(No Model.)

G. WESTINGHOUSE, Jr.

Steam Trap.

No. 239,001. **Patented March 15, 1881.**

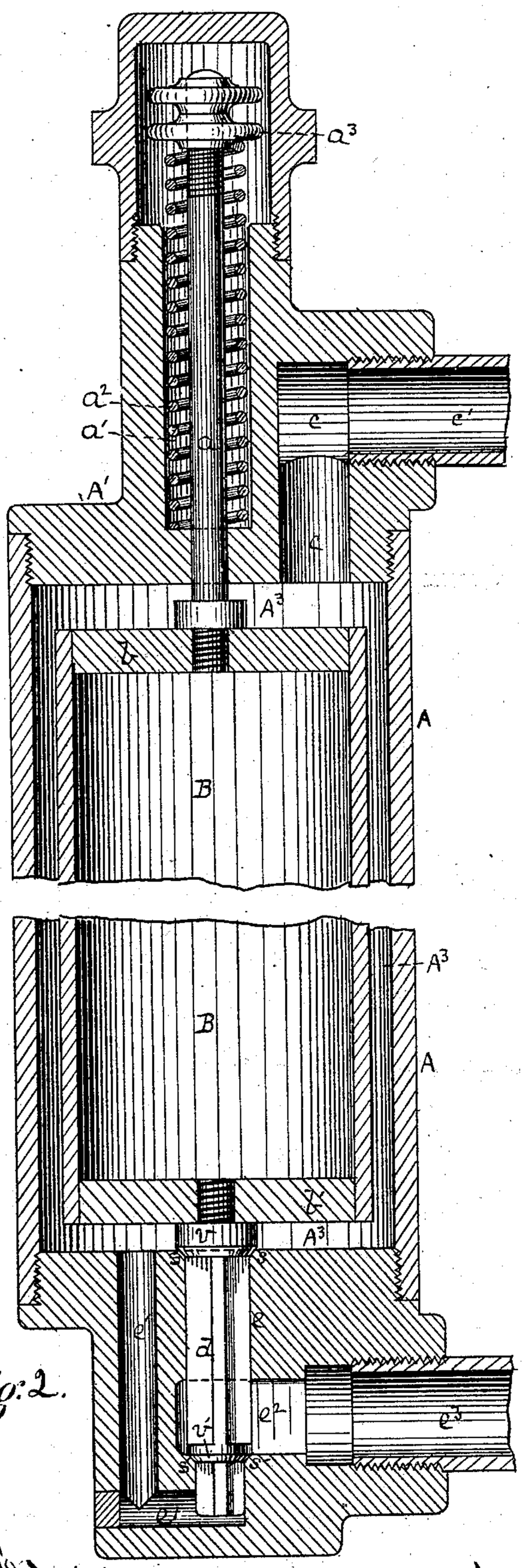

Fig. 2.

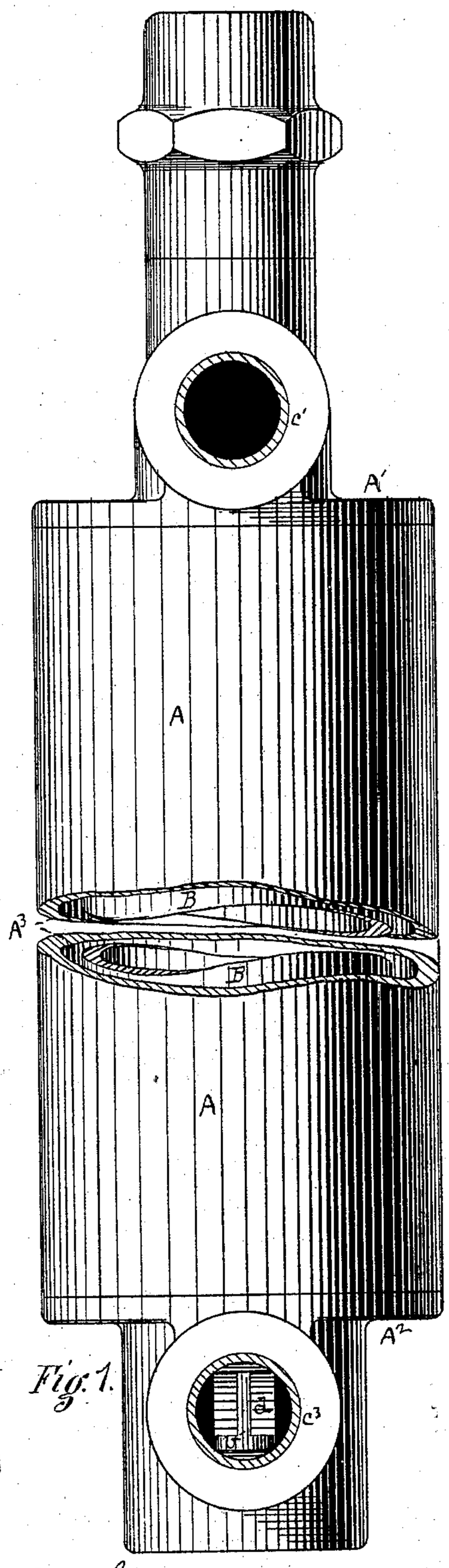

Fig. 1.

Witnesses:
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GEORGE WESTINGHOUSE, JR., OF PITTSBURG, PENNSYLVANIA.

STEAM-TRAP.

SPECIFICATION forming part of Letters Patent No. 239,001, dated March 15, 1881.

Application filed January 22, 1881. (No model.)

To all whom it may concern:

Be it known that I, GEORGE WESTINGHOUSE, Jr., of Pittsburg, county of Allegheny, State of Pennsylvania, have invented or discovered a new and useful Improvement in Steam-Traps; and I do hereby declare the following to be a full, clear, concise, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—like letters indicating like parts—

Figure 1 is a view, in elevation, of my improved steam-trap, and Fig. 2 is a vertical sectional view of the same.

In both figures the middle parts of the outside case and inner float-tube are broken away to reduce the length. The lengths of these parts may vary according to the work to be done, in accordance with principles well understood in the arts. Assuming the drawings to show full size, I would make the outer case about two feet long, more or less; but the dimensions as to both length and breadth may be varied at pleasure, provided only the essential features of construction and operation be substantially preserved.

My present invention relates to an improved construction of steam-trap chiefly designed for use in automatically drawing off or discharging the water of condensation from steam-pipes, steam-radiators, &c., either by a continuous discharge or intermittently, as often as it accumulates in excessive quantity, but without danger or liability of the escape of steam or admission of air.

My improved device consists of a tubular shell, A, which may be made of pipe closed at its upper and lower ends by caps or plugs A' A^2. In the chamber A^3 thus made I arrange an inner float-tube, B, tightly closed at its lower end by a plug, b', and for convenience of a steam attachment a plug, b, may be inserted in its upper end also; but a spider-frame or cross-bar may take the place of the plug; but for the present I will assume it to be a tight plug. This float-tube has an outside length and diameter a little less than the chamber A^3, so as to leave a little water-space beneath and around it, and also allow for a short range of vertical or endwise motion.

To the upper end of the float-tube B, I affix a stem, a, which extends up into a spring-chamber, a', wherein is a spring, a^2, arranged on the stem a, and acting by its resilience or elasticity on the under side of an adjustable screw-nut, a^3, so that the tendency of the spring will be to lift the float-tube. A port, c, through the upper plug or cap, A', provides means for the attachment of a drainage-pipe, c', and for the drainage of water of condensation into the chamber A^3.

In the lower plug, A^2, I make two drain-ports, e e', of which the one, e, is in or near the axial line of the tube, and opens at its lower end into a chamber, e^2, from which a pipe, e^3, may lead to a return or waste. The other port, e', made a little to one side, passes down beneath the chamber e^2, and then rises and opens into e^2, with its axial line coincident with the axial line of the port e. A valve-seat, s, is made at the upper end of the port e, and another, s', but of a slightly less area, at the discharging end of the port e'; then on a winged stem, d, which is secured to the lower end of the float-tube, I arrange two puppet-valves, v v', in such manner that when the float-tube is down such valves will rest on the seats s s' and close the escape; but as the float-tube is raised both valves will be unseated, and water of condensation will pass out at both ports e e'. These valves v v' are so nearly of the same area and are so arranged relative to the steam-pressure that practically they are balanced valves. The downwardly-acting steam-pressure, which tends to hold the upper one to its seat, is practically balanced by the upwardly-acting steam-pressure on the lower side of the lower one.

The spring a^2 is to be so set by adjusting the screw-nut a^3 that it will come a little short of supporting the weight of the float-tube, or, in other words, so that the float-tube will, by its gravity, keep the valves v v' to their seats, both as against the lifting-power of the spring a^2 and as against the lifting-power of at least enough water to keep the valve-seats s s' covered, and also to fill the space beneath the float-valve. Ordinarily I would adjust the spring a^2 so that the float-tube will stay down and keep the valves v v' to their seats until the space between the float-tube and the outer case is full up to, say, one-half its vertical height, more or less, and so that as such space fills up with water above such level the lift-

ing action of the water and spring combined shall overcome the weight or gravity of the float-tube, and so raise it, and by lifting the valves *v v'* open the ports *e e'*. Water of condensation will then escape freely, but as soon as by such escape the amount of water around and under the float-tube has become so far lessened that the residue is insufficient to float or carry that part of the weight of the float-tube which the spring is not adjusted to carry, then the float-tube will sink or go down, and by seating the valves *v v'* will cut off the escape. With another accumulation of water the float-tube will again be raised and the operation repeated.

While I have thus, for clearness of illustration, explained the action of the devices as intermittent, it is also true that, if carefully constructed and adjusted, a uniform water-level will be maintained in the chamber A^3, such that the valves *v v'* will stand much or all of the time at such open position that the escape of water will just equal the addition by condensation, and the discharge will then be continuous. Also, for clearness of description, I have described the device B as a float-tube; but, mechanically speaking, it is simply a float. Instead of being made hollow, it may be made solid; or, if hollow, it may be filled or be allowed to fill with water.

I am aware that floats which are carried wholly by the water on or in which they rest, and which, as they rise and fall, operate to move a valve, are not, broadly considered, new; but I am not aware of any prior use of a float of any kind which was carried partly by the buoyancy of the water on or in which it rested and partly by a spring; nor am I aware of any float which was arranged in any manner to operate a balanced valve, and hence I believe these features of invention to be new with myself. And it will now be understood that the efficiency of my improved apparatus, taken as a whole, depends chiefly, in the first place, on the use of a float of such gravity that at the water-depth at which its action as a valve-opener is desired it will be too heavy to be raised by the lifting-power of the water alone, and, in the second place, on the partial balancing of the weight of the float by a spring and the carrying of the residue of such weight by the buoyancy or lifting-power of the water. The effective gravity or valve-closing power of the float increases rapidly as the level of the water is lowered by its escape; and the partial balancing of its gravity by a spring renders it an exceedingly sensitive device, as the water-level comes to or rises above the point where the lifting-power of the water and of the spring combined equal the weight of the float.

Of course, it will be understood that as the float employed is increased in weight provision must be made for the action of a higher water-column as a means of lifting it, or else the spring must be made stiffer.

I claim herein as my invention—

1. A valve-actuating float carried at and during its valve-opening action partly by the water on or in which it rests and partly by a spring, arranged for operation substantially as set forth.

2. In combination with exterior case, interior float, water-chamber, and supply and escape ports, a stem, *a*, spring a^2, and nut a^3, for partially carrying the weight of the float, and balanced valves *v v'*, for opening and closing the escape or waste ports, all arranged substantially as set forth.

In testimony whereof I have hereunto set my hand.

GEORGE WESTINGHOUSE, JR.

Witnesses:
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