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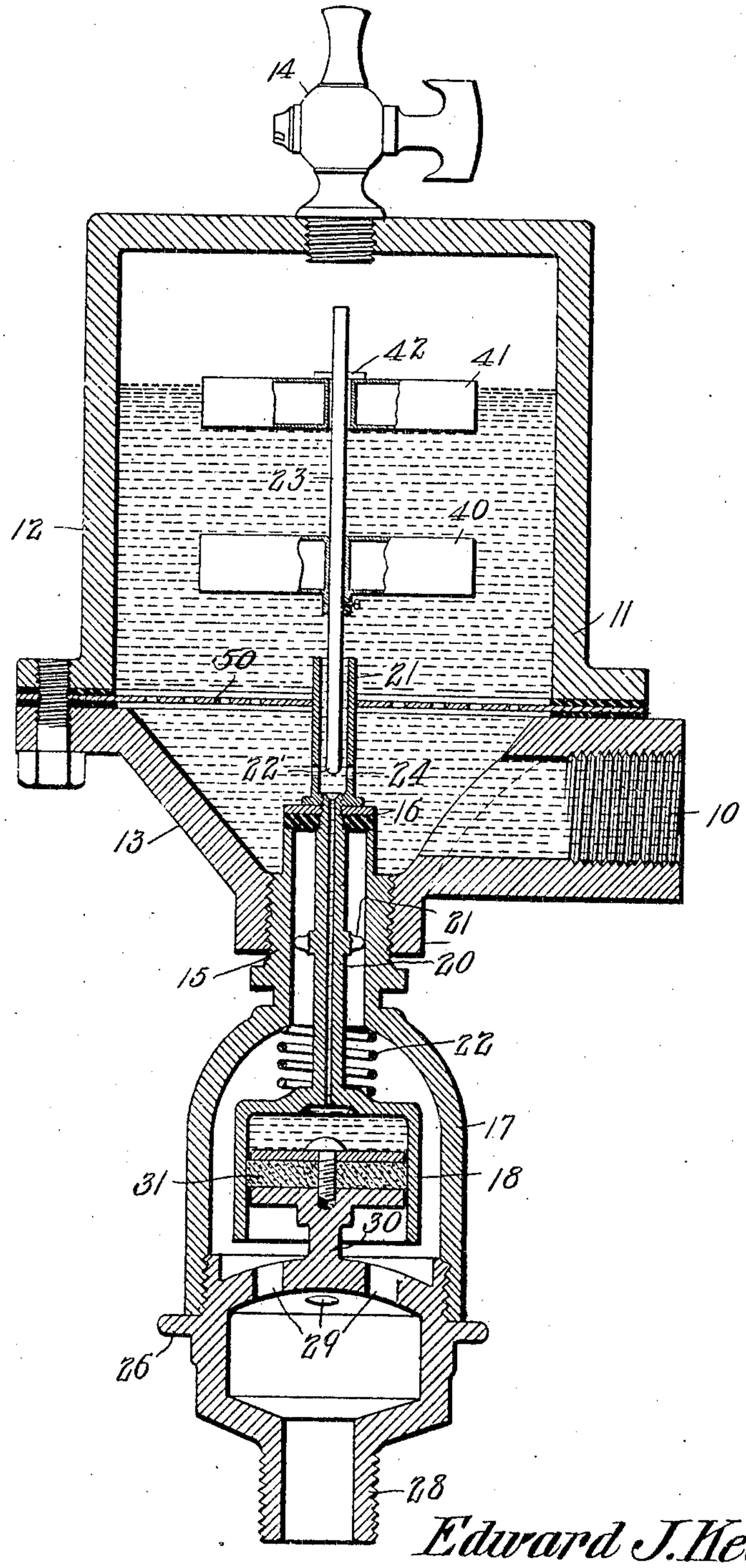
E. J. KELLEY.

STEAM TRAP.

APPLICATION FILED JAN. 29, 1906.



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STEAM-TRAP.

No. 849,401. Specification of Letters Patent. Patented April 9, 1907.

Application filed January 29, 1906. Serial No. 298,486.

To all whom it may concern:

Be it known that I, EDWARD J. KELLEY, a citizen of the United States, residing at Washington, District of Columbia, have invented a new and useful Steam-Trap, of which the following is a specification.

This invention relates to steam-traps employed for the removal of water of condensation from steam-heating or other systems, and has for its principal object to provide a device of simple and economical construction which will permit the accumulations of water to discharge without permitting the escape of steam.

A further object of the invention is to provide a float-valve of novel construction wherein a pair of floats is arranged to operate the valve, the floats being successively operable and the buoyancy of both being required to raise the valve.

A further object of the invention in this connection is to so arrange and construct the floats and the valve as to permit gradual opening and gradual closing of the valve.

With these and other objects in view, as will more fully hereinafter appear, the invention consists in certain novel features of construction and arrangement of parts hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size, and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

The accompanying drawing represents a vertical section of a steam-trap constructed in accordance with the invention.

The water of condensation flows through a connection 10 to a casing 11, that preferably is formed of two sections 12 and 13, united by suitable bolting-flanges, a gasket being introduced to prevent escape of fluid. At the top of the section 12 is a petcock 14 to permit the escape of air when necessary.

Connected to the lower portion of the section 13 is a nipple 15, the upper end of which extends up into the chamber 11, and its upper edge is faced to form a seat for a valve 16. To the lower end of the nipple a casing 17 is permanently secured, and within this casing is a cylinder 18, that is of much smaller diameter than said casing, an annular water-passage being formed between the periphery of the cylinder and the inner wall of the casing. The lower end of the cylinder is open, and from the upper end thereof extends a tube 20, that is provided with spider-arms 21, sliding within the nipple 15 in order to maintain the tube in central position. The lower portion of the tube is surrounded by a spiral spring 22, bearing at one end against the upper wall of the casing and at the opposite end against the top of the cylinder and tending to force said cylinder down. The tube 20 passes through and supports a valve 16, and said valve is held in place by a short tube 21, which is screwed onto the upper portion of the tube 20. The bore at the top of the tube 20 is tapered in order to form a seat for a vertically-movable float-valve 22′, that is formed at the lower end of a stem 23, and said stem is guided in part by tube 21. The lower portion of the tube 21 is provided with a number of perforations 24 to permit the free passage of fluid.

The lower end of the casing 17 is closed by a cap 26, which is screwed in place and has a nipple 28, which may be connected to a drain-pipe, the cap having a number of perforations 29, through which the water may flow to the nipple. The cap 28 is provided with a stem 30, to which is secured a piston 31, that fits within a cylinder 18, the piston being packed, but being of sufficiently small diameter to permit water within the cylinder 18 to pass the piston under the action of a spring 22 near the completion of each discharging operation.

To the lower portion of the stem 23 is secured a float 40, that preferably is in the form of a hollow cylindrical casing; but the buoyancy of this float is not in itself sufficient to raise the valve 22′ from its seat. The stem 23 serves also as a guide for a hollow float 41, which normally rests on top of the float 40, and said float 41 moves upward as the water-level increases until it comes in contact with a pin or lug 42 in the upper portion of the stem 23. This second float 41 is not of sufficient buoyancy to raise the stem 23.

In operation the water of condensation will gradually flow into the chamber 11 and the float 40 will be submerged, being held down by its own weight added to that of the stem 23. The float 41 will rise with the water and will finally come into contact with the lug or

pin 42, and the buoyant force of both floats then acting on the stem 23 will raise the latter clear of the seat at the upper end of the tube 20, permitting the water under steam-pressure to flow down into the cylinder 18. As the piston 31 is stationary, the cylinder must rise, and said cylinder moves upward against the stress of spring 22 until the valve 16 is moved from its seat, so that the water within the chamber 11 may flow freely through the nipple 21 into the casing 17 and from thence pass around cylinder 18 through openings 29 to the nipple 28 and through the drain-pipe. The float 41 gradually descends, but the valve will remain open until the float 41 strikes the float 40 and the water-level passes below the bottom of the float 41, so that the buoyant force of the float 40 only is exerted to maintain the valve in open position. This being insufficient for the purpose, the stem moves down, but the closing is gradual, and the valve 22′ will not seat until practically all of the water has escaped past the valve 16. When the valve 22′ is closed, its weight, together with the weight of the stem and the floats and the stress of the spring 22, are exerted on the cylinder 18, and the latter will move down gradually as the water oozes out between the piston 21 and the wall of the cylinder 18, this portion of the mechanism acting as a dash-pot to prevent sudden closing of the valve, so that the water may all drain from the chamber 11, while valve 22, being closed, will prevent the passage of steam into said cylinder 18. In order to prevent water-hammer, a foraminous disk 50 is placed between the sections 12 and 13 of the casing 11, as shown in the drawing.

I claim—

1. In a steam-trap, an upper water-receiving chamber, a lower discharge-chamber, a valve controlling communication between the two, a hollow stem carrying said valve, a piston secured to a fixed point within the lower chamber, a cylinder carrying the hollow stem, a spring surrounding the stem and tending to close the valve, a float-valve arranged in the upper chamber and controlling the passage of water through the hollow stem, and a guiding-tube carried by said stem and surrounding the lower portion of the float-valve.

2. In a steam-trap, the combination with an upper water-receiving chamber, of a lower discharge-chamber, a connecting-nipple between the two, the upper end of the nipple being spaced to form a valve-seat, a valve, a hollow stem carrying the valve, a piston arranged within the lower chamber, a cylinder inclosing the piston and carrying the hollow stem, a spring tending to maintain the valve in closed position, and a float-controlled valve controlling the flow of water through the hollow stem into said cylinder.

3. In a steam-trap, a water-receiving chamber having a discharge-outlet, a spring-closed valve for said outlet, an operating-cylinder connected to the valve, a stationary piston fitting within the cylinder, a hollow valve-stem through which water under pressure may pass from the chamber to the cylinder, and a float-controlled valve for closing the passage through the stem.

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

EDWARD J. KELLEY.

Witnesses:
J. Ross Colhoun,
C. E. Doyle.