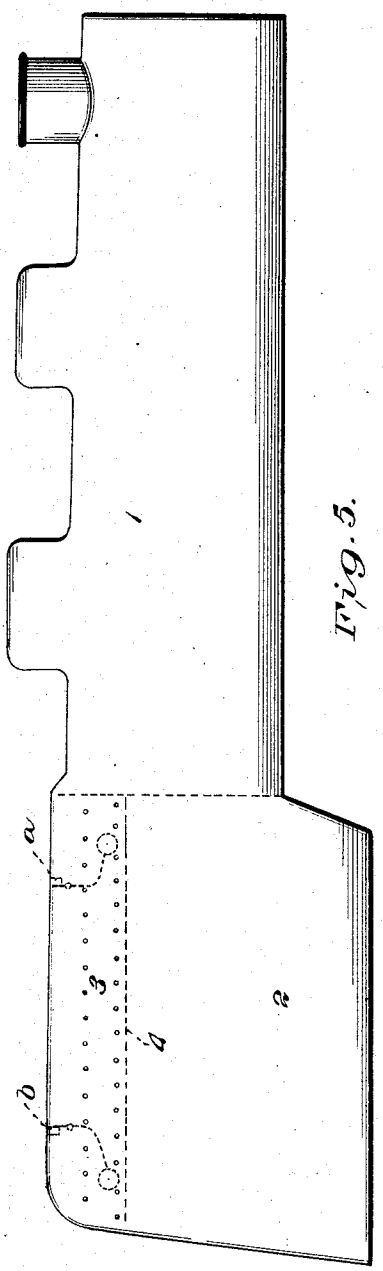

Fig. 5.

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HIGH AND LOW WATER ALARM FOR STEAM-BOILERS.

1,045,892. Specification of Letters Patent. Patented Dec. 3, 1912.

Application filed February 16, 1911. Serial No. 608,959.

To all whom it may concern:

Be it known that I, CHARLES E. ROBISON, a citizen of the United States, and resident of Harrisburg, Dauphin county, State of Pennsylvania, have invented certain new and useful Improvements in High and Low Water Alarms for Steam-Boilers, of which the following is a specification.

This invention relates to improvements in the class of signals or alarms which are employed for indicating certain water levels in liquid holding reservoirs.

The invention is intended for use with all classes of liquid holding reservoirs but is practically adapted for use with steam boilers and one of its objects is the provision of a circuit closer in the form of a float actuated by the water in the boiler to open and close an electric circuit and which is constructed to withstand the maximum steam pressure that may be generated in the boiler to which it is applied without decreasing the buoyant properties or the mass thereof.

Another object resides in the employment of a plurality of contact members and the arrangement of the same at the opposite end portions of the water space of the boiler of a locomotive or other traction device for the purpose of indicating to the attendant the height of the water column at either end of the boiler, so that when the engine is going up or down grade an alarm will be sounded if the surface of the water at the higher end of the boiler is below a certain point, whereupon the attendant will cause more water to run into the boiler and thus the danger of overheating the crown sheets and consequent explosion will be prevented.

These and other objects will appear and be better understood from the following description taken in connection with the accompanying drawings, in which,

Figure 1 is a diagrammatic view of the apparatus applied to the opposite end portions of the water chamber of a boiler; Fig. 2 is a detail longitudinal section taken through the water chamber of a traction boiler showing the device in side elevation; Fig. 3 is a detail end view of the device partly in section also showing one side of the boiler in vertical section; Figs. 4 and 5 are a plan and a side elevation respectively of a locomotive boiler showing the water chamber and the crown sheet in dotted lines and my device in operative position.

The boiler has the usual tube space 1, fire box 2, water chamber 3 and crown sheet 4 which divides the fire box 2 and water chamber 3. The sides of the water chamber are connected by upper and lower series of stay bolts 6 and 7.

Arranged exteriorly of the boiler and preferably located in the cab (not shown) is a source 8 of electricity. This electrical generator may be of any improved type but is herein shown to consist of a battery. Arranged at the opposite end portions of the water chamber of the boiler and located on either side and adjacent to the top thereof are what will subsequently be termed stationary contacts *a* and *b*. These contacts are insulated from the metal of the boiler and are connected with the source 8 in a manner to be presently described. Fig. 3 shows the means for securing and insulating the contact members from the boiler. In this connection it will be observed that a transverse opening 9 is formed in the side wall of the water chamber, the said opening 9 is interiorly screw threaded and receives an exteriorly screw threaded bushing 10. The bushing 10 is preferably of brass and corresponds in length approximately to the thickness of the side wall. The contact member comprises a cylindrical body portion 11 considerably greater in length than the thickness of the side wall and terminates at its inner end in an enlarged circular portion 12 which corresponds in diameter to the diameter of the bushing or approximately so. The circular portion 12 has an axial extension 13, the terminal portion of which is non-cylindrical in contour and provided with a platinum contact point 15. Arranged between the circular portion 12 and the inner surface of the side wall is a mica washer 16, and arranged in the bushing 10 is mica packing 17 which surrounds the body 11. Arranged at the opposite ends of the packing 17 and located at the opposite ends of the bushing is steam packing 18 and 19 of non-conductive material. The body 11 is screw threaded for a portion of its length, as shown at 20, the screw threaded portion being located outwardly from the portion of the body located in the bushing. A clamping nut 21 is screwed onto the threaded portion 20 and arranged between the inner face of the nut and outer face of the crown sheet is a mica washer 22.

Secured by studs 22′ on the inner surface of the boiler and below the inner end portion

of the contact member shown in Figs. 2 and 3, is a bracket comprising a vertical portion 23, the upper end of which terminates in a lateral extension 24, the outer end portion of which is screw threaded, as shown at 25. What will subsequently be termed the circuit closer comprises a tubular body portion 26 and a hollow spherical float 27. The float 27 is provided with a small inlet opening 28. An interiorly threaded socket 29 is secured to the outer surface of the float and surrounds the opening 28. One end portion of the arm 26 is exteriorly screw threaded, as shown at 30 and is screwed into the socket 29. The contact member is shown to include a hub portion 31 having oppositely extending arms 32 and 33 the former of which is provided with a platinum contact 33′ to bear on the contact 15. The arm 33 is exteriorly screw threaded and connection between the upper end of the arm 26 and arm 33 is established by means of an internally screw threaded sleeve 34, the opposite ends of which engage with the threads 35 at the upper end of the arm 26 and the threads of the arm 33. As shown in Figs. 2 and 3, a small space exists between the contiguous ends of the arms 33 and 26 and formed in the sleeve 34 and in alinement with the said space is an opening 36. The hub portion 31 is provided in its bore with a bushing 37 which loosely receives the extension 24 of the bracket. A nut 38 is screwed on to the threaded end portion 25 of the extension 24 and prevents lateral displacement of the hub, the nut 38 being locked against turning movement by a jam nut 39.

By reference to Fig. 2 it will be seen that the stationary contact member is located above the upper series 6 of the stay bolts and the pivotal support or extension 24 is likewise located above the upper series 6. The arm 26 extends downwardly and between two adjacent stay bolts of the upper series, and the lower end portion of the said arm is offset and out of vertical alinement with the pivotal support or extension 24 of the bracket.

The circuit from the source 8 extends by the conductor 40 to the outer end portion of the stationary contact member *b* located on the rear end portion of the boiler, as shown at 40′ in Fig. 3. A conductor 41 is grounded, as shown at 42′, on the exterior of the boiler and adjacent to the stationary contact member *b*. An electrically operated audible signal is herein shown to comprise a well known form of bell 42. One terminal of the coil in the bell is connected with the opposite terminal of the source by a conductor 43. The opposite terminal of the coil of the bell is grounded on the exterior of the boiler adjacent to the contact *a* by means of a conductor 44. The conductor 41 is connected to the conductor 44 and a similar connection is established between the stationary contact member *a* and the conductor 40, by means of the conductor 45.

When the contacts at the rear end portion of the boiler bear one upon the other, the circuit will be through the conductor 40, contact members 13 and 32, the boiler conductors 41 and 44, the bell 42 and conductor 43. When the contacts at the forward end portion of the water space of the boiler are in engagement, circuit will be with the conductors 40 and 45, contact member *a*, circuit closer, boiler, conductor 44, bell 42 and conductor 43.

With this construction it will be seen that when the engine is going down grade and the surface of the water with respect to the crown sheet is higher at the forward end thereof than at the rear if the water at the rear end is sufficiently low to endanger the crown sheet at the rear end, the circuit closer at the rear end portion of the boiler will close the circuit and the alarm will sound. So also will the circuit closer at the forward end portion of the water chamber close the circuit when the engine is going up hill. It is well known that most boilers explode while the engine is going up grade, because there is practically nothing employed at present to indicate to the operator the height of the water column at the forward end of the boiler, in fact at this time the conditions are very deceptive for the reason that the depth of the water at the rear end portion of the boiler is greater than at the forward end portion, whereby the water in the gage glass shows what would be considered a safe margin if the engine were on the horizontal.

In most locomotives and traction engines the average steam pressure carried while the engine is working would collapse the float 27 were not some means provided for equalizing the pressure on the outer and inner surfaces of the said float. For this reason I have employed the tubular arm 26 and also the inlet openings 28 and 36, whereby the steam from the boiler will pass through the opening 36, arm 26, opening 28 and into the float 27. Owing to the shape of the arm when the latter rises, the medial portion thereof will engage one of the bolts in the upper series 6 in time to prevent the float from engaging with one of the said stay bolts and thus avoid injury or denting the float.

It will be further observed if through negligence the water be permitted to flow into the boiler so as to substantially fill the same, the circuit will be closed when the surface of the water reaches the contacts before described.

Although I have shown and described the device as applied to a locomotive or traction

boiler, it must be understood however that I am not to be limited to this specific application since it can be readily seen that the device will operate equally as well with other types of boilers or in fact with any supply reservoir or vessel.

Having described my invention what I claim and desire to secure by Letters-Patent is,

1. In a device of the class described, the combination with a steam boiler, an electric circuit and an electrically operated signal connected in said circuit, of a contact member forming one terminal of said circuit and extending through one wall of the boiler and insulated therefrom, a buoyant circuit closer forming the opposite terminal of said circuit and including a tubular arm connected at one end to a hollow float and provided at its opposite end portion with a contact, said circuit closer being pivotally supported on the interior of the boiler and provided with an inlet opening for establishing communication between the interior of said boiler and float.

2. In a device of the class described, the combination with a traction boiler provided with a fire-box section, an electric circuit and an electrically operated signal connected in said circuit; of contact members connected in said circuit and arranged at the opposite end portions of said fire-box section, and pivotally mounted circuit closers arranged in said boiler and connected in said circuit, said circuit closers being movable to close the circuit by the liquid falling below a certan point in the boiler.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES EVARD ROBISON.

Witnesses:
GRACE ROBISON,
G. L. CULLMERRY.