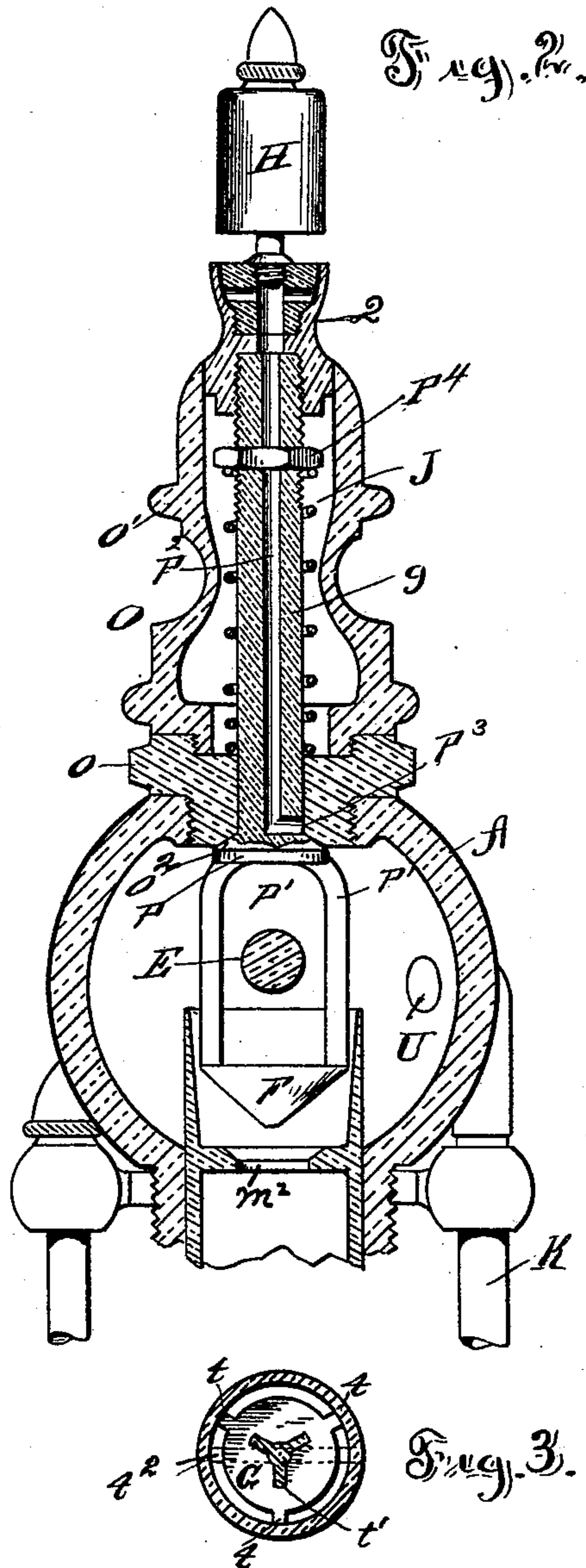
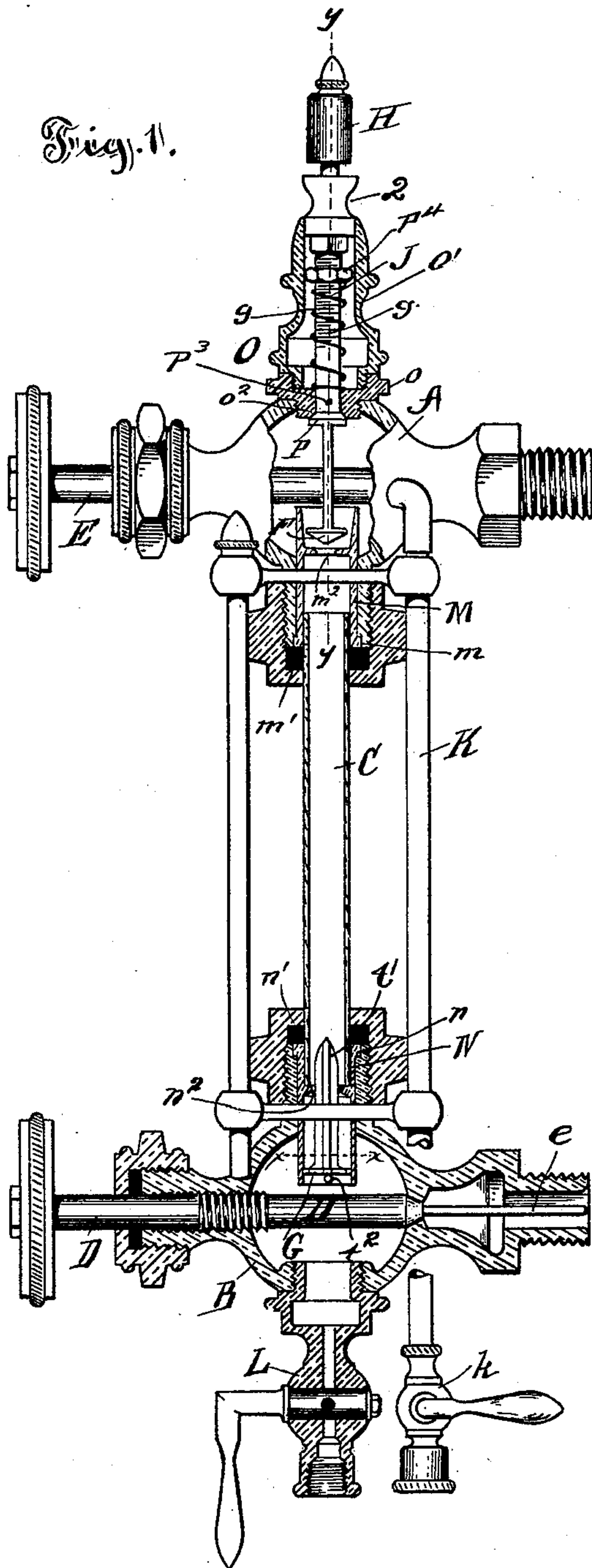


(No Model.)

D. H. ROBERTS.
WATER GAGE.

No. 500,298.

Patented June 27, 1893.



WITNESSES
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UNITED STATES PATENT OFFICE.

DUGALD H. ROBERTS, OF DETROIT, MICHIGAN.

WATER-GAGE.

SPECIFICATION forming part of Letters Patent No. 500,298, dated June 27, 1893.

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To all whom it may concern:

Be it known that I, DUGALD H. ROBERTS, a subject of the Queen of Great Britain, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Water-Gages; and I declare the following to be a full, clear, and exact description of the invention, such as it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to certain improvements in automatic safety water gages. Its object is to overcome certain defects that such gages have been hitherto subject to; to combine with the self-closing valves an automatic signaling device; also, to afford means of readily examining the condition and facility of operation of the automatic valves, and to clean the gage by blowing off whenever necessary. These results are accomplished by the peculiar arrangement and combination of parts hereinafter described.

In the drawings, Figure 1 shows an elevation of the gage, the larger portion of which being in section in a plane corresponding with that of the attachments to the boiler. Fig. 2 is an enlarged partial sectional view on the line y, y , of Fig. 1, on a plane at right angles to that of Fig. 1. Fig. 3 is a cross sectional view on the line x, x , on the lower portion of Fig. 1, showing the self closing valve and indicators.

Similar letters refer to similar parts.

A represents the upper valve chest; B, the lower valve chest; C, a glass indicating tube of the usual construction; D, the lower stop valve and valve stem; E, the upper stop valve, which is exactly the same in construction as the lower one, and hence is not shown in section; F, the upper automatic valve; G, the lower automatic valve; H, a whistle attached to a hollow prolongation of the stem g of the upper valve; J, a spring surrounding the stem g of the upper valve; K, a testing tube which serves also as one of the guards for the glass, and which carries at its lower end a small pet valve k .

L is a blow off valve attached to the lower valve chest B.

The further lettering of the various parts will appear in the description.

The valve chests A and B are constructed in the usual manner, constituting hollow receptacles for the steam and water received by means of the stop valves D and E from the boiler with which the device may be connected. The glass indicating tube C is inserted in the glands of the valve cases A and B, and packed in the usual manner. Before inserting the glass tube C in either of the glands, there are inserted two thimbles, M and N. These thimbles are turned to fit the opening in the gland, their outer ends having a small angular shoulder which fits into recesses in the gland at m, n , respectively. These thimbles grasp and hold in place either end of the glass tube. Interiorly, they are constructed with diaphragms, which are pierced longitudinally, the upper one having the hole concaved upon the upper side, and the lower one having the hole in the diaphragm concaved toward the lower side. These concavities form valve seats, m^2, n^2 . It is plain that the glandular packing for the glass tube also holds these thimbles and valve seats in position. Above the upper valve chest A is attached thereto by appropriate means a case O. This case is preferably composed of two pieces, o, o' ; the lower piece, o , being directly attached to the valve case A, and is pierced by a hole of appropriate size, which is bored to fit the stem g of the automatic valve F; the lower portion of the piece o is reamed out or concaved to form the valve seat, o^2 . The stem g has upon its lower end a valve, P, to fit the valve seat o^2 . Below this valve the valve stem g is flattened and bifurcated, forming a yoke, P' ; the lower end of this yoke carries a conical piece, F, which forms the valve adapted to engage and fit the valve seat m^2 . The valve stem g has a hole, P^2 , traversing it, making it hollow. This hole is connected by a port, P^3 , extending through from the hole to the circumference of the stem g , immediately adjacent to the valve P. The parts are so proportioned that the descent of the valve stem, yoke and valves P and F would bring the port P^3 below the valve seat o^2 , and thus open communication between the interior of the valve chest A and the hollow stem g . The upper

end of this valve stem g carries a suitable cap, Q , the outer side of which is turned to fit the bored inner side of the upper portion o' of the case O , but not so tightly as to prevent its easy perpendicular motion within the case O . The case O thereby affords merely a guide to the cap Q . The upper portion of this cap is formed into and carries an ordinary whistle, H , of suitable dimensions, the hole P^2 in the valve stem g communicating directly, as is more especially shown in Fig. 2, with the steam whistle. The yoke P' embraces, without touching, the valve stem of the upper stop valve E .

Surrounding the valve stem g is the spiral spring J , the lower end of this spring resting on that portion of the case marked o , and the upper portion impinging against an adjustable jam nut P^4 . The office of this nut is to adjust the tension of the spring, the office of the spring being to hold the valve stem carrying the whistle and its appliances above and away from the valve seat m^2 and normally in contact with the valve seat o^2 .

It will be noticed that the faces of the valve P and of the valve F are unequal in area, also that the thimble surrounding the valve F is chamfered out so that when raised away from its appropriate valve seat there is a passage way afforded around the valve F whereby steam from the interior of the valve chest A can pass by the valve through the valve seat, and from thence into the interior of the indicating tube. By virtue of the unequal areas of the two valves P and F , any sudden eruption of steam through the valve chest A and through the valve seat m^2 , caused by the breakage of the glass tube or any other reason, causes unequal pressures on the two heads of the valves P and F , and thereby causes the valve F carrying the valve P , the valve stem g and the whistle H to descend until the valve F comes in contact with the valve seat m^2 and closes the opening. At this instant, the port P^3 would be opened and steam would pass into the hole in stem g , and from thence to and sound the whistle H . The lower thimble, N , carries within it a valve, G , of peculiar construction, especially illustrated in Figs. 1 and 3. The valve is constructed with three flanges, which form guides within the thimble N , and are marked in Fig. 3, t , t , t .

The spaces between the periphery of the valve G proper and the thimble N , and located between the flanges t , t , t , form passage ways for the steam or water to rise from the valve chest B up and through the valve seat n^2 , into the lower end of the indicating tube. Projecting from the upper face of the valve G is a triangular or bayonet-formed projection, t' , which is of such length that it approaches the upper edge of the gland of the packing for the indicating tube, and thus, when the valve is in position shown in Fig. 1, is not visible. The widths of the triangular projections are such that they just fit the perforation through the valve seat, n^2 , and

thus it forms a guide to steady the valve in its movements. Any sudden eruption of water or steam caused by the breakage of the indicating glass into, through and from the valve chest B , would cause the valve G to rise against its weight until it was seated upon the seat n^2 , thus closing off any further eruption of steam and water in that direction. The bayonet point, t' , of the valve would also be raised high enough to be visible in the tube, and thus indicate that the valve was closed. If for any reason it should stick in its place, the sight of the bayonet point would indicate that it was out of order.

Surrounding the indicating tube is the usual cage constructed with a suitable frame with three rods, the fourth rod being replaced by a tube K , which communicates with the upper valve chest A through and by means of the hole U shown in Fig. 2. The lower end of this tube K carries the pet valve k , heretofore mentioned. By means of this device, and by means of the valve attached to the lower valve chest B , the valve chests may be blown off independently or together, as desired. The lower and upper stop valves, D and E , carry attached to their inner faces a flat spatula or projection, shown in the lower sectional view of Fig. 1 as e , the thin edge being presented to the observer. It is obvious that, on turning the valve to withdraw it from its seat, this projection will clear out any clogging that may be in the hole leading to the boiler or in the valve seat proper.

It is obvious that by unscrewing the glands holding the glass, and the removal of the glass, the thimbles M and N , with their valve seats, can be withdrawn at any time for inspection or cleaning. The withdrawal of the lower thimble withdraws also the valve G (it being held in place from dropping into the valve chest by a cross pin t^2), so that its working can also be inspected.

Unscrewing both portions o and o' of the upper case O permits the upper valve seat also to be withdrawn together with the valve F , while unscrewing section o' affords means for reaching and adjusting the spring as hereinbefore described. This may be done while the device is under full steam pressure.

The operation of the whistle can be tested at any time by simply pressing it down and overcoming the tension of the spring, thus placing it in the position to sound the signal. The device can be blown off and cleaned at any time by slightly opening the upper valve E and the lower valve L attached to the lower valve case B , and at the same time holding by grasping the whistle, and thus preventing the descent of the valve F to the valve seat m^2 . By simply opening the valve E to a greater extent and releasing the valve stem and opening the valve L so as to allow the steam to blow through to the shut valve E , the operation of the upper valve and its signaling whistle can be tested, as the conditions are then the same

as though the indicating glass had broken, so far as the upper valve and its signaling whistle are concerned.

The operation of the lower valve D can be tested by closing the upper valve E, opening the lower valve D, and opening the valve $\frac{1}{2}$ attached to the stem K. This permits a flow through from the boiler into the lower valve chest B, and up through the glass tube, and back down through the tube K, thus placing the lower valve G under the same conditions as though the indicating glass had become broken. The valve will instantly close and the indicator appear in the glass, as hereinbefore explained. At the close of the test, by the re-adjustment of the valves, placing the apparatus in its normal condition, the pressures upon opposite sides of the valve G become balanced and the valve falls by its weight away from the valve seat to the position shown in the drawings, thus restoring communication through the lower valve to the indicating tube. The openings around the automatic valves are so proportioned as to more than equal the opening to the body of the gage, and thus they will not in any way interfere with the circulation.

What I claim is—

1. In combination with a valve case, an automatic valve having two heads opposing each other, the lower head of which is greater than the upper, whereby a differential pressure may be exerted to close the lower of said valves, and carrying a hollow valve stem upon which is located a communicating signaling device, an opening from the hollow of said valve stem adapted to open communication between the signaling device and the interior of the valve case on the descent of the valve, and to be closed off from such communication by the seating of the upper valve, and a spring sustaining the weight of the valve, valve stem and signaling device, substantially as described.

2. In combination with the valve case, an indicating tube, a valve seat in said case between said case and said indicating tube, a valve chamber adjacent to and below said valve seat, a valve in said valve chamber containing annular recesses between said valve

and said chamber to permit the passage of water or steam, a support for said valve, and a bayonet-formed projection upon said valve adapted to slide in the opening in the valve seat and proportioned in length relatively to the distance of the valve seat below the top of the cap surrounding the indicating tube so as to form an indicator when the valve is raised to the seat, but is rendered invisible by descending below the cap surrounding the indicating tube when the valve returns to its normal position substantially as described.

3. The combination of two valve cases having located therein main hand valves for the admission or closing off of steam or water, an indicating tube connecting said cases by appropriate means, an automatic differential valve carrying a hollow stem adapted to communicate with the interior of said upper valve case, a signaling device attached to said hollow valve stem and adapted to be operated thereby, a spring sustaining said valve and valve stem, and a blow off cock attached to the lower valve case, substantially as described.

4. The combination of two valve cases carrying therein valves for the admission or closing off of steam or water therefrom, said valve cases being connected by an indicating tube, the lower of said valve cases having adjacent to said indicating tube a valve seat and an automatic valve located therein adapted to be raised by an undue flow and pressure of water or steam and carrying thereon an indicating device adapted to indicate its varying position and a stop cock connected to said upper valve case, substantially as described.

5. The combination of a valve case carrying a hand valve adapted to be withdrawn, and having detachably mounted thereon an upper case carrying a valve, valve stem, a spring inclosing said valve stem, and an automatic signaling device, substantially as described.

In testimony whereof I sign this specification in the presence of two witnesses.

DUGALD H. ROBERTS.

Witnesses:

MARION A. REEVE,
R. A. PARKER.