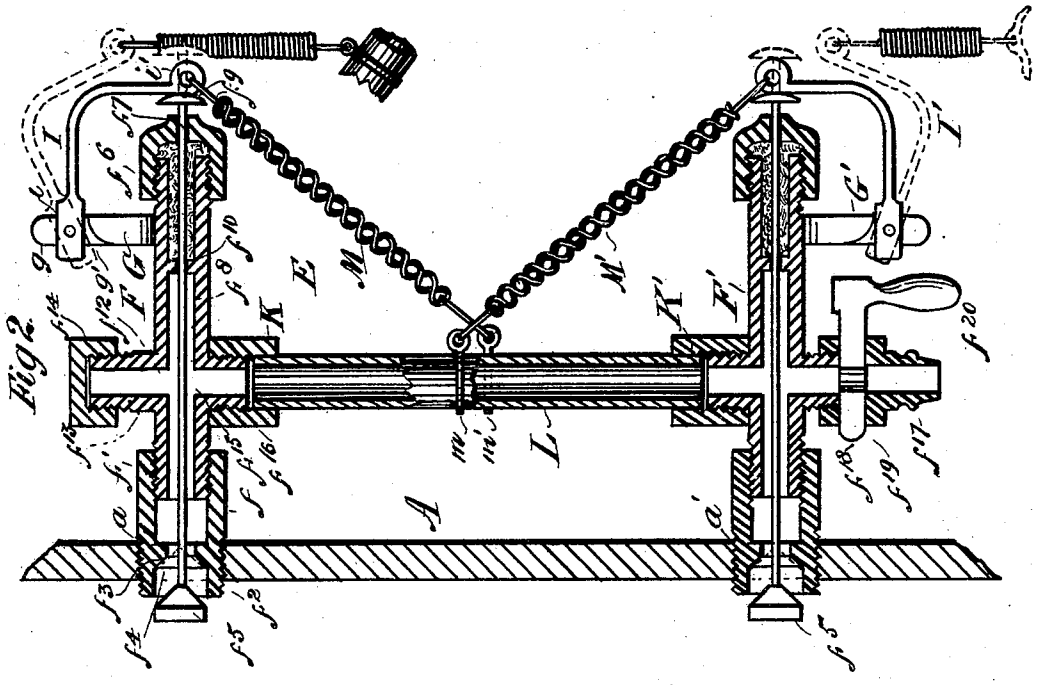
(No Model.)

D. BEST.

WATER GAGE.

No. 587,297. Patented Aug. 3, 1897.



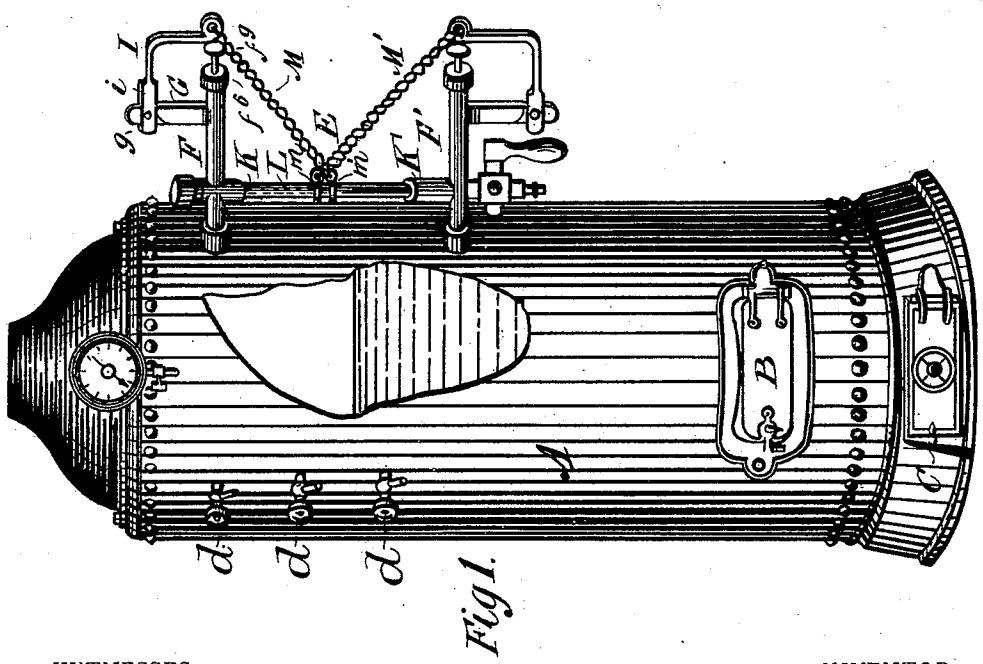


Fig 1.

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WATER-GAGE.

SPECIFICATION forming part of Letters Patent No. 587,297, dated August 3, 1897.

Application filed July 27, 1896. Serial No. 600,641. (No model.)

To all whom it may concern:

Be it known that I, DANIEL BEST, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, 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 of the invention, such as will enable others to make and use the same, reference being had to the accompanying drawings, forming a part of this specification.

My invention has for its object, primarily, a positive cut-off to the escape of steam and water incident to the breakage of the sight-tube in water-gages to steam-boilers; secondly, the automatic closure of a normally open valve controlled by the sight-tube.

My invention consists in the novel construction and combination of parts, such as will be first fully described, and specifically pointed out in the claims.

In the drawings, Figure 1 is a front elevation of a portable upright steam-boiler, showing the improved water-gage connected therewith, a portion of the side of the boiler being broken away, showing the corresponding height of water in the boiler and the sight-tube. Fig. 2 is an enlarged vertical sectional view of the improved water-gage, showing a broken portion of the side of the boiler, to which the improved water-gage is attached, and the position of the respective parts upon the breakage of the sight-tube.

Similar letters of reference indicate corresponding parts in both figures.

Referring to the drawings, A represents an upright cylindrical boiler for generating steam, which is constructed in the ordinary manner with a furnace and fire-box in the base.

B is the door to the furnace, and C is the door to the fire-box.

D is the steam-pressure meter, near the dome of the boiler.

d d d are try-cocks at high and low water lines and connected with the boiler.

E represents the improved self-closing valvular water-gage, which is constructed as follows: The upper portion of the gage, which is connected directly with the boiler, consists of a horizontally-extended tube F, which is screw-threaded externally at each end. To the inner end of the tube F is connected a short tube f, which is larger in diameter than the tube F, one end f' of which is screw-threaded internally to receive said inner end of pipe F. The other end f^2 of the tube f is screw-threaded externally. On the inner surface of the end portion f^2 of tube f and a short distance inwardly from the said end is an annular flange or valve-seat f^3, which is beveled or inclined inwardly, as at f^4. Within the end portion f^2 of tube f is fitted a piston-valve f^5, the inner side of which is beveled so as to fit the valve-seat f^4. Upon the outer end of the tube F is fitted an internal screw-threaded cap f^6 of the same diameter as tube f, in the end of which cap is an opening f^7. Within tube F is a valve-rod f^8, one end of which rod is connected with the valve f^5 and the other end extends through the opening in the cap f^6 and a short distance beyond the outer end of said cap for the proper operation of the valve, and upon said end is rigidly attached a disk f^9, the outer side of which is convex.

Within the tube F and at a point a considerable distance from the outer end of said tube is a centrally-perforated fixed plate f^{10}, through which passes the rod f^8, and which affords a bearing for said rod between the valve and the cap f^9. Other bearing may be provided at such points within the tube F as may be found necessary. The space between the inner side of the cap f^6 and the bearing f^{10} constitutes a stuffing-box and is filled with suitable packing.

In the upper side of the tube F a short distance from the end connected with tube f is an opening f^{12}, extending around which opening and secured rigidly to the outer surface of the tube is an upwardly-extended tubular extension f^{13}, which is short in length and screw-threaded at the upper end. Upon said upper end of extension f^{13} is fitted a tube closing internally-threaded cap f^{14}. Directly beneath the opening f^{13} in the tube F is an opening f^{15}, around which and secured rigidly to the outer side of said tube is an externally-screw-threaded downwardly-extended flange f^{16}.

To the upper side portion of the tube F, close in position to the cap f^6, is connected rigidly a post or standard G, which extends a

short distance upwardly, and a portion of its upper end halved out at g in the longitudinal direction of the tube F, leaving a shoulder g' below the upper end of the standard, which inclines rearwardly and downwardly in a curved line.

To the halved portion of the standard G is pivotally attached a flat plate i, the forward end of which plate rests upon the upper portion of shoulder g'. To said forward end of plate i is connected one end of a rod or arm I, which extends in a horizontal direction outwardly a distance corresponding to that of the disk f^9 on the rod f^8, retracted in position, as seen in full lines in Fig. 1, and is then bent at right angles and the other end of said rod extended to a position in contact with the convex surface of the disk f^9, and is then bent at its extreme end into the form of an eye i'.

The lower part of the water-gage, which is also connected directly with the boiler, consists of a horizontal tube F', which is constructed in precisely the same manner as described of the tube F, the position of the parts of tube F' being inverted. Said tube F' is provided with a short extended tube, a valve-rod and valve arranged and operating in precisely the same manner as the valve-rod f^8 and valve f^5 in the tube F.

Upon the tube F' is a standard G' and bent arm I', which is constructed and arranged in the same manner as described of the standard G and the arm I on the tube F. With the downward tubular extension f^{17} of the tube F', which corresponds with the extension f^{13} of tube F, is connected an ordinary petcock f^{18}.

On the threaded flange f^{16} of the tube F is a thimble K, which is considerably longer than the said flange. Upon the corresponding threaded flange on the tube F' is a threaded thimble K'. To the lower edge portion of the flange f^{16}, within the thimble K, is fitted one end of a transparent sight-tube L, made of glass, the other end of which tube is inserted within the thimble K' and fitted endwise to the upwardly-extended tubular portion. Upon the tube L are separate loosely-fitting rings m m'.

To the eye i' on the arm I on tube F is connected one end of a coiled spring-band M, the other end of which band or spring is connected with the ring m', which is beneath the ring m. To the eye on the arm I of the tube F' is connected one end of a coiled spring M', the other end of which spring is connected with the ring m on the sight-tube L.

In connecting the automatic gage with the boiler A a screw-threaded opening a is made in the side of the boiler at the proper point near the upper end of said boiler and the threaded end f^2 of the tube f fitted in said opening. An opening a' is then made in the side of the boiler below the low-water line and the portion of tube F' corresponding to tube f inserted in said opening. The sight-tube, to which the yielding connections with the arms I I' are connected, is placed in position within the thimbles K K', thus drawing down the arms I I' in contact with convex surface of the cap or disk f^9 on the valve-rod f^8 in tube F, which is thrust inward by pressure upon said rod, opening valve f^5 and also drawing upward the arm I on standard G on the tube F in contact with the disk upon the valve-rod in said tube and opening said valve.

In the operation of my improved water-gage the water finds entrance through the passage in the tube F' and thence finds its level with the water in the boiler A, the steam finding an entrance through the tube F into the sight-tube, the packing in the stuffing-box of both tubes F F' preventing escape of water or steam. Upon the breakage of the sight-tube L, which is of frequent occurrence, particularly in railway-locomotives, the strain upon the sight-tube being at the point nearly equidistant from the opposite ends, which is caused by the tension of the coiled-wire connections M M' on the rings m m', the rupture of the glass at said point immediately occurs, releasing the rings and also the downward and upward tension on the respective arms I I', and the valves f^5, connected with the valve-rods in the respective tubes F F', are immediately forced into the valve-seats, the area of the valve being greater than the annular escapement. The arm I', which offers slight resistance to the pressure of the water upon the valve, being thrown into the position as seen in Fig. 2 in the second position and the arm I, under the pressure of the strain upon valve f^5, throwing the disk f^9 outwardly, and the arm I, which bears on the convex portion of the disk, is thrown into the position as seen in the second position in Fig. 2. It will thus be seen that the action of the valves is positive, and in the frequent bursting of the water-gage the danger from the escaping steam is prevented, and also the lowering of the water in the boiler below the gage, which may occur when the fires are banked beneath the boiler and the boiler without an attendant.

For the purpose of cleaning the sight-tube the cap f^{14} is removed from the tubular extension f^{13} of tube F and the valve f^{19} opened by turning the handle f^{20}. During this operation the spring connections M M' are released from the rings m m' and the valves f^5 in the respective tubes f f' are closed, which enables the introduction of any well-known cleaning appliance to the sight-tube. I have shown the water-gage applied direct to the boiler A. I may, however, employ the usual water-column, to which the improved gage is attached in the ordinary manner, instead of the tube f on the end of the tube F. I may form the valve-seat in the inner end of the tube F, which may be enlarged in proportion to the size of the piston-valve.

An ordinary link chain may be employed in place of the springs M M' should the steam-pressure require a less sensitive connection with the arms I I'.

The improved gage may be applied to any receiver for volatile or other liquids—such as ammonia-tanks, gasolene-holders, and wherever a liquid-pressure is maintained.

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

1. In a water-gage a body portion consisting of separate water-conducting tubes, each tube having an opening in the side thereof, and a sight-tube connected with the respective openings, a piston-valve and seat in one end of the respective water-conducting tubes and a cap at the other end, a valve-operating rod in each tube connected at one end with said valves and extending through said cap at the other end, a standard upon the said water-conducting tube and a bent arm pivotally connected with said standard and contacting with the end of said valve-operating rod, and adapted to retain the piston-valve in a normally open position, as and for the purpose described.

2. In a water-gage for steam-boilers a body portion comprising separate upper and lower horizontal water-tubes connected with the boiler, each tube having a perforate cap at one end and a piston-valve and valve-seat at the other end, a valve-operating rod in each tube connected with the piston-valve at one end, and having the other end extending through said cap and provided with an antifriction extremity, a standard upon the upper side of the upper tube and under side of the lower tube, an arm pivotally connected at one end with the respective standards, and the other end bent at an angle and having said bent end contacting with the antifriction end of said valve-operating rod, said upper and lower tubes having openings on the side opposite to each other, a sight-valve connected at each end with said openings in the respective tubes, and bands connected with the other end of the pivoted arms on each standard and also with the sight-tube, as and for the purpose described.

3. In a water-gage for steam-boilers, a body portion comprising separate upper and lower horizontal water-tubes connected with the boiler, each tube having a perforate cap at one end and a piston-valve and valve-seat at the other end, a valve-operating rod in each tube connected with the piston-valve at one end, and having the other end extending through said cap and provided with an antifriction extremity, a standard upon the upper side of the upper tube and under side of the lower tube, an arm pivotally connected at one end with the respective standards, and the other end bent at an angle and having said bent end contacting with the antifriction end of said valve-operating rod, said upper and lower tubes having an opening on the side opposite to each other, a sight-tube connected at each end with said openings in the respective tubes and separate springs, each spring having one end connected with the bent end of each pivoted arm on said standards, and the other end connected with the sight-tube, as and for the purpose described.

4. In a water-gage for steam-boilers the combination with said boiler and the sight-tube of a connecting-tube to the boiler, a piston-valve and seat at one end of said tube and a perforated cap at the other end, a valve-rod within said tube, having one end connected with said valve and the other end extending through said cap, a standard on said tube and a self-releasing rod-holder connected with the standard and also with the sight-tube, as and for the purpose described.

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Witnesses:
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