

No. 751,250.

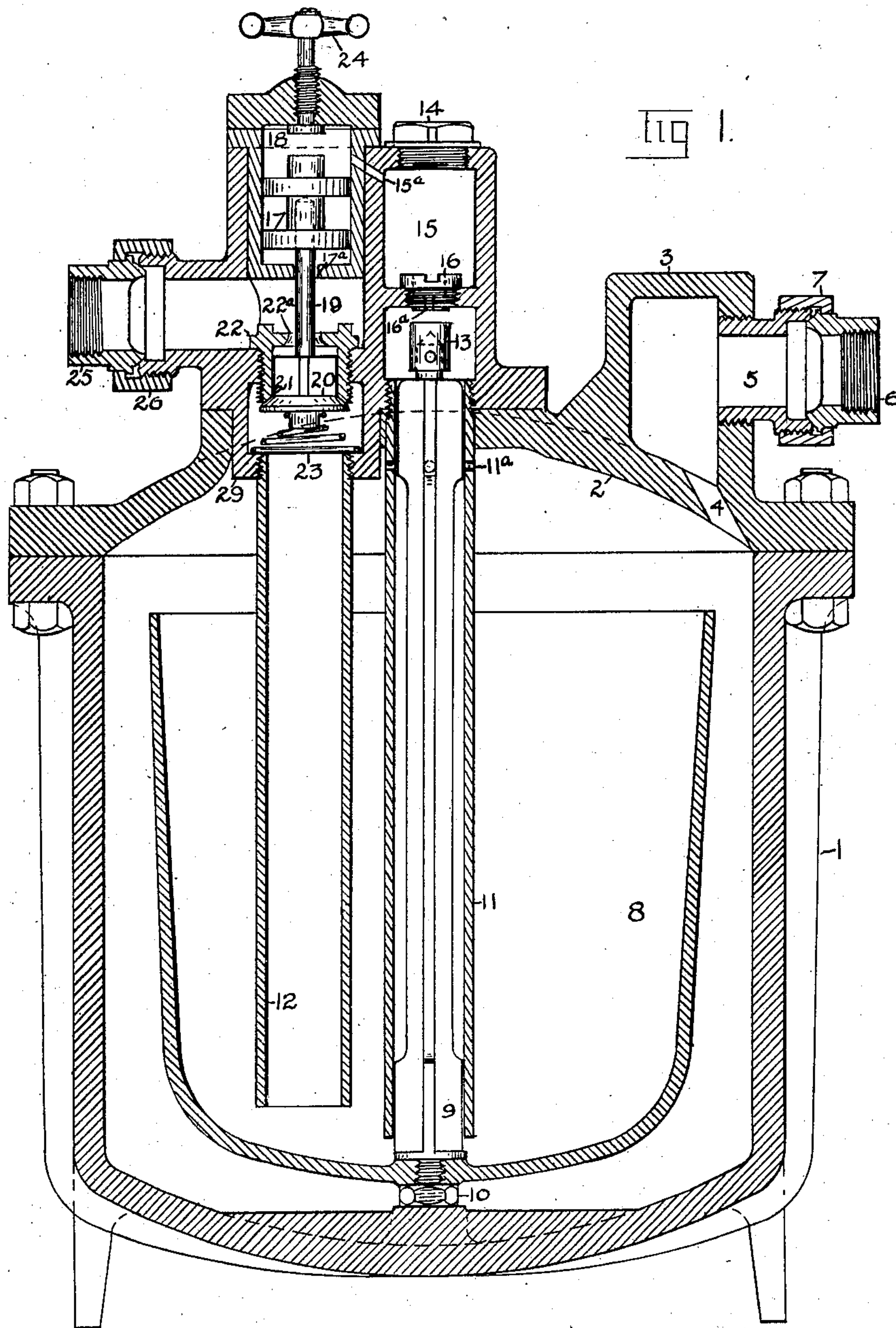
PATENTED FEB. 2, 1904.

J. H. BLESSING.  
STEAM TRAP.

APPLICATION FILED APR. 1, 1903.

NO MODEL.

2 SHEETS—SHEET 1.



WITNESSES  
*James O. Sumner*  
*W. P. Fairchild*

INVENTOR  
*James H. Blessing*  
*by R. H. Harris*  
*att*

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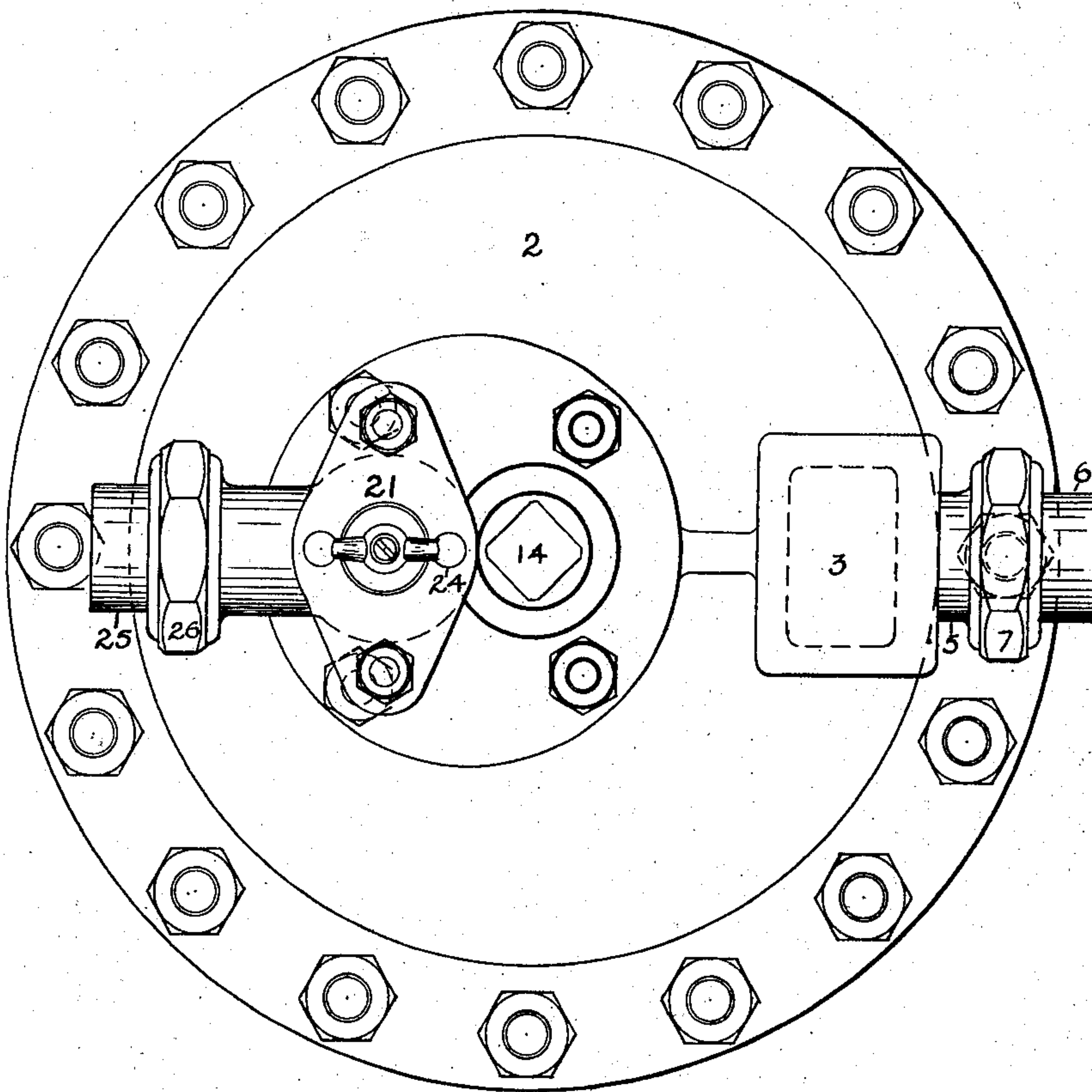
J. H. BLESSING.  
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APPLICATION FILED APR. 1, 1903.

NO MODEL.

2 SHEETS—SHEET 2.

Fig 2.



WITNESSES  
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## UNITED STATES PATENT OFFICE.

JAMES H. BLESSING, OF ALBANY, NEW YORK.

## STEAM-TRAP.

SPECIFICATION forming part of Letters Patent No. 751,250, dated February 2, 1904.

Application filed April 1, 1903. Serial No. 150,667. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES H. BLESSING, a citizen of the United States, residing at Albany, in the county of Albany and State of New York, have invented certain new and useful Improvements in Steam-Traps; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to steam-traps of the non-return order in which the condensation of the steam delivered from a system to the trap is not returned to a steam-generator. Devices of this character are generally provided with means for operating a valve connected with a discharge-pipe, whereby the valve may be opened automatically and the water discharged from a retaining-bucket through such discharge-pipe. The means commonly used for accomplishing this purpose consists of a valve attached to a valve-stem secured to a bucket and adapted to bear against a valve-seat, so that the condensed steam which flows into the outer casing of the trap and under and around the retaining-bucket raises the bucket and brings the valve onto its seat, and thereby closes the opening in said valve, and as the casing and bucket become filled with water the bucket descends of its own weight, and thereby releases the valve from its seat and permits the water to escape through said valve. If the opening of the valve operated directly by the bucket is used as a discharge-outlet and is made of suitable dimensions for such purpose, the bucket will under ordinary conditions be able to descend by the force of gravity and release the valve from its seat and open the outlet-valve; but such is not the case when the trap is used under a high pressure of steam, such as from one hundred and fifty to two hundred pounds. In such cases the pressure within the casing holds said valve so securely on its seat in consequence of the extended area of the valve that the bucket is unable to descend by the force of gravity against the resistance of such pressure and is therefore unable to release the valve from its seat and permit the surplus water to discharge through said valve at the proper

time. If the area of the valve and valve-seat be reduced to such an extent that the bucket will by its own weight release the valve from its seat, the opening of the valve must necessarily be so small as to be inoperative as an outlet for the surplus water in the bucket. It has therefore been found necessary in using devices of this character under such high pressure to supplement the weight of the bucket with auxiliary mechanism adapted to operate a valve of sufficient dimensions connected with a discharge-pipe. Means for accomplishing this result are shown and claimed in Letters Patent No. 578,310, granted to me the 9th day of March, 1897. In such construction the weight of the bucket is augmented by means of a lever which operates a valve connected with the outlet-pipe of the trap; but the possibilities of increasing the effectiveness of the gravity of the bucket in this manner are limited, because in order to obtain sufficient leverage to enable the bucket to release from its seat the valve operated thereby the outer end of such lever must necessarily move to a considerable extent, and difficulties sometimes arise in using such construction under a high pressure of steam. When a valve of suitable dimensions is used in connection with a discharge-pipe in traps of this character under a high pressure, it has been found that the surplus water when forced through said valve strikes with such force upon the valve-seat as to wear away the surface irregularly and produce corrugations and uneven surfaces, which destroy the efficiency of the valve.

My invention has for its object, first, to provide means adapted to automatically open a valve of suitable area connected with a discharge-pipe when used under high pressure, and, second, to provide means for protecting the seat of said valve from the effect of the water passing through the opening of the valve under great pressure. These objects I accomplish by the use in connection with a discharge-pipe extending into a bucket of a steam-actuated valve of enlarged area, having a valve-seat provided with a discharge-aperture and an outlet connected therewith smaller than the valve-opening. By such means the



valve-seat is made sufficiently large to enable the water to pass freely through the same, and the wire-drawing effect produced by the water as it passes through under great pressure is sustained by the contracted outlet instead of by the valve-seat.

In the accompanying drawing the outer casing of the trap consists of a shell 1, having a top 2 bolted thereto. An inlet-pipe 6 is connected to a receiving-chamber 3 on the top of the casing, which chamber is provided with a port-hole 4, leading into the outer casing. Within the outer casing is arranged a bucket 8, to the lower portion of which is secured the lower end of a valve-stem 9. This valve-stem is preferably provided at its upper and lower ends with laterally-extending flanges, which bear against the inner surface of a pipe 11, secured to the top of said casing, and guide the vertical movement of said valve-stem. Attached to the upper end of said valve-stem is a flat-faced valve 13, which on its under portion is provided with an inclined socket, by means of which the valve is pivoted on the pointed upper end of the valve-stem, to which said valve is loosely secured by means of a pin, so as to enable the valve to have a limited rocking movement on its bearing on said stem, and thereby enable the face of the valve to bear evenly against the flat face of a valve-seat 16, which preferably consists of a circular plug provided with a threaded outer edge and detachably secured thereby to a horizontal partition formed at the bottom of a steam-chamber 15. The valve-seat 16 is provided with a port-hole 16<sup>a</sup>, extending through said valve-seat and leading into the steam-chamber 15. The upper end of this steam-chamber is provided with a hand-hole having a threaded plug 14, which may be removed when desired, so as to enable the valve-seat 16 and valve 13 to be removed and replaced. A port-hole 15<sup>a</sup> extends from the steam-chamber 15 into a steam-cylinder 18, within which cylinder is arranged a piston 17, secured to a rod 19, which rod on its lower end is provided with a valve 20, having a smaller area than the piston 17 and adapted to bear against a valve-seat 21, which valve-seat is preferably formed on a valve-bushing 22, having a threaded outer surface engaging a correspondingly-threaded surface formed on the valve-head connected with the top 2 of the trap. The valve-seat is provided with a central discharge-aperture, and the upper portion of said bushing is provided with a diaphragm having an outlet 22<sup>a</sup>, smaller than the opening of the valve-seat. The top of the cylinder 18 is provided with a cap which may be detached, so that the piston 17, the valve-bushing 22, the valve 20, and the inner wall of the chamber 18 may be removed and replaced when desired. The opening 17<sup>a</sup> in the lower portion of the steam-cylinder 18 is made slightly larger than the diameter of the piston-rod 19, passing therethrough, so

that an air-chamber may be formed in the lower portion of said cylinder and permit the air to escape gradually, and thereby resist a too-sudden downward movement of the piston. The piston 17 is supported upon a spiral spring 23, which rests upon an annular shelf 29, formed on the lower portion of the valve-head connected with the top 2 of the trap. A discharge-pipe 12 is also secured to the valve-head, and its lower end extends down into the lower portion of the bucket 8. The cap of the steam-cylinder 18 is provided with a threaded stem having a handle 24 on its upper end and adapted at its lower end to bear against the upper end of the piston 17 and move the piston-rod downward, so as to remove the valve 20 from its seat and make a continuous open passage-way from the discharge-pipe 12 through the outlet 22<sup>a</sup>, formed in the bushing 22, and the outlet-pipe 25.

When this device is in use, the condensation from the steam delivered from a system enters through the inlet-pipe 6 into the receiving-chamber 3, from which it passes by means of the port 4 into the space between the wall of the bucket 8 and the inner wall of the shell 1. When a sufficient quantity of water has entered the casing, the bucket 8 is raised thereby until the valve 13 is brought into contact with the valve-seat 16. This valve being pivoted upon the upper end of the valve-stem 9 is enabled to conform to the under surface of the valve-seat 16 and lie evenly thereon. The water as it continues to flow into the outer casing eventually fills the space between the inner wall of the shell and the bucket and overflows into the bucket, which eventually becomes filled with water. When the pressure of water within and without the bucket becomes equalized, the bucket descends of its own weight, carrying with it the valve-stem 9 and the valve 13, secured thereto. The steam which has entered the trap with the water and which remains on the upper surface thereof then enters the upper end of the pipe 11 through the steam-ports 11<sup>a</sup> and passes through the aperture 16<sup>a</sup> in the valve-seat 16 into the steam-chamber 15 and from thence through the steam-port 15<sup>a</sup> into the cylinder 18, where it presses the piston 17 downward until the valve 20 is removed from the valve-seat 21. As the piston 17 descends its downward movement is retarded somewhat by the air in the lower portion of said cylinder below the piston, which forms a cushion for the piston and enables the air to escape gradually through the aperture 17<sup>a</sup>, formed in the lower end of the cylinder 18 and made slightly larger than the diameter of the valve-stem 19. When the valve 20 is removed from its seat, the pressure within the trap forces the water from the bucket 8, out through the discharge-pipe 12, past the valve 20, and through the contracted outlet 22<sup>a</sup> to the outlet-pipe 25, from which it is delivered into the atmosphere, a



or other receptacle. This overflow of from the bucket continues until the has become sufficiently empty to rise and bring the valve 13 in contact with its and shut off the supply of steam from under 18. When this has taken place, the within the upper portion of the cylinder 18 condenses and after passing by the piston 17 drips down and out of the lower end of the cylinder 18. When the steam has been shut off from the upper end of the cylinder 18 and the pressure on the upper surface of the piston thereby removed, the pressure within the casing is exerted on the under surface of the valve 20 and lifts the valve gradually toward its seat 21; but as the valve comes in close proximity to its seat and the area of the space between the valve and its seat becomes less than the area of the outlet 22<sup>a</sup> the steam in the chamber between the valve and said diaphragm escapes and relieves the upper surface of the valve 20 from any opposing pressure, and the valve then closes quickly onto its seat and stops the discharge of water from the trap. By means of such construction the valve-opening may be made of the same diameter as the outlet or discharge pipe and permit a free and uninterrupted flow of water through the outlet-valve, and the water discharged from the trap as it passes under high pressure through the discharge-pipe 12 is retarded by the contracted outlet 22<sup>a</sup>, and consequently the valve-seat is relieved from the strain and wire-drawing effect which is exerted on the edge of the outlet 22<sup>a</sup>. As the water continues to flow into the outer casing it again fills the chamber or space between the casing and bucket and overflow into the bucket, which again descends, removing the valve 13 from its seat and permitting steam to pass into the cylinder 18, as before, to depress the valve 20 and again permit the water from the bucket to be discharged into the atmosphere. It is sometimes desirable to permit the steam and water to flow through the trap continuously, and this is accomplished by screwing down the threaded stem at the upper end of the steam-cylinder 18 by means of the handle 24, which releases the valve 20 from its seat and enables the

steam and water to pass freely and continuously through the discharge-pipe 12 and the valve connected therewith as long as desired.

I do not desire to be limited to the specific mechanism shown and described herein for accomplishing the objects of my invention. 55 Other means having similar capabilities in respect to their general construction and mode of operation may be substituted therefor without departing from my invention.

What I claim as new, and desire to secure 60 by Letters Patent, is—

1. The combination with an outer casing, of a steam-cylinder, a piston with said cylinder mounted upon a rod smaller in diameter than the opening for said rod in the cylinder, a valve 65 mounted on said rod, a valve-seat cooperating with said valve, and a discharge-pipe connected with said valve, substantially as shown and described.

2. The combination with an outer casing, of 70 a bucket, a discharge-pipe extending into said bucket, a steam-actuated valve connected with said discharge-pipe, a valve-seat having a discharge-aperture, and an outlet connected therewith smaller than the aperture of the valve-seat, substantially as shown and described. 75

3. The combination with an outer casing, of a bucket, a discharge-pipe extending into said bucket, a steam-cylinder, a piston mounted upon a rod within said cylinder, a valve operated by said piston, a valve-seat having a discharge-aperture, and an outlet connected therewith smaller than the aperture of the valve-seat, substantially as shown and described. 80

4. The combination with an outer casing, of 85 a bucket, a discharge-pipe extending into said bucket, a steam-actuated valve connected with said discharge-pipe, and a valve-bushing provided with a valve-seat having a discharge-aperture, and an outlet smaller than the aperture of the valve-seat, substantially as shown and described. 90

In testimony whereof I affix my signature in presence of two witnesses.

JAMES H. BLESSING.

Witnesses:

BORDEN H. MILLS,

ROBERT W. HARDIE.