No. 724,254. PATENTED MAR. 31, 1903.

J. G. BRANCH.

STEAM TRAP.

APPLICATION FILED MAY 12, 1902.

NO MODEL.

Fig. 1.

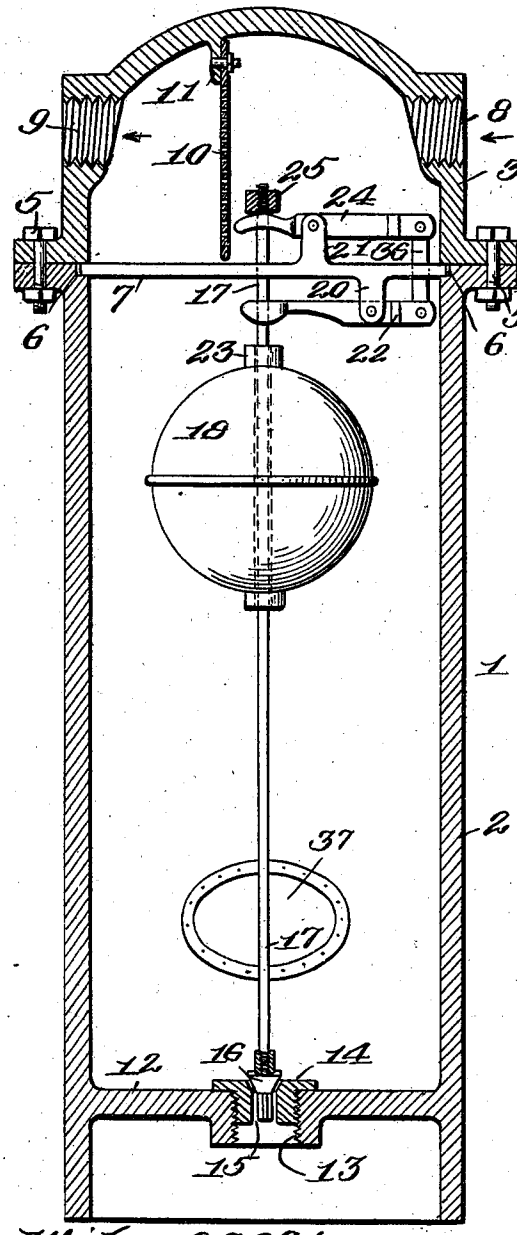


Fig. 2.

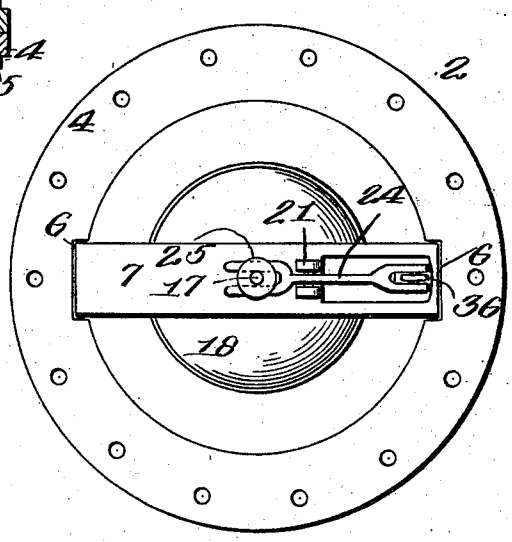
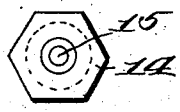


Fig. 3



Witnesses;
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UNITED STATES PATENT OFFICE.

JOSEPH G. BRANCH, OF ST. LOUIS, MISSOURI.

STEAM-TRAP.

SPECIFICATION forming part of Letters Patent No. 724,254, dated March 31, 1903.

Application filed May 12, 1902. Serial No. 106,960. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH G. BRANCH, a citizen of the United States, residing at St. Louis, in the State of Missouri, have invented new and useful Improvements in Steam-Traps, of which the following is a specification.

This invention relates to steam-traps for separating the watery particles from the steam; and it has for its object to provide a device of the character referred to which will be simple in construction and efficient in operation and which may be manufactured at a small cost.

It also has for its object to provide such a steam-trap that will act almost continuously, the water of condensation flowing from the trap almost uninterruptedly.

It has for a further object to provide improved means arranged to be acted on by a float for actuating the discharge-valve, by means of which the lifting power of the float will be greatly augmented, so as to overcome the pressure of steam with certainty, and thus insure the proper operation of the trap.

Finally, it has for its object to provide a device of the character referred to that will be very ready of access, so that it can be conveniently repaired should any of the parts become worn.

To this end my invention consists in the features and in the construction, combination, and arrangement of parts hereinafter described, and particularly pointed out in the claims following the description, reference being had to the accompanying drawings, forming a part of this specification, wherein—

Figure 1 is a vertical sectional view of my improved steam-trap. Fig. 2 is a top plan view thereof, the top being removed; and Fig. 3 is a detailed view of the valve-seat for the discharge-valve.

Referring to the drawings, the numeral 1 indicates a vertical cylindrical casing comprising a lower portion 2 and an upper portion or top 3. The upper portion is adapted to be fitted on the upper end of the lower portion, and said upper and lower portions are provided with laterally-projecting flanges 4, which are adapted to be secured together steam-tight by bolts 5. In the upper inner edge of the lower portion 2 of the casing are formed two diametrically-opposed recesses 6, in which is fitted a transverse bar or bridge-piece 7, which when the top 3 is bolted in place is held rigidly to its seat. The purpose of the bar 7 will shortly hereinafter appear. Formed in one side of the top 3 is a steam-inlet 8, and formed in the opposite side of said top is a steam-outlet 9, said inlet and outlet being arranged horizontally, as shown, so that the steam will not be discharged directly downward onto the float hereinafter to be described. Pendent from the under side of the upper end of the top 3 is a foraminous or reticulated plate 10, which may consist either of a piece of wire-gauze or a perforated plate or the like, and said plate is conveniently secured in place by bolting its upper end to a lug 11, formed on the under side of the upper end of the top 3. As shown, this plate is interposed directly between the steam inlet and outlet, whereby the incoming steam is discharged against said plate and the molecules of water carried by the steam are arrested and are caused to trickle down from the plate into the lower portion 2 of the casing, the dry steam passing through said plate and passing out through the outlet 9. Formed centrally in the bottom 12 of the lower portion 3 of the facing is a threaded opening 13, in which is screwed a valve-seat 14, consisting of a nut screwed into the opening 13 from the interior of the casing and provided centrally with an opening 15, which is tapered at its top, as shown, to form a seat for the tapered valve 16. The valve 16 is formed on or attached to the lower end of the rod 17, the upper end of which passes through and is guided in a suitable aperture formed in the bridge-piece 7. On the rod 17 is arranged a float 18, that is adapted to freely slide up and down on said rod for a limited distance.

Formed on the bridge-piece 7 are two vertically-projecting lugs 20 and 21, the lug 20 projecting downwardly and the lug 21 upwardly. Pivoted to the lug 20 is a lever 22, which is bifurcated and straddles the rod 17 at a point above the float and is adapted to be engaged by a boss 23, formed on or fixed to the top of the float, or if preferable said boss may consist of a collar, which may be fixed on the rod 17 by a set-screw or other suitable means. Pivoted to the lug 21 is a

lever 24, one end of which is bifurcated and straddles the rod 17 and is adapted to engage the under side of an adjustable nut 25, screwed on the upper end of the rod. The other ends of the levers 22 and 24 are connected together by a link 36. It will be noted that the fulcrum of the lever 22 is arranged at a point distant from the free end of said lever approximately equal to two-thirds of the entire length of said lever, whereas the fulcrum of the lever 24 is arranged at a point distant from the free end of said lever equal to one-third the entire length of the lever. It will be apparent, therefore, that the power will be applied to the longer end of the lever 22, that the latter lever will transmit the power through its shorter end to the longer end of the lever 24, and that the power will be transmitted through the shorter end of the last-named lever to the rod 17 to lift the latter. Hence it will be manifest that by means of a system of levers shown the power communicated to said lever by the rising of the float will be multiplied many times before it is finally applied to the rod.

The operation of my improved trap is as follows: The steam enters through the inlet 8 and escapes through the outlet 9 and in its passage through the upper portion of the trap passes through the foraminous reticulated plate 10, which operates to arrest the globules of water and cause them to drop by gravity into the lower portion of the trap. Owing to the weight of the rod 17 and the float 19, the valve 16 is held close to its seat, and this operation is assisted by the weight of the water contained in the trap and the pressure of the steam. When a sufficient quantity of water of condensation has accumulated in the trap to raise the float, the latter will rise with the water as the trap continues to fill, and eventually the float will bear against the under side and raise the longer end of the lever 22, and the latter will transmit this power to a link 26 and lift the shorter end of the lever 24 in a manner before described and lift the rod 17 and raise the valve 16 from its seat. The water will then escape through the opening 15 in the valve-seat, and its escape will be facilitated and hastened by the pressure of the steam. As the water escapes the float will fall and move away from lever 22, and owing to the weight of the rod 17 and the float 18, assisted by the pressure of the steam, the valve will close. The movement of the float on its rod is a limited one. Hence slight variations in the level of the water contained in the trap will operate to alternately open and close the valve, and for this reason the valve will be rapidly seated and unseated, making the operation of the device almost continuous and very slightly interrupting the fall of water from the trap. The means for multiplying the power exerted by the lifting action of the float forms an important feature of the device, for the pressure of the steam exerts a force which tends to press the float downward and possibly submerge it; but by the described arrangement of levers the lifting power of the float is multiplied many times, so that the upward movement of the float will be applied to a rod to lift the valve quickly and with certainty.

Should any of the parts become worn or disarranged, it is only necessary to unbolt the top 3 and lift the latter off, when the bridge-piece 7, together with the lever mechanism, the float, the rod, and the valve may all be lifted out. Should the valve-seat be worn, after the parts have been removed in the manner described the valve-seat may be readily unscrewed and lifted out of the casing and reground or a new valve-seat be substituted.

The nut 25 is threaded onto the rod 17, so that the valve 16 can be readily adjusted to allow only a certain amount of condensation to escape, depending upon the amount of steam to be trapped and the work to be done by the steam. The valve 16 is threaded onto the rod 17, so that the valve can be easily replaced when worn without disturbing any of the parts of the trap.

It is preferable to have a hand-hole 37 arranged in the casing 1 at the point shown, so that the valve 16 and the seat 14 will be of easy access without removing the top 3 or disarranging the levers.

Having described my invention, what I claim is—

1. In a steam-trap, the combination with a casing provided with a water-outlet in its bottom, of a valve for closing said outlet, a stem connected to said valve, a float movable on the stem, a system of multiplying-levers arranged to be operated by the upward movement of the float for raising the valve from its seat to permit the discharge of the water from the trap, a steam inlet and outlet in the upper end of the trap, and a foraminous diaphragm arranged between said steam inlet and outlet, whereby the steam in its passage through the trap is caused to pass through said diaphragm, substantially as described.

2. In a steam-trap, the combination with a casing provided with a water-outlet in its bottom, of a valve-seat removably fitted in said outlet from the interior of the casing, a valve for closing said valve-seat, a stem connected to said valve, a float movable on the stem, a system of multiplying-levers arranged to be operated by the upward movement of the float for raising the valve from the seat to permit the discharge of the water from the trap and a steam inlet and outlet in the upper end of the trap, substantially as described.

3. In a steam-trap, the combination with a casing provided with a valved water-outlet in its bottom, of a valve for closing said outlet, a stem connected to said valve, a float movable on the stem, two parallel levers pivoted intermediate their ends, and loosely straddling said stem at one end, a link connecting the other ends of said levers, one of said le-

vers being arranged to be engaged by the float in its upward movement and the other lever being arranged to engage the valve-stem to raise the latter, and a steam inlet and outlet in the upper end of the trap, substantially as described.

4. In a steam-trap, the combination with a casing provided with a valved water-outlet in its bottom, of a valve for closing said outlet, a bridge-piece fixed transversely in the upper portion of the casing, a stem connected to said valve and vertically movable in said bridge-piece, a float movable on the stem, a system of multiplying-levers fulcrumed intermediate their ends on said bridge-piece and arranged to be actuated by the upward movement of the float to raise the valve and permit the discharge of the water from the trap, and a steam inlet and outlet in the upper end of the trap, substantially as described.

5. In a steam-trap, the combination with a casing provided with a valved water-outlet in its bottom, of a valve closing said outlet, a stem connected to said valve, a float movable on the stem, a system of multiplying-levers arranged to be actuated by the upward movement of the float for raising the valve to permit the discharge of the water from the trap, a steam inlet and outlet diametrically arranged in the opposite sides of the upper end of the trap, and a foraminous diaphragm arranged transversely between said steam inlet and outlet, whereby the steam in its passage through the trap is caused to pass through said diaphragm, substantially as described.

6. In a steam-trap, the combination with a casing provided with an outlet in its bottom, of a valve arranged to close said outlet, a stem connected to said valve, a float movable on the stem, a bridge-piece arranged transversely in the upper portion of the casing through which said stem is vertically movable, oppositely-projecting vertical lugs carried by said bridge-piece on which said levers are fulcrumed, and a steam inlet and outlet in the upper part of the casing, substantially as described.

7. In a steam-trap, the combination with a vertical casing comprising an upper and lower portion removably fitted together, the lower portion of the case being provided on its upper edge with two oppositely-arranged recesses and its bottom with a valve-seat constituting an outlet for the water of condensation, of a valve arranged to close said outlet, a stem connected to said valve, a bridge-piece seated at its ends in said recesses, a valve closing said outlet, a stem connected to said valve and vertically movable in said bridge-piece, a float movable on the stem, a system of multiplying-levers arranged to be operated by the upward movement of the float to raise the float from its seat and a steam inlet and outlet arranged in the opposite sides of the upper portion of the casing, substantially as described.

8. In a steam-trap, the combination of a vertical casing comprising an upper and lower portion removably fitted together, the upper portion having a horizontal inlet and outlet arranged diametrically opposite each other, a transverse foraminous diaphragm pendent from the top of said upper portion between the inlet and outlet, a removable valve-seat in the bottom of the lower portion constituting an outlet for the water of condensation, a valve for closing said outlet, a stem connected to the valve, a float movable on the stem, and a system of multiplying-levers arranged to be operated by the upper movement of the float to raise the valve from the seat, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JOSEPH G. BRANCH.

Witnesses:
REYDEN K. PRETTY,
SIDNEY E. DAVIS.