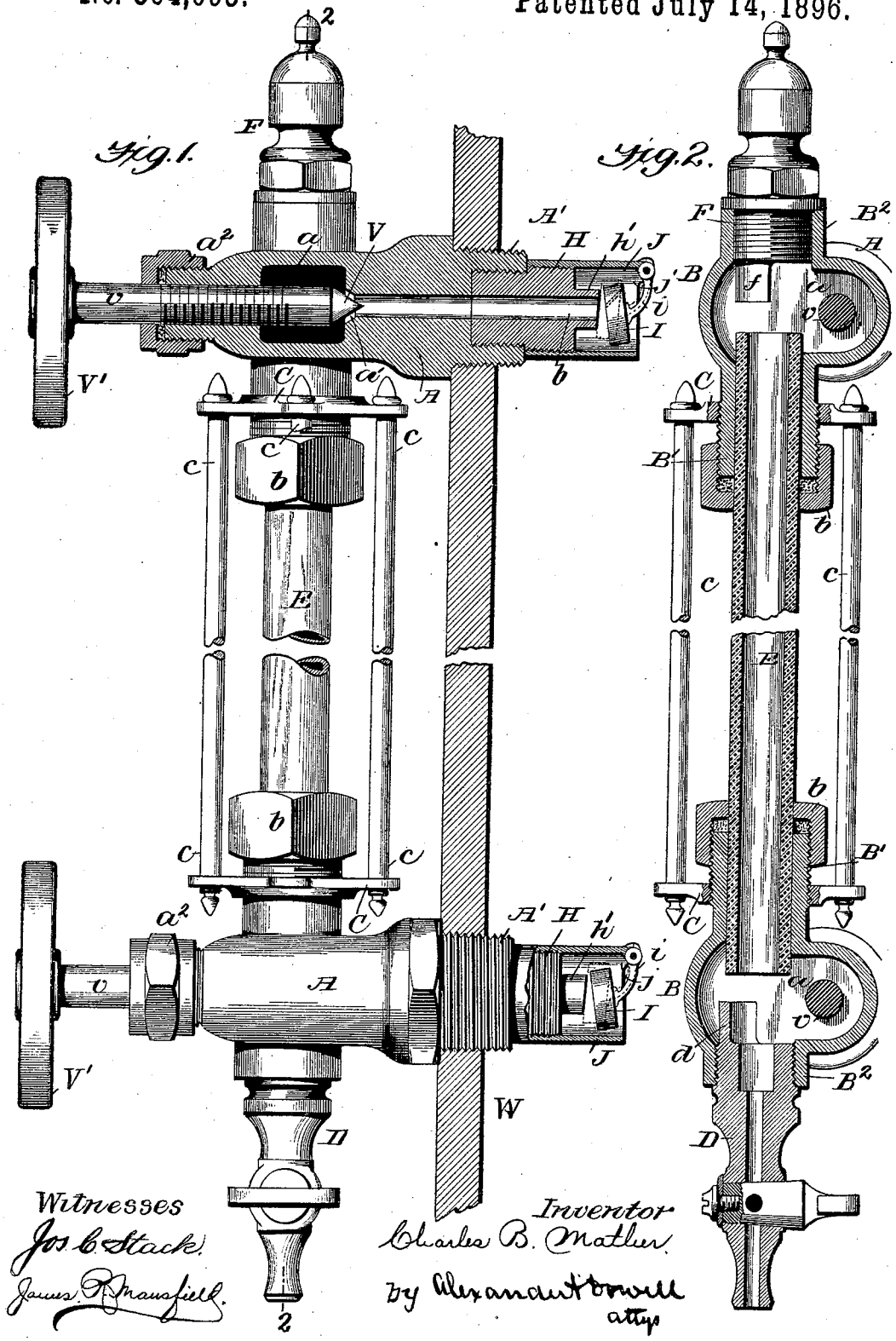
(No Model.)

C. B. MATHER.

WATER GAGE.

No. 564,095. Patented July 14, 1896.



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UNITED STATES PATENT OFFICE.

CHARLES BIDDLE MATHER, OF OTTUMWA, IOWA.

WATER-GAGE.

SPECIFICATION forming part of Letters Patent No. 564,095, dated July 14, 1896.

Application filed February 15, 1896. Serial No. 579,432. (No model.)

To all whom it may concern:

Be it known that I, CHARLES BIDDLE MATHER, of Ottumwa, in the county of Wapello and State of Iowa, have invented certain new and useful Improvements in Water-Gages; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification.

This invention is an improvement in water-gages for steam-boilers and other high-pressure fluid-reservoirs. Its object is to provide a gage which is applicable in any position, wherein the glass can be set to right or left of the valves, can be readily cleansed while in place, or removed and replaced without loss of steam, and in which scalding of the attendant or excessive escape of steam will be prevented should the valves or glass be accidentally broken.

Further objects are to so construct the valve-casings that they can be easily cast and finished without expensive cores or machinery, and in which ready access can be had to the valve-seats, the valve-stems being of ordinary rotatable kind.

Another object is to make the upper and lower valve-casings duplicates, so that they are interchangeable, and all connections are interchangeable also.

Another object is to provide automatic cut-offs by which escape of steam, &c., would be prevented if the glass or valves proper break, and to connect the cut-offs adjustably to the valve-casings, so that they can be set in proper position within the boiler whether the glass be vertical, inclined, or horizontal.

Various of these objects have been aimed at, and possibly realized, in prior inventions and patents, and my invention is not generic, but consists in the construction and combination of parts hereinafter described and claimed, and illustrated in the accompanying drawings, in which I represent a practical and reliable embodiment of my invention.

In said drawings, Figure 1 is a part side view and part section of my improved water-gage and automatic cut-off. Fig. 2 is a vertical section on line 2 2, Fig. 1.

The valve-casing of either upper or lower valve has a main portion A, which is substantially shaped like that of an ordinary rotary-valve gage-cock, having a valve-chamber a, in which is a valve-seat a', and a stuffing-box a^2 at its outer end, through which passes the stem v of an ordinary-shaped cut-off or needle-valve V, which can be turned by a hand-wheel V′ or other convenient means and screwed up to close the valve or unscrew to open it. The inner end of the casing A is exteriorly threaded at A′ to screw into the side plate of the boiler W or other place where the casing is to be secured, and it has a short interior thread for the engagement of the automatic cut-off-valve casing hereinafter referred to. The casing also has a tubular enlargement B at one side of and opening into chamber a. Part B lies at about right angles to part A and extends above and below it, one end B′ being externally threaded and the other end B′ internally threaded, as shown. It will be observed from the drawings that ready access is had through part B to valve-chamber a and seat a', so that said chamber and seat can be readly cleansed.

Two of the casings A are screwed into place the proper distance apart, with the ends B′ toward each other. Then the guard-holding plates C are screwed on ends B′ and the guard-rods c put in place. Then a petcock D is screwed into the end B^2 of the lowermost valve, said petcock being of ordinary construction, except that, as shown, it has an upstanding rib or finger d on its inner end, which rib is about as high as half the diameter of the glass and is formed to prevent the end of glass being fitted so closely against the petcock as to prevent free flow of fluid into or through the glass.

An ordinary tubular glass E of proper length can be then slipped through part B of the upper casing, and through suitable stuffing-boxes b b, previously partly screwed onto ends B^2 of the casings, and made steam-tight by screwing up the stuffing-boxes, and finally the upper casing closed by screwing a plug F into the end B′ thereof. This plug also has a rib f on its inner end which prevents the end of glass being jammed directly against the end of plug, so as to obstruct the flow of water. The gage is thus complete, but it

may be put together in various ways. For instance, the glass may be inserted after all the other parts are in place, and to do this stuffing-boxes *b b* are loosened. Then one end of the glass is slipped into the end B^2 of either valve-casing until its other end can be slipped into the end B^2 of the other casing. Then the stuffing-boxes are tightened. It will be observed that the end of the glass can be slipped an inch or two into either casing, and thus the glass can be readily put in place, as last described; or it can be inserted upward, by first removing petcock D, or downward by first removing plug F. Either method of placing the glass in position can be followed that is found most convenient, and no exact length of glass is required. The fact that the valve-stems are to one side of the glass enables the steam to be cut off entirely while replacing or cleaning the glass, and thus the great annoyance of escaping steam, and danger therefrom incident to the repair or cleaning of ordinary gage-cocks when in position, is entirely avoided. I can also clean the glass without removing it or changing its position, by removing either or both plug F and cock D, as is evident, which is another advantage, as, practically, a glass once removed cannot be safely replaced, as the difference in position or strain thereon caused by its removal apparently destroys the power of the glass to resist strains.

In the inner end of each casing A is screwed a plug H, having a central bore *h*, (which communicates with the steam-passage in casing A to the inside of seat *a'*,) and around the end of said bore *h* is an annular flange *h'*, which forms a seat for a gravity-valve I, which is suspended by an arm *i* from and within a short tube J, screwed onto the projecting end of plug H, and projecting beyond seat *h'* sufficiently to protect it and the valve I, as shown. The arm *i* is suitably pivoted between ears *j* on the end of tube J, or otherwise connected thereto, so that the valve I will by gravity normally drop away from seat *h'*.

If the glass should break, the valves B being open, or if either casing A should break exterior to the boiler, so as to allow escape of steam and water, the unwonted rush of steam, &c., past valves I would swing them up against seat *h'* and they would thus automatically shut off steam and prevent injury of attendants. When the damage to gage is repaired, however, it is necessary to equalize the pressure on both sides of valves I else they would not unseat. To accomplish this, I make a very small perforation in, preferably, the upper valve or plug, so that a minute jet of steam can always pass out into the casing, if the main valve V is opened. This jet of steam, therefore, when the gage is in working order, will establish and maintain an equilibrium of pressure, and thus valves I will stay open and not prevent or obstruct the ordinary working of the valve.

My cut-off works wholly independent of the main valve.

The position the casing will occupy being known prior to securing it in place, the automatic cut-off is adjusted on the end thereof (by rotating it) until it is in such position that when the casing is in place the valve I will hang vertically, and thus always act properly by gravity. The condition of the automatic cut-offs can always be tested by simply opening the petcock when main valves are open, as if the valves I are working properly the water would escape from the glass faster than it or steam could enter.

The glass can be placed to left or right of valves by putting the top casing at bottom and changing the plug and petcock accordingly, which is a point of practical value where the gage has to go in a corner or very confined quarters.

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

1. The combination of the similar interchangeable and reversible valve-casings having valve-containing portion A, and glass-attaching portion B constructed substantially as described; with the valves in said casings, the glass secured between and to parts B of the casings, the plug F attached to the upper casing having a downwardly-projecting rib *f* on its inner end, and the petcock D attached to the lower casing having an upstanding rib *d* on its inner end, all substantially as and for the purpose described.

2. The combination with a valve-casing, of a water-gage of an automatic cut-off removably and adjustably secured on the inner end of each casing consisting of a threaded plug H secured onto the casing and having a bore an annular flange *h'* around the inner end of said bore, a tube J secured to the plug and projecting beyond the flange *h'*, and a gravital valve I hinged to the inner end of the tube so as to be suspended therein, said valves being arranged to open by gravity and close by excessive outrush of fluid; and one of said valves or casings having a minute passage for steam or fluid whereby an equilibrium of pressure will be gradually established in the gage and boiler and the cut-offs open automatically, all substantially as described.

3. In a water-gage, the combination of two similar valve-casings, each having a part A and a part B arranged substantially at right angles; part A having internal valve-chamber *a*, and internal seat *a'*, and threaded at one end for attachment to boiler, and having a stuffing-box on its outer end; and part B open at both ends and communicating centrally with chamber *a*, one end of part *b* being internally threaded, the other externally threaded; the petcock D attached to the lower casing having upstanding glass-arrest-

ing rib *d*, and the plug F attached to upper casing having a depending rib *f*, substantially as set forth; and the stuffing-boxes on the exteriorly-threaded ends of parts B, a water-glass secured between and in parts B of the casings by said stuffing-boxes; and the needle-valves V in parts A, all substantially as described.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

CHARLES BIDDLE MATHER.

Witnesses:
J. M. BURTON,
M. A. THOMPSON.