(No Model.)

P. J. GRAU.

LOW WATER INDICATOR FOR STEAM BOILERS.

No. 401,701. Patented Apr. 16, 1889.

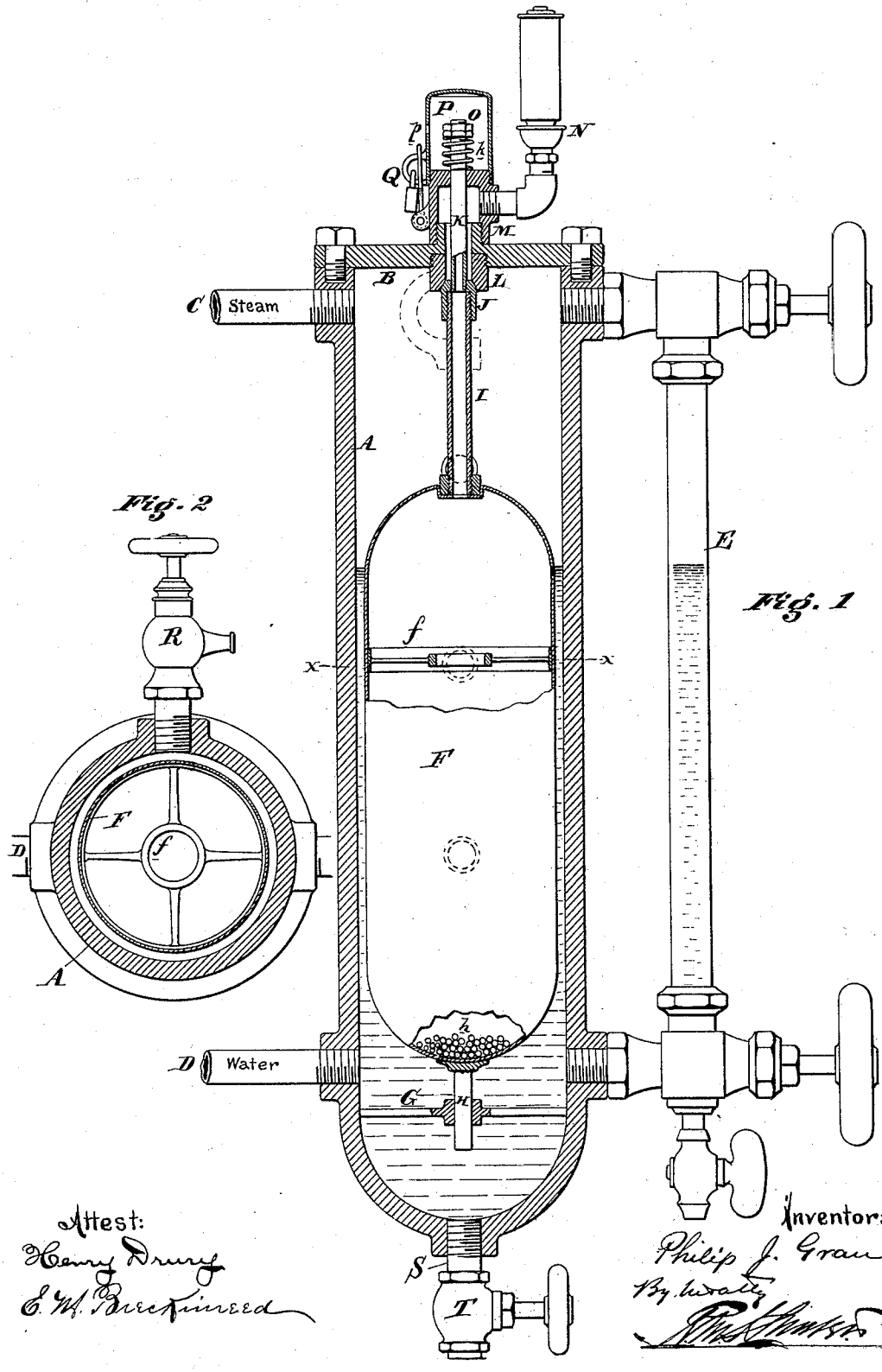


Fig. 2

Fig. 1

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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 objectionable 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 side, and this hood may be locked against removal by any suitable form of locking device, Q. The function of this hood is to prevent the accumulation of dirt about the spring-roll and nuts, and, secondly, to prevent meddling 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 complicated structures. It will also be seen that 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 experienced. The function of the spring *k* is to act as an elastic support for the float when 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 float.

It is not always easy to properly adjust the float to different steam-pressures; and to readily accomplish this I simply drop a few shot, *h*, down through the tubes into the float to 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 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 outlet from the interior of the float F to the atmosphere any attempting to sweat is prevented by the vapor which might enter the float becoming instantly dissipated into the atmosphere. It is also evident that if the 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 inoperative, 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 tapering 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 time to time and thus avoid the above danger, and, furthermore, the blowing off of the water from the chamber A tests the operativeness 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 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 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-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:
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