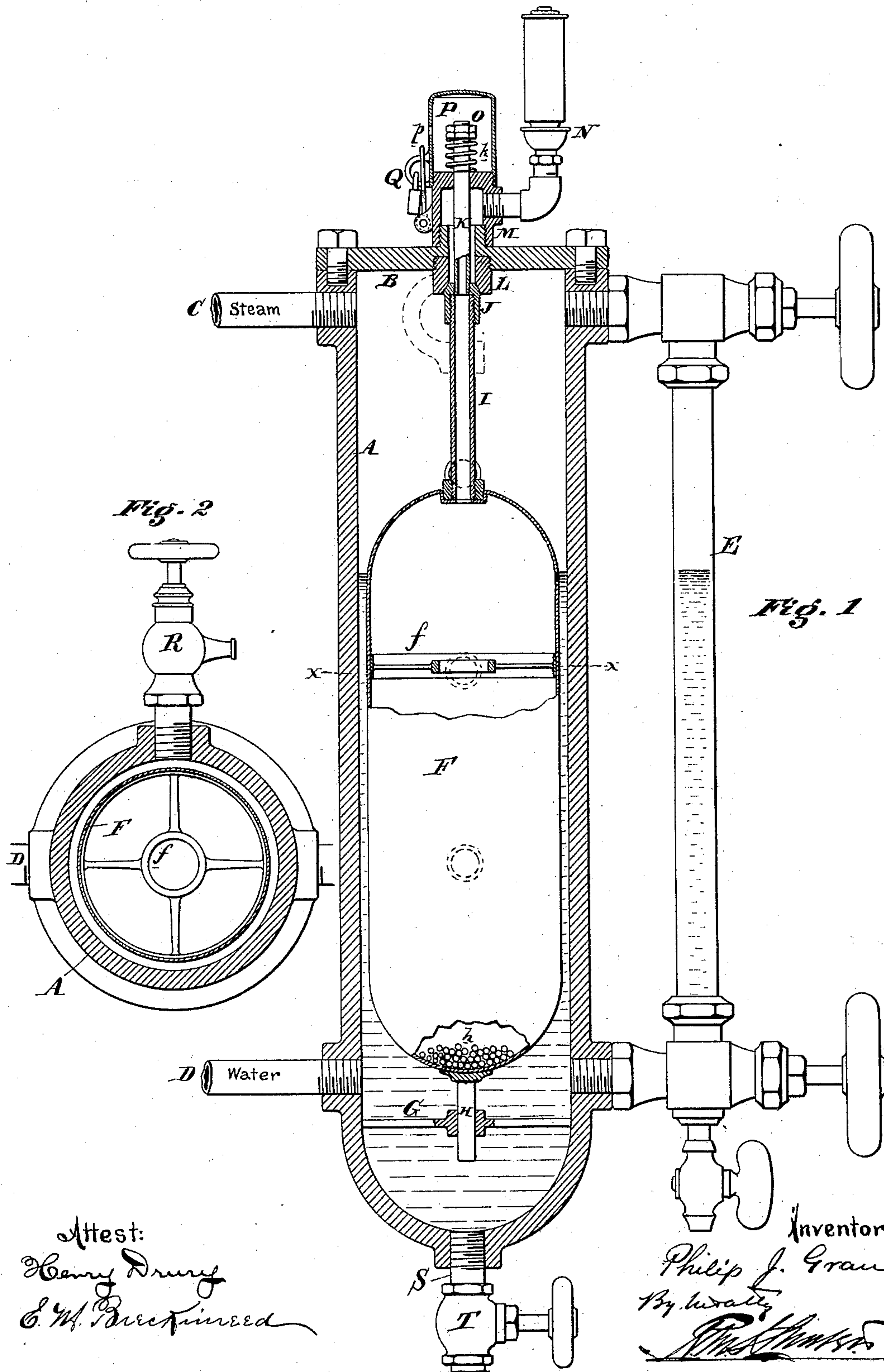


(No Model.)

P. J. GRAU.
LOW WATER INDICATOR FOR STEAM BOILERS.

No. 401,701.

Patented Apr. 16, 1889.



Attest:
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By *[Signature]*

UNITED STATES PATENT OFFICE.

PHILIP J. GRAU, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO
JEREMIAH G. DONOGHUE, OF SAME PLACE.

LOW-WATER INDICATOR FOR STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 401,701, dated April 16, 1889.

Application filed April 27, 1888. Serial No. 272,012. (No model.)

To all whom it may concern:

Be it known that I, PHILIP J. GRAU, of the city and county of Philadelphia, and State of Pennsylvania, have invented an Improvement in Low-Water Indicators for Steam-Boilers, of which the following is a specification.

My invention has reference to low-water indicators for steam-boilers; and it consists of certain improvements, fully set forth in the following specification and shown in the accompanying drawings, which form part thereof.

Prior to my invention low-water indicators have usually been made with floats which were made air-tight and which actuated a valve controlling the steam to the alarm-whistle by means of bell-crank levers and loose connections within the chamber inclosing the float. There were several objections to these constructions, some of which may be stated as follows: The float, being air-tight and inclosed in an atmosphere of steam and water under varying pressure, will sweat on the inside—that is to say, the moisture will pass through the thin metal of the float, and when the temperature-steam is low condense on the interior, and this in time water-logs or loads the float, so that it responds too soon and is not reliable, and the ultimate result is to refuse to act at all, as its buoyancy is destroyed. Another trouble is that the connections between the float and whistle-valve are irregular and are liable to get out of order and wear out, and when deranged they cannot be easily gotten at. A third objection is that when from any cause it is desired to dismantle the apparatus the cap has to be removed before the float and its mechanism can be gotten at, and then this mechanism must be all disconnected before the float can be removed from the chamber. These objectionable features in many indicators not only cause trouble and annoyance, but render the alarm unreliable, and are at the same time expensive to make and keep in repair.

The object of my invention is to provide a construction which will overcome these ob-

jectionable features, and this I do by making my low-water indicator in the manner now to be explained.

In the drawings, Figure 1 is a sectional elevation of my improved low-water indicator, and Fig. 2 is a cross-section of same on line *x x*.

A is the water and steam chamber, and is shown as a short cylinder with a removable head, B, at the top and a rounded bottom, and adapted to be connected above the water-line in the boiler by a pipe, C, and below the water-line by a pipe, D, to supply steam and water to the chamber A. This chamber A has the usual gage-cocks, R, and glass gage E, to indicate the level of the water.

F is a float within the chamber A, and made of light sheet metal, which may be strengthened by means of one or more spiders, *f*, within it to prevent destructive effect of any collapsing strains. The lower part of this float is provided with a guide-stem, H, which plays in a guide, G, formed within or secured to or near the bottom of the chamber H. The upper part of the float is provided with a section of tube, I, opening into the interior of the float, and on the top of this tube is secured the whistle-valve J, and secured upon this valve and extending upward as a guide is an additional section of small tube K, which extends up through the top of the head to the atmosphere, so that at all times the interior of the float is in communication with the atmosphere. The valve J seats itself against a valve-seat, L, secured to the under part of the head B, or may be formed integral with it. I prefer to make it separate and of brass, first, because it is easily replaced if worn out, and, second, brass makes a better seat than iron, as it will not rust. The top of the head has secured to it the cap, M, into which the whistle N connects. By locating the valve-seat and valve entirely within the steam-chamber the temperature is maintained constant, and the valve fits its seat better and requires less grinding and care. The tubular stem K extends up through the top of this cap, and is surrounded with a spring,

k, the tension of which may be adjusted by
 the nuts O. Screwing over the top of the
 cap to inclose these nuts and spring is a
 hood, P, which has a small air-vent, p, to one
 5 side, and this hood may be locked against
 removal by any suitable form of locking de-
 vice, Q. The function of this hood is to pre-
 vent the accumulation of dirt about the spring-
 roll and nuts, and, secondly, to prevent med-
 10 dling with the adjustment of the parts. It
 will now be seen that the entire action of
 the float and the valve mechanism is in one
 straight line, and there are no joints or com-
 plicated structures. It will also be seen that
 15 if the head B is removed the float and all the
 appendages are simultaneously removed also,
 and hence no loss of time or trouble is expe-
 rienced. The function of the spring k is to
 act as an elastic support for the float when
 20 down, and also aid it in closing its valve J
 against the escape of the steam. It is evident
 that if desired this spring might be dispensed
 with, as might also be the nuts O, as the guide
 G would limit the downward movement of the
 25 float.

It is not always easy to properly adjust the
 float to different steam-pressures; and to read-
 ily accomplish this I simply drop a few shot,
 h, down through the tubes into the float to
 30 make it of the required weight to open the
 valve against the steam-pressure acting upon
 the under surface of the valve when the water
 is down to the danger-mark. If the valve J
 should become clogged or dirty, it is simply
 35 necessary to remove the hood P and turn the
 tube end by hand, in effect grinding the valve
 J to its seat and thus making it steam-tight.
 This is not possible where the mechanism is
 wholly within the chamber A. By having the
 40 outlet from the interior of the float F to the
 atmosphere any attempting to sweat is pre-
 vented by the vapor which might enter the
 float becoming instantly dissipated into the
 atmosphere. It is also evident that if the
 45 float had a small leak any water which might
 work through would be vaporized by the
 heat within the float, in view of the reduced

pressure. In fact, the float cannot become
 water-logged or loaded, so as to become in-
 operative, from any normal cause.

It is evident that in place of making the
 tube from the float extend through the cap
 M the tube part K might be dispensed with
 and a guide for the tube I used, as indicated
 in dotted lines.

The bottom of the chamber A is made ta-
 55 pering or conical, and terminates in a blow-
 off tube or pipe, S, which may be provided
 with a valve, T. The object of this is to
 blow off the accumulations of dirt which
 would otherwise collect in the bottom of the
 chamber A and in time prevent the fall of
 the float, and thereby cause a derangement
 of the alarm or indicator. This accumulated
 dirt may by this means be blown off from
 65 time to time and thus avoid the above dan-
 ger, and, furthermore, the blowing off of the
 water from the chamber A tests the opera-
 tiveness of the alarm without requiring low
 water in the boiler.

While I prefer the construction shown, as
 having been found practically correct, I wish
 it to be understood that I do not limit myself
 to the details thereof, as they may be modified
 in various ways without departing from my
 75 invention.

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

In a low-water indicator, the combination
 80 of a float-chamber, a head therefor, a valve-
 seat and whistle carried thereby, a float, a
 valve-stem extending from the top of the
 float and connected to said head, and a valve
 on said stem adapted to work with the valve-
 85 seat, whereby the float, valve, and all of their
 appendages may be simultaneously removed
 with the removal of the head.

In testimony of which invention I hereunto
 set my hand.

PHILIP J. GRAU.

Witnesses:

ERNEST HOWARD HUNTER,
 R. M. HUNTER.