No. 867,700. PATENTED OCT. 8, 1907.

W. C. BROWN.

STEAM TRAP.

APPLICATION FILED AUG. 9, 1906.

Fig. 1.

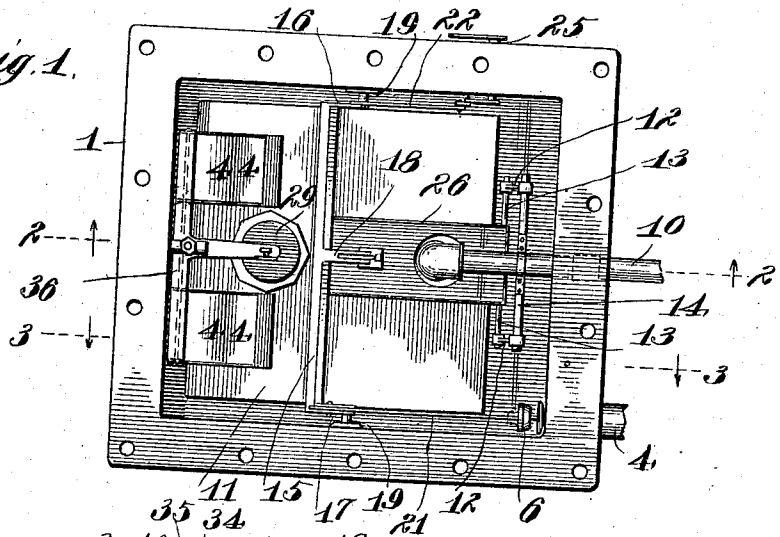

Fig. 2.

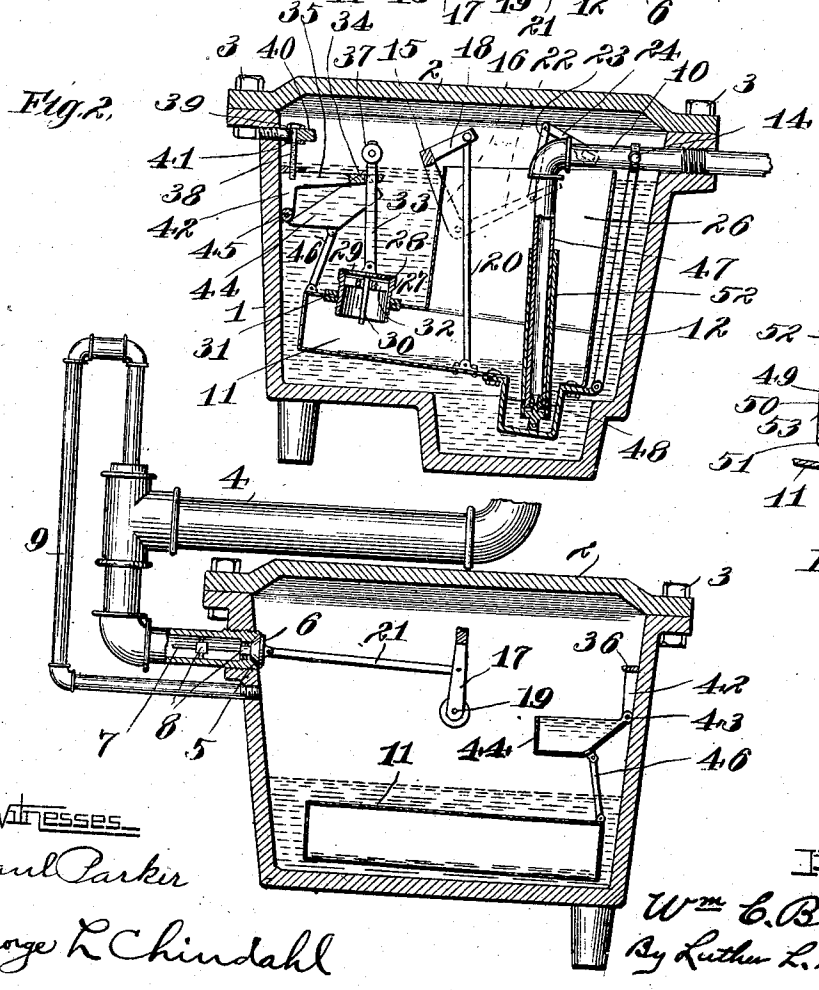

Fig. 4.

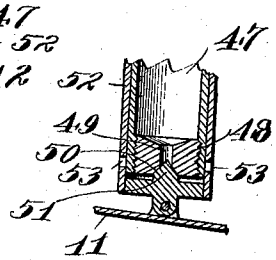

Fig. 3.

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STEAM-TRAP.

No. 867,700. Specification of Letters Patent. Patented Oct. 8, 1907.

Application filed August 9, 1906. Serial No. 329,816.

To all whom it may concern:

Be it known that I, WILLIAM C. BROWN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Steam-Traps, of which the following is a specification.

This invention relates to steam traps, and contemplates certain new and useful improvements designated more especially for employment in connection with the forms of steam traps for which Letters Patent Nos. 622,925; 643,415; and 773,872 were issued to Fritz Knackstedt. It is to be understood, however, that the present improvements are capable of use in connection with other forms of steam traps, and no limitation is intended by the reference to the patents above noted.

One of the objects of this invention is to provide means for holding the discharge valve tightly closed at all times save during the discharging operation.

Another object is the provision of means for holding the inlet valve firmly seated during the discharge operation.

A further object is to arrange the valve that admits water to the float so that there shall always be sufficient water in the trap casing to make the operation of the float regular and certain.

The invention further relates to an improved arrangement of the by-pass which admits steam to the steam trap after the valve controlling the inlet pipe has been closed.

The invention also refers to the other improvements in steam traps hereinafter set forth.

In the accompanying drawings, Figure 1 is a top plan view of a steam trap embodying the features of my invention, the cover for the trap having been removed. Fig. 2 is a vertical central section through the trap, taken on the plane of dotted line 2 2 of Fig. 1. Fig. 3 is a vertical section through the trap on dotted line 3 3 of Fig. 1, the parts, however, being shown in a different position from that which they are represented as occupying in Figs. 1 and 2. Fig. 4 is a detail sectional view of the discharge valve.

The embodiment herein shown of my invention comprises a casing 1 provided with a cover 2 secured thereto, in this instance, by bolts 3. Said casing is connected with the steam system by means of the inlet pipe 4, the inner end of which is provided with a valve face 5 upon which the valve 6 is adapted to be seated. The valve 6 is provided with a guide stem 7 slidably mounted in suitable guides 8 located within the inlet pipe 4. Said valve is arranged to be closed at intervals by means to be hereinafter described.

In order to permit of placing the interior of the casing 1 under steam pressure when the inlet pipe 4 is closed by the valve 6, I provide a by-pass pipe 9 extending, in this instance, through the side of the casing 1 a little below the point of entrance of the inlet pipe 4. The other end of said by-pass pipe is connected with the inlet pipe 4 at any suitable point above that to which water is likely to accumulate while the inlet pipe is closed by the valve 6. Intermediate its ends the by-pass pipe 9 rises some distance above the point to which water may accumulate so as to avoid the possibility of water being carried over into the casing 1 through said by-pass pipe. The interior of the casing 1 is connected with the boiler or other vessel to which the trapped water is to be carried by means of a discharge pipe 10.

Within the casing 1 is suitably supported a float 11, the rear end of said float being suspended, in this instance, from the discharge pipe 10 by means of two links 12 pivotally connected at their lower ends to pins 13 fixed with relation to the float, and at their upper ends pivotally connected to the opposite ends of a cross-bar 14 clamped upon said discharge pipe. A lever 15 in yoke form and comprising the arms 16, 17, and 18 is pivotally mounted upon bearing studs 19 suitably secured to the sides of the casing 1. The arm 18 is located centrally of the upper bar of the yoke lever 15 and is connected with the float 11 by means of a link 20. The arm 17 of the yoke lever 15 is connected with the valve 6 by means of the link 21. To the arm 16 of the yoke lever 15 is fixed an arm 22 which has a link (23) connection with an arm 24 fast to the inner end of a register-actuating shaft 25 rotatably mounted in one wall of the casing 1. The outer end of the register-actuating shaft 25 is operatively connected with a register (not shown) for registering the movements of the float 11 and thereby registering the quantity of water discharged from the trap through the pipe 10. The yoke lever 15, with its various arms 16, 17, 18 and 22, is preferably an integral casting.

Upon the upper side of the float 11 is an extension 26 which is of such a height as to extend to the level to which it is desired the entrapped water shall rise prior to its being discharged from the trap. A short cylinder 27 is adjustably secured in any suitable manner within an opening in the upper wall of the float 11 and projecting above said upper wall, said cylinder having a valve seat 28 formed about its upper end. This valve seat is intended for the reception of a valve 29, the movements of which valve are guided by a central stem 30 lying loosely within an opening 31 formed in the cross-bar 32 of the cylinder 27. The valve 29 is pivotally connected with one end of a stem 33 passing through an opening 34 formed in one arm 35 of a bracket 36. A stop 37 adjustably movable along the stem 33 provides means for limiting the downward movement of the valve 29. The bracket 36 is adjustably supported upon the inner face of one of the walls of the casing 1

by means of a screw 38 having a screw-thread engagement with said bracket and passing freely through an opening 39 in a stud 40 projecting inwardly from said wall. A lock-nut 41 on the screw 38 provides means for locking the bracket 36 in adjusted position. The bracket 36 comprises two downwardly extending arms 42 which support a pintle 43 upon which are mounted two cups 44, said cups being held properly spaced apart by means of a sleeve 45 on the pintle 43. The cups 44 are each connected with the float 11 by means of a link 46.

The discharge pipe 10 comprises a downwardly extending portion 47, in the lower end of which is a plug 48 having a perforation 49 therein. The lower end of the plug 48 is shaped to provide a conical valve seat 50 adapted to receive a conical valve 51 pivotally mounted within the float 11. The valve has fixed thereto a tube 52 telescoping with the pipe 47, said tube being provided at its lower end with a number of perforations 53.

In Fig. 2 the movable parts of the trap are represented in the positions they occupy just previous to a discharge movement. The float 11 is at the upper limit of its movement; the valve 6 for the inlet pipe 4 is open (Fig. 1); the valve 29 controlling the admission of water through the cylinder 27 is closed; and the discharge valve 51 is closed. The level of the water is indicated in Fig. 2 in dotted lines, and is shown to be near the upper end of the float-extension 26. As more water accumulates in the casing 1 the level rises until the water overflows into said extension, weighting the float 11 so that it begins to sink. Continuing downward movement brings the stop 37 into contact with the bracket arm 35, stopping the descent of the valve 29 and as the float continues to sink admitting water suddenly to the float through the cylinder 27. As soon as the float begins to settle, the valve 51 is moved away from its seat 50, permitting the passage of water through the perforations 49 and 53 into the discharge pipe 10. At the same time the valve 6 is closed, preventing the entrance of water to the trap during the discharge operation. The downward movement of the float 11 tilts the yoke-lever arm 22 and causes a registering movement of the register-actuating shaft 25. The cups 44 being supported upon and attached to the float 11, sink into the position shown in Fig. 3 when the float reaches the lower limit of its movement. During their descent the cups 44 have retained therein a quantity of water. The water in the casing 1 continues to be discharged through the pipe 10 by means of the steam pressure admitted through the by-pass pipe 9 until the water outside the float reaches the level indicated in dotted lines in Fig. 3. The weight of the full cups 44 holds the float down until the water within the float reaches the level indicated in Fig. 3. When this level is reached the buoyancy of the float 11 causes the latter to rise. The upward movement of the float 11 tilts the cups 44 and spills their contents, thus raising the water level outside the float and lightening said float, the buoyancy of which float is thereby so increased as to enable it to hold the discharge valve 51 firmly closed.

By reason of the inlet through the valve cylinder 27 being some distance above the upper wall of the float 11, sufficient water is retained within the trap casing to float said float before the level of the water within the float has been lowered enough to uncover the discharge valve 51, thus preventing the escape of steam through the discharge pipe 10.

It will be observed that when the float 11 is in its lower position it does not rest upon the bottom of the casing but is carried by the link 20, the weight of the float thus being used to hold the inlet valve 6 tightly closed. Considerable leverage is obtained by attaching the link 20 to the float 11 relatively near the pivotal support for the latter, as shown.

I am aware that various changes can be made in the construction and arrangement of the parts herein shown without departing from the spirit and scope of my invention. No undue limitation, therefore, should be understood from the foregoing detailed description.

I claim as my invention:

1. A steam trap comprising a float adapted to be flooded, and a valve-controlled outlet from said float, said float having an inlet located at a point above the upper surface of said float, and means for holding said float down, adapted to permit said float to rise before the steam can escape through said outlet.

2. A float for steam traps, having an extension upon its upper side, and an upwardly extending member upon its upper side providing an inlet located at a point above the upper surface of the float.

3. A steam trap comprising an inlet and a float, and means actuated by said float and independent of the inlet for increasing the level of the liquid supporting said float.

4. A steam trap comprising a float and a receptacle adapted to be emptied by said float for decreasing the weight of said float.

5. A steam trap comprising a float and a water-retaining cup adapted to be tilted by the rising movement of said float to spill the water contained in said cup.

6. A steam trap comprising a float, a pivoted cup, and a link connecting said cup with said float.

7. A steam trap comprising a casing; an inlet valve; a float; and means for utilizing the weight of said float to hold the inlet valve closed.

8. A steam trap comprising a casing, an inlet valve, a float adapted to be flooded, and means for supporting said float when flooded, adapted to hold said inlet valve closed.

9. A steam trap comprising a casing, an inlet valve, a float adapted to be flooded, and a lever arranged to support said float when flooded and adapted to operate said inlet valve.

10. A steam trap comprising a casing, an inlet valve, a float adapted to be flooded, and means for suspending said float in the liquid when flooded, said suspending means being adapted to hold said inlet valve closed.

11. In a steam trap, in combination, a casing; an inlet valve; a discharge valve; a float; means for supporting said float, comprising a lever pivotally mounted at opposite sides of said casing and a link connecting said lever with said float; and an operative connection between said lever and said inlet valve.

12. In a steam trap, in combination, a casing; a float; and means for supporting said float comprising a yoke lever, two arms of which yoke lever are pivotally mounted upon the side walls of said casing, said yoke lever comprising an arm having a link connection with said float.

13. In a steam trap, in combination, a casing; a float; means for supporting said float comprising a yoke lever, two arms of which lever are pivotally mounted upon opposite sides of said casing, said yoke comprising an arm having a link connection with said float; a register-actuating shaft; and an operative connection between said yoke lever and said shaft.

14. In a steam trap, in combination, a casing; an inlet pipe; a valve for said inlet pipe; and a by-pass pipe

connected at one end with said casing and at its other end with a point in said inlet pipe above the point to which water probably will accumulate in said inlet pipe, said by-pass pipe rising some distance above said latter point.

15. In a steam trap, in combination, a float; a valve-seat member secured to said float; a valve adapted to be seated upon said member, said valve having a stem; and means for limiting the movement of said stem.

16. In a steam trap, in combination, a float; a cylinder secured to said float, and provided with a valve seat at one end; a cross bar in said cylinder having an opening therethrough; a valve adapted to be seated upon said valve seat, said valve having a stem extending through the opening in said cross bar; a stem pivotally connected with said valve; and means for limiting the movement of said latter stem.

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Witnesses:
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