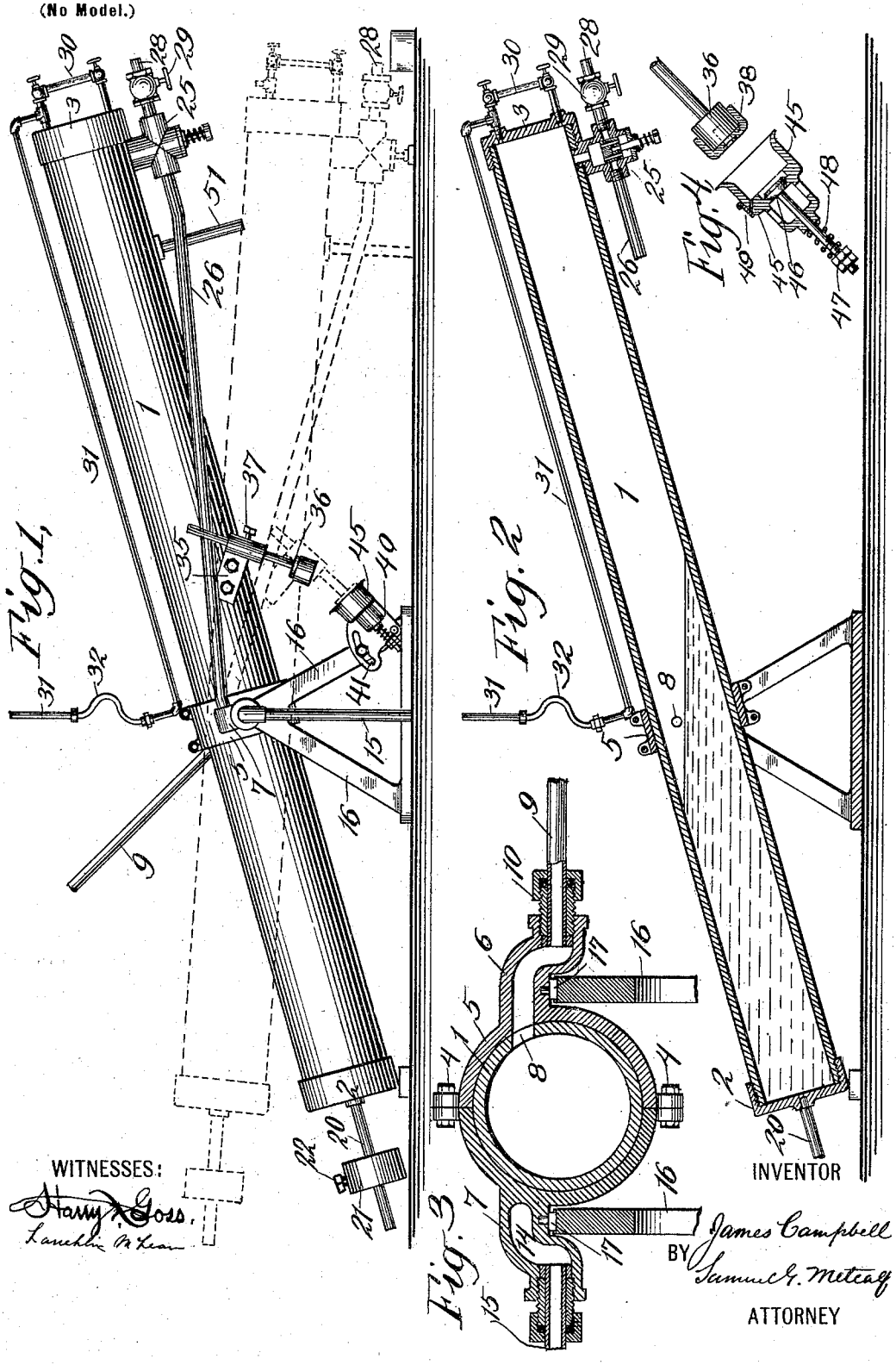
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J. CAMPBELL.

STEAM TRAP.

(Application filed Oct. 25, 1901.)

(No Model.)



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STEAM-TRAP.

SPECIFICATION forming part of Letters Patent No. 708,996, dated September 16, 1902.

Application filed October 25, 1901. Serial No. 79,901. (No model.)

To all whom it may concern:

Be it known that I, JAMES CAMPBELL, a citizen of the United States, and a resident of Port Blakely, in the county of Kitsap and State of Washington, have invented certain new and useful Improvements in Steam-Traps, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

The object of my invention is to provide a steam-trap which shall be simple in construction, efficient and reliable in operation, and in which the principal operating parts are readily accessible, so that repairs and adjustments can be made quickly and cheaply; and my invention consists in the novel structural features and combinations hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a side elevation of my improved trap. Fig. 2 is a central longitudinal section. Fig. 3 is a sectional detail on the line 3 3, Fig. 1; and Fig. 4 is a detail, partly in section, of the retaining device.

Similar reference characters are employed to designate corresponding parts in all the views.

In the particular embodiment of my invention which, without any intention of limiting my invention to any particular details of construction, I have selected for the purpose of description and illustration, 1 is the trap-chamber, and consists, preferably, of a section of pipe or tubing of suitable length and diameter for the purpose desired, the ends of which are closed by caps 2 and 3. Upon the exterior of the chamber 1 is clamped by suitable fastening devices 4 a ring 5, which is provided with the arms 6 and 7. The arm 6 is cored throughout its length to form a passage to the interior of the chamber 1 when the ring 5 is in position to register with the opening 8, formed in the wall of the chamber. The feed-pipe 9 enters said passage and is secured to the arm 6 by means of a swivel-joint comprising a gland and stuffing-box 10, which permits the rocking movement of the trap, hereinafter referred to, without affecting the tightness of the joint. The opposite end of the pipe 9 is connected with the coils or other apparatus to be trapped. Thus a direct passage to the interior of the trap is formed free from valves or other moving parts. The arm 7 is also cored out to form a chamber 14, with which the discharge-pipe 15 is connected by a joint similar to that employed for the feed-pipe. The chamber 1 is fulcrumed upon supports 16, which rest upon any suitable foundation, by means of the knife-edges 17, which are secured to the under sides of the arms 6 and 7 and the edges of which rest in shallow grooves formed at the apices of the supports 16. To the shorter end of the chamber 1 is secured a guide 20, upon which is mounted the counterweight 21. This can be adjusted to any position upon the guide 20 and there secured by means of a set-screw 22.

Upon the longer end of the chamber 1, at or near its extremity, is secured a discharge-valve 25, which is preferably in the form of a balanced piston-valve, and a pipe 26 connects the discharge-valve 25 with the chamber 14 in the arm 7. The discharge-valve 25 is thus in open connection with the discharge-pipe 15. A drainage-outlet 28, controlled by the stop-valve 29, is connected with the discharge-valve 25. This longer end of the trap-chamber 1 is also provided with a suitable gage-glass 30, and an equalizing-pipe 31 is connected with this end of the chamber at or near its highest point and the apparatus to which the trap is connected to equalize the pressure between them. The equalizing-pipe preferably extends toward the center of motion of the chamber 1 and is there provided with a flexible joint 32.

Secured to chamber 1 is a guide-bracket 35, which carries a plunger 36. A set-screw 37 serves to rigidly hold the plunger in any position in the guide 35 to which it may be adjusted. Upon the head of the plunger 36 is secured a cap 38, of some flexible or yielding substance, such as leather. A plate 40 is pivotally secured to one of the supports 16 16 and is provided with a slot 41, which receives a clamping-screw 42. A cup-like device 45 is mounted on the plate 40. Seated in the bottom of the cup is a valve 46, Fig. 4, the stem of which is arranged to play in a

suitable guide and which is provided with set-screws 47, which coöperate with the springs 48 to regulate the force required to open the valve. The cap 38 is arranged to fit tightly within the cup 45, and a flap-valve 49 serves as a self-closing vent for the cup 45, opening when the plunger 36 enters it to permit the escape of air and closing as soon as the cap 38 on the plunger is firmly seated in the cup 45. By means of the clamping-screw 42 the angular position of the cup 45 may be adjusted so as to squarely receive the plunger. A stop 51 is preferably secured to the chamber 1 to limit the downward movement of the longer end.

The operation of the apparatus which I have just described and which embodies my invention in one of its preferred forms is as follows: The apparatus being in the position shown in full lines in Fig. 1, the water of condensation from the coils or other apparatus to be trapped flows freely into the chamber and gradually fills it. The counterweight 21 is preferably so adjusted that the chamber 1 must be nearly full before the weight of the longer end of the chamber will overbalance it. When this occurs, the chamber will tilt and the longer end will descend until the stop 51 arrests its downward motion. In moving downwardly the stem of the valve 25 will strike the support upon which the trap is mounted or some tripping device arranged in its path, and the valve will be moved to uncover the end of the discharge-pipe 26. The pressure in the chamber will then cause the water in the trap to flow out through the discharge-pipe into any suitable tank or receptacle that may be provided for it. On this movement of the chamber 1 the plunger 36, carrying the cap 38, will enter the cup 45, the parts being so adjusted that when the longer end of the chamber has reached its lowermost position the cap 38 will be seated firmly in the cup 45, and the suction exerted by the yielding face of the cap 38 upon the bottom of the cup and upon the valve 46 will hold the chamber in its discharging position until the chamber is nearly emptied. When this occurs, the weight of the shorter end of the chamber and the counterweight greatly preponderates, and the suction thereby produced by the cap 38 on the bottom of the valve 46 will move it slightly from its seat against the force of the spring 48 and relieve the vacuum in the cap, so that the chamber will be released and returned to its original position and the operations just described will be repeated. The amount of liquid which must flow into the trap to cause its longer end to overbalance the shorter end and the counterweight is determined by the position of the counterweight, while the point in the discharging operation of the trap at which the plunger 36 is released to permit the trap to return to its original position is regulated by the degree to which the spring 48 is compressed by the set-nuts 47.

It is not to be understood that my invention is limited to any particular form of device for retaining or holding the chamber in its discharging position. I prefer the form herein illustrated and described because it serves the purpose of a retaining device very efficiently and in addition acts as a cushioning device for the chamber, so that it will attain its discharging position without appreciable shock or noise.

While my invention obviates the necessity of using any automatically-operated valves in the feed-pipe of the trap to insure regular operation, it is to be understood that suitable stop-valves may, if desired, be arranged at convenient points in the feed and discharge pipes.

With my invention when the trap tilts into discharging position the locking devices are brought into engagement, and they are positively held in engagement until the releasing device positively releases them. This will not occur and the trap will not move until the counterweight largely overbalances the chamber, so that when the trap is released it returns by virtue of this overweight quickly to its receiving position, and there is no possibility that the trap will find a balance or see-saw intermediate the receiving and discharging positions, as frequently happens where a sliding or movable weight is depended upon to effect the return of the trap.

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

1. In a steam-trap, the combination of a movable chamber, locking devices for holding the chamber in discharging position comprising two normally disengaged members which are brought into engagement by the movement of the chamber, one of which members moves with the chamber and the other of which is supported independently of the chamber, and a device actuated by the emptying of the chamber for releasing the locking devices.

2. In a steam-trap, the combination of a pivotally-mounted chamber, a discharge-valve actuated by the movement of the chamber, locking devices for holding the chamber in position when said valve is open, comprising two normally disengaged members which are brought into engagement by the movement of the chamber, one of which members is mounted upon and moves with the chamber and the other of which is supported independently of the chamber, and a device actuated by the emptying of the chamber for releasing the locking devices.

3. In a steam-trap the combination of a movable chamber and a retaining device for holding it in discharging position, comprising a plunger, a cup to receive the same and

a valve actuated by the plunger to admit air between the plunger and the cup, substantially as shown and described.

4. In a retaining device for steam-traps the combination of an adjustable plate, a cup secured thereto, a plunger movable by the operation of the trap relatively to the cup and a relief-valve actuated by such movement to admit air between the plunger and the cup, substantially as shown and described.

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