

(No Model.)

3 Sheets—Sheet 1.

J. UHRI.  
STEAM PUMP.

No. 356,671.

Patented Jan. 25, 1887.

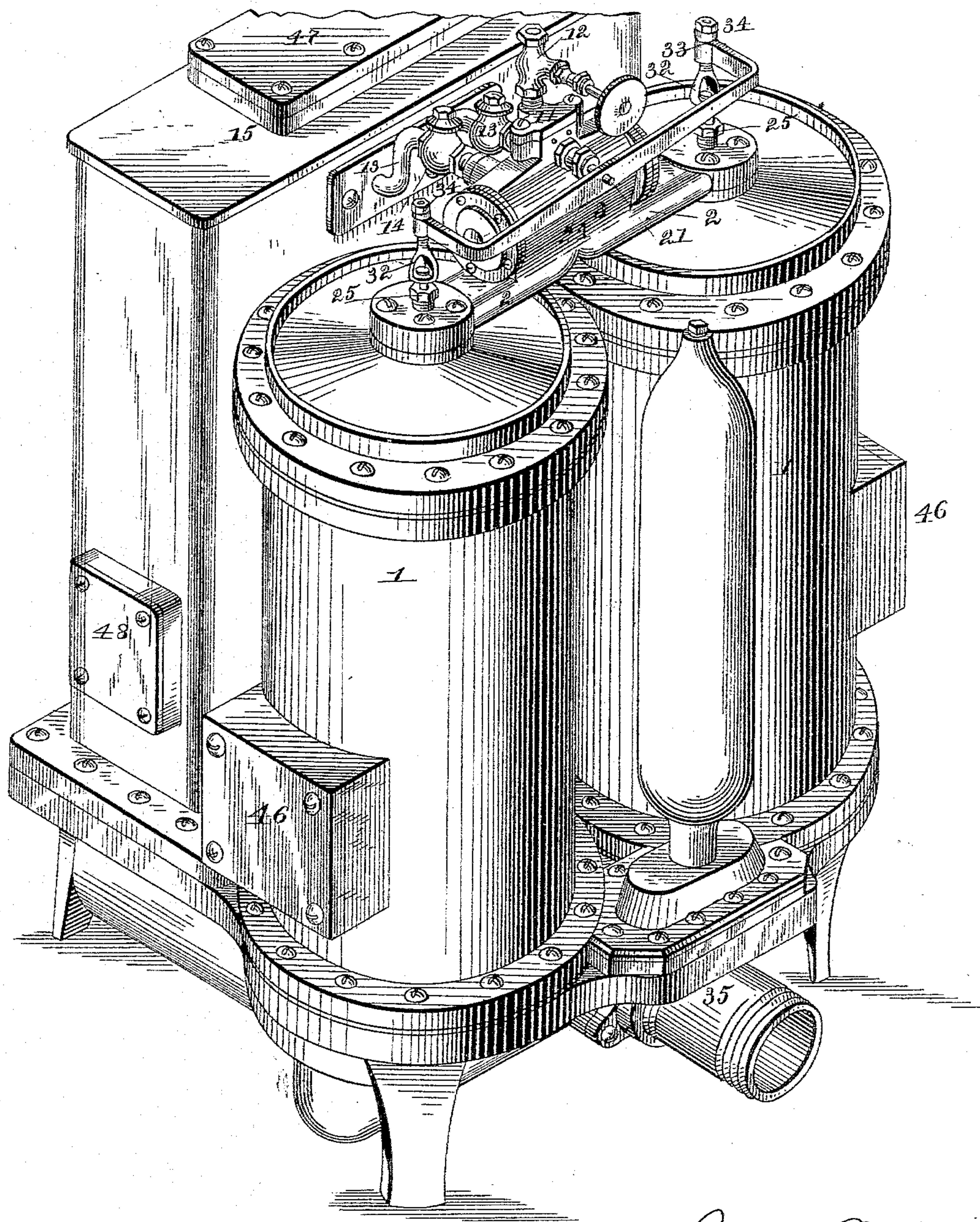


Fig. 1.

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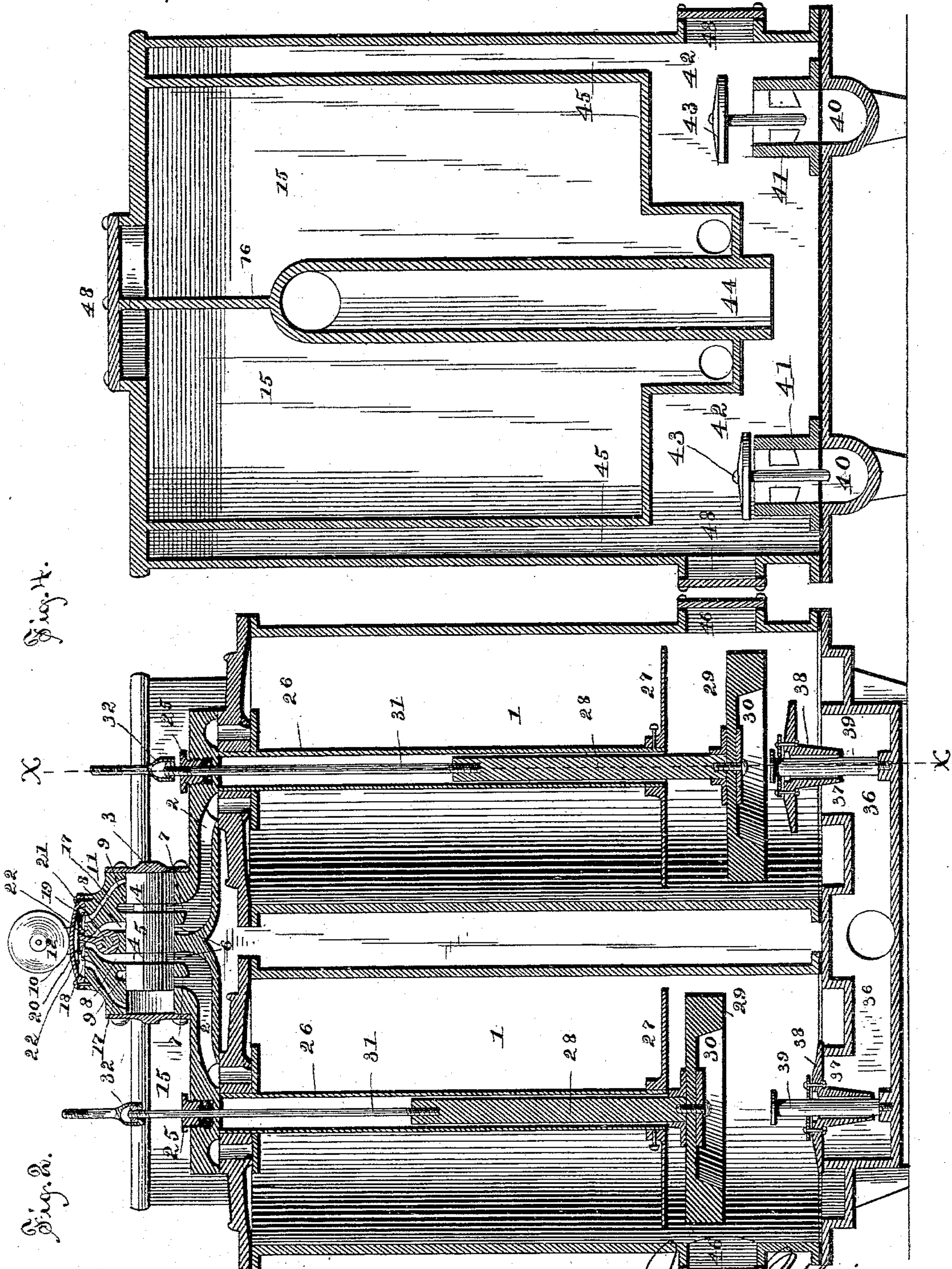
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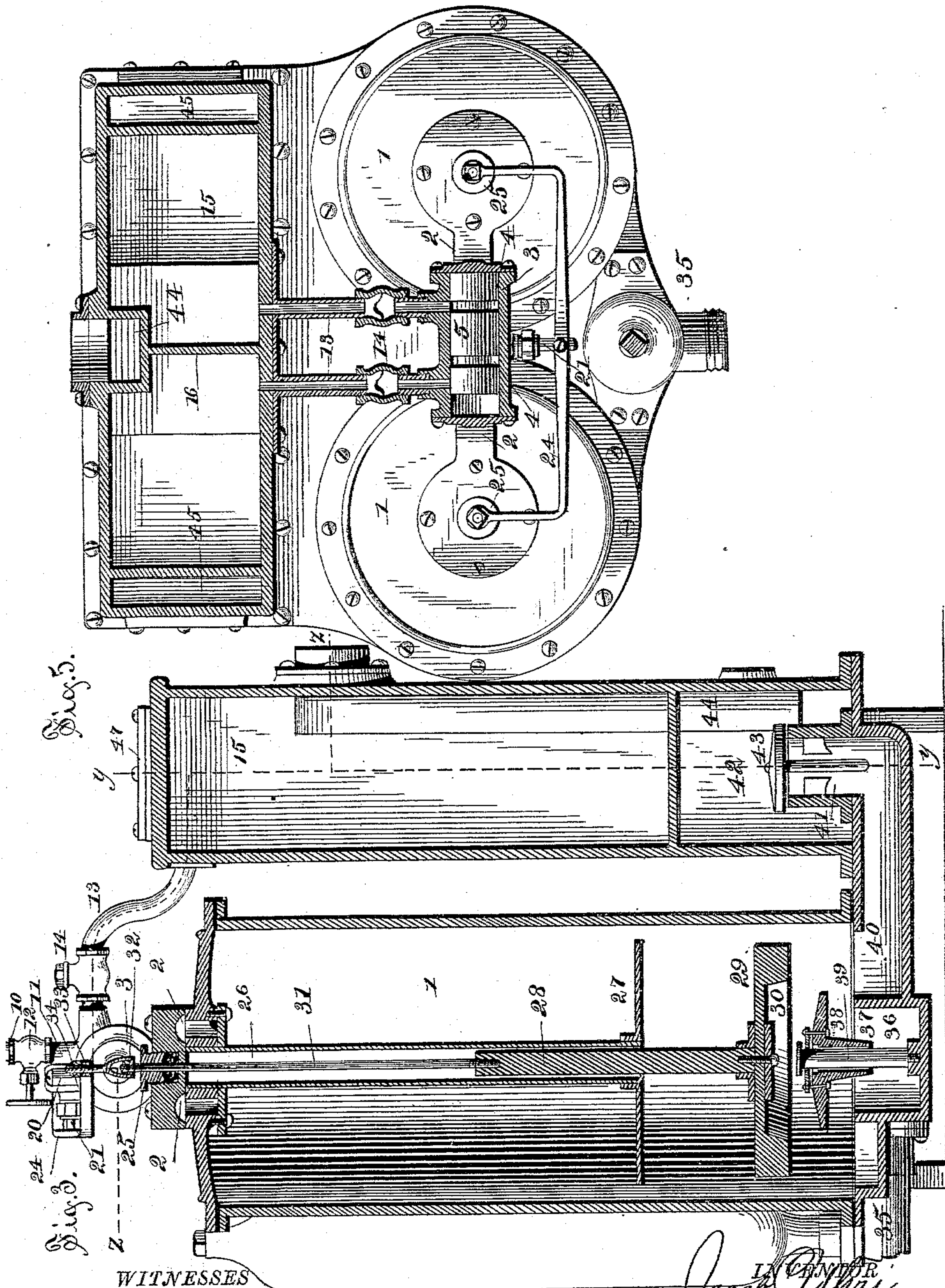


Fig. 5.

Fig. 3.

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# UNITED STATES PATENT OFFICE.

JACOB UHRI, OF CHICAGO, ILLINOIS.

## STEAM-PUMP.

SPECIFICATION forming part of Letters Patent No. 356,671, dated January 25, 1887.

Application filed October 6, 1886. Serial No. 215,479. (No model.)

*To all whom it may concern:*

Be it known that I, JACOB UHRI, a subject of the King of Sweden and Norway, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Steam-Pumps; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification, and in which—

Figure 1 is a perspective view of my improved steam-pump. Fig. 2 is a vertical sectional view through the axes of the two cylinders. Fig. 3 is a similar view on line *xx*, Fig. 2. Fig. 4 is a similar view on line *yy*, Fig. 3; and Fig. 5 is a horizontal sectional view on line *zz*, Fig. 3.

Similar numerals of reference indicate corresponding parts in all the figures.

My invention has relation to that class of steam-pumps in which water is raised by the condensation of steam within a receptacle and again forced out by admitting steam into the receptacle; and it consists in the improved construction and combination of parts of such a pump, as hereinafter more fully described and claimed.

In the accompanying drawings the numerals 1 1 indicate two cylinders having steam-pipes 2, extending from their heads into a cylindrical valve-chest, 3, supported above the cylinders. A piston or cylindrical valve, 5, slides and fits within this valve-chest, and is formed with two annular grooves, 4, which may alternately register with two pairs of steam-ports, 6 7 and 6 7, in the lower side of the valve-chest, and with two pairs of steam-ports, 8 9 and 8 9, in the upper side of the valve-chest. The ports in the lower side of the valve-chest open into the steam-pipes of the cylinders, the ports 6 being the live-steam ports and the ports 7 being the exhaust-ports; and the ports 8 in the upper portion of the valve-chest, near the center of the same, are the live-steam ports registering with the live-steam ports in the lower side of the chest, and communicating with the live-steam pipe 10, which enters at one side of an enlargement, 11, upon the valve-

chest, and is provided with a suitable valve, 12. The ports 9, nearer the ends of the valve-chest in the upper side of the same, correspond to and register with the exhaust-ports in the under side of the valve-chest, and are continued into exhaust-pipes 13, each of which is provided with a check-valve opening from the valve-chest, as shown at 14, and enters an exhaust-compartment, 15, at the rear of the cylinders, the two compartments being separated by a partition, 16.

The annular grooves in the valve or piston may alternately register with one set of the live-steam ports and with one set of the exhaust-ports, one groove registering with a set of one kind, while the other groove registers with a set of the opposite kind, and for the purpose of reciprocating the valve the enlargement of the valve-chest is provided with two steam-channels, 17, which enter the bore of the valve-chest, one at each end, and which open at their upper ends in a flat valve-seat, 18, formed in the upper end of the enlargement, and having an ordinary slide-valve, 19, alternately covering and uncovering the ports of the said channels, the chamber 20 in which the slide reciprocates communicating with the live-steam pipe. It will thus be seen that when the slide is reciprocated from one side to the other the live steam will be admitted to one end of the valve, forcing it toward the other end of the valve-chest and changing the flow of the steam to and from the cylinders, the small slide merely acting for the purpose of operating the cylindrical valve.

A rock-shaft, 21, is journaled in the enlargement of the valve-chest transverse to the same, and is provided with an upwardly-projecting arm, 22, which projects through a suitable recess, 23, in the enlargement, and the upper end of this arm engages the middle of the under side of the small slide, reciprocating the same when the shaft is rocked, and a lever, 24, or balance-bar is secured with its middle to one end of the rock-shaft.

The heads of the cylinders are provided with stuffing-boxes 25, and tubes 26 project downward from the inner ends of these stuffing-boxes, down through the cylinders, and are provided with circular flanges 27 at their lower ends, and rods 28 slide within these



tubes, and are provided at their lower ends with circular blocks 29, having, preferably, circular recesses 30 in their under sides.

The upper ends of the rods within the tubes 5 are secured to the lower ends of thinner rods, 31, which pass up through the stuffing-boxes in the heads of the cylinders, fitting tightly in the same, and the upper ends of these rods are swiveled in stirrups 32, having their screw-threaded shanks passing up through perforations 33 in the ends of the balance-bar and secured by means of washers and nuts 34.

The feed-pipe 35 for the cylinders is formed with two horizontal branches, 36, the ends of 15 which open at the centers of the bottoms of the cylinders, having raised valve-seats 37, upon which seats play valves 38, which slide upon headed rods 39, projecting from the branch pipes up through the valve-seats, the 20 said headed rods limiting the play of the valves.

The water-outlets or discharge-pipes 40 for the cylinders open at the bottoms of the same and extend rearward to form upwardly-projecting valve-seats 41 in the chambers 42 25 formed below the bottoms of the exhaust-chambers, the bottoms of the said exhaust-chambers forming the tops of the water-chambers, being cast in one piece with them.

30 The water-chambers have valves 43, playing upon the valve-seats, and the chambers open into a common discharge-pipe, 44, opening with its lower end into the chambers and passing up at the middle of the steam-exhaust 35 chambers, opening near the upper end of the same.

The water-chambers are extended at the sides of the steam-exhaust chambers, forming flat chambers 45, which serve to cool the sides 40 of the exhaust-chambers by the water raised in the said chambers from the discharge-pipes.

The sides of the cylinders, near their lower ends, are preferably provided with hand-holes 46, through which the valves and reciprocating blocks or weights in the cylinders may be 45 reached, and the top of the exhaust-chambers are likewise provided with a hand-hole, 47, and the sides of the discharge-chambers have hand-holes 48, all the said hand-holes being 50 tightly covered with suitable covers or plates.

When the pump is to be used, steam is let into one of the cylinders from the steam-pipe and thereupon shut off by means of the valve upon the said pipe, when the steam in the cylinder 55 may condense and thus form a vacuum in the same. The water will be raised in the inlet-pipe by the vacuum thus created, and if the water is not raised sufficiently high the first time to enter the cylinder, the steam is let into 60 the cylinder and let out again until one cylinder is filled with water, when the flow of steam is allowed to act undisturbed. Steam will now enter the cylinder and drive the water in the same out through the discharge-pipe, where- 65 upon the balance-bar may be tilted so as to reciprocate the valve and turn the steam into the

other cylinder. The steam from the first cylinder may now pass partly out into the exhaust-chamber, where it may be condensed, and it will partly condense within the cylinder, 70 creating a vacuum, which will draw the water into the cylinder again, and the steam in the second cylinder will drive the water out of this cylinder, causing the block or weight in the same to overbalance the weight in the 75 first cylinder, which is floated by the water in the same, the balance-bar being thus automatically tilted and the steam alternately distributed to the cylinders.

It will thus be seen that a pump will be produced which will slowly raise a large quantity 80 of water to any height, which may be overcome by the pressure of the steam used, and the water will be delivered in one continuous stream, as the one cylinder will fill while the other dis- 85 charges.

The pump will require very little attention, as there are very few moving parts, and the moving parts of the pump are not subjected to any pressure or wear, the cylindrical valve 90 merely serving to distribute the steam to the cylinders, and the slide serving to distribute steam to the cylindrical valve, and the weights and their rods will be supported by the water within the cylinders and will move so slowly 95 that there will be but slight wear or strain upon any portion of the pump.

It will be seen that as the pump is used the exhaust-steam in the exhaust-chambers will be condensed by the cooling effect of the water 100 passing up between the chambers and at the sides of the same, forming a vacuum within these chambers, which will serve to draw the exhaust-steam from the cylinders when the steam is cut off from the same, allowing a 105 vacuum to be more quickly formed within the same, and thus causing the pump to work more speedily and with more effect.

If the pressure in the exhaust-chambers is greater than in the cylinders, the check-valves 110 upon the exhaust-pipes will prevent any of the contents of the chamber from entering the cylinders, and the chambers are provided in their rear walls with outwardly-opening check-valves 49, which will admit of the extra pressure 115 within the chambers being relieved, while preventing any air from entering the chambers from without.

By having the valve-seats for the inlet-pipes raised above the bottom of the cylinders and 120 above the outlet-pipes, the valves cannot be obstructed by sand or similar impurities, which will settle upon the bottoms of the cylinders and eventually either be cleaned out from the bottoms of the cylinders or carried off with 125 the flow of water through the pump, the discharge-valves having also their seats raised for the same purpose.

Having thus described my invention, I claim and desire to secure by Letters Patent of the 130 United States—

1. In a steam-pump, the combination of two



cylinders having inlet and outlet apertures in their bottoms, provided with suitable valves and having steam-pipes entering their heads, a valve for automatically and alternately admitting and exhausting steam to and from the cylinders, and exhaust-chambers communicating with the cylinders through the exhaust-pipes and having the water-discharge pipes partly surrounding them, as and for the purpose shown and set forth.

2. In a steam-pump, the combination of two cylinders having valve-seats in their bottoms communicating with the inlet-pipe and provided with upwardly-opening valves, means for alternately admitting and exhausting steam to and from the cylinders, exhaust-chambers communicating with the cylinders through the exhaust-pipes and separated by a central partition, discharge-pipes extending from the bottoms of the cylinders and having raised valve-seats at their other ends, provided with upwardly-opening valves, water-chambers surrounding the said seats and separated from the bottoms of the exhaust-chambers by a partition having extensions projecting at both sides of the exhaust-chambers, and a discharge-pipe opening from the discharge-chambers and extending between the exhaust-chambers near their rear walls, as and for the purpose shown and set forth.

3. In a steam-pump, the combination of two cylinders having raised valve-seats in the centers of their bottoms communicating with the inlet-pipe and provided with upwardly-opening valves, exhaust-chambers separated by a vertical partition and located to the rear of the cylinders, discharge-chambers formed at the bottoms of the exhaust-chambers and extending up at both sides of the same and communicating into a vertical discharge-pipe extending upward between the exhaust-chambers in the rear wall of the same, discharge-pipes opening from the bottoms of the cylinders and having upwardly-projecting valve-seats entering through the bottoms of the discharge-chambers, provided with upwardly-opening valves, means for alternately admitting and exhausting steam to and from the cylinders, and exhaust-pipes having valves opening toward the exhaust-chambers and extending from the steam-distributing means to the exhaust-chambers, as and for the purpose shown and set forth.

4. In a steam-pump, the combination of two cylinders having inlet and outlet pipes in their bottoms and having steam-pipes entering their heads, a cylindrical valve-chest having an enlargement upon its upper side and formed with two pairs of live-steam and exhaust ports in its under side, communicating with the

steam-pipes, and having live-steam ports entering at the upper side and communicating with a live-steam pipe, and exhaust-ports communicating with exhaust-pipes and formed with upwardly-extending channels extending from the ends of the chest to a seat upon the upper side of the enlargement, covered with a casing, a cylindrical valve sliding in the chest and having two annular grooves in its cylindrical face, registering alternately with a set of exhaust-ports and with a set of live-steam ports, and a small slide upon the upper seat having means for reciprocating it, as and for the purpose shown and set forth.

5. The combination of two cylinders having steam-pipes entering their heads, a cylindrical valve-chest having two pairs of live-steam and exhaust ports in its under side, and having two live-steam ports at the middle of the upper side, registering with the live-steam ports in the under side, and two exhaust-ports nearer the ends, registering with the exhaust-ports in the under side, a cylindrical valve sliding in the chest and having two annular grooves registering with a set of exhaust-ports and a set of live-steam ports at the same time, an enlargement upon the upper side of the valve-chest, having steam-channels extending from the ends of the chest to a valve-seat in the top of the enlargement, a slide-valve upon the said seat, and a rock-shaft having means for rocking it and journaled in the enlargement, and having an arm projecting upward in the enlargement, engaging the slide with its upper end, as and for the purpose shown and set forth.

6. In a steam-pump, the combination of two cylinders having inlet and outlet pipes in the bottoms and having a suitable valve mechanism for admitting and discharging steam to and from the same, a balance-bar secured at its middle to the valve-operating mechanism, tubes extending from the lower ends of stuffing-boxes in the heads of the cylinders and having circular flanges at their lower ends, bars sliding in the tubes and having circular weights or blocks upon their lower ends, and rods secured with their lower ends to the upper ends of the rods and sliding in the stuffing-boxes, and having their upper ends movably connected to the ends of the balance-bar, as and for the purpose shown and set forth.

In testimony that I claim the foregoing as my own I have hereunto affixed my signature in presence of two witnesses

JACOB UHRI.

Witnesses:

CHARLES ERICHSON,  
WILLIAM HORNWAM.