

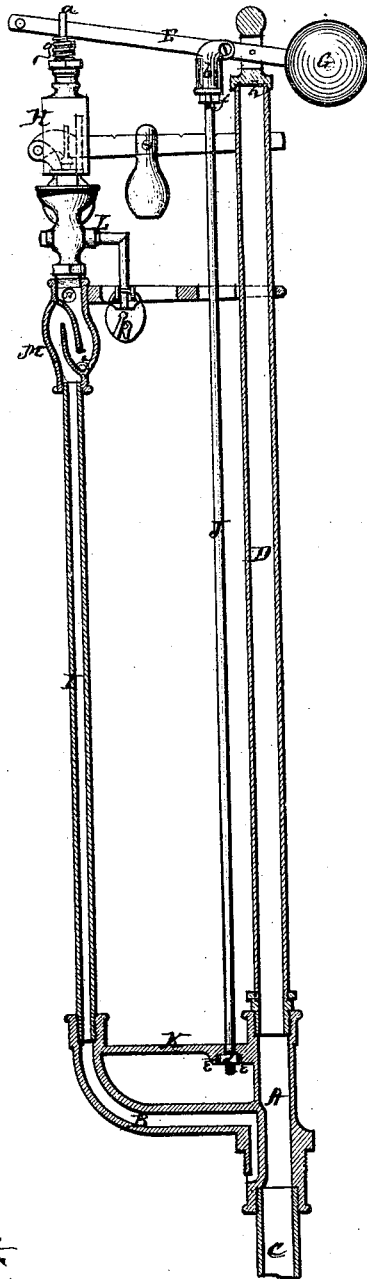
*L.F. Smith,*

*Steam Indicator.*

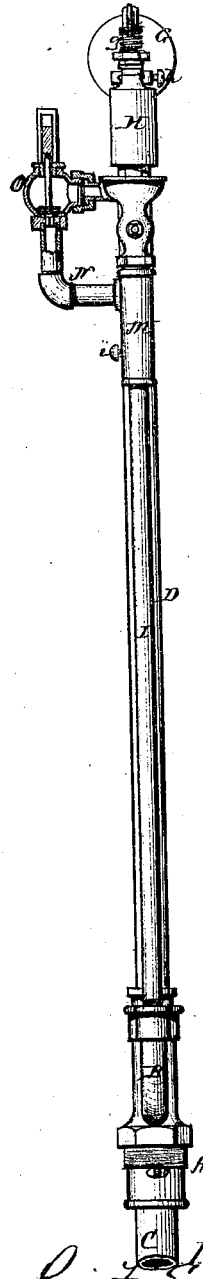
*No. 107,114.*

*Patented Sept. 6. 1870.*

*Fig. 1.*



*Fig. 2.*



*Witnesses:*

*L. E. Gentry*  
*A. T. Mason*

*Inventor*  
*L. F. Smith*  
*per* *Wm. H. Mason*  
*attys*

# United States Patent Office.

LEVI F. SMITH, OF PHILADELPHIA, PENNSYLVANIA.

Letters Patent No. 107,114, dated September 6, 1870.

## IMPROVEMENT IN LOW-WATER AND HIGH-STEAM INDICATOR.

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, LEVI F. SMITH, of Philadelphia, in the county of Philadelphia and in the State of Pennsylvania, have invented certain new and useful Improvements in Low-water and High-steam Indicator; and do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing and to the letters of reference marked thereon making a part of this specification.

The nature of my invention consists in the construction and arrangement of a "low-water and high-steam indicator," as will be hereinafter fully set forth.

In order to enable others skilled in the art to which my invention appertains to make and use the same, I will now proceed to describe its construction and operation, referring to the annexed drawing, in which—

Figure 1 is a longitudinal vertical section, and Figure 2, a side view of my machine.

A represents a straight pipe, of any suitable dimensions, screwed into the boiler, and provided with a side pipe, B, opening on the side of the pipe A directly below the point where it is screwed into the boiler.

At the lower end of the pipe A, within the boiler, is screwed another pipe, C, which should extend to from one and a half to two and a half inches above the tubes, flues, or fire-line.

At the upper end of the pipe A is attached a brass tube, D, which is closed at its upper end, and has a lever, E, pivoted on it, as shown in fig. 1.

One end of this lever is provided with a weight, G, while the other is attached to the valve-stem *a* of the whistle H, which latter is, by a pipe, I, connected with the upper end of the side pipe B, which forms the steam-connection.

At a suitable point on the lever E is attached a head, *b*, forming the connection with the adjustable rod J, which passes through a bar, K, connecting the pipes A and B.

The rod J is provided with right and left-hand screws at its ends, the upper end being screwed into the connecting head *b*, while on the lower end is screwed a nut, *d*, placed between two lugs or shoulders, *e e*, on the under side of the connecting-bar K.

By this means the rod J is readily shortened or lengthened at will, and a jam-nut, *f*, screwed against the under side of the head *b*, holds it in place when adjusted.

Around the valve-stem *a*, between the box on top of the whistle and the under side of the lever E, is a spiral spring, *g*, which may be used to assist the weight G, or alone to hold the whistle-valve up in its place.

When the water is above the end of the tube C in

the boiler, the pressure of steam on the water forces the same up into the brass tube D. There being no circulation, the water cools down to about the same temperature of the surrounding atmosphere, the air being previously exhausted by means of loosening a set-screw, *h*, at the top of the tube; but when the water, from any cause, falls below the end of the tube C, the tube D is at once emptied of water. Steam, which is from 200° to 300° hotter, takes its place, the tube D expands, the short end of lever E with weight G moves upward, which causes the long end of the lever to press down the whistle-valve, and the alarm is at once given.

Below the valve of the steam-whistle H is a stop-cock, L, for the purpose of shutting off the steam from the whistle. This stop-cock is used when the alarm for low-water is given to stop the whistle, because it will of course require some time before the water is brought up in the boiler, the tube D filled and contracted again to close the whistle-valve. As soon as the whistle-valve is closed again by the contraction of the tube D, the cock L should be opened again, so that the whistle may be sounded when required. The handle of the stop-cock L is in the shape of a lever, which may be locked when the cock is opened, as shown in fig. 1, so as to prevent anybody from tampering with it.

In the pipe I below the whistle is placed a siphon, M, or rather the pipe I leads into a siphon, which is then connected with the whistle. The object of this siphon is that, as the steam passes up to the whistle-valve, and condenses, it will collect in the bottom of the siphon, and, by the vacuum created above the same, the water condensed from the steam will be drawn up to and against the whistle-valve, and prevent the same from sticking, which is frequently the case when the steam stands against the valve.

In the bottom of the siphon M is a set-screw, *i*, which can be taken out at will to draw off the water, to prevent freezing in cold weather.

From the back of the upper end of the siphon M a pipe, N, leads to a safety-valve, O, connected with the whistle, for the purpose of indicating or sounding the alarm for high steam. This valve may be constructed and operates substantially in the same manner as described in my patent for low-water and high-steam indicator, dated November 24, 1868, and hence needs no further description here. This valve O, being connected with the siphon M at its upper end, is prevented from sticking in the same manner as above described for the whistle-valve. All valves, when steam is allowed to stand against them for any length of time, will get a more or less thick crust formed on them, which frequently acts as a cement to stick the valve tight to its seat. This difficulty is entirely over-

come by the use of the siphon, because the water condensed from the steam is drawn up against the valve, and prevents the steam from coming in contact with the valve except for a very short time.

Having thus fully described my invention,

What I claim as new, and desire to secure by Letters Patent, is—

1. The arrangement of the pipe A with side pipe B, pipe C, and expanding tube D, the pipes A C D being in a straight line, substantially as shown and described.

2. In combination with a steam-valve of any de-

scription, a siphon, arranged substantially as and for the purposes herein set forth.

3. The combination of the indicator D, whistle H, safety-valve O, and siphon M, all constructed as described, and arranged with necessary pipes on a steam-boiler, substantially as and for the purposes herein set forth.

In testimony that I claim the foregoing, I have hereunto set my hand this 4th day of June, 1870.

Witnesses:

LEVI F. SMITH.

C. L. EVERT,

A. N. MARR.