(No Model.)

D. C. WALTER.

LOW WATER ALARM.

No. 412,052. Patented Oct. 1, 1889.

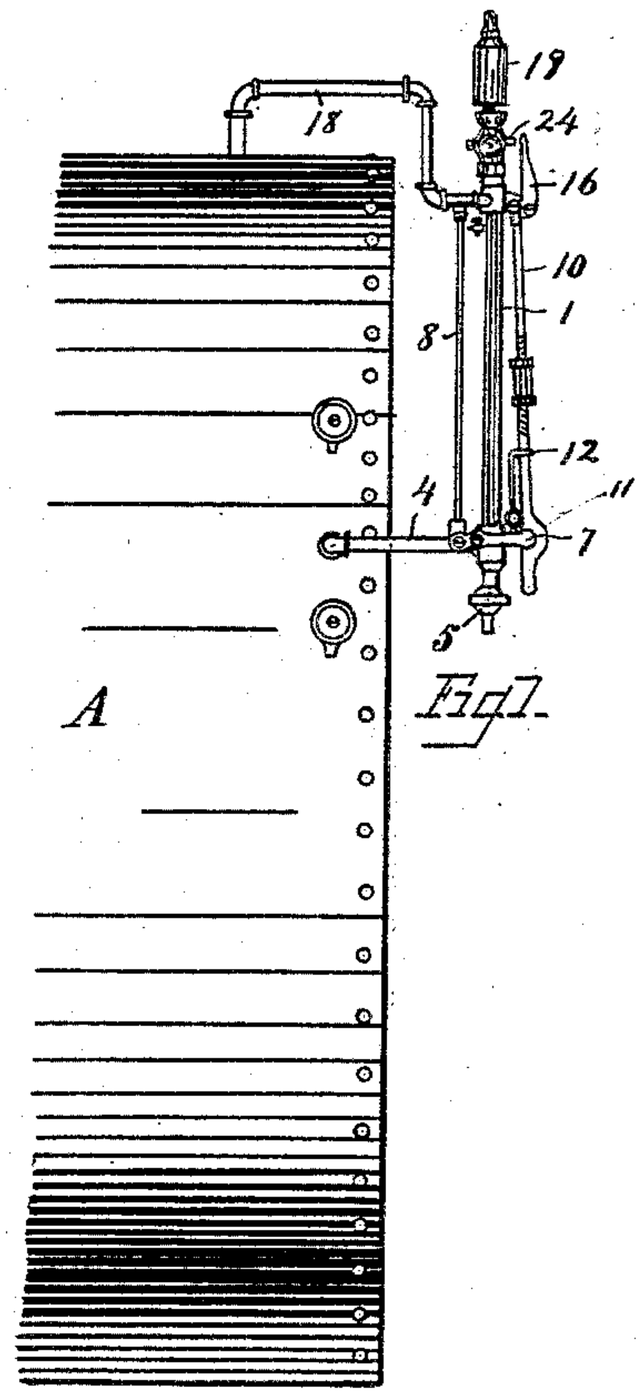

Fig 1.

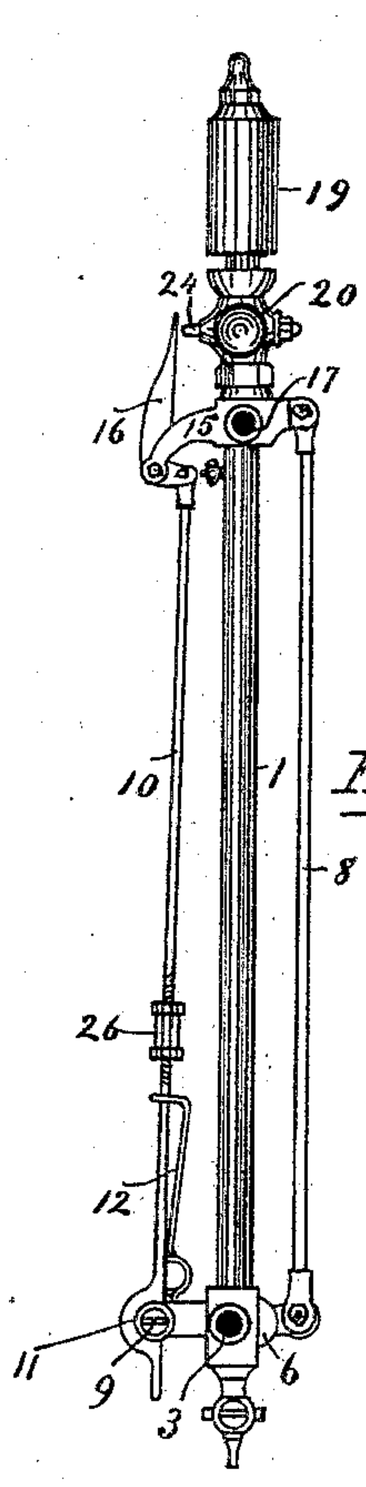

Fig 2.

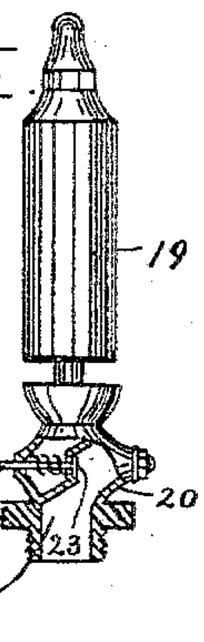

Fig 5.

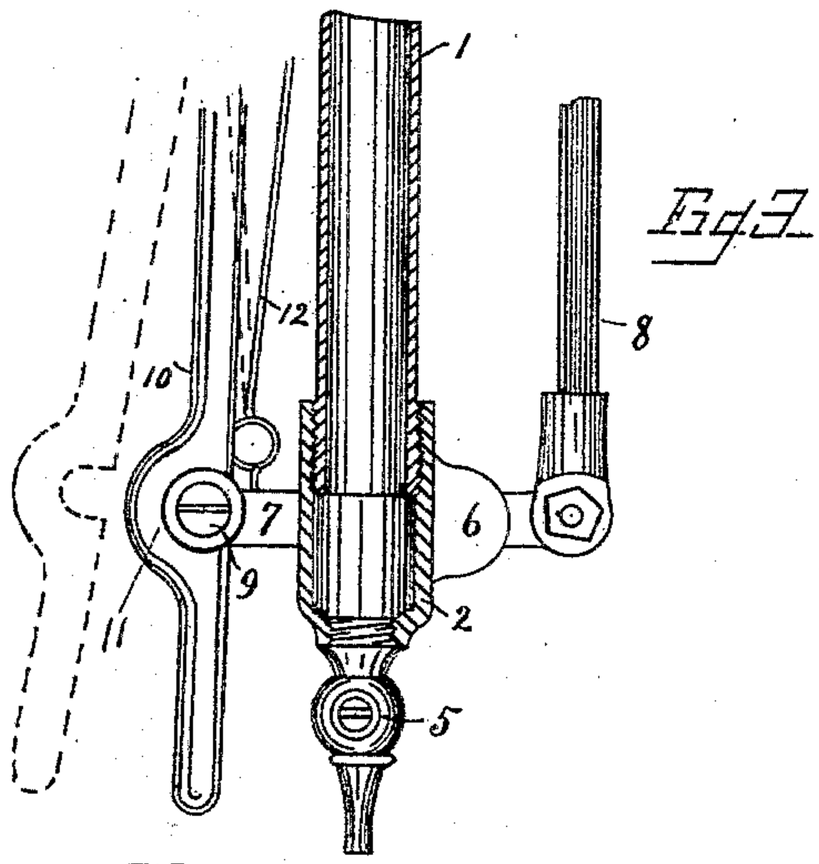

Fig 3.

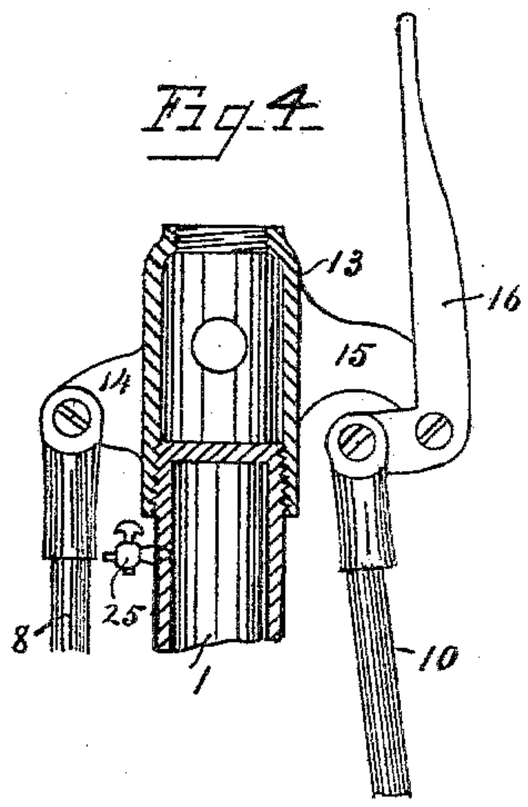

Fig 4.

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UNITED STATES PATENT OFFICE.

DAVID C. WALTER, OF TOLEDO, OHIO, ASSIGNOR OF TWO-THIRDS TO JAMES C. OTIS AND SAMUEL P. BOWLES, BOTH OF SAME PLACE.

LOW-WATER ALARM.

SPECIFICATION forming part of Letters Patent No. 412,052, dated October 1, 1889.

Application filed September 3, 1888. Serial No. 284,515. (No model.)

To all whom it may concern:

Be it known that I, DAVID C. WALTER, a citizen of the United States, residing at Toledo, in the county of Lucas and State of Ohio, have invented certain new and useful Improvements in Low-Water Alarms; and I do hereby declare that the following is a full, clear, and exact description of the invention, which 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 letters of reference marked thereon, which form part of this specification.

My invention relates to appliances for automatically sounding an alarm when the water-level falls below the safety-point, and more particularly such as utilize the expansion of metal as the means for sounding the alarm.

The objects of my invention are, first, to produce a low-water alarm in which all of the operative parts shall be completely isolated from the expansion-tube and thus be practically unaffected by expansion and contraction, and also readily accessible for repairs and manipulation when required.

A further object of my invention is to provide means for readily stopping the alarm after it is automatically sounded in such manner as to permit the device to automatically reset itself for future operation.

A still further object of my invention is to produce a low-water alarm of the expansion type which shall take dry steam directly from the boiler in order to sound the alarm, thus insuring a clear and distinct action of the same.

To the above purposes my invention consists in a low-water alarm composed of an expansion-tube connected at its lower end with the water-space of the boiler and carrying an alarm upon its upper end, and connecting-rods for operating the alarm, and in the provision of a detachable rod or lever for permitting the alarm-valve to be closed by hand, and so arranged as to set itself automatically when the tube has contracted in readiness for future action.

My invention further consists in certain peculiar and novel features of general construction and arrangement, all as hereinafter described and claimed.

In order that my invention may be fully understood, I will proceed to describe it with reference to the accompanying drawings, in which—

Figure 1 is a side elevation of my improved low-water alarm in operative position upon the end of a horizontal boiler. Fig. 2 is a rear elevation of the same detached from the boiler. Fig. 3 is a transverse vertical section of the lower end of the expansion-tube on an enlarged scale, showing the adjacent operative connections. Fig. 4 is a similar view of the upper end of the expansion-tube, showing the adjacent operative connections, and also the steam-space for supplying the alarm-whistle. Fig. 5 is a detached view of the alarm-whistle, the base of the same being partially broken away to show its internal construction.

In the said drawings, A designates a steam-boiler, which may be either of the horizontal type shown or of any other suitable or preferred kind.

1 designates a metal tube, (preferably brass,) which constitutes the main body portion of the device, and which is of any suitable preferred length and diameter. At its lower end this tube is threaded into a coupling 2, which is formed at one side with a socket 3 to receive one end of a pipe 4, the opposite end of which is preferably threaded into one of the gage-cock openings at or near the normal water-line, as shown in Fig. 1. The coupling 2 is also provided at its bottom with a pet-cock 5, for a purpose to be hereinafter explained, and at one side with a lug 6, extending horizontally from the coupling 2. Upon this lug 6 is pivoted a lever 7, to one end of which is pivotally connected the lower end of a rod 8. The lever 7 normally extends horizontally, and at its end opposite from the rod 8 is provided with a laterally-extending stud 9, which is engaged by a bend 11 in the lower part of the lever 10, for a purpose to be hereinafter explained, the lever 7 carrying a vertical spring 12, the upper end of which surrounds the rod 10 and draws the latter inward, so as to retain the bend 11 upon the stud 9.

The upper end of the expansion pipe or tube 1 is closed, as shown in Fig. 4, and is threaded into a collar or coupling 13. Upon one side of the coupling 13 is formed a lug 14, to which the upper end of lever 10 is pivoted,

and at the opposite side of said coupling is formed a lug 15, shown as curved slightly downward. Upon the outer end of this lug 15 is pivoted an L-shaped lever 16, the pivot passing through the angle of union of the two arms of said lever. The upper end of rod 10 is pivotally connected to the lower end of lever 16, and the upper end of the latter lies in close proximity to the stem of the whistle-valve, so as to operate upon the latter, as hereinafter explained. The coupling 13 is provided also at one side with the socket 17, to receive one end of a pipe 18, the opposite end of which is inserted into the boiler-shell, so as to communicate with the steam-space thereof.

19 designates the alarm-whistle, and 20 designates the valve-casing of the same, which is threaded at its lower end into the upper end of coupling 13. Within casing 20 is formed a diaphragm 22, in which valve 23 is set, the stem 24 of said valve extending out horizontally through the valve-casing in close proximity to the upper end of lever 16.

A petcock 25 is set in the upper part of expansion-tube 1, for a purpose to be hereinafter explained.

The lever 10 is formed in two sections, the contiguous ends of which are oppositely threaded and connected by a tension-nut 26, which serves to accurately regulate the length of lever 10 and thus render the device sufficiently sensitive for immediate and reliable action when required.

The operation of my improved low-water alarm is as follows: When the water in the boiler is at its normal level, it rises to a corresponding level in expansion-tube 1, and owing to the isolated position of the tube from the boiler the water in the tube is comparatively cold, or, in any event, not hot enough to effectively expand the tube. When the water-level in the boiler falls to the point of connection of pipe 4, steam rushes through said pipe and enters the expansion-tube 1. The heat of the steam expands tube 1 lengthwise and the elongation of the expansion-tube acts, through rod 8, to tilt the lever 7 at the lower end of the tube. As the lever 7 moves, its end contiguous to lever 10 is depressed and this lever is caused to draw down upon lever 16, pressing the upper end of said lever against the outer end of stem 24 of valve 23, thus opening said valve and sounding the whistle by steam from the boiler, the latter entering through pipe 18. Now, as soon as the attendant hears the alarm he can stop the same by moving the lower end of lever 10 outward, thus disengaging stud 9 from the bend 11 of lever 10. When lever 10 is released, the spring 12 will draw its lower end back, so that stud 9 will lie below bend 11. Now, as the tube contracts in length stud 9 will move upward and enter bend 11 again, thus automatically setting the alarm for future use. By opening petcock 25 before the device is first brought into operation air is allowed to escape from the upper part of tube 1, and the effective action of steam in said tube is insured. By opening petcock 5 all condensation will be allowed to flow readily out of the tube, thus insuring the proper action of the device.

It will be observed that steam for blowing the whistle is not taken from the expansion-tube 1, but directly from the dry-steam space of the boiler. This is a very important feature of my invention, as it insures a clear and distinct sounding of the alarm, which could not be relied upon were mixed water and steam from the expansion-tube used, as heretofore in this class of devices. Furthermore, it will be seen that the rod 8 and lever 10 are completely isolated from the tube, so that they are not affected by expansion and contraction, but retain their normal length at all times, thus insuring the prompt and effective action of expansion of the tube 1.

As a whole, the device is simple and durable in construction and reliable in operation, and comprises but few parts, which are simple in form and easily connected for operation.

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

1. In a low-water alarm, the combination, with an alarm-whistle, expansion-tube, and couplings at either end, of a cross bar or lever secured to the lower coupling, an elbow-lever pivoted to the upper coupling at one side and adapted to bear upon the valve-stem of the whistle, an extensible rod connecting said elbow-lever with one arm of the cross bar or lever, and a rigid rod connecting the upper coupling with the opposite arm of the cross bar or lever, substantially as shown and described.

2. In a low-water alarm, an expansion-tube carrying an alarm-signal, and a bar or rod pivotally connected with the signal, so as to bring the same into action when the tube is heated to expand longitudinally, said rod being detachably connected at one end with the expansion-tube and arranged to automatically connect therewith, substantially as and for the purposes set forth.

3. The combination, with the expansion-tube and a valve-operating lever secured to the upper end of said tube, of a lever at the lower end of the tube, a rod connected to said lever and to the upper end of the tube, a lever pivotally connected to the valve-operating lever and detachably engaging the lower lever, and a spring for automatically throwing the rod into engagement with the lower lever, substantially as and for the purpose specified.

In testimony that I claim the foregoing as my own I hereby affix my signature in presence of two witnesses.

DAVID C. WALTER.

Witnesses:
WILLIAM WEBSTER,
JNO. L. CONDRON.