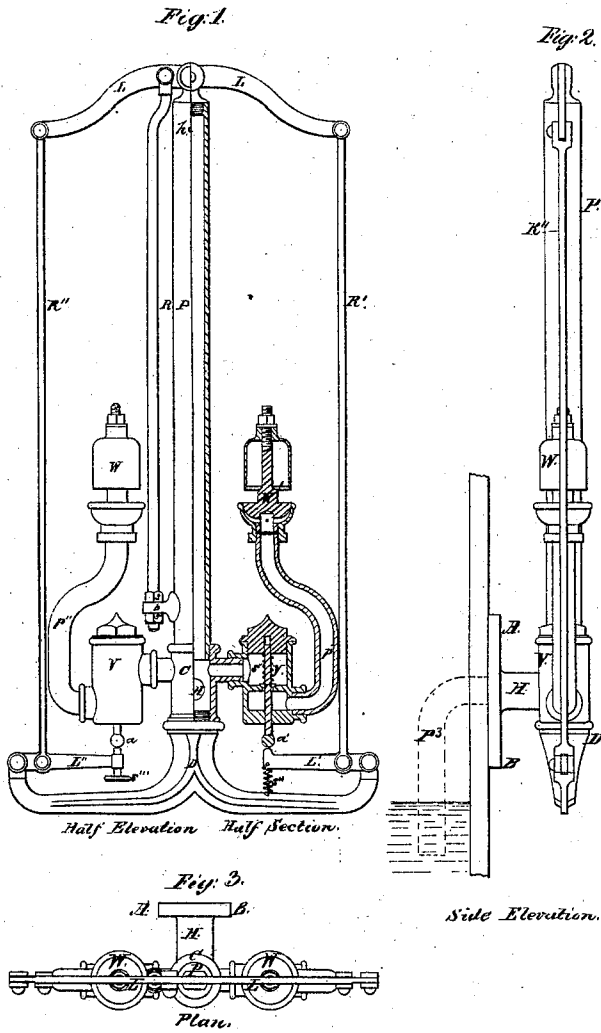


D. M. Greene,
Steam-Boiler Indicator.

Patented Oct. 22, 1867.



Inventor:

by Dodge & Munn,
Attorneys

United States Patent Office.

D. M. GREENE, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR TO
MARIA N. GREENE, OF SAME PLACE.

Letters Patent No. 70,086, dated October 22, 1867.

IMPROVEMENT IN STEAM-GENERATOR INDICATORS.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, D. M. GREENE, of Washington, in the county of Washington, and District of Columbia, have invented certain new and useful Improvements in Indicators for Steam-Boilers; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification, and to the letters of reference marked thereon; like letters indicating like parts wherever they occur.

To enable others skilled in the art to construct and use my invention, I will proceed to describe it.

My invention consists of an apparatus so constructed that when attached to a steam-boiler the temperature of the steam shall cause an alarm to sound whenever the pressure exceeds a certain degree, and which shall also sound a similar alarm whenever the pressure falls below a certain other specified degree, and which may also be made to serve as a low-water indicator for the boiler.

Figure 1 is a front elevation shown partially in section,

Figure 2 is a side elevation, and

Figure 3 a top plan view.

The object of my invention is to produce an instrument that can be attached to the exterior of a steam-boiler, and sound an alarm whenever the pressure of the steam rises above the required degree, or falls below a certain other specified degree, and thus to keep the pressure at all times within certain specified limits, the instrument being made adjustable to adapt it to varying degrees of pressure, as may be required in different cases, or which, instead of indicating the high and low degrees of pressure, may be used to indicate the high pressure, and at the same time act as a low-water indicator. It is a well-established fact that the pressure of steam increases with an increase of its temperature, and it is upon the application of this principle that my instrument depends for its operation.

I provide a tube, P, which I connect with the boiler by a short tube, H, having a flange, A B, for bolting it to the boiler, as represented in figs. 2 and 3. The lower end of the tube P is closed, and terminates in a solid portion, D, which is divided into two lateral arms or brackets, as shown in fig. 1. From opposite sides of the tube P, near its bottom, project short tubes leading to valve-chambers V and V', from which rise tubes P' and P'', upon each of which is mounted a steam-whistle, W and W', as represented in fig. 1. From the side of the steam-tube P a stud, b, projects, to which is secured a vertical rod, R, the upper end of which is pivoted to a lever, L, said lever being pivoted at its centre to the top of the steam-tube P, as shown clearly in fig. 1. To the outer ends of this lever L are pivoted rods R' and R'', the lower ends of which are pivoted to the levers L' and L'', said levers being pivoted to the extremities of the arms or brackets D, and having their inner ends (one or both) provided with set-screws, arranged to press on the valve-stems *a* and *a'*, when the levers are moved, as hereinafter described.

The instrument being thus constructed and applied to the boiler, the operation is as follows: The steam as it is raised in the boiler enters the pipe or tube P, which is thereby heated in proportion to the temperature of the steam. And to keep the tube at this corresponding temperature, and prevent it from becoming cooled by a condensation of the steam in its upper part, a small orifice, *h*, is provided near its upper end, as shown in fig. 1, from which a very small jet of steam is allowed to escape, so as to keep up a current of steam in the tube P. When the steam has been raised to the desired pressure the rod R is adjusted by means of the nuts *s s'*, so as to draw the lever L' up in contact with the projecting end of the valve-stem *a'*, this being the pressure above which it is intended the steam shall not be allowed to go to any great extent. The steam is then allowed to fall to the lowest point at which it is intended to have it go, and the set-screw *s''* in the end of lever L'' is so adjusted as to bring it in contact with the end of the valve-stem *a*, the degrees of pressure, both high and low, of course, being optional, as is also the range between these limits, either or both being changed, as may be desired, to suit the circumstances of the case. This being done, the instrument may be considered adjusted, ready for operation. Now, as steam enters the tube P and increases its temperature, it will be expanded, thereby, of course, increasing its length; and as this expansion continues with the increase of temperature and pressure, and as the rod R, being insulated and unaffected by the steam, is not expanded like the tube P, it follows that

the right-hand arm of lever L will be elevated by the expansion of the tube P, and as it moves will also elevate the lever L', by means of the connecting-rod R', and thereby open the valve v, thus permitting the steam to flow through pipe P', and at once sound an alarm by blowing the whistle W', as soon as the steam has risen above the pressure at which the instrument had been previously adjusted, as described. On the other hand, as the pressure and temperature decrease the tube P contracts, thereby elevating the left-hand arm of lever L, and by means of the connecting-rod R'' raises the lever L'', thereby opening the valve in the valve-chamber V, thus permitting the steam to flow through pipe P'', and sounding an alarm by blowing the whistle W. In this way the instrument operates as a differential pressure alarm or indicator, and automatically notifies the attendant whenever the pressure exceeds or falls below the required degree.

As, however, the falling of the pressure below the designated point is not attended with any special danger, and is not, therefore, of so much importance, this feature may be dispensed with, and this part of the instrument be converted into a low-water indicator by providing it with a separate steam-tube, P, and rod R, and connecting the levers to them, so as to operate independent of the high-pressure alarm. In such case a pipe, P³, will enter the boiler and have its mouth immersed in the water, as represented in fig. 2. Whenever the water in the boiler is so lowered as to uncover the mouth of the pipe P³, the steam will pass through it up into the tube P, and by heating and expanding it will open the valve in the chamber V, and sound an alarm by blowing the whistle W, as previously described, and thus the instrument becomes a high steam-pressure indicator, and also a low-water indicator. It is obvious that in such case the two parts will operate independently, and may be made and applied separately; but, for the purpose of making it more symmetrical and convenient of construction and application, I prefer to make it in the manner described.

It may be desirable to form the working-joints of the levers on the knife-edge plan, as is done in scales and similar machines, to permit of their working with greater freedom and accuracy. This construction of an indicator adds greatly to the safety of steam-boilers, by indicating danger from excess of steam pressure, and is important as an indicator of an insufficiency of heat and steam.

Having thus described my invention, what I claim is—

1. The combination of steam pipe P, stationary rod R, levers L, L', and L'', connected by the rods R' and R'', arranged substantially as described.
2. The steam pipe P, stationary rod R, levers L' and L', valve v, and the whistle W', arranged substantially as set forth.

D. M. GREENE.

Witnesses:

W. C. DODGE,

OTTO LEISSRING.