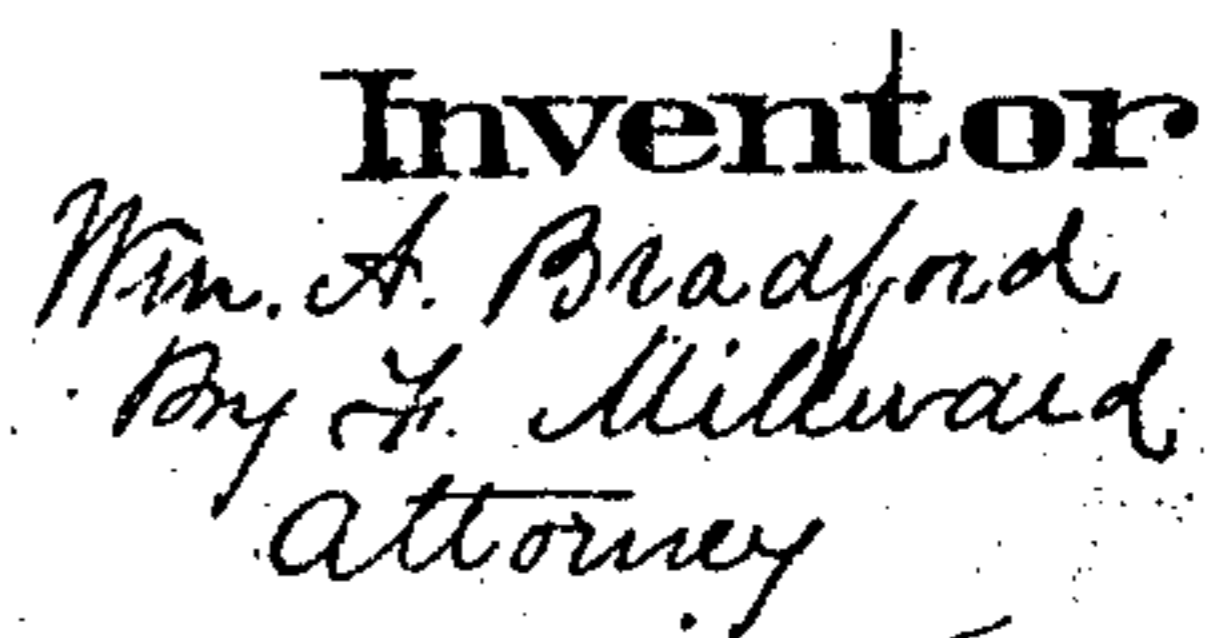


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# UNITED STATES PATENT OFFICE.

WILLIAM A. BRADFORD, OF CINCINNATI, OHIO.

## IMPROVEMENT IN LOW-WATER INDICATORS.

Specification forming part of Letters Patent No. **113,843**, dated April 18, 1871.

*To all whom it may concern:*

Be it known that I, WILLIAM A. BRADFORD, of Cincinnati, Hamilton county, State of Ohio, have invented a certain new and useful Improvement in Low-Water Indicators for Steam-Boilers; and I hereby declare the following to be a sufficiently full, clear, and exact description thereof to enable one skilled in the art to which my invention appertains to make and use it, reference being had to the accompanying drawing, making part of this specification.

### *Nature and Objects of Invention.*

My invention relates to the expansion-tube class of low-water indicators; and consists, first, in connecting the rod which, by the expansion of the tube, automatically opens the whistle-valve to the stem of the latter, by means of an intermediate adjustable thimble, in the socket of which said rod is fitted to slide, so as to relieve the valve of all strain as the tube contracts, the valve being closed by a suitable spring; second, of an expansion-tube centrally divided by a thin diaphragm, running from the lowest point of the tube to near the upper end, for the purpose of causing a rapid displacement of the water by the steam when the water in the boiler falls below the proper level; third, in a peculiar form of diaphragm for the expansion-tube, by which it is rendered self-fastening; fourth, in the employment, in connection with other parts, of a hand-lever for blowing the whistle independently of the action of the expansion-tube.

### *Description of the Accompanying Drawing.*

Figure 1 is a vertical section of an apparatus or instrument constructed in accordance with my invention, the instrument being in the act of giving the alarm for low water. Fig. 2 is a cross-section of the expansion-tube. Fig. 3 is a vertical section, on an enlarged scale, to show the construction and connection of the parts at the end of the whistle-valve rod. Fig. 4 is a perspective view, illustrative of the attachment of the hand-lever to the nut on the end of the whistle-valve rod.

### *General Description.*

A is the expansion-tube, communicating with the water-line of the boiler in the usual

way. It is not surmounted by the whistle, the latter being always stationary, and communicating by a short channel, C, with the steam-chamber of the boiler only, so that water cannot reach the valve of the whistle at any time. The whistle D is also located in so close proximity to the boiler, and so entirely separated from the expansion-tube, (which will contain at the top much colder water than that in the boiler,) that no condensation of steam can occur.

The valve E of my whistle is operated by the rod F and multiplying-lever G, the latter being jointed to the rod F and tube A at points H and I, and fulcrumed to the vertical rod J at K. The valve E is kept against the seat when the water in the boiler is at the proper height by the coiled spring L.

Into the upper end of the valve-rod an adjusting-thimble, M, is screwed, which receives in the socket in its upper end the lower end of the rod F. This thimble is so adjusted in the valve-stem that the end of the rod F sliding in its socket touches the bottom thereof when the expansion-tube is filled with heated water and the boiler is making steam.

By simply turning the thimble M the valve may be adjusted to blow off at the desired point.

The rod F, being connected to the adjustable thimble by a slip-joint, exerts no action on the valve as the expansion-tube contracts on the cooling of the boiler, and the parts of the apparatus are thus relieved of the excessive strain which must necessarily result where the said rod is pivoted to the valve-stem.

To the valve-stem a lever, N, is jointed, which is pivoted at O to the support J, and serves to enable the engineer to try the whistle at any time to test its condition.

A diaphragm, P, is fitted to the tube A, completely dividing into two parts for almost the entire length, a short distance at the top end being undivided. The diaphragm P is formed in nearly the shape of the letter S to render it elastic, and thus enables it to be tightly forced into the tube A and made self-sustaining.

### *Claims.*

1. In combination with the expansion-tube A, multiplying-lever G, rod F, and valve E,

the adjustable thimble M, for connecting the valve-stem and rod F, substantially as and for the purpose set forth.

2. An expansion-tube for a low-water indicator, centrally divided by diaphragm P, as and for the purpose described.

3. The curved elastic self-sustaining diaphragm P, substantially as described.

4. In the described combination with the apparatus embodied in the first clause of

claims, the whistle-testing lever N, connected and operating substantially as and for the purpose described.

In testimony of which invention I hereunto set my hand.

W. A. BRADFORD.

Witnesses:

FRANK MILLWARD,  
ELITHA F. LAYMAN.