No. 701,516. Patented June 3, 1902.

E. F. SHALLOW.

WATER GAGE FOR BOILERS.

(Application filed Feb. 17, 1902.)

(No Model.)

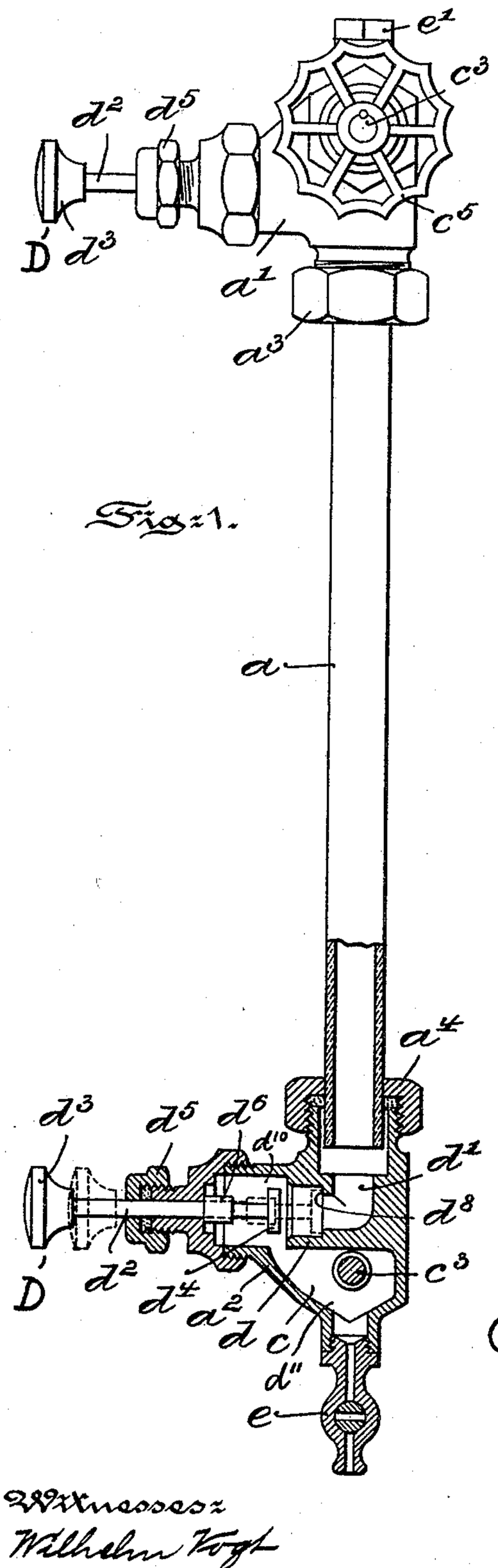

Fig. 1.

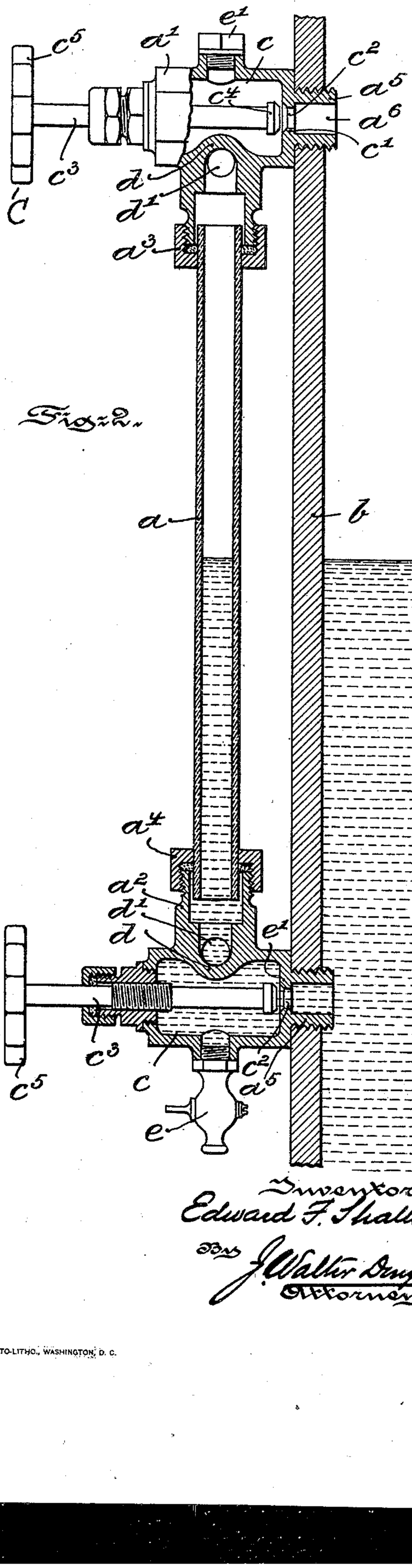

Fig. 2.

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UNITED STATES PATENT OFFICE.

EDWARD FRANCIS SHALLOW, OF WEST PHILADELPHIA, PENNSYLVANIA.

WATER-GAGE FOR BOILERS.

SPECIFICATION forming part of Letters Patent No. 701,516, dated June 3, 1902.

Application filed February 17, 1902. Serial No. 94,363. (No model.)

To all whom it may concern:

Be it known that I, EDWARD FRANCIS SHALLOW, a citizen of the United States, residing at West Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Water-Gages for Boilers, of which the following is a specification.

My invention has relation to a water-gage for boilers; but it is also adapted for use in other appliances or apparatus in which a liquid is kept under pressure and the height of which liquid in such appliances is required to be visible, and in such connection it relates to the construction and arrangement of the parts constituting the water-gage for the said use among others.

The principal object of my invention is to provide in a water-gage outside of an ordinary cut-off a simple and efficient valve which in the event of breakage of the glass tube of the gage, either from overpressure from the boiler or accident, will be adapted to automatically and instantaneously check or cut off the flow of water and steam through the broken glass tube or through its connection with the boiler and at the same time securely close the passages for steam and water leading to the tube from the boiler.

The nature and scope of my invention will be more fully understood from the following description, taken in connection with the accompanying drawings, forming part hereof, in which—

Figure 1 is a front elevational view, partly in section, of a water-gage embodying main features of my invention; and Fig. 2 is a view, partly in section and partly in side elevation, taken at a right angle to Fig. 1.

In the drawings, a represents a glass tube the upper and lower ends of which engage valve-housings a' and a^2 and held steam and water tight therein by stuffing-boxes a^3 and a^4. Each of the valve-housings is provided with a threaded extension a^5, which forms the connection between the housings and the boiler b or other appliance or apparatus partially shown in Fig. 2, and in addition thereto forming a passage a^6 for water or steam from said boiler to a chamber c, arranged in said housings. Between the passage a^6 and the chamber c is arranged a partition c', provided with an opening c^2, which partition-opening and a threaded stem or spindle c^3, arranged opposite said opening, form a cut-off valve C. This cut-off valve C is adapted when operated by a hand-wheel c^5 to close with its head c^4 the opening c^2, and thereby to cut off communication between the boiler b and chamber c of the housings a' and a^2. In addition to the partition c' the housings a' and a^2 are provided with a second partition d, forming a roof-like extension and separating the chamber c from a chamber d^{10}. These chambers are connected with each other by a narrow slot-like passage d^{11}. In the partition d is arranged an angular passage d', connecting the chamber d^{10} with the glass tube a, as illustrated in Fig. 1. The lower portion of the passage or conduit d' is controlled by a differential valve D, the stem or spindle d^2 of which slides back and forth in a stuffing-box d^5 of the housings a' and a^2, and outside thereof is provided a button or handle d^3, and in the interior of the chamber d^{10} is provided a head or disk d^4. A projection d^6, integral with the valve stem or spindle d^2, and a seat d^8 for the head or disk d^4 of the stem, are provided in the partition d and are adapted to limit the range of movement of the differential valves D in either direction in the chamber d^{10} of the housings a' and a^2. Water from the boiler b fills the lower housing a^2 and partially the tube a, as well as steam fills the upper housing a' and upper portion of the tube a, surrounding the head or disk d^4 of the valve-stem d^2 of the differential valve D from all surfaces. The disk or head d^4 of the valve-stem d^2 will, however, present two surfaces of different areas to the pressure of the steam and water. The larger one is on the free side of said head or disk d^4. It follows, therefore, that the pressure of the steam or water will always tend to force the head d^4 and stem d^2 of the differential valve D outward, which movement, however, will be limited by the projection d^6 on the stem d^2, and in this manner the passage d' connecting, the chamber c with the glass tube a, will be kept open. Should, however, the glass tube a break, either through overpressure from the boiler or other causes, the flow of water and steam from the broken tube a, acting upon one side of the head d^4 only, will instantly force the head onto its

seat d^8 and by securely closing the passage d' will stop any further flow of water and steam from the tube a or housings a' and a^2. From the foregoing description it will also be observed that the differential valve D is centrally located in the path or body of water or steam coming from the boiler and entering the glass tube a and for this reason will be more readily responsive and receptive to the action of said steam or water, for in the case of breaking of the glass tube a the pressure exerted upon the differential valve D centrally and from one side only will tend to close said valve instantaneously. In order to insert or replace the glass tube a into the housings a' and a^2, it is necessary to close the opening c^2 in each of the housings a' and a^2 by the spindle or stem c^3 of the cut-off valve C. The tendency of the water and steam to always keep the head or disk d^4 of the stem d^2 of the differential valve in an open position or away from its seat d^8 will prevent accidental or other closing of said valve, and in such instance the same will be forced back into its open or normal position. Furthermore, the extent of projection of the spindle or valve-stem d^2 of the differential valve D beyond each housing will in conjunction with its button or handle d^3 thereof afford a ready signaling means for determining the proper position of the valve within the housings a' and a^2 and will expose said valve to atmospheric pressure. The lower housing a^2 is provided with a drip-valve e, while the upper housing a' is provided with a threaded plug e' to permit each to be used either as a lower or an upper housing.

The construction and arrangement of the differential valve D and cut-off valve C is such as that by closing the opening c^2 by the cut-off valve C and preventing the flow of water from the boiler b to the chamber c of the lower housing a^2 the water and impurities accumulating in the tube and housings a' and a^2 can be readily forced out or removed therefrom by opening the drip-valve e and permitting the steam to pass from the upper housing a' through the tube a into the lower housing a^2 and through the drip-valve e. The differential valves will in this instance be automatically kept open by the pressure of the escaping steam. On the other hand, when both cut-off valves are closed the differential valves can be entirely removed from the housings a' and a^2, whether under boiler-pressure or not, for cleaning, repairing, and any other purposes.

Having thus described the nature and object of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a water-gage, a boiler, a glass tube, housings, superposed chambers arranged in said housings, an inlet connecting the chambers with each other, a valve arranged in said lower chamber controlling the boiler-outlet and permitting of the entrance of water or steam from said boiler into said chambers, an angular passage connecting the upper chamber with said tube, and a valve centrally arranged in said upper chamber and having a differential face in alinement with the flow of water or steam from said boiler into said tube.

2. In a water-gage, a boiler, a glass tube, housings, superposed chambers arranged in said housings, an inlet connecting the chambers with each other, a valve arranged in said lower chamber controlling the boiler-outlet and permitting of the entrance of water or steam from said boiler into said chambers, an angular passage connecting the upper chamber with said tube, a valve centrally arranged in said upper chamber and having a differential face in alinement with the flow of water or steam from said boiler into said tube, and a drip-cock leading from the lower chamber of one of said housings directly to the atmosphere.

In testimony whereof I have hereunto set my signature in the presence of two subscribing witnesses.

EDWARD FRANCIS SHALLOW.

Witnesses:
J. WALTER DOUGLASS,
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