

No. 743,983.

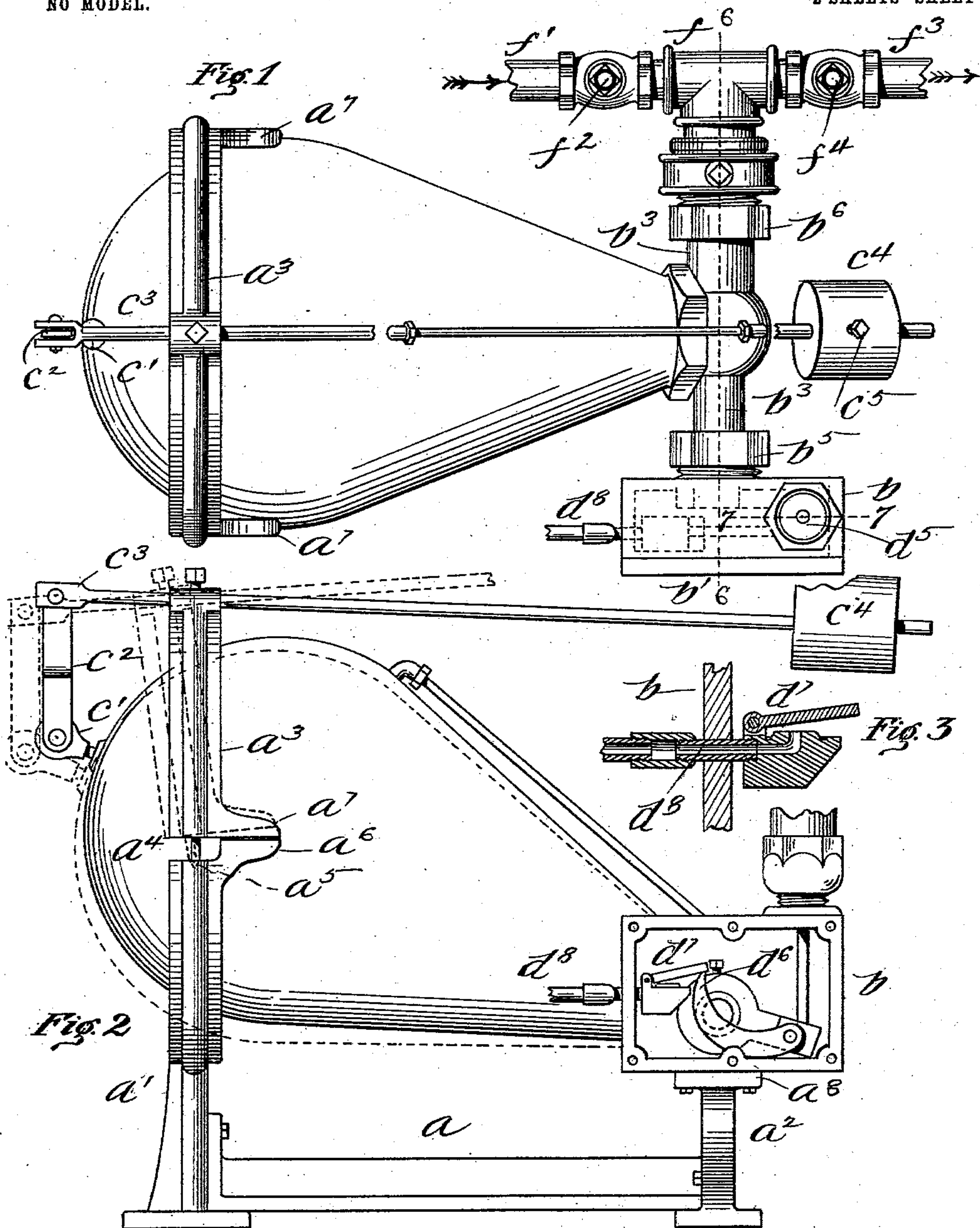
PATENTED NOV. 10, 1903.

E. HIPPARD.  
STEAM TRAP.

APPLICATION FILED MAY 20, 1902. RENEWED OCT. 14, 1903.

NO MODEL.

2 SHEETS—SHEET 1.



WITNESSES:

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INVENTOR

*Emanuel Hippard*  
by *J. R. Nottingham*  
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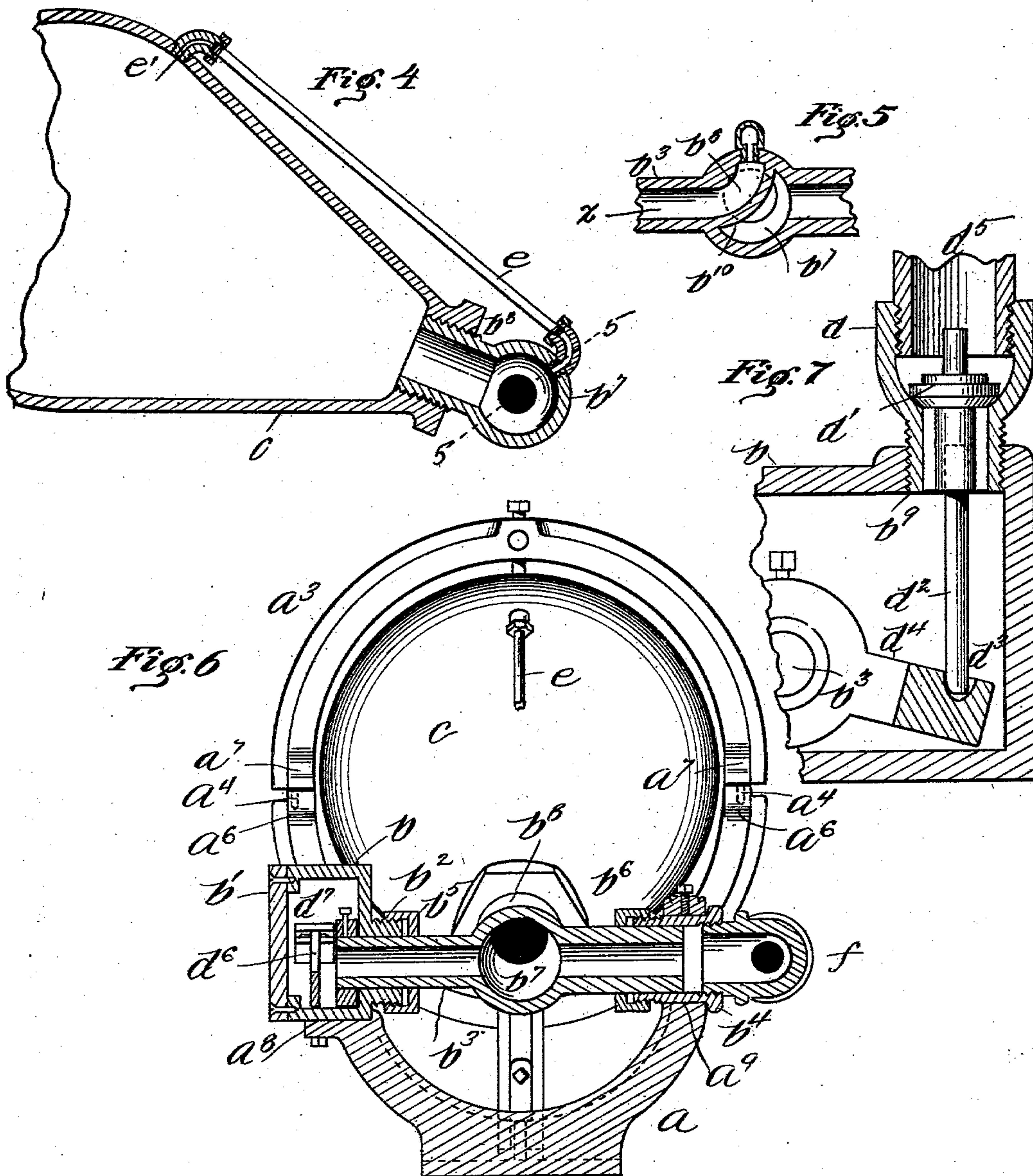
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*W. J. Huxon*  
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# UNITED STATES PATENT OFFICE.

EMANUEL HIPPARD, OF YOUNGSTOWN, OHIO.

## STEAM-TRAP.

SPECIFICATION forming part of Letters Patent No. 743,983, dated November 10, 1903.

Application filed May 20, 1902. Renewed October 14, 1903. Serial No. 177,008. (No model.)

*To all whom it may concern:*

Be it known that I, EMANUEL HIPPARD, a citizen of the United States, residing at Youngstown, in the county of Mahoning and State of Ohio, have invented certain new and useful Improvements in Steam-Traps; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to that class of steam-traps having an oscillatory receiver which receives the water of condensation when in a raised position and receives steam to expel the water when in its lowered position; and it consists, essentially, of novelly-constructed mechanism for quickly and positively oscillating the receiver.

The invention further consists in the mechanism for automatically cutting off the flow of water to the receiver and opening the steam-inlet to admit steam into the receiver to expel the water.

The invention further consists in mechanism for automatically permitting the escape of the water back into the boiler and the escape of the entrapped air; and the invention further consists in the general arrangement and combination of the several parts, as will be hereinafter described, and stated in the claims.

The principal object of the invention is to simplify and cheapen the cost of construction of this class of traps without in any way impairing their durability and effectiveness in operation.

Other objects will become apparent upon the detail description of the invention.

In the drawings, Figure 1 is a top plan view of my improved device; Fig. 2, a side elevation, the face-plate of the steam box or casing being removed to show the mechanism for operating the steam-inlet valve; Fig. 3, a detail section of the air-escape valve; Fig. 4, a vertical section of a portion of the oscillatory receiver, showing the means by which steam is admitted to the receiver to expel the water therefrom; Fig. 5, a detail section on line 5 5

of Fig. 4; Fig. 6, a section on line 6 6 of Fig. 1, and Fig. 7 a section on line 7 7 of Fig. 1.

Referring to the several views, the letter *a* indicates a suitable base provided at one end with a yoke *a'* and at the other end with a U-shaped standard *a''*. Fulcrumed on the ends of yoke *a'* is an arch-shaped rockable support *a'''*, which is provided with pivotal points *a''''*, seated in sockets *a'''''* in the ends of the yoke *a'*. The ends of said yoke *a'* are provided with outwardly-projecting stops *a''''''*, upon which the heels *a''''''''* of the rockable support *a'''* are adapted to rest and make contact. The ends of the U-shaped standard are provided with suitable seats *a''''''* and *a''''''''*, respectively, and secured on the seat *a''''''* is a steam box or casing *b*, provided with a removable face-plate *b'*. The inner side of the steam-box is provided with a bearing *b''*, in which is journaled one end of a rockable hollow shaft *b'''*, the other end of said shaft being journaled in a bearing *b''''*, secured to the seat *a''''''*. The bearings *b''* and *b''''* are provided with suitable stuffing-boxes *b''''''* and *b''''''''*, respectively, as shown in Figs. 1 and 6. The center of the hollow shaft is formed with a chamber *b''''''*, provided with a short communicating pipe *b''''''''*, which is screwed into one end of an oscillatory receiver *c*. The top of the steam-box is provided near one end with an opening *b''''*, into which is screwed a screw-threaded end of a casing *d*, containing a valve *d'*, having a stem *d''*. The free end of the valve-stem is seated in a socket *d''''* of an arm *d''''''*, said arm being secured on one end of the rockable hollow shaft. Screwed into the valve-casing *d* is a pipe *d''''*, which leads to the boiler or steam-generator. (Not shown.) Secured to the arm *d''''''* is a curved arm *d''''''''*, which has its free end in constant contact with the free end of a flap-valve *d''''''''''*, adapted to open and close a passage *d''''''''''*, leading outside of the steam-box, through which passage the entrapped air and steam are permitted to pass during the filling of the oscillatory receiver with the water of condensation.

In the upper part of the chamber *b''''''* is tapped a steam-pipe *e*, leading to the oscillatory receiver, as shown at *e'*, and the chamber is provided with a partition *b''''''''*, which pre-



vents communication with the other or opposite end of the hollow shaft, as shown in Fig. 5. Communicating with the opposite end of the hollow shaft is a T branch  $f$ , having an inlet-pipe  $f^1$ , controlled by a check-valve  $f^2$ , and an outlet or discharge-pipe  $f^3$ , controlled by a check-valve  $f^4$ . The water flowing from the receiver (not shown) that is placed at the steam-pipes to receive the water of condensation that takes place in the radiator and pipes is admitted by the valve  $f^2$  to the oscillatory receiver by way of the hollow shaft  $b^3$ , and when the water is expelled from the oscillatory receiver it is returned back into the boiler through the pipe  $f^3$  by means of the valve  $f^4$ .

Pivoted to a stud  $c^1$ , secured to the oscillatory receiver, is one end of a connecting-link  $c^2$ , the other end of said link being pivoted to one end of a counterbalance-beam  $c^3$ , passing through a slot in the rockable support  $a^3$ . On the outer or free end of the beam is a weight  $c^4$ , capable of being adjusted at any desired point thereon and secured by a binding-screw  $c^5$ .

The operation of the device is as follows: When the receiver is filled with the water coming from the radiator-pipes or other heating system, (not shown,) the receiver will overcome the weight  $c^4$  and be quickly dropped to its lower position. (Shown by the dotted lines in Fig. 2.) In its downward movement the receiver rocks the hollow shaft to which it is secured, and the water passing out through pipe  $f^3$  opens the valve  $f^4$ , permitting the water to pass to the boiler, the check-valve  $f^2$  closing automatically. At the same time this operation is taking place the arm  $d^1$  is rocked upward and the valve  $d'$  opened to admit steam from the boiler, thus allowing the pressure in the trap and boiler to become uniform, and a check-valve, which is usually placed at the inlet to the boiler below the water-line, opens by the weight of the water and allows the water to enter the boiler. As the steam is admitted into the steam-box it passes through the passage  $x$ , Fig. 5, of the hollow shaft into the pipe  $b^3$  and thence into the receiver, forcing the water therefrom. The expelled water flows through the discharge-pipe and forcibly opening the check-valve  $f^4$  passes into the boiler, as aforesaid. The oscillatory receiver resumes its normal position as soon as the water is discharged.

It is obvious from the foregoing description of the operation of the trap that when the accumulated water within the oscillatory receiver overcomes the weight  $c^4$  the free end of the receiver will at once begin to fall, the weight of balance being suddenly shifted over the center or fulcrum point. It will be readily seen that this overweight of balance is materially increased by the weight  $c^4$ , and hence the downward movement of the receiver is greatly increased, permitting a quick drop of the same. When the water in the re-

ceiver has been expelled by the force of the inflowing steam, the weight  $c^4$  quickly returns the receiver to its normal position. The quickness of the fall and rise of the receiver is materially assisted by the low position of the fulcrum-point  $a^1$ , which, it will be observed, is situated approximately midway between the top and bottom of the free end of the receiver or, in other words, a slight distance below the horizontal center of said receiver, as such position of the fulcrum-point greatly increases the leverage of the beam  $c^3$  in both its rising and falling movement.

Various modifications and changes in the construction of my improved trap may be made without departing from the spirit of my invention or sacrificing the principle thereof.

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

1. In a steam-trap, the combination with a rockable hollow shaft having a water-receiver attached thereto, the hollow shaft being provided at one end with inlet and outlet valves, and at the other end with a steam-valve for admitting steam into the receiver, of a rockable arm secured to the hollow shaft and adapted to open and close the steam-valve, an air-valve for the receiver, and means independent of the steam-valve stem attached to the rockable arm for opening and closing the air-valve.

2. In a steam-trap, the combination with a rockable hollow shaft, a water-receiver attached thereto, inlet and outlet valves at one end of the hollow shaft and a steam-box at the other end thereof, of a steam-valve for admitting steam into the steam-box, a steam-pipe leading from said hollow shaft to the receiver, and air-valve for said receiver, a rockable arm secured to the hollow shaft and adapted to open and close the steam-valve, and an arm secured to the rockable arm for opening and closing the air-valve.

3. In a steam-trap, the combination with an oscillatory receiver, of a rockable support having its fulcrum-points at opposite sides of the receiver, and a counterbalance-beam adjustably mounted in said support, said beam having one end connected to said receiver and the other end provided with a weight.

4. In a steam-trap, the combination with an oscillatory receiver, of a rockable support, and a counterbalance-beam adjustably attached to the rockable support, said beam having one end connected to the receiver and the other end provided with a weight, said rockable support having its fulcrum-points situated approximately midway between the upper and lower surfaces of the receiver.

5. In a steam-trap, the combination with an oscillatory receiver, of a rockable support, a counterbalance-beam adjustable in the rockable support, a link connecting one end



of the counterbalance-beam with the receiver, and a weight adjustable on the other end of said counterbalance-beam.

5 6. In a steam-trap, the combination with an oscillatory receiver, of a base-supported yoke, a rockable support fulcrumed on the yoke, a counterbalance-beam adjustable in the rockable support, a link connection between one end of the counterbalance-beam

and the receiver, and an adjustable weight on the other end of said counterbalance-beam.

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

EMANUEL HIPPARD.

Witnesses:

W. R. GRAHAM,

W. B. HALL.