

(No Model.)

2 Sheets—Sheet 1.

B. THOENS.
STEAM TRAP.

No. 603,980.

Patented May 10, 1898.

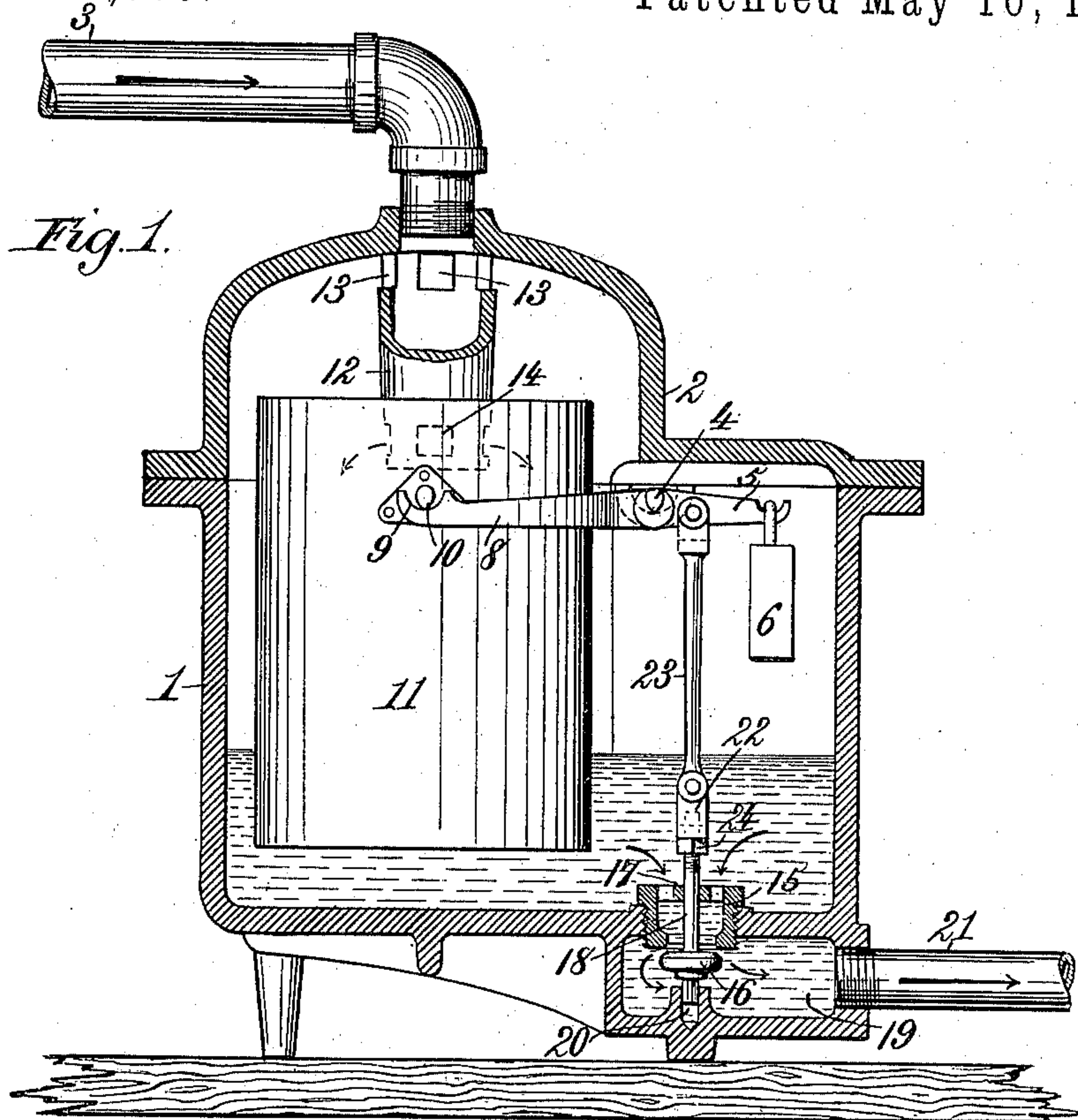
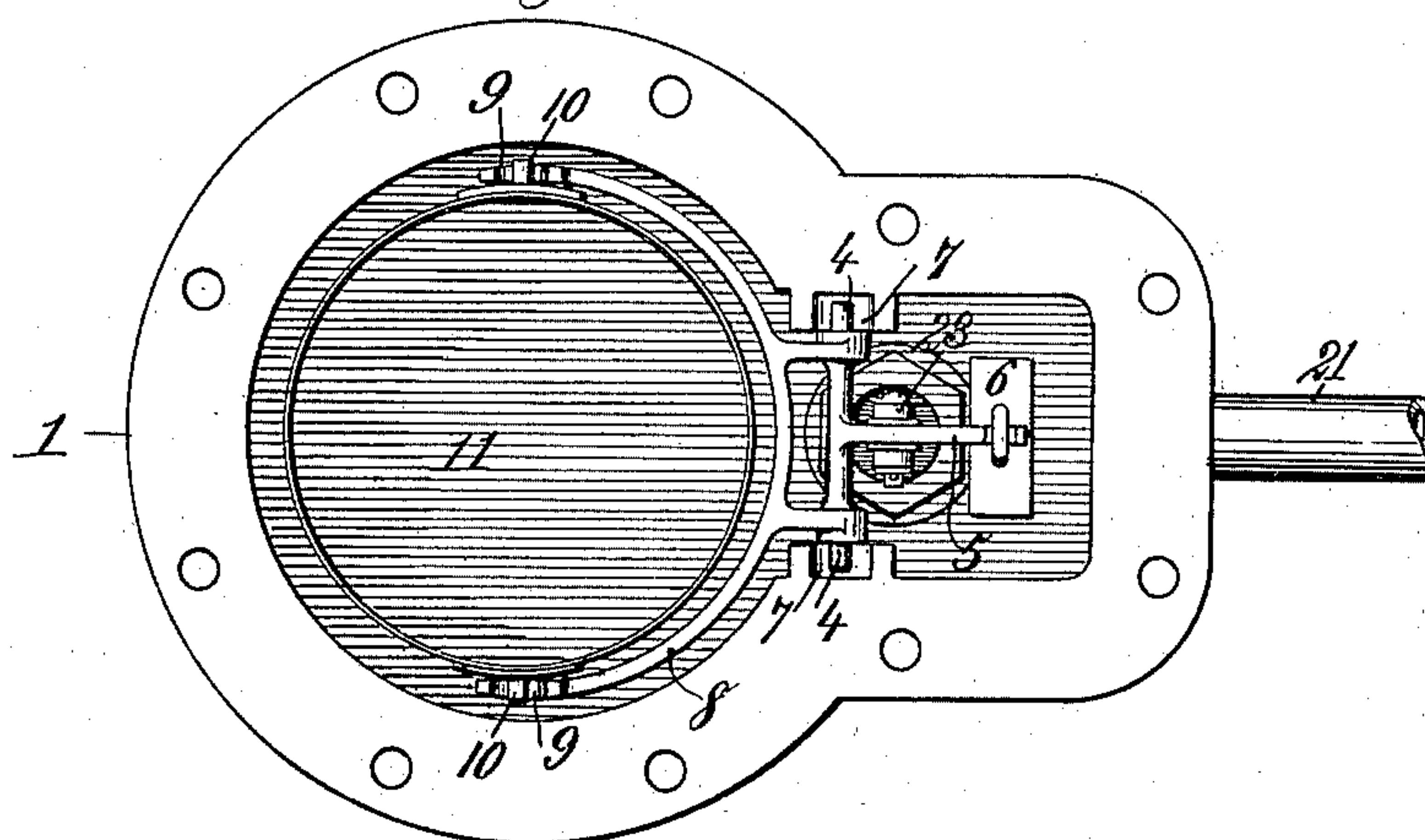


Fig. 2.



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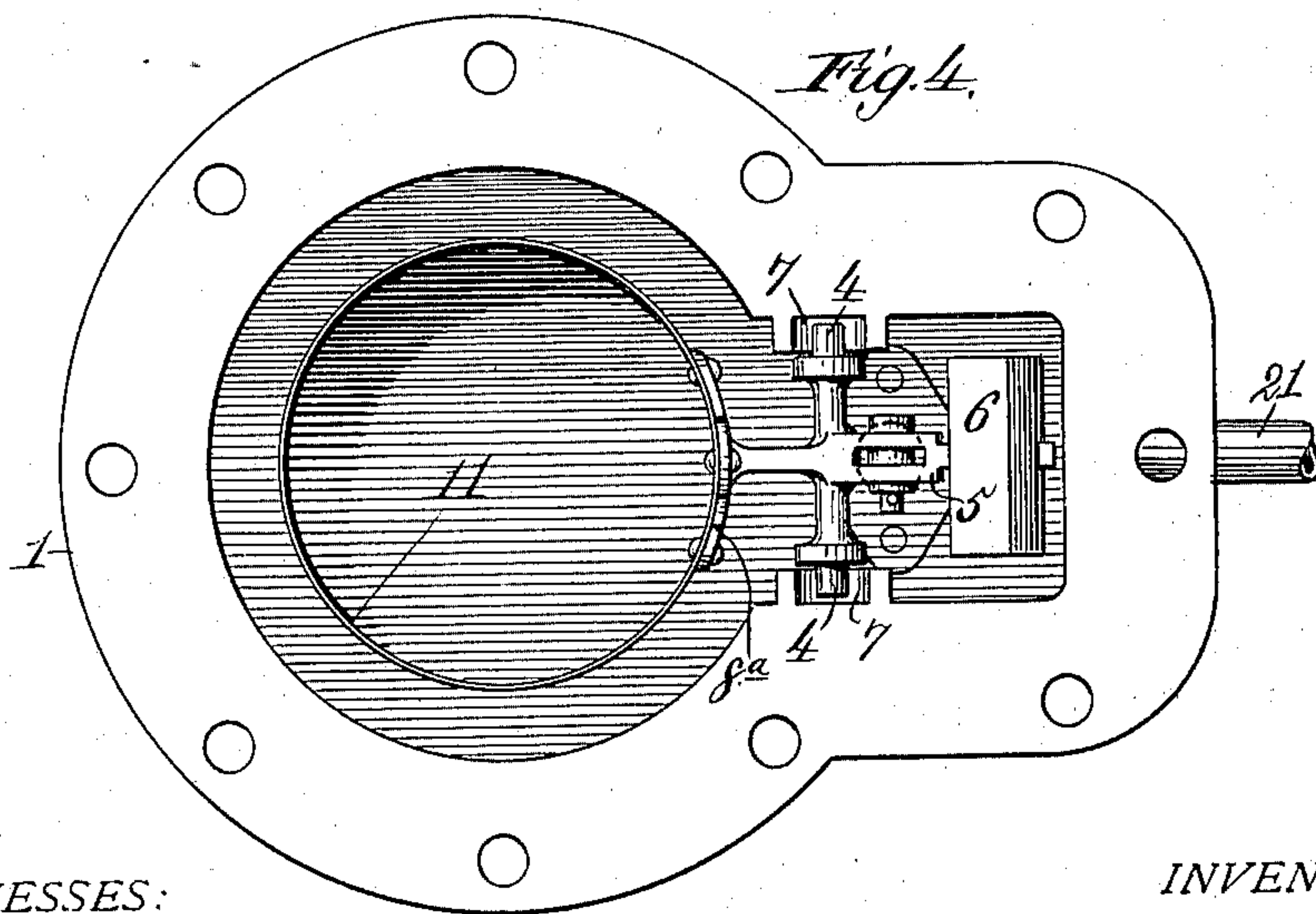
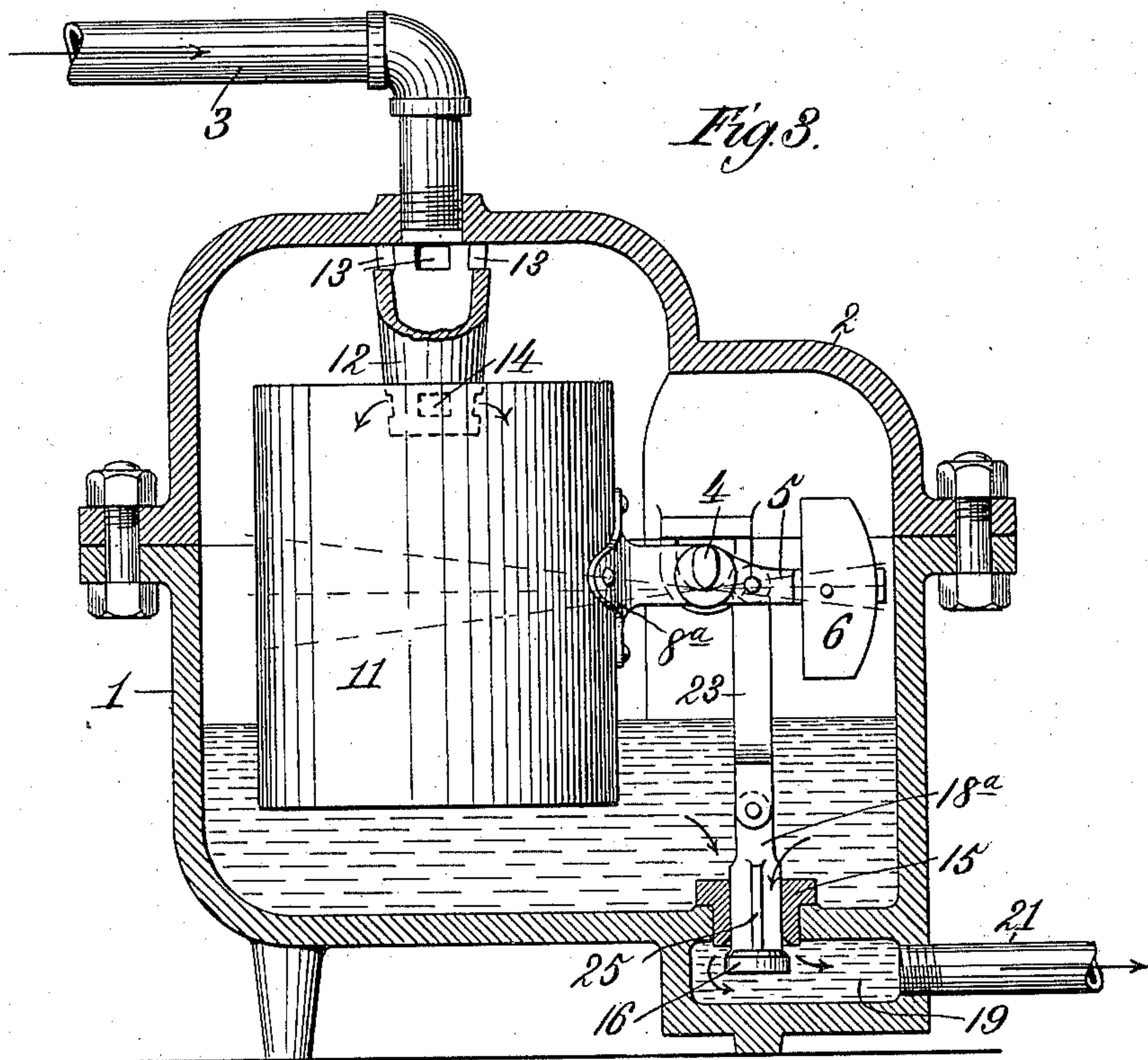
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2 Sheets—Sheet 2.

B. THOENS.
STEAM TRAP.

No. 603,980.

Patented May 10, 1898.



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UNITED STATES PATENT OFFICE.

BURCHARD THOENS, OF NEW ORLEANS, LOUISIANA.

STEAM-TRAP.

SPECIFICATION forming part of Letters Patent No. 603,980, dated May 10, 1898.

Application filed June 18, 1897. Serial No. 641,384. (No model.)

To all whom it may concern:

Be it known that I, BURCHARD THOENS, a subject of the German Emperor, residing at New Orleans, in the parish of Orleans and State of Louisiana, have invented certain new and useful Improvements in Steam-Traps; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the annexed drawings, making a part of this specification, and to the figures of reference marked thereon.

This invention relates to steam-traps, and has for its object to provide simple, reliable, and thoroughly effective means for draining steam-pipes, heating-coils or radiators, steam-jackets, &c., of the water of condensation without any possibility of permitting the blowing of steam through the trap and without requiring the constant care and watchfulness of an attending engineer to observe whether the trap is actually working or in working order.

It is a further purpose of my invention to provide a steam-trap that will work continuously at any and varying pressures and having no collapsible floats and no stuffing-boxes in which movable parts will stick.

Other purposes of the invention will hereinafter appear with reference to the features of construction and novel combinations of parts in a steam-trap, as described and claimed.

The invention is illustrated in the annexed drawings, in which—

Figure 1 is a sectional elevation of a steam-trap embodying my improvements. Fig. 2 is a plan of the same with the cover of the trap-chamber removed. Fig. 3 is a sectional elevation illustrating modifications in some of the trap parts. Fig. 4 is a plan of the modified form of trap, the cover being removed.

The trap-chamber 1 may have any suitable form and dimensions and is provided with a preferably dome-like cover 2, with the top of which is connected the inlet-pipe 3 for passage of steam and water of condensation from the steam apparatus to be drained.

In an upper portion of the trap-chamber 1 there is fulcrumed, by means of knife-edge trunnions 4, a lever 5, that may have a weight 6 suspended from one end, as shown in Fig.

1, or otherwise attached, as in Fig. 3. To receive and support the knife-edge trunnions 4, there are provided sockets or bearings 7 in the walls of the trap-chamber. As shown in Figs. 1 and 2, the other end of the lever 5 may be made in the form of a horizontally-disposed bifurcation 8, having sockets 9 in its extremities. These sockets 9 are provided to afford bearings for knife-edge lugs 10 on the sides of an open-top vessel 11, that is thus suspended from one end of the lever 5 and at a point beneath the inlet-pipe 3, which is in communication with the steam apparatus to be drained.

Instead of suspending the vessel 11 by means of trunnions 10 it may be rigidly secured to a concavo-convex plate 8^a, formed on one end of the lever 5, as shown in Figs. 3 and 4.

There is depending from the trap-cover 2 and into the open-top vessel 11 a vertically-arranged pipe 12, the bottom of which is closed. The upper end of this pipe 12 is in communication with the inlet-pipe 3, so that the said pipe 12 practically constitutes a continuation of the inlet-pipe 3 into the trap-chamber. The upper portion of the vertically-depending pipe 12 is provided below the trap-cover 2 with lateral openings 13 for access of steam into the trap-chamber 1, whereby the pressure in said chamber is equalized with the pressure in the heating-coil or other steam apparatus that is being drained of its water of condensation. In the lower portion of the pipe 12 are lateral outlets 14 for passage of the water of condensation into the open-top vessel 11 by gravity alone and without the force of impact that would attend a direct downward delivery of water from the inlet-pipe.

In the bottom of the trap-chamber 1 there is located a removable valve-seat 15, which may have the form of an externally-screw-threaded bushing, as shown.

The under side of this bushing constitutes the seat for an upwardly-seating valve 16, and the upper end of said bushing may have the form of a grating 17, as shown in Fig. 1, to provide a guide for the valve-stem 18 and at the same time afford inlets for passage of wa-

ter downward to the upwardly-seated valve. Beneath the valve-seat or bushing 15 is an outlet-chamber 19, in the bottom of which there may be provided a step-bearing 20, Fig. 1, for the lower end of the valve-stem. An outlet-pipe 21 leads from the outlet-chamber 19 of the trap.

The upper end of the valve-stem 18, as shown in Fig. 1, has an adjustable screw-threaded connection with the lower end of a yoke 22, that has a jointed or pivotal connection with the lower end of a link or rod 23, the upper end of which has a pivotal or jointed connection with the lever 5 at a point intermediate the weight 6 and the lever-fulcrum. A lock-nut 24 may be provided on the valve-stem 18 to secure the valve 16 in its adjusted position with relation to the valve-seat and the lever connections.

In the construction shown in Fig. 3 the valve-seat 15 has the form of a simple bushing, and the valve-stem 18^a is provided with wings 25 and connects directly with a pivot in the lower end of the link 23, the upper end of which is pivotally attached to the lever 5 at a point intermediate the weight 6 and the lever-fulcrum. The weight 6, Fig. 3, is preferably so attached to the lever 5 as to be adjustable in and out.

The weight 6 and the open-top vessel 11 are so proportioned that the said weight will balance the vessel when empty. Water of condensation from a steam apparatus enters the vessel 11 through the inlet-pipe 3 and lateral outlets 14 near the closed bottom of the depending pipe 12, while the steam-pressure in the trap and connected apparatus under drainage will be equalized through the lateral passages or openings 13 in the upper portion of said depending pipe. The weight of the water accumulating in the vessel 11, multiplied by the leverage, will overbalance the weight 6, thereby causing that end of the lever 5 to rise and draw up or close the valve 16, that controls communication between the trap-chamber 1 and its outlet-passages. It will be noted that the closed bottom of the depending pipe 12 acts as a buffer to take the impact of the incoming water from the inlet-pipe 3 and prevents it from acting with sudden force in the counterpoised vessel; but as the water is continuously coming in the contents of the vessel 11 will finally overflow into the trap-chamber 1, whereby the weight of the vessel will be gradually diminished as the vessel becomes more immersed until the pressure on the downwardly-opening valve 16 is greater than the weight of the vessel 11, that tends to close it, whereupon the valve will open and let the water escape from the trap. Any scale or dirt that may come in with the water will be mainly deposited in the vessel 11, and it will be observed that all the parts of the trap are so constructed and arranged that they can be readily disconnected for cleaning if necessary. The proportions of

the various parts of the steam-trap are such that at one hundred pounds steam-pressure the forces for opening and closing the valve are balanced when the vessel 11 is immersed about one inch.

It will be observed that the pressure in the trap is equalized with the pressure in the apparatus to be drained. Therefore the water will flow in by gravity and without any obstruction, thus avoiding any necessity for occasional opening of air-cocks to lower the pressure in the trap-chamber to allow the water to flow into it. The valve 16 is closed upwardly by the weight of water acting in the counterpoised open-top vessel 11, and is opened downwardly by the weight of water in the trap-chamber 1 under the pressure of steam above the surface of such water. The valve 16 is positively closed by the weight of water in the vessel 11 after the water in the trap-chamber is lowered to a level that will sufficiently diminish the buoyancy of the suspended and partly-immersed water-filled vessel.

The trap is simple in construction, entirely automatic in operation, and not liable to get out of order. It provides a perfect drainage for water of condensation without permitting any waste of steam. All dirt, scale, or sediment will be deposited where it cannot readily get access to the valve, and should any of this dirt or scale get into the trap-chamber or onto the valve or valve-seat it will be readily washed off by the outflowing water.

What I claim as my invention is—

1. In a steam-trap, the combination of a trap-chamber having an inlet in its top and an outlet at the bottom, a lever fulcrumed in said trap-chamber and provided with an open-top vessel at one end and a weight at the other end, an outlet-valve connected with said lever at a point between the weight and the lever-fulcrum, and a vertically-depending inlet-pipe connected with the trap-chamber inlet immediately above the open-top vessel and provided with a closed lower end and with lateral lower outlets for discharge of water into the open-top vessel and with lateral upper outlets or passages for steam to equalize the pressure in the trap-chamber and connected steam apparatus, substantially as described.

2. In a steam-trap, the combination of a trap-chamber having in its bottom an upwardly-seating outlet-valve, a lever fulcrumed in the trap-chamber and having an open-top vessel attached to one end and a weight attached to the other end, means for suspending and operating the upwardly-seating outlet-valve from the said lever at a point between the lever-fulcrum and the said weight, an inlet-pipe connected with the cover of the trap-chamber at a point above the counterpoised open-top vessel, and a vertically-depending pipe closed at its lower end and having its upper end in communication with said inlet-pipe and the said depending

pipe being provided in its lower portion with lateral outlets for discharge of water into the open-top vessel and having in its upper portion openings or passages for steam to equal-
5 ize the pressure in the trap-chamber and the connected steam apparatus, substantially as described.

In testimony whereof I have hereunto subscribed my name in the presence of two witnesses.

BURCHARD THOENS.

Attest:

JNO. J. WARD,
P. Z. CANOUGE.