

No. 719,740.

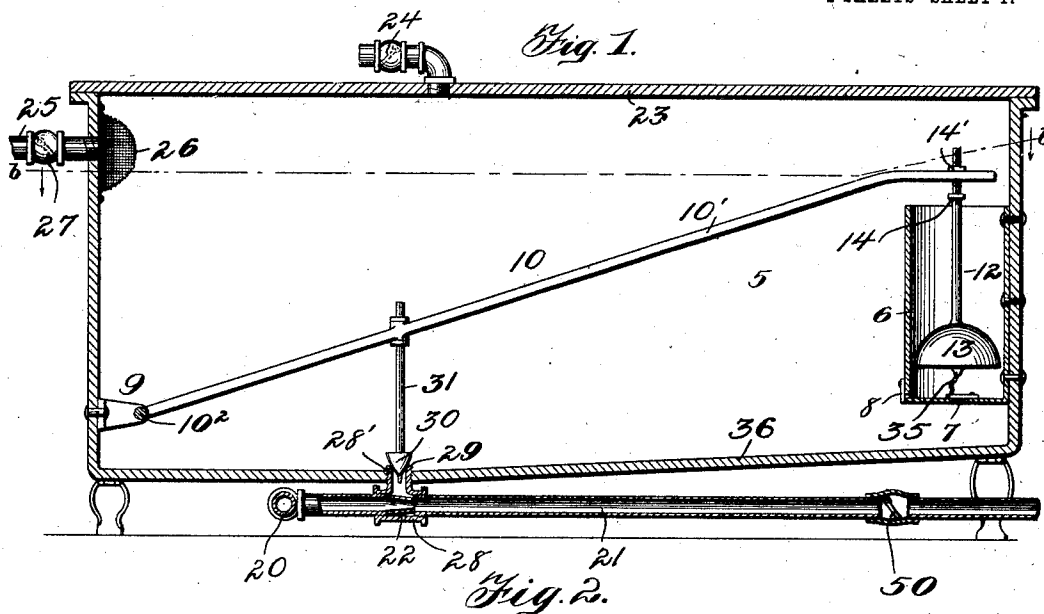
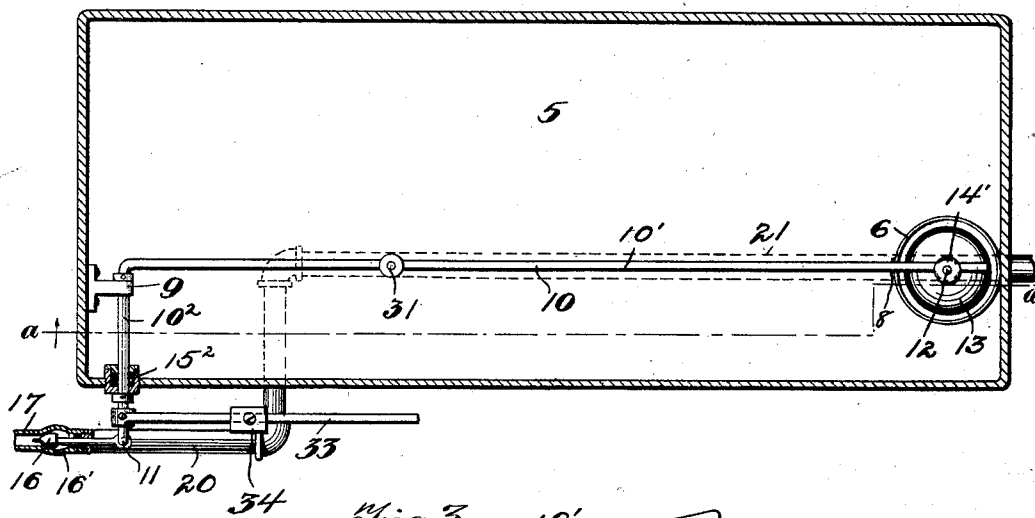
PATENTED FEB. 3, 1903.

J. J. BURKE.
STEAM TRAP.

APPLICATION FILED FEB. 25, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



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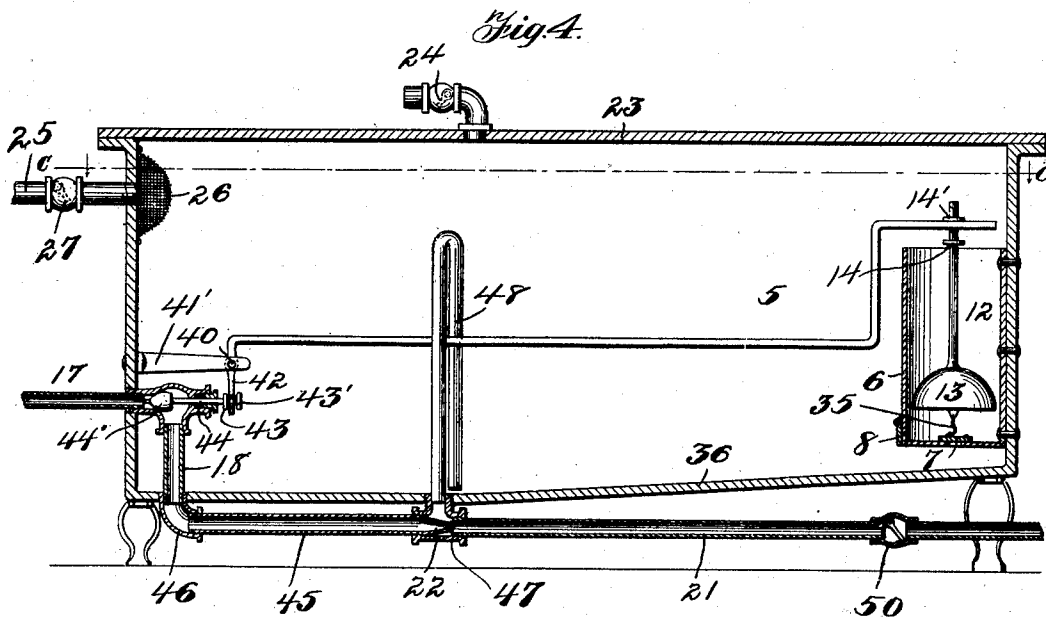
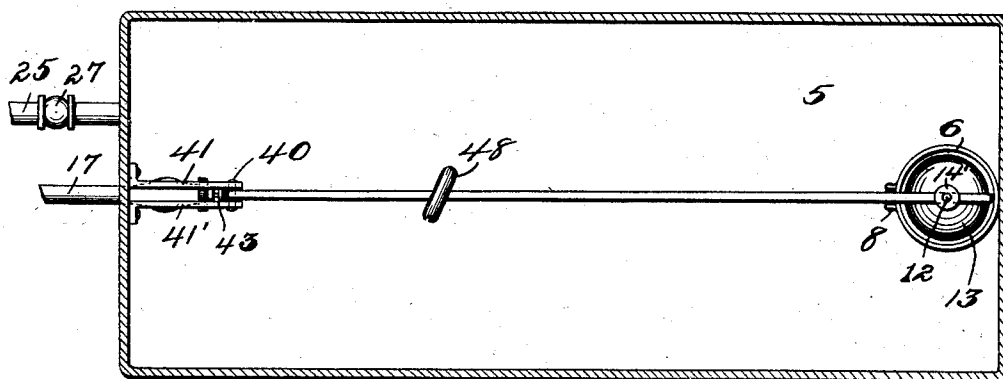


Fig.5.



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UNITED STATES PATENT OFFICE.

JAMES J. BURKE, OF HARTFORD, CONNECTICUT.

STEAM-TRAP.

SPECIFICATION forming part of Letters Patent No. 719,740, dated February 3, 1903.

Application filed February 25, 1902. Serial No. 95,561. (No model.)

To all whom it may concern:

Be it known that I, JAMES J. BURKE, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Steam-Traps, of which the following is a specification.

My invention relates to steam-traps, and has for its object the provision of an improved device of this kind which will be simple in construction and reliable in operation.

A further object of the invention is the provision, in a steam-trap, of improved means for causing the contents of said steam-trap to be conveyed to a steam-generator.

A further object of the invention is the provision, in a steam-trap, of improved means for causing the valves employed therein to remain open until the entire contents of the trap are discharged therefrom.

Further objects of the invention will be set forth in the detailed description which now follows.

In the accompanying drawings, Figure 1 is a longitudinal vertical section of one form of my improved steam-trap, taken upon line *a a* of Fig. 2. Fig. 2 is a horizontal section upon line *b b* of Fig. 1. Fig. 3 is a perspective view of a portion of the valve-operating mechanism and the steam-valve. Fig. 4 is a longitudinal vertical section of a modified form of my improved steam-trap with certain parts shown in elevation, and Fig. 5 is a horizontal section upon line *c c* of Fig. 4.

Like numerals designate similar parts throughout the several views.

In the form of my invention illustrated in Figs. 1, 2, and 3 I have provided a casing 5, to which is secured an overflow-chamber 6, having valves 7 and 8 for a purpose hereinafter described. Mounted in a bracket 9, secured to one of the walls of the casing, is an angle-lever 10, through the free end of which passes the rod 12 of a float 13, depending by said rod from the angle-lever into the overflow-chamber 6, said rod 12 having adjustable collars or washers 14 and 14' to limit the movement which the float may have without actuating the lever 10. A packing-box 15 is shown where the lever 10 passes through the wall of the casing to provide a fluid-tight joint at that point. The angle-lever 10 com-

prises a free portion 10' and a bearing portion 10², bent at an angle to said free portion. At its outer end this bearing portion is bent downward, as at 11, and is reduced at its free end 11' to fit into an eye 15' of the valve-stem 15 of a steam-valve 16, fitting in a casing 16', one of the branches 17 of said casing leading to a steam-generator or other source of high-pressure steam, while the other branch 16² of the valve-casing connects with a vertical branch pipe 18, which is in turn connected to a horizontal line of piping 20, leading to a discharge-pipe 21 of the trap, the end of said piping being reduced at 22 to form an injector-nozzle at the point where the piping 20 enters the discharge-pipe 21. The casing 5 is provided with a closure 23, carrying a check-valve 24 for allowing the air contained in the trap to be expelled therefrom as the trap fills and designed to close and prevent the ingress of air to the trap when the contents thereof are being discharged. Designated by the numeral 25 is the usual supply-pipe for conveying the water of condensation from a heating system or low-pressure coil to the steam-trap, over the mouth of which pipe is a screen 26 for preventing scale or other injurious substances from entering the trap, said supply-pipe being provided with a check-valve 27 for a purpose hereinafter described. A coupling 28, connecting the piping 20 and the discharge-pipe 21, has a branch 28' entering the bottom of the trap and forming the discharge-valve casing thereof, said casing being provided with a valve-seat 29, upon which is normally seated the valve 30, the stem 31 of said valve being carried by the free portion 10' of the angle-lever 10. Mounted upon the bearing portion 10² of the angle-lever 10 is a counterpoise-lever 33, carrying an adjustable weight 34, this weight determining the height to which the water must rise in the overflow-chamber before the lever 10 actuates the valves 16 and 30 to discharge the contents of the trap through the discharge-pipe 21, which leads to the steam-generator, from which the valve-casing 16' receives its supply of high-pressure steam. The operation of this form of my improved steam-trap is as follows: When the water of condensation entering the trap through the supply-pipe 25 has attained

sufficient height to overflow into the chamber 6, the buoyancy of the float 13 causes it to rise as the water fills the chamber, and it is obvious that when the float ascends to a sufficient height to cause the adjustable collar 14, carried by the rod 12, to strike against the lever 10 the valves 16 and 30 will be opened to permit live steam from the boiler to pass through the piping 20 and discharge-pipe 21, thereby causing the contents of the trap to be returned to the steam-generator through the coupling 28 and discharge-pipe 21; but just before the float reaches the above-described point the valve 7 in the bottom of the overflow-chamber will be lifted through the medium of a flexible connection 35, between said valve and the float 13, which will result in a sudden influx of water into the overflow-chamber, thereby causing the float and the free end of the angle-lever to be lifted with a quick and positive movement and through said lever the valves 16 and 30 to be opened, as hereinbefore described. Heretofore devices of this class have sometimes failed to operate on account of the adhesion of the valves to their seats; but by the provision of means as described for imparting a sudden movement or jerk to the angle-lever this defect is overcome, and both valves will be positively opened to permit all of the contents of the trap to be discharged. As the water-level falls the check-valve 24 closes and a vacuum is formed in the body of the trap, and consequently in the supply-pipe and the low-pressure coil to which said supply-pipe leads, which will cause any water standing in said coil to be drawn into the trap and discharged, as above described, the check-valve 27 upon said pipe serving a purpose which will be hereinafter described.

As soon as the discharge of water from the trap has resulted in reducing the water-level in the body of the trap enough to allow the float to drop and the valve 7 to be seated any further discharge of water from said trap will cause the valve 8 to be opened by the pressure from the overflow-chamber and the contents of said chamber to be discharged into the body of the trap. By making the discharge-opening covered by the valve 8 much smaller than the main discharge-opening formed by the valve-seat 29 the complete discharge of the contents of the overflow-chamber is retarded to such an extent that the entire contents of the body of the trap are discharged before the float 13 drops sufficiently to close the valves 16 and 30, such complete discharge being facilitated by having a portion of the bottom of the trap inclined, as at 36, thereby causing the water to flow to the main discharge-opening.

In the modified form of my invention illustrated in Figs. 4 and 5 the casing 5, overflow-chamber 6, valves 7 and 8, rod 12, float 13, adjustable collars 14 and 14', branch 17, vertical branch pipe 18, discharge-pipe 21, injector-nozzle 22, closure 23, check-valve 24,

supply-pipe 25, screen 26, check-valve 27, flexible connection 35, and incline 36 are the same as those shown in the preferred form of my invention; but in this modification the form of the angle-lever has been changed, as shown, a vertical extension 42 of said lever being pivoted at 40 in brackets 41 and 41', said extension being fitted between collars 43 43' of the valve-stem 44 of the valve 44', the valve-casing being connected, as before stated, with the vertical branch pipe 18, which is in turn connected to the horizontal branch pipe 45 by an elbow 46. This pipe 45 is reduced to form an injector-nozzle 22, which fits in a coupling 47, and said coupling is substantially like the coupling 28, excepting that the valve-seat 29 is omitted therefrom and that in the place of the valve 30 a branch of a U-shaped siphon-tube 48 is threaded into said coupling, the other branch of said tube terminating short of the bottom of the trap for a purpose hereinafter described. In the operation of this form of my invention the movement of the float, and consequently the angle-lever, is the same as that described in the preferred form of my device, and it is obvious that said movement of the angle-lever will, through the vertical extension 42, open the valve 44', thereby admitting live steam to the pipes 18 and 45 and the injector-nozzle 22, which will result in a vacuum being formed in the coupling 47, U-shaped siphon-tube 48, and discharge-pipe 21, and will cause the contents of the trap to be siphoned therefrom through the parts described. The closure of the valve 44', which is caused by the fall of the water in the chamber 6, will stop the flow of steam to the nozzle 22 when the contents of the trap have been discharged, said fall of water permitting the float 13 to return to its normal position, as described in the preferred form of my invention. It is obvious that the discharge of the contents of the trap will create a vacuum in the low-pressure coil leading from the supply-pipe 25, as hereinbefore described.

In both forms of my invention a check-valve 50 is provided in the discharge-pipe 21 to prevent back pressure from the boiler from affecting the trap, and if this valve should not open promptly upon the admission of live steam through the nozzle 22 and in consequence the pressure in the steam-trap becomes unusually great by the steam finding its way through the coupling 28 into said trap the check-valve 27 in pipe 25 will act to prevent such pressure from entering the low-pressure coil.

Having thus described my invention, what I claim is—

1. In a steam-trap, the combination, with a receptacle, of a steam-supply valve; an injector controlled by said valve; a discharge-valve; a discharge-pipe; and means controlled by the rise of the liquid in the receptacle for actuating both of said valves.

2. In a steam-trap, the combination, with

a receptacle, of a steam-supply valve; an injector controlled by said valve; a discharge-valve; a discharge-pipe; means controlled by the rise of liquid in the receptacle for opening said valves; and means for causing said valves to remain open until the entire contents of the receptacle are discharged.

3. In a steam-trap, the combination, with a receptacle, of a steam-supply valve; a discharge-valve; means for opening both of said valves quickly and positively; means for causing said valves to remain open until the entire contents of the trap are discharged; and means for discharging said contents of the trap.

4. In a steam-trap, the combination, with a receptacle, of a discharge-valve; a steam-supply valve; a float; means controlled by the float for actuating both of said valves; and an injector entering the discharge-valve casing.

5. In a steam-trap, the combination, with a receptacle, of a discharge-pipe leading from said receptacle; a steam-supply pipe; a valve in said steam-supply pipe; a valve controlling the passage of liquid to the discharge-pipe; a float; and means connecting by the float with both of said valves.

6. In a steam-trap, the combination, with a receptacle, of a supply-pipe for said receptacle; a chamber in said receptacle; a float within said chamber; a discharge-valve; and means controlled by the float for actuating said discharge-valve.

7. In a steam-trap, the combination, with a receptacle, of a supply-pipe for said receptacle; a chamber in the receptacle; a valve in said chamber; a float; means connecting the float with the valve; a discharge-valve; and means controlled by the float for actuating said discharge-valve.

8. In a steam-trap, the combination, with a receptacle, of a chamber within said receptacle; a float located in the chamber; a valve in the chamber, said valve being connected to the float; a discharge-valve; and a lever, actuated by the float for operating said discharge-valve.

9. In a steam-trap, the combination, with a receptacle having a discharge-port, of a float, an overflow-chamber in which the float is located; a steam-supply pipe; a valve in said pipe; an injector - nozzle connected to said pipe; a discharge-pipe for receiving the jet from the injector; and means controlled by the float for actuating the valve in the steam-supply pipe.

10. The combination, with a receptacle, of an overflow-chamber; a float located in said overflow-chamber; a lever controlled by the float; a steam-supply valve actuated by the lever; an injector; and a discharge-passage for receiving the jet from said injector.

11. The combination, with a receptacle, of an overflow-chamber within said receptacle; a float in the overflow-chamber; a valve to which said float is connected; adjustable stops

on the stem of the float; a pivoted lever, an arm of which is located between said stops; a steam-supply valve connected to another arm of said lever; an injector; and a discharge-passage leading from the receptacle and with which the injector communicates.

12. In a steam-trap, the combination, with a receptacle, of an overflow-chamber; valves carried by said chamber; a float in said chamber; and means for actuating one of said valves when said float has risen to a predetermined height.

13. In a steam-trap, the combination, with a receptacle, of an overflow-chamber; valves carried by said chamber; a float in said chamber; and a connection between said float and one of said valves.

14. In a steam-trap, the combination, with a receptacle, of an overflow-chamber; valves carried by said chamber; a float in said chamber; and a flexible connection between said float and one of said valves.

15. In a steam-trap, the combination, with a receptacle; of a pivoted lever; an overflow-chamber; a float carried by said lever and located in said overflow-chamber; and a discharge-valve controlled by the lever.

16. In a steam-trap, the combination, with a receptacle, of a pivoted lever; valves actuated by said lever; an overflow-chamber; a valve in said chamber; and a float connected to one of the valves of said chamber and to the lever.

17. In a steam-trap, the combination, with a receptacle having an inclined bottom, of a lever; a float carried by said lever; steam supply and discharge valves actuated by said lever; means for creating a vacuum at a point adjacent to said discharge-valve; and means for actuating the lever with a quick and positive motion.

18. In a steam-trap, the combination, with a receptacle having an inclined bottom, of an overflow-chamber; valves carried by said overflow-chamber; a pivoted lever; a float carried by said lever and depending into the overflow-chamber; a steam-supply valve; a discharge-valve, both of said valves actuated by said lever; a supply-pipe; a check-valve carried by said supply-pipe; a closure for the receptacle, said closure carrying a check-valve; a discharge-pipe; a check-valve carried by said discharge-pipe; a pipe connection between the steam-supply valve and the discharge-pipe; an injector-nozzle formed at the juncture of said steam-supply connection and the discharge-pipe; a weighted arm carried by the pivoted lever; and a connection between the float and one of the valves carried by the overflow-chamber.

19. In a steam-trap, the combination, with a receptacle, of an overflow-chamber; valves carried by said chamber; a lever; a float carried by said lever and depending into the overflow-chamber; a connection between said float and one of said valves; a steam-supply valve; said valve being actuated by the le-

ver; a closure for the receptacle; a check-
valve carried by said closure; a supply-pipe;
a check-valve carried by said supply-pipe;
a discharge-pipe; a check-valve carried by
5 said discharge-pipe; a coupling into which
the discharge-pipe is inserted; and an in-
jector-nozzle in said coupling.

In testimony whereof I affix my signature
in presence of two witnesses.

JAMES J. BURKE.

Witnesses:

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