(No Model.)

3 Sheets—Sheet 1.

# H. CREAMER.

## STEAM TRAP.

No. 509,202. Patented Nov. 21, 1893.

Fig: 2.

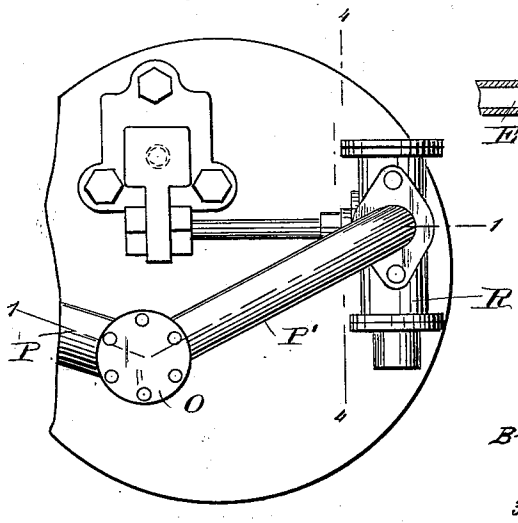



Fig: 1.

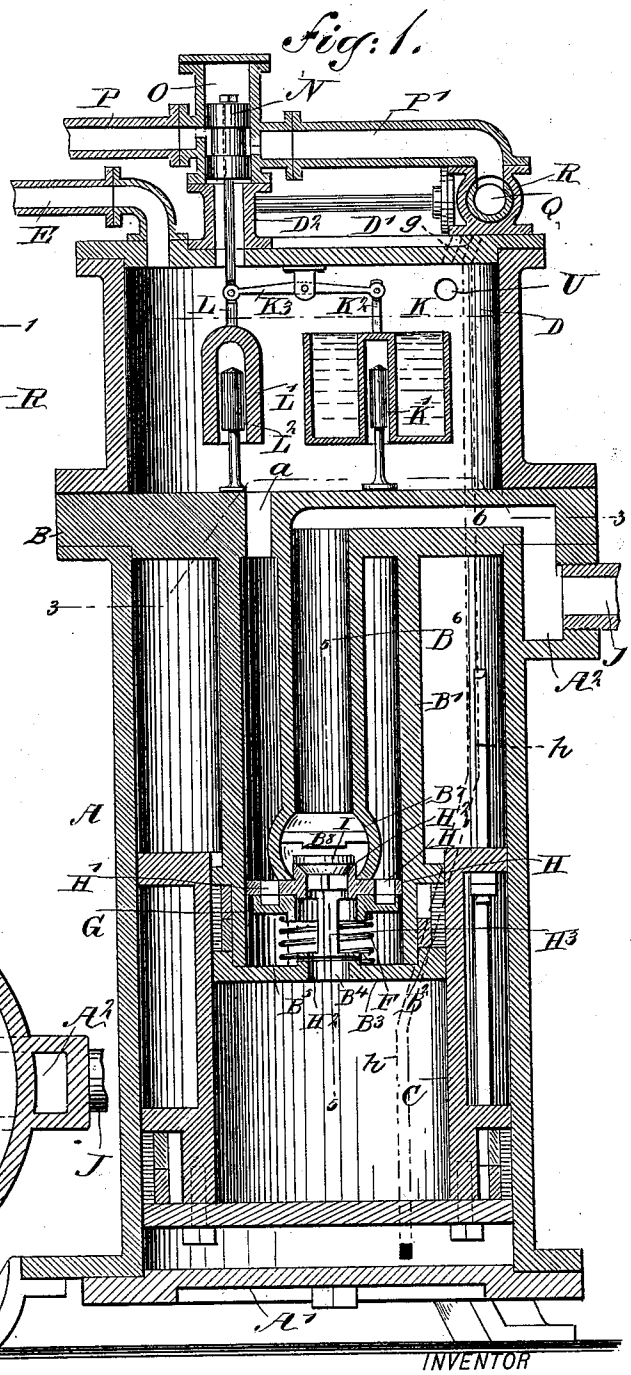
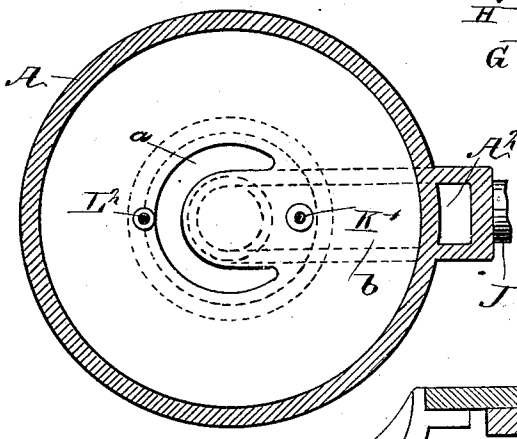



Fig: 3.




WITNESSES:

Chas. Nida.

S. Sedgwick

INVENTOR

H. Creamer

BY Munn & Co

ATTORNEYS

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

(No Model.)

3 Sheets—Sheet 2.

# H. CREAMER.

## STEAM TRAP.

No. 509,202. Patented Nov. 21, 1893.

Fig: 4.

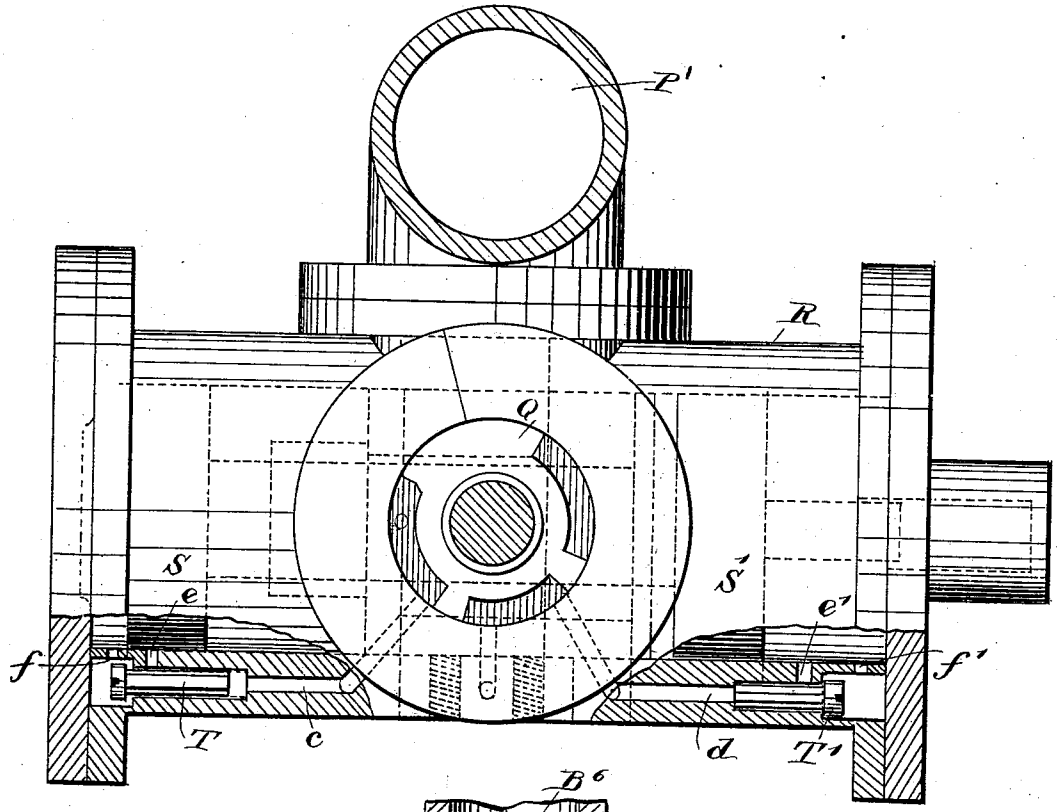
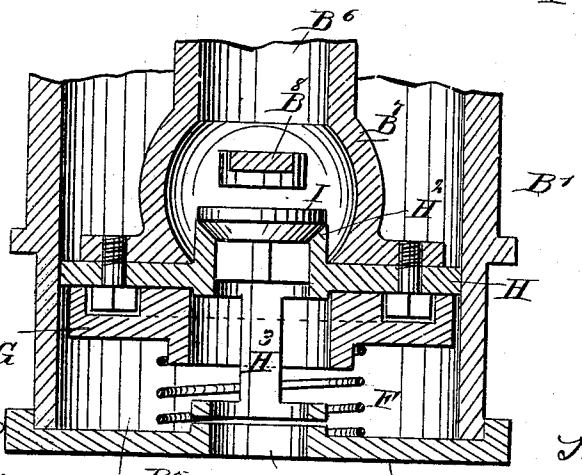



Fig: 5.




WITNESSES:

Chas. Nicola.

E. Sedgwick

INVENTOR

H. Creamer

BY

Munn & Co

ATTORNEYS

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

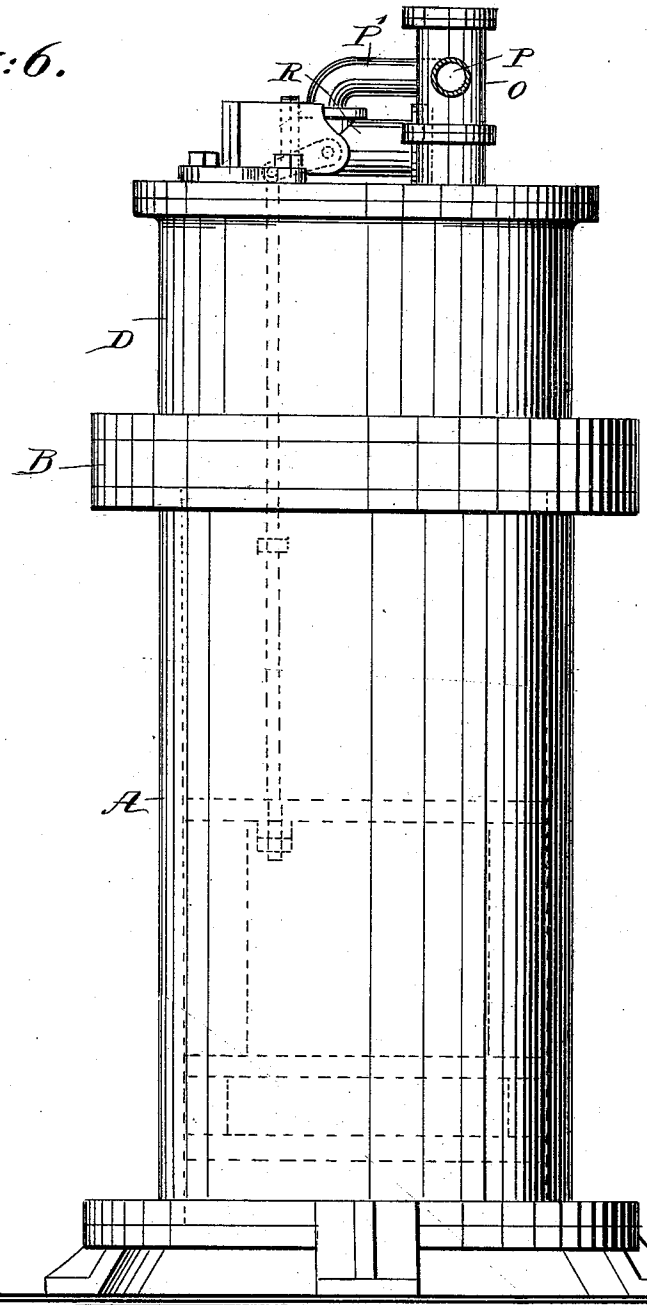
(No Model.) 3 Sheets—Sheet 3

# H. CREAMER.

## STEAM TRAP.

No. 509,202. Patented Nov. 21, 1893.

Fig. 6.




WITNESSES:

Chas. Nida.

C. Sedgwick

INVENTOR

H. Creamer

BY Munn & Co

ATTORNEYS.

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

# UNITED STATES PATENT OFFICE.

HENRY CREAMER, OF NEW YORK, N. Y.

## STEAM-TRAP.

SPECIFICATION forming part of Letters Patent No. 509,202, dated November 21, 1893.

Application filed June 30, 1893. Serial No. 479,199. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY CREAMER, of the city, county, and State of New York, have invented a new and Improved Steam-Trap, of which the following is a full, clear, and exact description.

The invention relates to steam traps for automatically conducting water of condensation from engines, steam heating systems, &c., back into the boiler.

The object of the invention is to provide a new and improved steam trap, which is simple and durable in construction, very effective and automatic in operation, and arranged to facilitate the conducting of water of condensation from engines, steam heating systems, and the like, back into the boiler.

The invention consists principally of a receiver for receiving water of condensation, and connected by a port with a fixed neck held on the cylinder and containing an inlet valve adapted to open on the down stroke of the pump piston to admit the water to the same, and a discharge valve for discharging the water from the said piston.

The invention also consists of certain parts and details, and combinations of the same, as will be hereinafter described and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a sectional side elevation of the improvement. Fig. 2 is a plan view of the same. Fig. 3 is a sectional plan view of the same on the line 3—3 of Fig. 1. Fig. 4 is an enlarged face view of the valve controlling the inlet and exhaust of the steam to the cylinder, parts being in section on the line 4—4 in Fig. 2; and Fig. 5 is a vertical section of part of the improvement on the line 5—5 of Fig. 1. Fig. 6 is a side view of the trap.

The improved steam trap is provided with a cylinder A, closed at its lower end by a head A′, and at its upper end by a head B, from which projects downward into the cylinder a neck B′, carrying at its lower end a permanent piston $B^2$, engaging the interior of a piston C, mounted to reciprocate within the cylinder A. This piston C is actuated in the manner fully shown and described in my Letters Patent No. 457,983. That is to say, in a box on the head of the cylinder, is arranged a rock-shaft, having an arm connected by a rod with the collar of the piston, C.

In the head B is formed a port *a*, which connects the interior of the neck B′ with a receiver D, provided in its cover D′ with a pipe E, through which the water of condensation from the engine, steam heating apparatus, &c., can pass into the said receiver. The lower end of the fixed piston $B^2$ on the neck B′ is provided with a cap plate $B^3$, formed with a central aperture $B^4$ leading to a space $B^5$, formed in the lower end of the neck B′, the said cap plate supporting the lower end of a spring F, supporting on its upper end an inlet valve G, adapted to open and close apertures H′ formed in a valve seat H, arranged within the hollow neck B′, the said seat H being secured by bolts to arms projecting from the lower end of a discharge or outlet pipe $B^6$, extending centrally within the neck B′ and depending from the head B, as will be readily understood by reference to Figs. 1 and 5. The seat H is provided with a downwardly extending tubular cage $H^3$ which forms the guide for the valve G.

The upper end of the pipe $B^6$ connects with a channel *b* arranged within the head B, and leading to a recess $A^2$ formed on the cylinder A, and connected by a pipe J with the boiler so as to return the water thereto. The lower end $B^7$ of the discharge pipe $B^6$ is preferably made spherical, as shown in Fig. 1, and in it projects a seat $H^2$ in alignment with the cage $H^3$ and formed on the top of the fixed valve seat H. On this seat $H^2$ is fitted a check valve I, the upward motion of which is limited by a suitable stop $B^8$, arranged within the lower end $B^7$ of the pipe $B^6$. The spring F is sufficiently strong to hold the inlet valve G to the under side of the seat H, and the check valve I is normally seated on its seat $H^2$ by its own weight. Now, when the piston C is on its downward stroke, the water of condensation in the receiver D passes through the port *a* into the neck B′ and through the apertures H′ past the now open inlet valve G, to flow through the cage $H^3$ centrally into the chamber $B^5$, and through the opening $B^4$ into the lower closed part of the piston C. When the piston C is on the up stroke the valve G closes

and the water contained in the piston is forced upward into and through the hollow valve seat H past the now open check valve I to flow into the discharge pipe $B^6$ and from the latter through the channel *b* and recess $A^2$ into the pipe J, to be returned to the boiler.

It is understood that when the piston C is on the down stroke the suction within the same causes the opening of the inlet valve G and the seating of the discharge valve I, and on the return or upward stroke of the said piston, the valve G returns to its seat by the action of the spring F and the pressure of water within the chamber $B^5$, while the other valve I opens to permit the water to pass through the pipe $B^6$, channel *b*, recess $A^2$ and pipe J to the boiler.

Within the receiver D is arranged a float K, made in the form of a cup-shaped vessel open at the top and adapted to be filled with the water of condensation flowing into the said receiver D. The float K is guided on a pin K′, erected within the receiver D, as plainly shown in Fig. 1, and the said float is also provided with an upwardly extending arm $K^2$, pivotally-connected with a horizontally-disposed lever $K^3$, fulcrumed on the under side of the cover D′ of the said receiver D. The other end of the said lever $K^3$ is pivotally-connected with a valve stem L, extending upwardly through the cover D′ and the short pipe $D^2$, and carrying at its upper end a piston valve N, arranged within a cylinder O, provided with a steam inlet pipe P connected with a suitable source of steam supply, and with an outlet pipe P′ leading to a valve Q, arranged within a casing R supported on top of the cover D′. The lower end of the valve stem L is provided with a weight L′, formed in its under side with a bore fitted to slide on a fixed pin $L^2$, erected within the receiver D, so that the said rod L is properly guided in its up and down movement. The valve Q referred to and shown in detail in Fig. 4 is in the main, part of the construction described in the Letters Patent above referred to, so that further description of the same in all its detail parts is not deemed necessary. The valve Q serves to alternately admit steam to the cylinder A at its upper and lower ends. However, the said valve has its connected pistons S and S′ steam cushioned, for which purpose I employ the auxiliary piston valves T and T′ respectively, arranged in the ports *c* and *d* respectively, through which passes steam to the outer ends of the casing R, to move the pistons inwardly. Two ports *e*, *f* and *e*′, *f*′ lead from the said ports *c* and *d* to the ends of the cylinder so that when steam is admitted, say to the port *c*, then its corresponding valve T is forced outward to permit steam to pass through the port *f* to the outer end of the cylinder to force the piston S inward until the said piston has uncovered the other port *e*, so that a full supply of steam is admitted to this end of the cylinder to move the piston S inward. When the said piston S moves outward, then steam can escape through the port *e* into the port *c* now connected with the exhaust port, so as to exhaust part of the cylinder at this end, that is, until the piston S on its outward stroke, closes the said port *e*. The steam then passes through the other port *f* to exert a pressure on the valve T so as to seat the same to prevent a further escape of the steam, whereby part of the steam is trapped within this end of the cylinder to cushion the piston S. The same operation takes place in the other end of the cylinder relative to the piston S′, valve T′, and ports *d*, *e*′ and *f*′.

The operation is as follows: The water of condensation is received in the receiver D through the pipe above the pumping part of the trap. The water accumulating in the said receiver and the neck B′ connected with the receiver by the port *a*, also fills the float K, so that when the piston C moves downward, as above described, to drain the water from the neck B′ and receiver D, then the float K by being weighted with the water moves downward to cause an upward movement of the weighted stem L, whereby the valve N is shifted and the supply of steam is cut off from the valve Q. As soon as the supply of steam is shut off the pump will remain at a standstill until the receiver D again begins to fill with water, and as soon as it reaches the height of the inverted cup-shaped float K then the latter will rise, owing to the preponderance of the weight L′ on the rod L, so that the valve N is again moved back to its position shown in Fig. 1, to permit live steam to flow from the pipe P past the said valve into the outlet pipe P′ connected with the valve to again start up the pump, whereby the piston C is caused to move upward to discharge the water as above described. The above described operation is then again repeated, that is, the valve N shuts off the supply when the float moves downward at the time water is lowered in the receiver by the action of the upward stroke of the piston C. It will be seen that by this arrangement, the water is automatically conducted back into the boiler and the pump is stopped and started according to the amount of water of condensation received within the receiver D from the steam heating system, engine or other device. It will be further seen, that the action of the pistons S and S′ of the valve Q is comparatively noiseless as the said pistons are steam cushioned. A pipe U leads from the receiver D to connect with the heating system so as to allow steam that may be in the receiver to flow back into the system.

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

1. A steam trap, comprising a receiver adapted to receive the water of condensation, a cylinder having a neck projecting from the top head of the cylinder into the latter, the said head being provided with a port connect-

ing the neck with the said receiver the hollow pumping piston, an inlet valve adapted to open on the down stroke of the pumping piston to admit the water to the same, and a discharge valve for discharging the water from the said piston, substantially as shown and described.

2. A steam trap, provided with a cylinder having a hollow neck extending therein to a discharge valve and an inlet valve, both arranged within the said neck and the hollow piston and its discharge pipe, substantially as shown and described.

3. A steam trap, comprising a cylinder having a neck projecting downward from the top head of the cylinder, and formed at its lower end with a fixed piston, a hollow reciprocating piston within the said cylinder and engaging the said fixed piston, an inlet valve arranged within the said neck, and an outlet valve arranged within the said neck and discharging into an outlet pipe, substantially as shown and described.

4. A steam trap, comprising a cylinder having a fixed hollow neck provided with a fixed piston, a reciprocating hollow piston within the said cylinder and engaging the said fixed piston, a receiver connected by a port with the said hollow neck, an inlet valve within the said neck, and a discharge valve within the said neck and connected with a discharge pipe, substantially as shown and described.

5. A steam trap, comprising a receiver connected by a port with the pump mechanism, a float which is hollow and cup-shaped, and arranged within the said receiver and thus adapted to be filled with water to cause it to act by its gravity thereby augmented, and a valve controlling the steam for actuating the pumping mechanism, the said valve being connected with the said float, substantially as shown and described.

6. A steam trap comprising a neck connected with the water receiver and with the hollow piston, a discharge pipe arranged within the said neck and connected with the pipe leading to the boiler, a valve seat attached to the said pipe within the said neck, a disk valve held on the said valve seat and pressed in contact therewith by a spring within the said neck, and a check valve seated on a central opening of the said seat and adapted to open into the said discharge pipe, substantially as shown and described.

HENRY CREAMER.

Witnesses:
THEO. G. HOSTER,
C. SEDGWICK.