

UNITED STATES PATENT OFFICE.

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LOW-WATER ALARM.

SPECIFICATION forming part of Letters Patent No. 663,128, dated December 4, 1900.

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To all whom it may concern:

Be it known that I, JAMES E. MCKAY, a citizen of the United States, residing at Detroit, in the county of Wayne, State of Michigan, have invented certain new and useful Improvements in Low-Water Alarms; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

This invention relates to low-water alarms for steam-boilers; and it consists in the construction and arrangement of parts hereinafter fully set forth, and pointed out particularly in the claims.

The object of the invention is to produce a low-water alarm of simple and inexpensive construction in which the arrangement is such as to insure a sounding of the alarm whenever the water in the boiler reaches a predetermined level or a point approaching the danger-line, a testing of the alarm without interfering with the water in the boiler, and a perfect and thorough cleaning of the expansion-tube to prevent the possible accumulation therein of anything to interfere with its perfect operation.

The above object is attained by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a general view, partly in section, showing my improved low-water alarm attached to the water-column of a steam-boiler. Fig. 2 is an enlarged sectional view through the lower end of the expansion-tube, the small interior tube standing centrally therein, the water-cock communicating with the lower end of said inner tube, and the pipe communicating with the normal water-space of the boiler.

Referring to the characters of reference, 1 designates a water-column carrying a water-glass 2. The opposite ends of the water-column communicate, as at 3 and 4, with the steam and water spaces, respectively, of the boiler 5, parts of which are broken away. Communicating with the water-column at a point below the normal water-level is a pipe 6, carrying upon the outer end thereof a coupling 7. The lower end of the expansion-tube

8 is secured in said coupling and communicates through said coupling with the pipe 6.

9 designates a bracket having a pipe-elbow 10 therein, which communicates with the steam-space of the boiler through the upper end of the water-column, to which it is attached, as at 11. Communicating with the elbow 10 is a vertical pipe 12, having a whistle 13 at its upper end and provided below said whistle with a valve-case 14, having a suitable valve for controlling the passage there-through whose stem 15 projects through said case. Pivoted to the bracket 9 is a bell-crank lever 16, whose free end projects vertically and is adapted to engage the stem 15 of said valve. The upper end of the expansion-tube is closed by a cap 17, having a projecting bracket 18, through which the threaded upper end of the connecting-rod 19 is adapted to pass and in which said rod is secured by the lock-nuts 20 and 21, which are screwed onto said rod and engage the opposite faces of said bracket, which arrangement not only locks the upper end of the rod securely in place, but enables it to be adjusted longitudinally for the purpose of regulating the throw of the lever 16, to which the lower end of said rod is pivoted at 22.

The outer end of the bracket 9 is apertured to freely receive the expansion-tube 8, which passes therethrough, and said bracket is supported at its outer extremity by means of the rod 23, whose upper end is adjustably secured therein by the jam-nuts 24. The lower end of said rod 23 is secured in a bracket 25, projecting from the coupling 7, and is locked therein by the nuts 26, which engage the opposite faces of said bracket.

Standing centrally within the expansion-tube 8 is a small tube 27, whose upper end terminates some distance below the cap 17 of said expansion-tube and whose lower end is screwed into and communicates with the passage 28, passing through the cock 29, which is in turn screwed into the lower end of the coupling 7 and is provided with a plug 30 for opening and closing the passage 28. Formed through the wall of the tube 27, near its lower end, is a small aperture 31 for purposes hereinafter described.

In the operation of this device the expansion-tube 8 remains filled with water, while

the water in the boiler remains at its normal level. The water in said tube not being in circulation with the water in the boiler becomes chilled and therefore does not act upon said tube to expand it. Should the water in the boiler fall to a point below the level of the pipe 6, the water occupying the expansion-tube 8 will flow therefrom through said pipe into the boiler and permit the steam from the boiler to take its place within the expansion-tube. The presence of the steam within said tube will cause it to expand longitudinally, thereby drawing upon the connecting-rod 19 and actuating the bell-crank lever 16 to open the valve controlling the passage through pipe 12, permitting the steam to flow through said pipe and blow the whistle 13, carried upon the upper end thereof. Upon a refilling of the boiler the water rises therein above the level of the pipe 6, cutting off the entrance of the steam thereto and allowing the steam which has filled the tube 8 to condense and said tube to again fill with water, whereby a contraction of said tube takes place and the lever 16 is actuated to permit the closing of the valve in pipe 12 and stop the blowing of the whistle.

Should it be desired to test the alarm or sound the whistle without disturbing the water-level of the boiler, it may be done by opening the plug-cock and causing a circulation of water through the tube 8, as the opening of the cock will cause the water to flow from the tube 27, whose upper end being open will draw the water out of the upper end of the tube 8 and will cause the water from the boiler to flow into said tube at its lower end, thereby maintaining a circulation of water in the tube 8 of the temperature of the water in the boiler, which will act upon said tube to expand it and sound the whistle, as before described. At the same time the circulation of the water through the outer and inner tubes serves to clean said tubes of all foreign matter and prevents the clogging thereof. The small aperture 31 through the inner tube 27 at its lower end is for the purpose of preventing a circulation of water in the expansion-tube 8 should the plug-cock leak, as the small amount of water likely to be discharged by the leaking of said cock will be supplied through said aperture 31, and thereby prevent a circulation of hot water throughout the tube 8 and an accidental sounding of the alarm. By attaching the inner tube to the plug-cock it may be removed with said cock and is thereby more readily inserted and withdrawn from the tube 8.

Instead of the whistle 13, as shown, any suitable alarm may be employed which may be actuated by the movement of the upper end of the lever 16.

Instead of connecting the tube 8 with a water-column it may be connected directly into the boiler, as may also the pipe 12, which communicates with the whistle, as will be well understood.

By employing the tie-rod 23, which connects the extended end of the bracket 9 with the lower end of the expansion-tube, said bracket is held against any upward movement when the tube expands and draws upon the rod 19, thereby obviating any lost motion through a yielding of the connected parts and making the device positive in its operation.

Having thus fully set forth my invention, what I claim is—

1. In a low-water alarm, the combination of a water-column communicating at its opposite ends with the steam and water spaces of the boiler respectively, an expansible tube standing adjacent to and communicating at its lower end with the normal water-space of said column, a second tube within said expansible tube and opening through the lower end thereof, a whistle communicating with the steam-space of said column, a valve to control said whistle, a bell-crank lever, one end of which is adapted to actuate said valve, a connecting-rod attached at its upper end to the upper end of said expansible tube and having its lower end pivoted to said lever.

2. In a low-water alarm, the combination of an expansible tube communicating at its lower end with the normal water-space of the boiler, a whistle communicating with the steam-space of the boiler, a valve to control said whistle, a lever adapted to actuate said valve, a coupling-rod connecting the upper end of said expansible tube to said lever, a second tube standing within and terminating at the upper end of said expansible tube, the lower end of the inner tube opening through the bottom of said expansible tube and a valve to control said opening.

3. In a low-water alarm, the combination of an expansible tube communicating with the normal water-space of the boiler, a second tube standing within said expansible tube terminating at the upper end of and having an opening through the lower end, an alarm, a lever adapted to actuate said alarm and a connecting-rod attached to the upper end of said expansible tube and to said lever.

4. In a low-water alarm, the combination of an expansible tube communicating at its lower end with the normal water-space of the boiler, a whistle communicating with the steam-space of the boiler, a valve to control said whistle, a fixed bracket, a lever adapted to actuate said valve fulcrumed on said bracket, a coupling-rod connecting the upper end of said expansible tube to said lever and a tie-rod connecting the bracket carrying said lever directly to the lower end of said expansible tube.

5. In a low-water alarm, the combination of a fixed bracket supporting a whistle which communicates with the steam-space of a boiler, a valve for controlling said whistle and a lever pivoted on said bracket and engaging the stem of said valve, an expansible tube communicating at its lower end with the normal water-space of the boiler and passing

freely through the outer end of said bracket,
a bracket extending from the lower end of
said expansible tube, a tie-rod extending from
said lower bracket to said upper bracket and
5 threaded at its ends in each and a connect-
ing-rod extending from the upper end of said
expansible tube to said valve-actuating lever.

In testimony whereof I sign this specifica-
tion in the presence of two witnesses.

JAMES E. MCKAY.

Witnesses:

E. S. WHEELER,
C. EDNA JOSLIN.