(No Model.)

C. WATSON & A. GAUKROGER.

STEAM TRAP.

No. 321,556. Patented July 7, 1885.

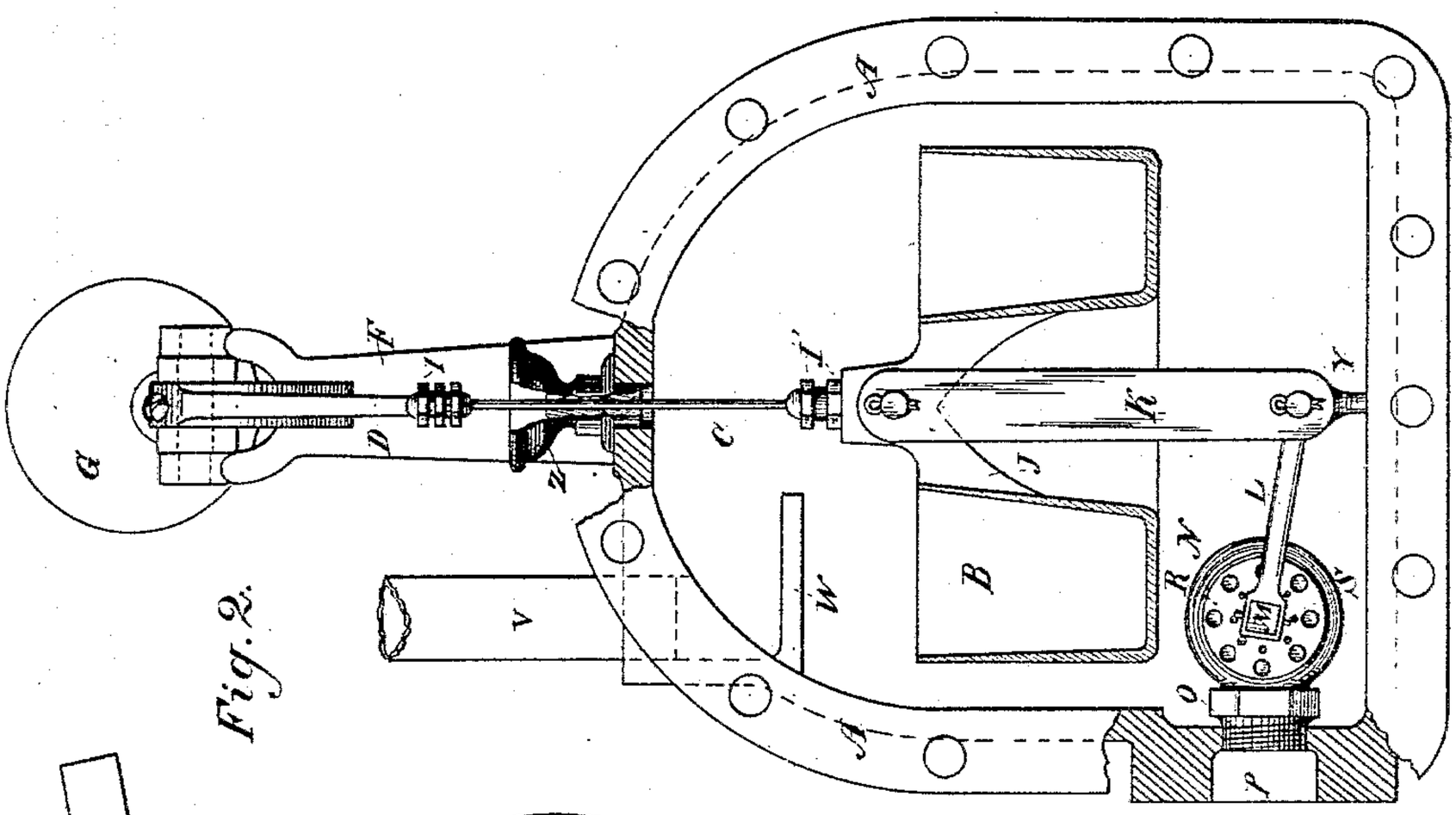

Fig. 2.

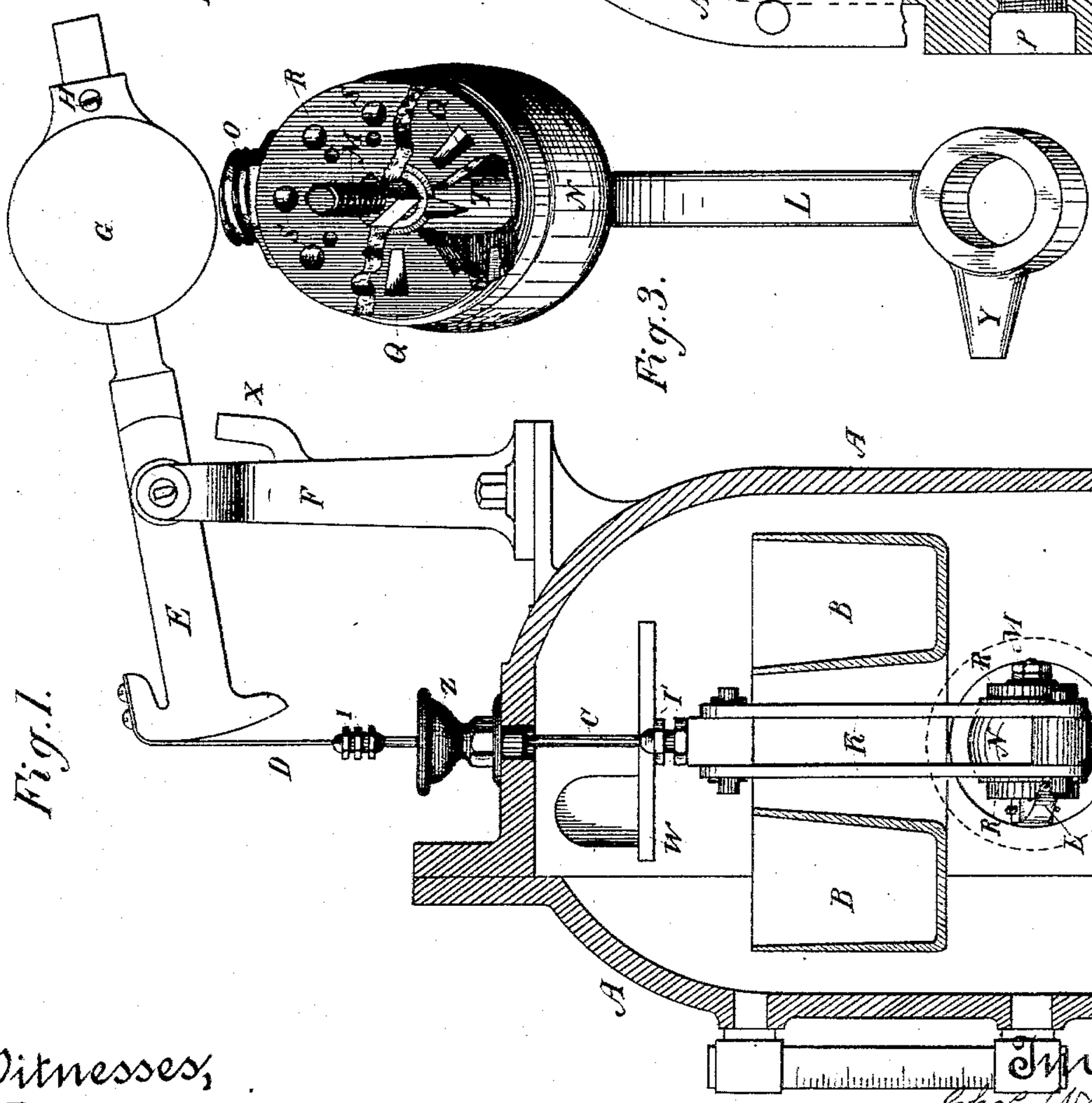

Fig. 3.

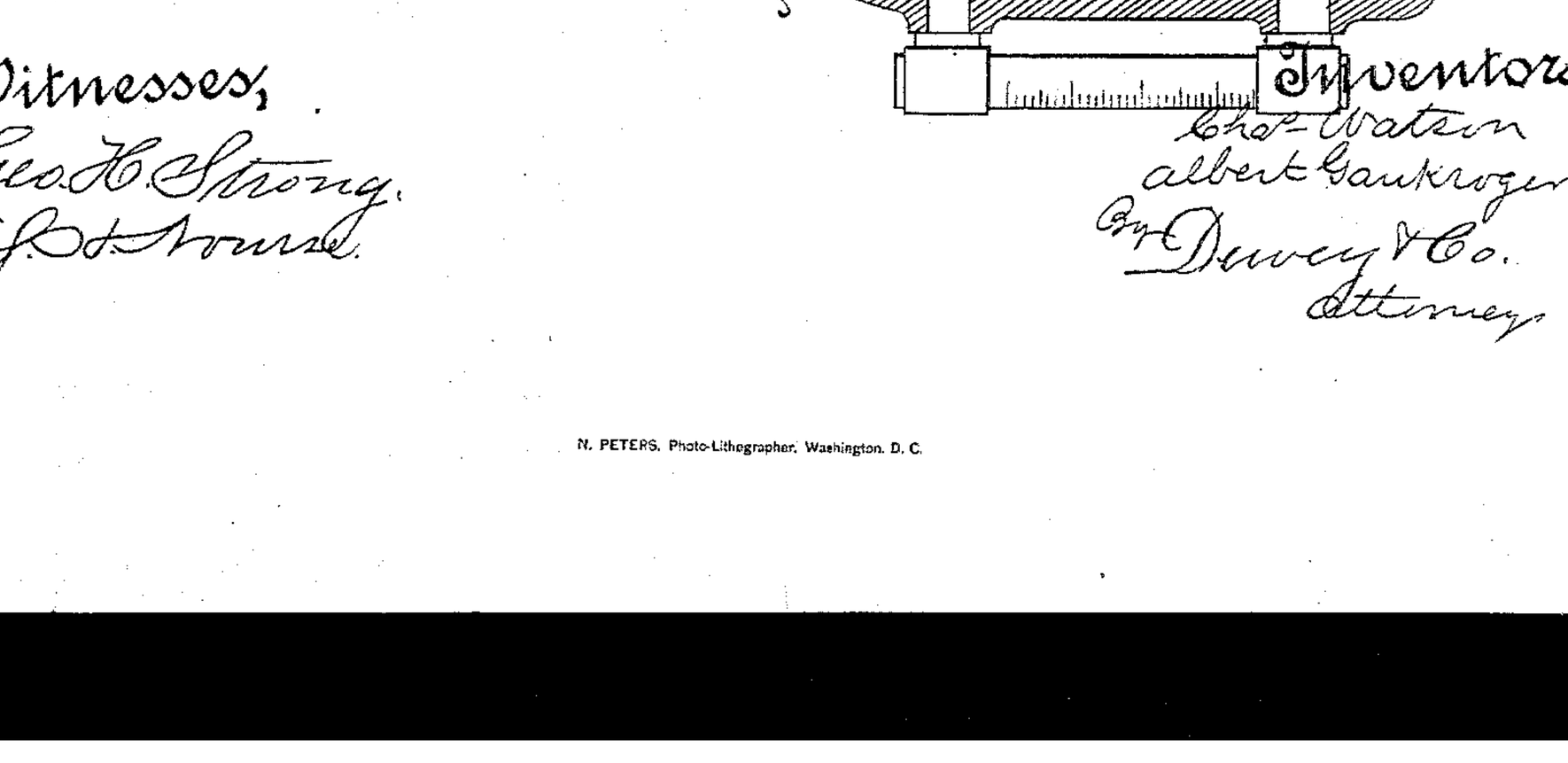

Fig. 1.

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UNITED STATES PATENT OFFICE.

CHARLES WATSON AND ALBERT GAUKROGER, OF SAN FRANCISCO, CAL.

STEAM-TRAP.

SPECIFICATION forming part of Letters Patent No. 321,556, dated July 7, 1885.

Application filed December 9, 1884. (No model.)

To all whom it may concern:

Be it known that we, CHARLES WATSON and ALBERT GAUKROGER, of the city and county of San Francisco, State of California, have invented an Improvement in a Steam-Trap; and we hereby declare the following to be a full, clear, and exact description of the same.

Our invention relates to certain improvements in steam-traps; and it consists of an inclosing-case having an ingress-pipe, through which the water of condensation is admitted, and an egress-pipe, through which it is discharged, the latter being controlled by a valve of peculiar construction, a float connected with the said valve, and also connected with a counter-balance exterior to the casing, stops for the valve, and also for the counterbalance-lever, and in a means for connecting the float with the counterbalance-lever without the use of a stuffing-box or packing, together with certain details of construction, all of which will be more fully described by reference to the accompanying drawings, in which—

Figure 1 is a vertical section of the trap, taken through the plane of the stuffing-box from front to rear, showing also section of the float. Fig. 2 is a front view of the trap with the front face or bonnet removed, showing a side view of the valve and a section of the float. Fig. 3 is an enlarged view of the valve, shaft, and sleeve.

A is the inclosing-case, which, in the present case, is shown in the form of a cylinder having a flat bottom and a dome-shaped top. Within this cylinder is a float, B, which is suspended by means of a slender rod or wire, C, and a flat steel ribbon, D, from one end of the counterbalance-lever E. This lever is supported upon knife-edges or in other suitable manner upon the fulcrum column or standard F. Upon the outer end of this lever a weight, G, is fitted, which may be caused to slide to or from the fulcrum until the float B within the casing is suitably counterbalanced when in condition for operation. The weight G is fixed at any point by a set-screw, H, or other device. The ribbon D is fixed by screws or bolts to the end of the lever E, which is made in the form of an arc of a circle, so that as the lever vibrates upon its fulcrum the ribbon D will always preserve a vertical line with the rod or wire C. Both the ribbon and the wire are fixed where their ends meet by split tapering sockets having clamping-nuts I, which screw upon them, and thus hold the ends of the ribbon and rods firmly, at the same time allowing them to be easily released or adjusted. The lower end of the rod C, from which the float B is suspended, is also secured by a similar clamping-nut, I'. In the present case we have shown the float B in the form of a deep annular cup the sides of which are inclined, so that the top is wider than the bottom, as shown. This cup becomes filled with the water of condensation, which enters the chamber A; and it is also surrounded so that it floats in the water, the counter-balance G being so adjusted that, in connection with the specific gravity of the float, the change in the depth of water within the chamber will influence the float so that it rises or falls. The tapering shape of the interior of the float prevents it from becoming broken by the freezing of any water within it, if it is allowed to become cold, as the expansion would be upward instead of outward. The float has a yoke, J, connecting it with the nut I', and a pin through this yoke passes also through the upper ends of the links K, which extend down below the bottom of the float, and are there connected by a pin with the outer end of the lever-arm L. This lever has its inner end fixed to the shaft or spindle M of the valve, by which the flow of water from the casing A is regulated.

This valve is a balance-valve, and constructed as follows:

N is a hollow cylindrical casing having the projecting tube O extending from its periphery, so as to be screwed into a corresponding hole in the outlet-opening P at the bottom of the trap. The ends of the cylinder N are perforated with slots or openings Q, through which water may pass from the interior of the casing A to the interior of the valve-casing N, and thence out through the pipe or nozzle O. The slots upon the sides of the valve-casing N are preferably placed opposite the closed portion of the opposite end, or so that the openings in the two ends do not stand in line. Upon the opposite ends of the shaft M, which passes

through the casing N, are fixed disks R, and these disks have holes S made in them, so that when they are turned to a certain point the holes will correspond with the slots Q in the valve-casing N, and when turned so as to stand midway between the slots Q they will cut off any escape of water through the valve. Upon the shaft M a sleeve, T, is fitted, this sleeve being just enough longer than the exterior of the ends of the casing N to form shoulders, against which the disks are pressed by the nuts which secure them in their places, thus holding them firmly against the ends of the valve-casing, but at the same time the sleeve prevents them from being pressed so closely as to cause undue friction. By this construction the opening or closing of the passages Q in the valve-casing is entirely controlled by the disks R, which are fitted over them, and these latter are rotated by the movement of the lever L, which is in turn actuated through the links K by the rise and fall of the float B. As the openings Q do not stand exactly opposite to each other, it will be seen that the currents of water flowing into the valve-casing N from opposite sides will not meet each other in such a manner as to choke or prevent a free delivery, and as the openings are made at opposite ends of the valve-casing it will be seen that the valve is perfectly balanced under whatever pressure it may have to act.

V is the inlet-pipe, and W is a sort of shelf upon which the water may strike to break its first force as it enters the casing A. The openings S and Q in the movable disks and in the ends of the valve-casing have together a slightly greater area than that of the ingress pipe V, so that there is no danger of the apparatus becoming overfull or waterlogged.

In order to prevent the outer end of the counterbalance-lever E from being moved too far downward, a stop, X, is fixed to the fulcrum or standard E, upon which the lever may strike; and in order to prevent the outer end of the valve-lever L from moving below a certain point, a projection or lug, Y, is fixed to it so as to rest upon the bottom of the casing A when the lever has moved far enough to close the valve.

In order to prevent the friction caused by a stuffing-box, which is necessary, if a rod of sufficient diameter is used to connect the float with the counterbalance-lever, we employ a slender wire, C, and this passes out through the casing A and through a cup, Z. The passage, while being sufficiently large to allow the wire to move freely through it, will not allow any appreciable amount of steam to escape beside the wire, and the cup may serve to hold water or other liquid, if desired, which will form a sort of packing. This, however, we have not found to be necessary, as there is no appreciable leakage around the small wires which we have used to make the connection. This avoids the friction incidental to the use of stuffing-boxes, as they must be packed tight enough to prevent leakage, and when this is done they are apt to be so tight as to prevent the delicate action and movement of the parts which are necessary to make the trap effective.

A pet-cock may be fitted to the trap to allow the water to escape, when desired, and a gage-glass is also affixed, so that the operation may be seen at a glance.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a steam-trap, an exit-valve consisting of a cylindrical casing, N, having closed ends with radial slots formed in them so that the slots at opposite ends do not stand in line with each other, a shaft extending through the center of the casing and having slots or perforations corresponding to those in the casing, in combination with a lever by which the disks may be rotated to open or close the slots, the disks R, and sleeve T, having shoulders, against which the disks are pressed, substantially as herein described.

2. In a steam-trap, a hollow cylindrical casing with radially-slotted ends, slotted or perforated disks fitted to said ends, a shaft passing through said disks and casing and having a lever fixed to it, a float with inclined sides suspended within the trap-casing and connected with said lever by links, in combination with a counterbalance-lever exterior to the casing and connected with the float by a ribbon, D, and rod C, substantially as herein described.

3. In a steam-trap, an exterior casing having an inlet-passage and an outlet-passage with a controlling-valve, as shown, in combination with a float, a ribbon, D, and rod C, for suspending the float, and a counter-balance and weight, said float being made in the form of an annular chamber with open center, and with the sides made wider at the top than at the bottom, substantially as herein described.

4. In a steam-trap, an exterior casing having inlet and outlet passages, a valve controlling the outlet-passage and connected with an annular float within the case, the movement of which actuates said valves, a ribbon and rod, by which said float is suspended, extending up through the top of the casing and connected with the counterbalance-lever above, in combination with a stop on the exterior of the casing, by which the downward movement of the outer end of the lever is arrested, substantially as herein described.

5. In a steam-trap, an exterior casing having inlet and outlet passages, a valve by which the escape of water is regulated, and a float suspended within the casing and connected with said valve, an exterior counterbalance-lever fulcrumed above the casing, together with a flexible ribbon, and a stem or wire of small diameter passing through the top of the casing and connected with the float, and an exterior cup surrounding said wire, whereby the stuffing-box is dispensed with, substantially as herein described.

6. In a steam-trap, a casing having inlet and

outlet passages, a valve controlling the escape of water from the latter, a float connected with and operating said valve, a counterbalance-lever fulcrumed to the exterior casing, a flexible ribbon and stem or wire by which the float is connected with the lever through the top of the casing, together with the split clamps and nuts whereby the ends of the ribbons and wire are connected, adjusted, and held, and the lower end of the wire is connected with the float, substantially as herein described.

In witness whereof we have hereunto set our hands.

CHARLES WATSON.
ALBERT GAUKROGER.

Witnesses:
S. H. NOURSE,
H. C. LEE.