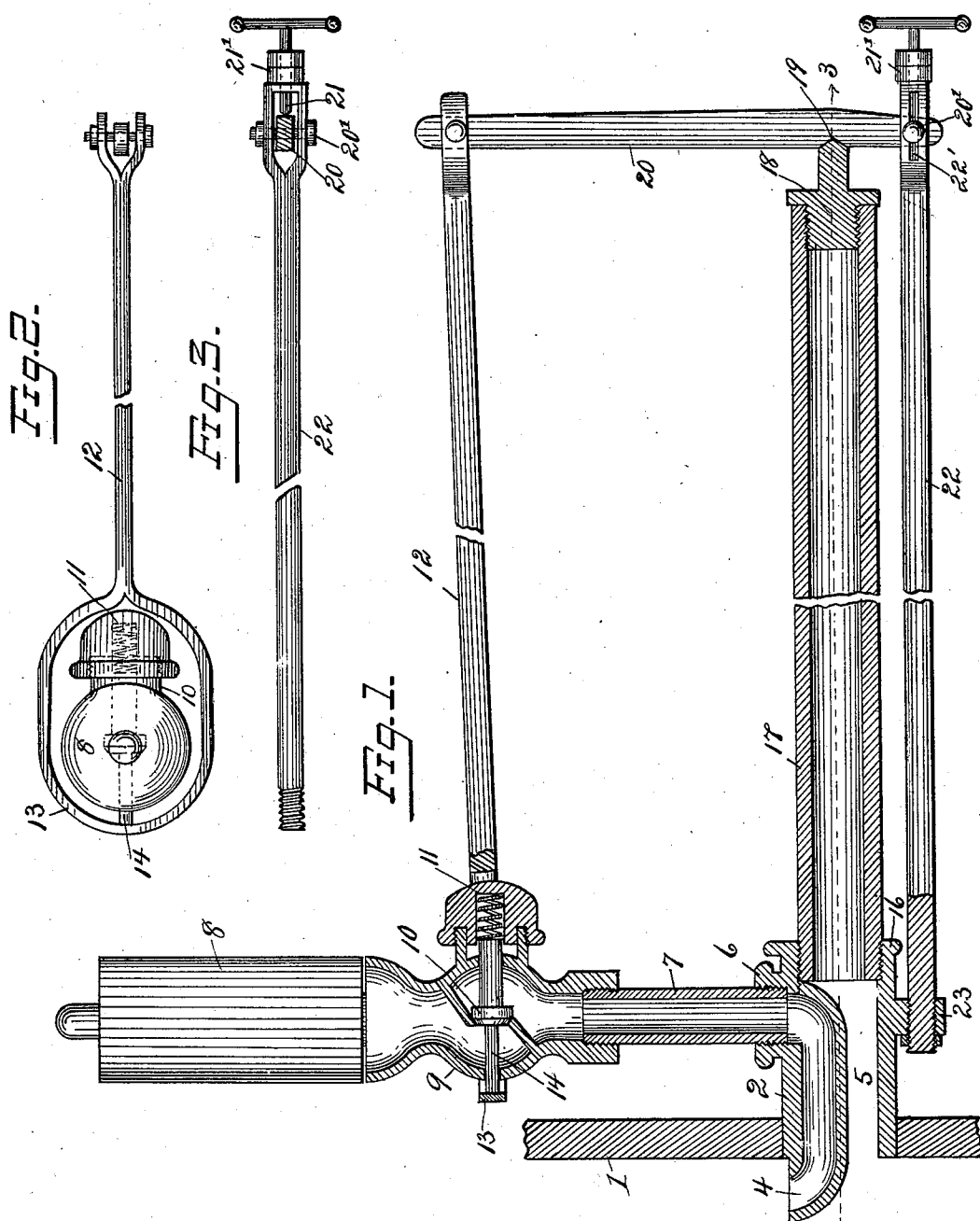


(No Model.)

J. W. EBERMAN.
LOW WATER ALARM.

No. 574,143.

Patented Dec. 29, 1896.



Witnesses.
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UNITED STATES PATENT OFFICE.

JOSEPH W. EBERMAN, OF CROTON-ON-THE-HUDSON, NEW YORK, ASSIGNOR
OF TWO-THIRDS TO LLEWELYN J. LEWIS AND EVELYN BELLEW, OF SAME
PLACE.

LOW-WATER ALARM.

SPECIFICATION forming part of Letters Patent No. 574,143, dated December 29, 1896.

Application filed June 11, 1896. Serial No. 595,143. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH W. EBERMAN, a resident of Croton-on-the-Hudson, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Low-Water Alarms; and I do hereby 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 pertains to make and use the same.

The invention relates to so-called "low-water alarms," and has for its object to increase the certainty and efficiency of their action; and the invention consists in the construction hereinafter described and particularly pointed out.

In the accompanying drawings, Figure 1 is a broken vertical section of the improved alarm and of a part of a wall of a boiler. Fig. 2 is a broken plan of a detail. Fig. 3 is a like view of another detail.

Numeral 1 indicates the wall of a boiler, and 2 denotes a nipple or hollow plug secured in said wall in any convenient manner and fitted steam-tight therein. It is situated in or near the plane of the predetermined low-water level, such level being indicated by broken line 3.

The nipple 2 has two passages 4 and 5 communicating with the interior of the boiler, one above and one below the said line of low-water level. The passage 4 may be curved upwardly at each end, as shown. This construction is preferred in order to avoid blowing off wet steam.

6 denotes a screw-threaded socket to receive a pipe 7, to which is coupled a steam-whistle or the alarm 8 by a valve-body 9, having a diaphragm provided with a valve-seat.

10 is a valve normally seated steam-tight in the opening in the diaphragm. Its stem is screw-threaded, whereby it is held in a screw-threaded socket 11, formed in the end of a connecting-rod 12.

13 denotes a ring or yoke connecting the rod 12, and a pin 14 bears on the valve and is adapted to push it off its seat in the diaphragm when said rod 12 is moved by the lever operated by an expansion-tube.

16 is a socket formed in the nipple 2 to receive an expansible tube 17, made of brass, iron, or other metal. This tube communi-

cates with the lower passage 5 of the nipple 2 and through it with the water-space of the boiler, so that it is normally filled with water up to the level of the bottom of the upper passage 4, the space above the water constituting an air-cushion. This tube is externally exposed to the atmosphere or to a low or comparatively cool temperature, and being filled to the level stated its contents remain quiescent and cool though steam be actively generated in the boiler. This tube 17 is closed steam-tight at its outer end by a solid plug 18, which has an extension 19, bearing against a lever 20. Said lever has a fulcrum consisting of a thumb-screw or "set-pin" 21, adjustable through the closed end of a forked rod 22, the opposite end of which rod is fixed to a stud 23 on the exterior of the hollow plug 2. Said screw 21 can be manipulated to regulate the movement of the lever. 21' denotes a jam-nut for the screw.

The arms of the fork are each provided with a transverse slot 22', in which is loosely fixed a pin 20', whereby lever 20 is connected to the rod. By this construction the lever is adjustably held between the set-pin 21 and the tube or plug extension 19 and can be easily regulated with great nicety to insure accurate control of the valve. The whole construction is adapted to act instantaneously and provides a perfectly automatic or self-acting alarm.

As water ordinarily fills the tube 17 to the level of the bottom of passage 4 steam cannot enter it until the water-level falls below the line indicated at 3. As soon as the water in the boiler falls to or below that line live steam enters the tube 17 and displaces its cool contents, with the effect to quickly heat and expand the tube. This action is practically instantaneous as a joint result of the horizontal situation of the tube, whereby its water contents can be expelled without obstructing the inflowing steam, and of the great difference between the temperature of the tube and its water contents and that of the live steam.

The above-described expansion of the tube and consequent movement of the lever and rod opens the valve, thereby allowing steam to operate the whistle or other alarm.

The advantages of the nipple and expan-

sion-tube combined, as specified, are not dependent upon the particular devices intermediate the tube and the valve; neither is the form of the valve or the specific structure of the alarm essential, nor the situation of the horizontal expansion-tube, and while the latter will act more quickly and will require less extent if the tube be exposed to the atmosphere or other cool medium, yet obviously it would act, though less efficiently, were said tube normally covered with boiling water. In any case if it be used in horizontal plane and combined with the nipple it will contain an air-cushion in its upper part and will be in situation to permit the instantaneous and unobstructed entrance of steam and consequent expulsion of water as soon as the water-level of the boiler falls below the bottom of the upper nipple-passage.

I am aware that vertically-disposed expansion-tubes have been applied to the tops of boilers and combined with whistles operated by the entrance of steam into the tube, and such device is not of my invention.

My improvement is characterized by the devices arranged and combined as herein set forth and hereinafter particularly pointed out, and especially by the construction which provides for the situation of the nipple and expansion-tube partly above and partly below the normal water-line, whereby the displacement of the comparatively cool contents of the tube is more quickly and certainly effected. The construction provides that the expansion-tube is more remote from the ascending hot-air currents and may be more accessible to the engineer. As the contents of the tube consist of water and air the entering steam acts more quickly on the lighter elastic mechanism, and for this reason, and because of the smaller specific gravity of the steam as compared with the water, it instantly fills the upper part of the tube and expels the water, the steam entering and water escaping at different levels. The filling of the tube with steam is more speedy and also more complete than under the vertical disposition of the tube heretofore made, in which, without a vent, the air is compressed and cannot be instantaneously and thoroughly expelled as by my improvement, which provides a path of escape for the air in the wake of the water, which latter easily underruns the entering steam, and the latter does not meet the opposition incident to a vertical tube entirely filled with air.

Having thus described my invention, what I claim is—

1. The combination of the boiler, the horizontal nipple attached to a vertical boiler-wall and having upper and lower passages, the upper passage adapted to communicate with a steam-operated alarm, and the lower communicating with a horizontal expanding valve-controlling tube, said tube having a part of its interior above the lower passage,

a valve adapted to open and close a steam-conduit leading to the alarm and devices connecting the tube and the valve whereby the latter is operated by the expansion of the tube, substantially as described.

2. The combination of the boiler, the horizontal nipple having upper and lower passages, the first adapted to communicate with a steam-operated alarm, and the latter communicating with a horizontal expanding valve-controlling tube, said tube having a part of its interior above the lower nipple-passage, a valve adapted to open and close a steam-conduit leading to the alarm and devices connecting the tube and the valve, whereby the latter is operated by the expansion of the tube, said connecting devices comprising a rod connected to the valve, a lever joined to said rod, a plug or like projection whereby the tube bears loosely on the lever, and a fulcrum for said lever, substantially as described.

3. The combination of the boiler, the horizontal nipple having upper and lower passages, the first adapted to communicate with a steam-operated alarm, and having its inlet end turned upwardly to avoid entrance of foam or wet steam, and the latter communicating with a horizontal expanding valve-controlling tube, said tube having a part of its interior above the lower nipple-passage, a valve adapted to open and close a steam-conduit leading to the alarm and devices connecting the tube and the valve, whereby the latter is operated by the expansion of the tube, said connecting devices comprising a rod connected to the valve, a lever joined to said rod, a plug or like projection whereby the tube bears loosely on the lever, and a fulcrum for said lever, substantially as described.

4. The combination of the boiler, the horizontal nipple having upper and lower passages, the first adapted to communicate with a steam-operated alarm, and the latter communicating with a horizontal expanding valve-controlling tube, said tube having a part of its interior above the lower nipple-passage, a valve adapted to open and close a steam-conduit leading to the alarm and devices connecting the tube and the valve, whereby the latter is operated by the expansion of the tube, said connecting devices comprising a rod connected to the valve, a lever joined to said rod, a plug or like projection whereby the tube bears loosely on the lever, and a fulcrum for said lever, said fulcrum being adjustable and situated at the end of the lever, substantially as described.

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

JOSEPH W. EBERMAN.

Witnesses:

WM. E. BARLOW,
PHILLIP CASSIDY.