No. 788,485. PATENTED APR. 25, 1905.

J. W. LYTTON.

STEAM TRAP.

APPLICATION FILED DEC. 30, 1904.

2 SHEETS—SHEET 1.

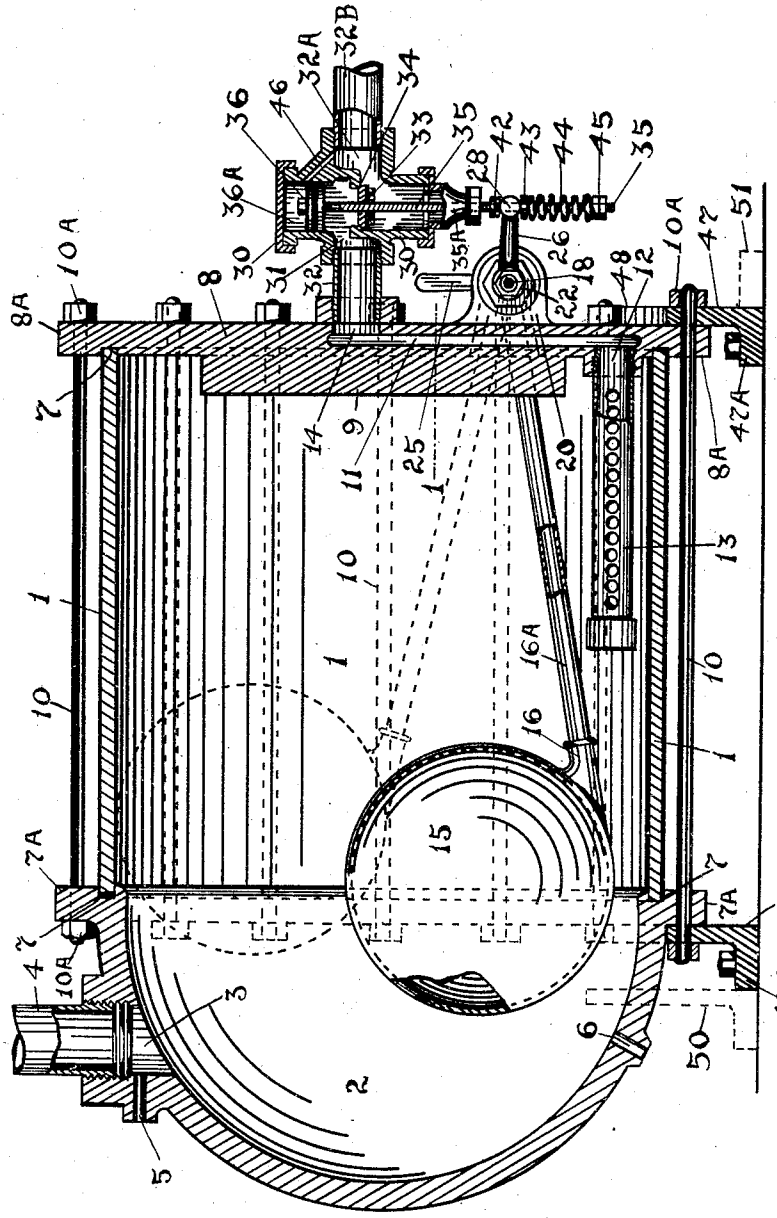


Fig. 1

Witnesses
George L. Bonney.
B. Rees

Jarard W. Lytton Inventor

By Walter B. Burrow Attorney

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2 SHEETS—SHEET 2.

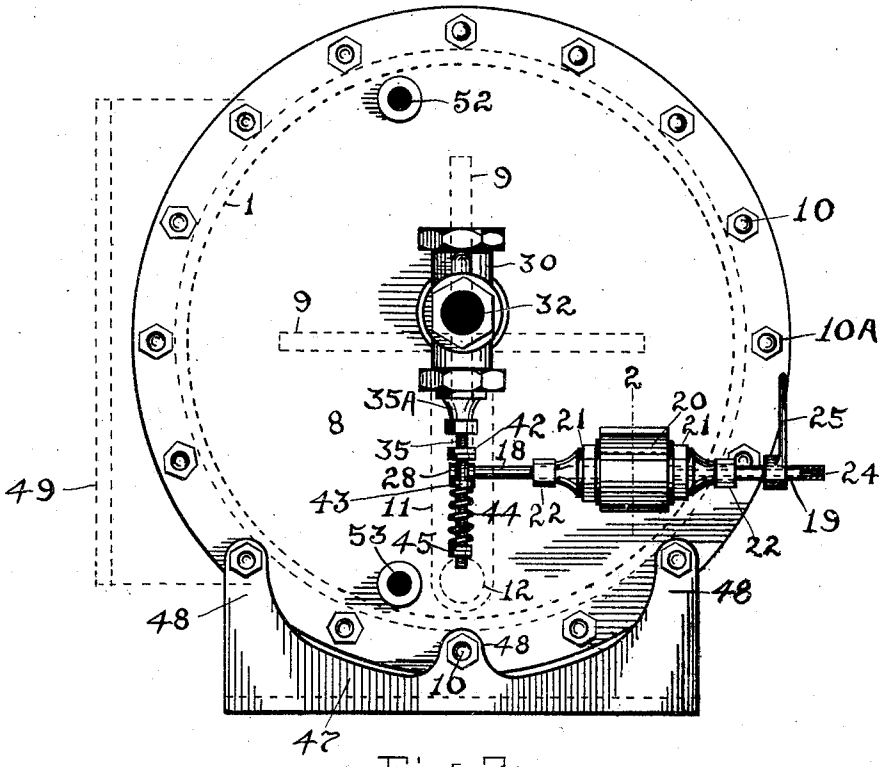


Fig 2

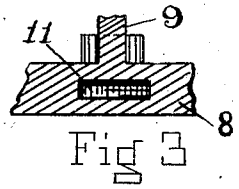


Fig 3

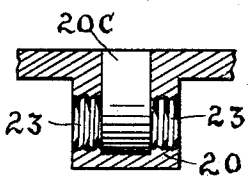


Fig 6

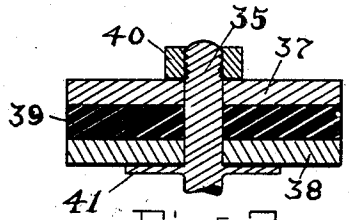


Fig 7

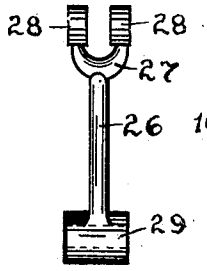


Fig 8

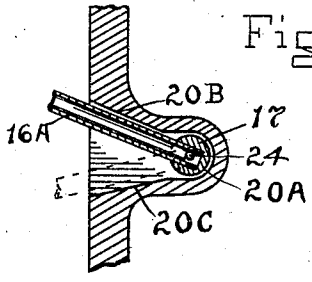


Fig 4

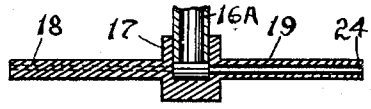


Fig 6

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B. Rees.

By Walter B. Burrow. Attorney

No. 788,485. Patented April 25, 1905.

UNITED STATES PATENT OFFICE.

JARARD W. LYTTON, OF PORTSMOUTH, VIRGINIA.

STEAM-TRAP.

SPECIFICATION forming part of Letters Patent No. 788,485, dated April 25, 1905.

Application filed December 30, 1904. Serial No. 238,934.

To all whom it may concern:

Be it known that I, JARARD W. LYTTON, a citizen of the United States, residing at Portsmouth, in the county of Norfolk and State of Virginia, have invented new and useful Improvements in Steam-Traps, of which the following is a specification.

My invention relates to steam-traps and parts thereof.

The principal object of the invention is to provide means whereby a puncture of the float may be made known by an escape of steam or vapor to the exterior of the trap-receptacle.

A further object of my invention is to provide a novel form of receptacle and elements pertinent thereto, the advantages of which will be more fully pointed out hereinafter.

The other objects and advantages of the invention will be set forth at length in the following description, while the novelty of which will form the basis of the claims hereunto appended.

My present invention includes certain peculiarities shown in simple embodiments in the annexed drawings, forming a part of this specification, in which—

Figure 1 is a sectional elevation through the trap-receptacle and the discharge-valve mechanism. Fig. 2 is a front end elevation of the receptacle, showing the plug-casing, discharge-valve, and their connecting members. Fig. 3 is a sectional plan of the discharge-port, taken on the line 1 in Fig. 1. Fig. 4 is a section through the plug-casing, plug, and a part of the hollow float-stem, taken on the line 2 in Fig. 2. Fig. 5 is a sectional plan of the plug-casing, the plug being removed therefrom. Fig. 6 is a sectional plan of the plug, showing the solid and hollow spindles forming a part thereof or connected thereto. Fig. 7 is a sectional elevation of the piston forming a part of the discharge-valve mechanism. Fig. 8 is a plan of the bifurcated disk-ended discharge-valve-operating lever which is shown in side elevation in Fig. 1.

In the drawings like reference-numerals indicate corresponding parts in the several views.

The trap-receptacle consists of a horizontal cylindrical member 1, Fig. 1, preferably a short length of wrought-iron or steel pipe, having its ends machined true in order to effect a tight joint. The ends of the hollow cylindrical or pipe section 1 are closed by cast-iron heads, one of which is shown at 2 and has a semispherical form for convenience, though I am not confined to such, as I may use a flat or dish-shaped head, as desired. The head or end member 2 is provided with an inlet 3 for the liquid, into which is screwed the inlet-pipe 4, connected to the source of supply. The head 2 is also provided with an opening 5 for a vent and a drain-orifice 6, in which are fitted suitable valves or cocks, though they are not shown in the drawings. The head or cover 2 is provided with an annular groove 7 on the circular flanged portion 7^A, into which the hollow cylindrical or pipe section 1 is inserted. I may use suitable packing in the groove or cylinder-channel 7, if necessary, in order to secure a steam and air tight joint. The other end of the pipe-section 1 is provided with a circular or disk head 8, having an annular flange 8^A and suitably strengthened by the ribs or brace-bars 9. The heads 2 and 8 are held against the ends of the pipe-section 1 by means of the screw-ended binding or stay rods 10, arranged in a circular or cylindrical row around the pipe-section 1. The proper degree of pressure necessary to hold the pipe and the head or end members together to form a hermetically-closed receptacle is exerted by the nuts 10^A when screwed up, which also enables the chamber or receptacle to be quickly taken apart by removing the nuts and separating the members.

The head or cover 8 has a port or channel 11 within its wall or web portion and extends vertically from near the bottom of the receptacle to the center of the cover 8 or in the direction of its perpendicular axis, Figs. 1 and 2. The lower end of the port 11 connects with the port-inlet 12, into which is fitted the perforated pipe 13, through which the liquid passes into the port and upward to the port-outlet 14 and thence to the discharge-valve mechanism, which will be described hereinafter.

15 is a hollow closed float having a sleeve 16 at a tangent thereto, into which one end

of the hollow stem 16^A is secured. The other end thereof is fastened into the plug 17 at right angles to its axis or diametrically therewith. The plug 17 is provided with spindles 18 and 19, axially extending on each end thereof. One of the spindles, as at 18, is solid, and the other spindle, 19, is hollow in order to effect a communication to the float interior, Figs. 4 and 6. I may make both spindles hollow, as desired, and I am not confined to the precise manner indicated in Fig. 6. The plug 17 is inclosed within the casing 20 and is so supported that the plug does not come in contact with the inner surface of the casing, and therefore forms an annular space 20^A, Fig. 4, between them, the plug being held in axial alinement by suitable stuffing-boxes and screw-plugs, as will be described hereinafter. The plug-casing 20 is provided with a divergent cavity forming inclined or sloping surfaces 20^B and 20^C, the point of the greatest divergence being within the receptacle in order to allow for the angular movement of the hollow float-stem, as shown in Figs. 1 and 4.

21 represents screw-threaded plugs carrying the stuffing-boxes 22 and are inserted into the screw-threaded portions 23, Fig. 5, in the plug-casing.

One of the plug-spindles, 19, as already described, is hollow and connects with the opening in the plug 17, into which the hollow float-stem 16^A is connected, so that should the float 15 become punctured or inoperative it will be immediately detected by the escape of steam or vapor issuing at the end of the hollow spindle 19 from the float interior, as shown at 24 in Figs. 2, 4, and 6. In order to actuate the float from the exterior of the receptacle to test the working parts of the trap, I provide a lever or handle 25, attached to one of the plug-spindles 18 or 19, by which the receptacle may also be prematurely discharged, if desired.

One of the spindles 18 or 19, preferably that at 18, is provided at its end with a lever 26, having a bifurcated portion 27, Fig. 8. The forked portion 27 is terminated by circular or disk ends 28, arranged parallel with the axis of the lever or arm or in direction of the length of the sleeve portion 29. The forked end of the lever 26 is for operating and partly inclosing the stem or spindle of the discharge-valve mechanism, as will be hereinafter described.

30, Fig. 1, is the casing of the discharge-valve, 31 being the inlet, and 32 is a pipe connecting the outlet of the receptacle to the valve-inlet 31.

32^A is the discharge-valve outlet, and 32^B the pipe connection leading to a suitable discharge point.

33 is a single puppet-valve normally upon its seat 34 and is secured upon a partly-threaded spindle 35, passing steam-tight through the bonnet 35^A.

36, Fig. 1, is a piston working steam-tight within the expansion-chamber 36^A in the upper portion of the valve-casing 30. The piston consists of an upper perforated disk or circular clamp-plate 37, Fig. 7; also a lower plate or disk concentric with that at 37.

39 is a packing disk or plate of some vulcanized material or other substance and is perforated so as to surround the spindle 35, the disks or plates 37 and 38 exerting pressure to clamp the packing when acted upon by the nut 40, so that they are held securely in concentric relation with each other.

41 is a collar on the spindle 35 for supporting the disks 37 and 38, together with the packing 39 of the piston.

42 represents adjusting-nuts near the bonnet 35^A and are for the purpose of regulating the period of the puppet-valve closing and are located above the disk ends 28 of the lever 26.

43 is a washer or blank nut surrounding the spindle 35 and loose thereon and is placed below the disk ends of the arm or lever 26 and is for the purpose of forming a bearing for the disk ends 28. The washer 43 rests upon the spring 44, rising and falling as the spring becomes depressed or extended during the operation of the trap. The spring surrounds the spindle 35, and its compression is regulated by means of the nuts 45, which also maintains the adjustment by the locking effect of one of the nuts.

The puppet-valve 33 is normally closed while the receptacle is filling with the liquid by pressure acting upon the piston 36, which tends to cause it to ascend due to its greater area, being larger in diameter than the valve 33. When the liquid in the receptacle causes the float to rise, the arm or lever 26 having motion coincident with that of the float and its stem the spring 44 is depressed or put into compressive tension by the fall of the lever 26, which causes the disk ends 28 to bear upon the washer 43, and so continues until the spring compression is sufficient to overcome the difference between the pressure acting on the area of the valve 33 and the piston 36, at which point the valve 33 instantaneously leaves its seat and the receptacle discharges its contents. After the operation already described takes place the float 15 falls and the lever 26 rises and closes the valve 33 by the disk ends 28 bearing on the nuts 42 and places the piston in its initial position for a subsequent operation. Should any steam or liquid escape around the piston and into the expansion-chamber 36^A above it, it is discharged through the port or channel 46 in the valve-casing 30 to the outlet 32^A and thence to the point of discharge.

In order to adapt my invention so that it

may be supported from any point other than a horizontal plane or for operation in a contracted space—as, for instance, in marine service—I provide detachable brackets or standards 47, having angular or L-shaped flanges 47[A] formed thereon, by which the brackets are secured by bolts and nuts to support the receptacle. The brackets have rounded ears or curved surface projections on their plate or web portions and are provided with apertures therein, so that they may be fastened to the heads or covers 2 and 8 by the screw-ended binding or tie rods 10 in order that the brackets 47, heads 2 and 8, and hollow cylindrical member 1 are firmly bound together by means common to all the elements comprising the receptacle or chamber.

49, Fig. 2, shows by dotted lines the arrangement of the brackets 47 when the trap is to be located on a vertical bulkhead or partition.

50, Fig. 1, represents dotted lines showing a drawn-apart position of the left-hand bracket, while the dotted lines at 51 show the angle or L-shaped feet turned outward and in a direction opposite to that shown by the adjacent full lines.

The position of the brackets may be greatly varied. For instance, the trap may be suspended from the ceiling or upon the opposite side to that shown by the dotted lines 49 in Fig. 2.

In order to determine the height of liquid in the receptacle, I provide openings 52 and 53 in the head or cover 8, Fig. 2, for connection with a suitable water-gage.

The space between the flanges of the heads or covers 2 and 8 may be filled with non-conducting material, thus covering the rods or bolts 10, which can be still further covered with planished sheet-iron in order to give a neater appearance to the receptacle.

I am not confined to the precise details of construction shown in the drawings, as I may modify such parts as may be deemed expedient without departing from the subject-matter herein claimed or sacrificing any of the advantages thereof.

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

1. In a steam-trap or similar apparatus, of a receptacle therefor comprising a single flangeless and continuous hollow member, a head or end member on each end thereof, and clamping-rods arranged in a circular row around the circumference of the said cylindrical member and uniting the said end members thereto; as described.

2. In a steam-trap, of a receptacle therefor comprising a single flangeless continuous and hollow cylindrical member and flanged end members thereof, and tie-rods arranged in a circular row and surrounding the said cylindrical member; as described.

3. In a steam-trap, of a chamber therefor comprising a single continuous hollow flangeless pipe-section, an end member closing each end thereof, and clamp-bolts inclosing the said pipe-section and uniting the said end members thereto; as described.

4. In a steam-trap, of a receptacle therefor comprising a single continuous hollow cylindrical or flangeless pipe member, an end member on each end thereof, bolt-clamping means for securing the said end members to the said pipe member, and means for forming a cylindrical cage with the said bolts and inclosing the pipe member therein; as described.

5. In a steam-trap or similar apparatus of a receptacle therefor comprising a single flangeless and continuous hollow member, a flanged cover on each end thereof, a series of rods or bolts surrounding the said hollow member and joining the covers thereto, and means for forming a tight joint between the edges of the hollow member and the face of the covers; as described.

6. In a steam-trap or like apparatus, of a receptacle therefor comprising a hollow intermediate member, a semispherical flanged head or cover on one end thereof, a ribbed flat cover on the other end of the hollow member, an annular groove on the flange portion of said covers, means for inserting the edges of the hollow member in the said grooves and forming a tight joint therebetween, and a series of screw-ended nut-adjusted rods or bars inclosing the hollow member and clamping the covers thereto; as described.

7. In a steam-trap or similar apparatus, a receptacle therefor comprising a hollow central member, a flanged semispherical or dished grooved cover member on one end thereof, a flanged grooved ported flat cover on the other end of the hollow member, a series of connecting-orifices in the said covers, a series of clamp bolts or rods arranged in circular form around the flanged portions of the said covers and inclosing the central member, means for clamping the said hollow central member between the covers for securing a tight joint therebetween; as described.

8. In a steam-trap or similar apparatus, of a receptacle therefor comprising a central pipe member, a flanged hollow semispherical member closing one end thereof, a flat cover closing the other end of the pipe member, a channel in the said flat cover extending at or near the edge of the cover to the center thereof, a series of openings in the said flat cover connecting with the channel therein, bolt means for joining the said flat and semispherical heads to the pipe members; as described.

9. In a steam-trap and the like, of a receptacle therefor comprising a central pipe member, a semispherical cover on one end thereof, a flat cover on the other end of the pipe member, a port within the wall or web of the said flat cover, a series of apertures connecting at

the ends of the said port and opening on each side of the cover, bolt means for inclosing the said pipe member and joining the covers thereto, and a series of angle-ended plates for supporting the said receptacle in any position; as described.

10. In a steam-trap and in combination with a receptacle and covers therefor, a series of receptacle-supports comprising a series of angle-end or L-shaped detachable plates having an undulating upper edge, a series of attaching ears or lugs formed by the highest points of the said undulating edge, bolt means for fastening the said L-shaped plates to the receptacle-covers; as described.

11. In a steam-trap and like apparatus, the combination with a central hollow section, a series of flanged cover members, a plurality of supports for the said receptacle comprising detachable reversible angle-ended plates having an alternately concave and convex margin, bolt means for clamping the said supporting-plates by their convex portions, and bolt means for clamping the said receptacle members and the supporting-plates together; as described.

12. In a steam-trap, the combination with a closed receptacle having inlet and outlet connection, an automatic discharge-valve attached to the said outlet, a hollow closed float, a socket attached thereto at a tangent, a hollow stem connected to the socket, a partly solid and hollow spindle or shaft on the said float-stem at right angles thereto, means for connecting the said spindle with the float-stem to effect a communication therethrough to the float interior, means for causing a discharge of steam or vapor from the float interior through to the hollow spindle end to the atmosphere when the float becomes perforated or inoperative, a lever on the said spindle for actuating the float and the discharge-valve from the receptacle exterior, and spring compression means for opening the said discharge-valve to eject the contents of the said receptacle; as described.

13. In a steam-trap, the combination with a closed receptacle having inlet and outlet connection, an automatic discharge-valve exteriorly connected to the said outlet, a closed hollow float, a hollow stem connected at a tangent thereto, a semirotary plug attached at right angles to the said stem, a hollow and solid shaft axially extending on the ends of the plug, a fork-ended lever on one of the spindles for actuating the discharge-valve during liquid-level changes within the receptacle, a handle or lever on the other spindle for actuating the mechanism within the receptacle and the discharge-valve from the exterior of the said receptacle, means for effecting a communication to the float interior through the said float-stem, the plug and the spindles thereof from the atmosphere; as described.

14. In a steam-trap, the combination with a closed receptacle or chamber having inlet and outlet connection, a float-controlled outside-connected automatic discharge-valve mechanism, a hollow stem for the said float, an outside-connected interiorly-diverging plug-casing on one end of and opening into the chamber, a diametrically and axially perforated plug supported in the said casing adjacent to the inner surface thereof, a series of axially-extending hollow spindles on the ends of the said plug, a series of spindle-supporting screw-plugs and stuffing-boxes on the casing, means for connecting the said float-stem and the spindles and plug to effect an opening to the interior of the float from the exterior of the chamber, a forked lever for opening and closing the said discharge-valve with the rise and fall of the liquid in the chamber, and means for actuating the float and its attached mechanism from the exterior of the said chamber; as described.

15. In a steam-trap or similar apparatus, the combination comprising a receptacle having inlet and outlet connection, a float-controlled outside-connected automatic valve for discharging the receptacle at intervals, a hollow spindle connecting the said float, an exteriorly-disposed internally-diverging plug-casing on one end of the receptacle, a perforated cylindrical plug attached diametrically to the said stem, a hollow and solid spindle axially extending from the ends of the plug, a series of screw-threaded plugs on each side of the plug-casing, a series of stuffing-boxes on the said plugs, means for supporting the plug by the stuffing-boxes out of contact with the inner surface of the plug-casing a lever-handle for actuating the said plugs, float and the discharge-valve from the outside of the receptacle, and means for connecting the plug-spindles and the plug to effect a passage from the interior of the float to the exterior of the receptacle; as described.

16. In a steam-trap, the combination with a closed receptacle having inlet and outlet connection, a liquid-level-actuated float, a hollow stem therefor, a float-controlled exteriorly-disposed hollow spindle, an outside-connected automatic discharge-valve comprising among its members, a valve-casing, a normally closed puppet discharge-valve, an expansion-chamber, a piston working therein, the said piston being of a greater area than the puppet-valve, means for holding the puppet-valve to its seat by the piston when under pressure, float means for overcoming the pressure acting on the piston to unseat the puppet-valve for discharging the receptacle; as described.

17. In a steam-trap and the like, the combination with a closed receptacle having inlet and outlet connection, an exteriorly-disposed spindle, a receptacle-inclosed liquid-supported float, hollow connecting means between the said float and spindle, a disk-ended float-controlled forked lever on the said spindle, an automatic receptacle-discharge valve located

on one end of the said receptacle and actuated by the float-controlled forked lever, the said discharge-valve comprising among its members, a valve-casing a normally closed puppet-valve, an expansion-chamber formed by the valve-casing, a piston working therein having a larger area than the puppet-valve and holding thereof to its seat by the pressure in the receptacle, a stem connecting the said puppet-valve and piston, means for overcoming the pressure acting on the piston, and means for regulating the closing period of the said puppet-valve; as described.

18. In a steam-trap and the like, the combination with a closed receptacle having inlet and outlet connection, a hollow float and stem therefor, a spindle arranged transversely upon the stem and exteriorly disposed upon the receptacle, a liquid-level-controlled outside-connected discharge-valve attached to the said receptacle-outlet and comprising among its members, a valve-casing, an expansion-chamber therein, a piston working in the said expansion-chamber, the said piston formed of a series of disks clamping packing material therebetween, a puppet-valve of less area than the said piston, pressure means for holding the said puppet-valve in a closed position by the piston until the receptacle is to be discharged, a disk-ended forked lever attached to the said transverse spindle for actuating the puppet-valve and piston, an operating-stem for connecting the puppet-valve and the piston with the forked lever, and resilient means acting on the said puppet-valve and piston by the said float-controlled forked lever to quickly open the puppet-valve when the pressure on the piston is counterbalanced by the force of the rising liquid in the receptacle when acting on the float; as described

19. In a steam-trap or the like, the combination with a liquid-receiving receptacle having inlet and outlet connection, a float-connected exteriorly-disposed hollow spindle adapted for semirotary movement, a liquid-level-operated outside-connected automatic discharge-valve attached to the said receptacle-outlet and comprising among its members, a valve-casing an expansion-chamber therein, a piston working in the said expansion-chamber, comprising a series of concentric perforated disks, a perforated concentric packing-disk therebetween, means for clamping the packing-disk by the said concentric disks, an operating-spindle connecting the said piston, a normally closed puppet-valve connected to the piston by the stem, means for allowing any leakage around the piston to pass to the discharge-valve outlet, a float-actuated disk-ended bifurcated lever on the spindle a spring surrounding the valve-operating stem, a loose collar or blank nut slidably positioned upon the spring, means for causing the disk ends of the bifurcated lever to compress the said collar and the spring to quickly open the puppet-valve against the pressure acting on the piston, means for closing the puppet-valve and the outlet of the receptacle by the bifurcated lever when the liquid recedes, a series of adjusting and lock nuts above the disk portion of the forked lever for regulating the closing period of the puppet-valve, and a series of adjusting and locking nuts on the lower end of the spindle for regulating the spring compression; as described.

20. In a steam-trap and like apparatus, the combination with a closed chamber having inlet and outlet connection, a closed hollow float controlling the said outlet, a hollow float-stem, an exteriorly-disposed transverse hollow spindle at right angles to the float-stem, communication means between the interior of the float to the ends of the spindles, a handle on one of the spindles for operating the float and its connected members non-automatically from the chamber exterior, a forked disk-ended arm on the other spindle, an automatic discharge-valve disposed upon the outside of the chamber, a valve-casing for the discharge-valve, an expansion-chamber in the valve-casing, a piston movably supported in the expansion-chamber, a channel in the valve-casing leading from the expansion-chamber to the outlet of the valve-casing, means for allowing any leakage around the piston to be discharged through the said channel, an operating valve-stem for the piston, a puppet-valve concentric with the piston attached to the said stem and having less area than the said piston, a spring surrounding the operating-spindle, a bearing-collar slidably located on the spindle and upon the spring, compression means actuated by the float to cause the spring to quickly open the puppet-valve to the discharge-outlet against the pressure acting on the piston, means for regulating the puppet-valve closing and adjustment means for increasing and decreasing the spring compression; as described.

In testimony whereof I have hereunto affixed my signature, in the presence of two witnesses, this 28th day of December, A. D. 1904.

JARARD W. LYTTON.

Witnesses:

J. H. NININGER,

THEODORE S. GARRETT, Jr.