

No. 704,469.

Patented July 8, 1902.

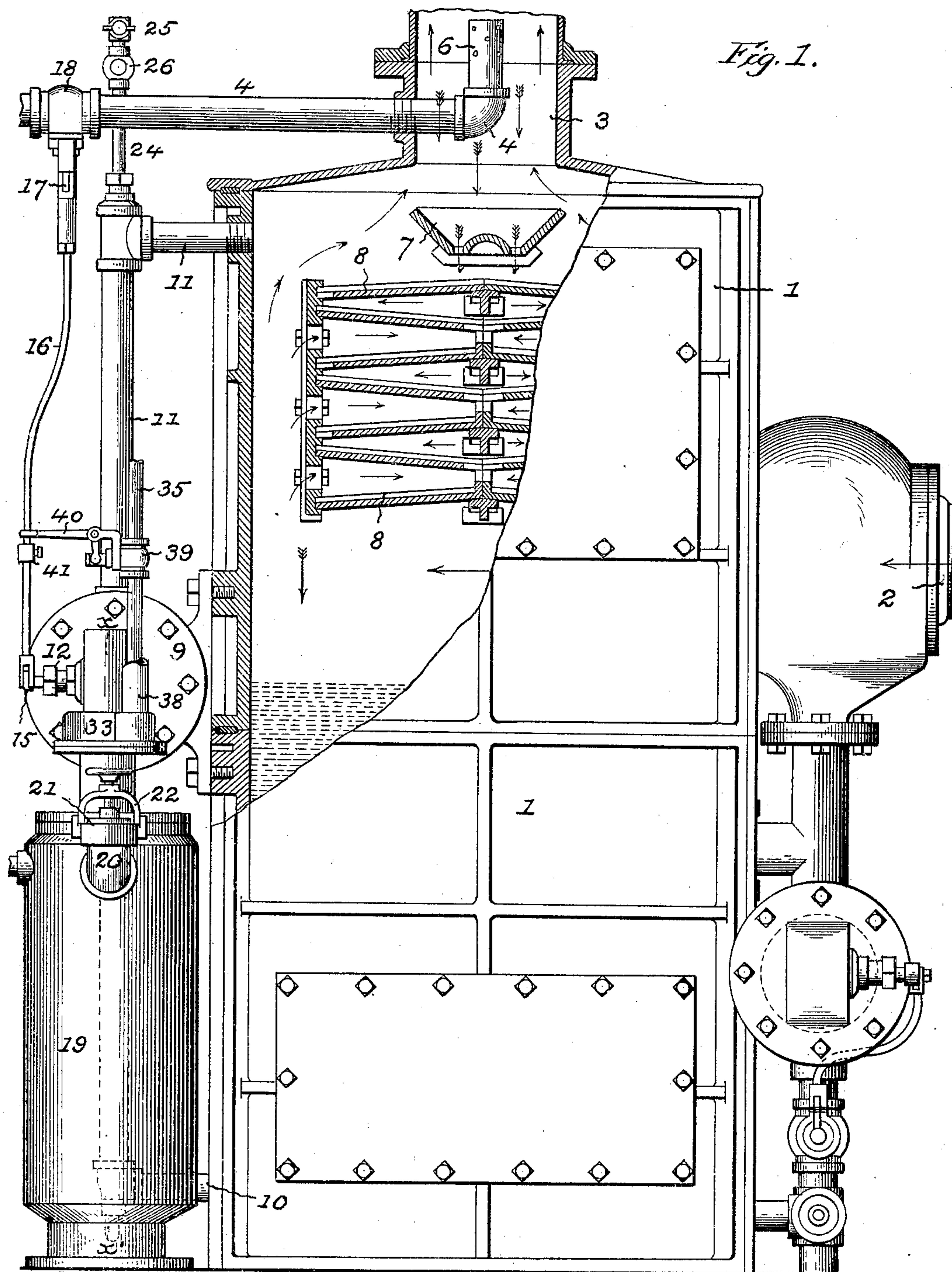
J. ANGELL.

PURGE FEEDING APPARATUS FOR STEAM PLANTS.

(Application filed July 27, 1901.)

(No Model.)

2 Sheets—Sheet 1.



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Fig. 2.

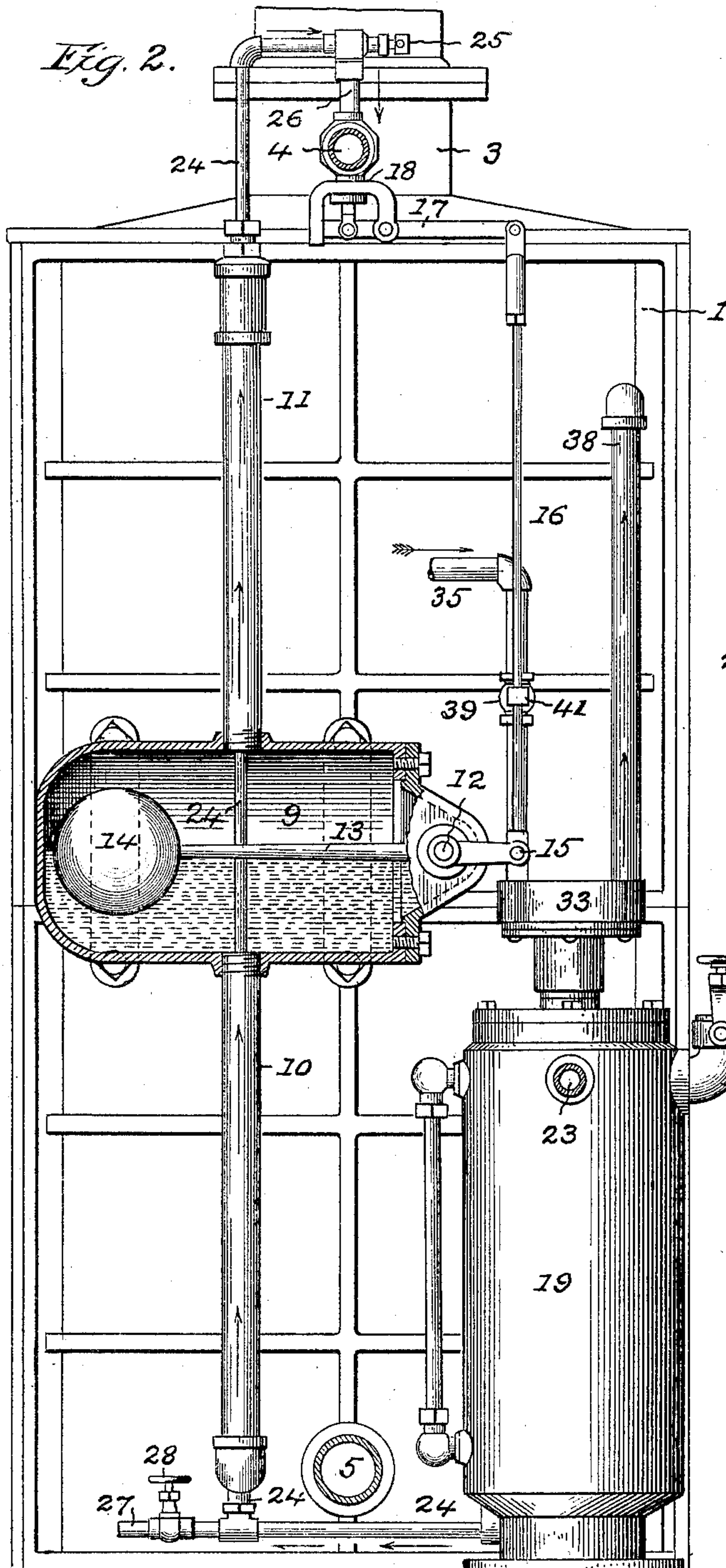


Fig. 4.

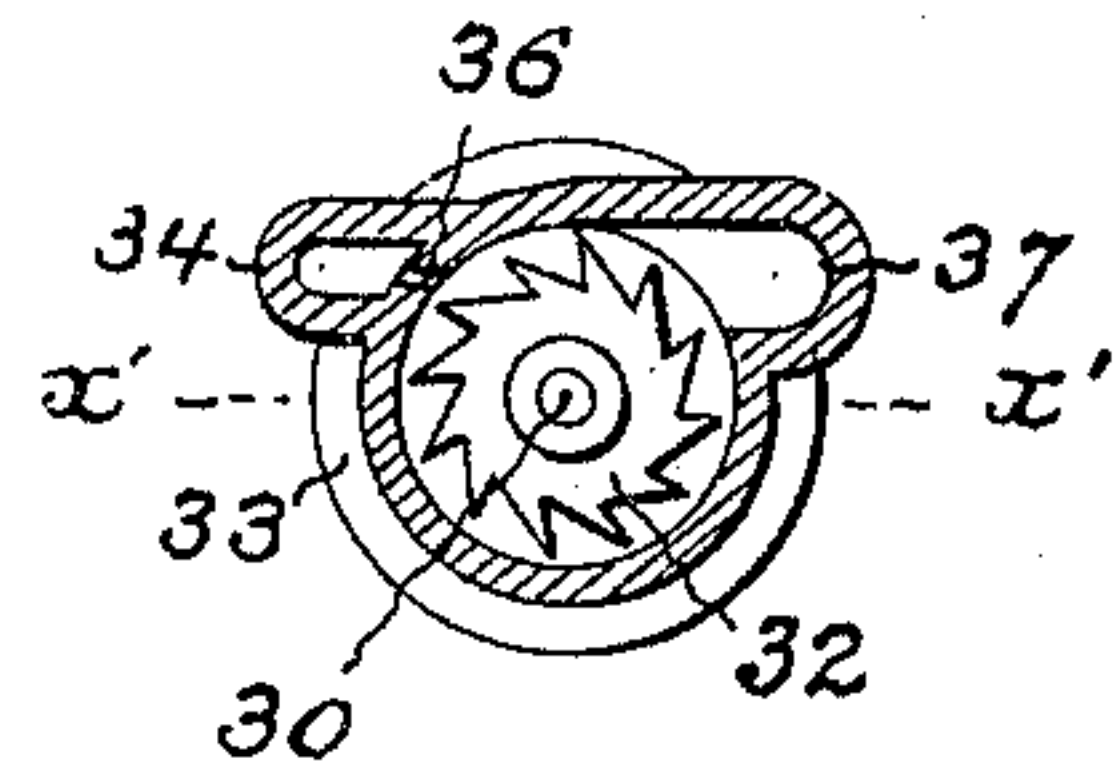
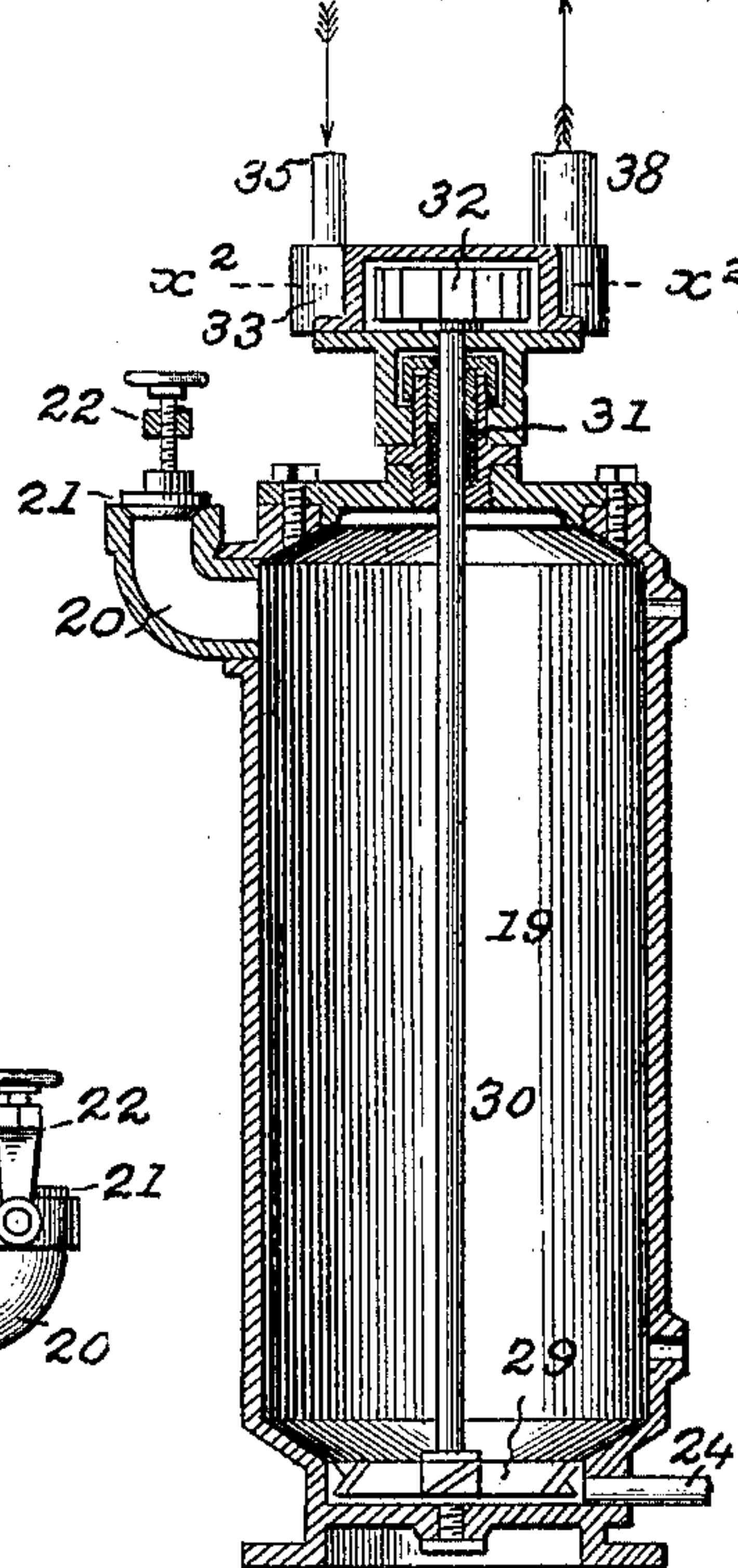


Fig. 3.



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JOHN ANGELL, OF ST. LOUIS, MISSOURI.

PURGE-FEEDING APPARATUS FOR STEAM PLANTS.

SPECIFICATION forming part of Letters Patent No. 704,469, dated July 8, 1902.

Original application filed April 27, 1901, Serial No. 57,685. Divided and this application filed July 27, 1901. Serial No. 69,883. (No model.)

To all whom it may concern:

Be it known that I, JOHN ANGELL, a citizen of the United States, and a resident of the city of St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Purge-Feeding Apparatus for Steam Plants; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification.

The present invention relates to that type of apparatus employed in steam-engineering plants in which the feed-water mixed with a proportionate quantity of purge or coagulant compound is heated by contact with the exhaust-steam from the engine, after which it is passed through a filter-bed to remove the impurities, and from thence into the steam-generator of the plant.

The objects of the present improvements are to provide a simple and efficient apparatus for effecting the different operations above mentioned and in which a constant stirring of the purge or coagulant compound is attained and a uniform and constant feed of the same effected in an automatic manner, all as will hereinafter more fully appear, and be more particularly pointed out in the claims.

I attain such objects by the construction and arrangement of parts illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation illustrating the present invention combined with a feed-water heater, portions of the casing and heating-shelves of such heater being shown in section; Fig. 2, an end elevation of the apparatus with parts in section at line $x x$, Fig. 1; Fig. 3, a detail vertical axial section of the containing-chamber for the purge or coagulant, illustrating the automatic stirring mechanism, the motor-engine of which is shown in section at line $x' x'$, Fig. 4; Fig. 4, a detail horizontal section at line $x^2 x^2$, Fig. 3, illustrating the motor-engine of the stirring mechanism of the coagulant-tank.

Similar numerals of reference indicate like parts in the several views.

Referring to the drawings, 1 represents a closed housing or casing, which in the present apparatus constitutes a heating-chamber

for effecting the required heating of the feed-water by the exhaust-steam from the engine. Said housing or casing will be provided with the usual steam-inlet neck or passage 2, steam-outlet neck or passage 3, feed-water-inlet pipe or passage 4, and feed-water-outlet pipe or passage 5, extending either directly to the steam-generator or to the feed-pump by which the generator is supplied.

6 is the discharge-head for the incoming feed-water, and 7 is a trough receiving such feed-water and distributing the same to the series of heating-shelves 8 within the main casing 1, as usual in the present class of feed-water heaters.

In the construction shown in the drawings a predetermined water-level is maintained automatically in the main heater-casing by means as follows: 9 is a float-chamber secured to the outside of the main heater-casing on the same level with the normal water-line which it is intended shall be maintained in the main heater-casing. 10 is a water-pipe extending from the lower end of the float-chamber 9 to the lower portion of the main casing and constituting a water connection between the two chambers or casings. 11 is an equalizing steam-pipe extending in like manner from the top of the float-chamber 9 to the upper portion of the main heater-casing and constituting a steam-filled connection between the two chambers or casings. As so arranged the two pipes 10 and 11 will maintain the same water-level in the float-chamber as prevails in the main heater-chamber, and such pipes will be made of comparatively large size for the purpose or function hereinafter described.

12 is a rock-shaft intersecting one end of the float-casing 9 and carrying within the same the arm 13 of an operating-float 14. The end of the rock-shaft 12 outside the float-casing carries an arm 15, having link connection 16 with a lever 17 by which the controlling-valve 18 in the feed-water-inlet pipe 4 is regulated and controlled in an automatic manner, in that with the falling of the water in the main heater-casing below the normal level the valve 18 will be opened by the automatic mechanism just described to admit a greater supply of feed-water, and as the feed-water accumulates in said main heater-cham-

ber, so as to reach the normal level, the valve 18 will again close or partially close to reduce the supply of feed-water. Such changes in the supply of feed-water to the heater will
 5 automatically occur responsive to the fluctuations of the water-level within such main heater.

19 is a closed holder or tank for the purge or coagulant compound of any usual shape
 10 and preferably arranged at the side of the main heater-casing in adjacent relation to the float-chamber 9 for the purpose of automatic control, as hereinafter set forth.

20 is a filling neck or opening for the tank
 15 19, closed by a cap 21, having an operating screw-shank at hand-wheel and a confining-yoke 22 swiveled to the neck, as shown, the described construction affording a connected attachment of parts which permits of the same
 20 being swung out of the way and not impede the operation of filling the tank.

23 is a pipe connection or passage opening into the upper part of the tank 19 and adapted to introduce a supply of water from any
 25 convenient source of water-supply having pressure sufficient to discharge the contents of the tank in the manner hereinafter described into the feed-water-inlet pipe 4 of the apparatus.

30 24 is an outlet-pipe connecting with the lower end of the purge-tank 19, which in my preferred construction, as shown in the drawings, is extended up through the pipes 10 and
 35 11 of the float-chamber 9 and from thence to the regulating-valve 25 and sight-feed tube 26 to the feed-water-inlet pipe 4 to discharge a regulated and limited quantity of the purge compound into the passing feed-water, and
 40 which amount can be regulated by the operator through the instrumentality of the regulating-valve 25, as his judgment may indicate.

27 is a branch or extension of the outlet or
 45 purge pipe 24 of the purge-tank provided with a valve 28, constituting a blow-off for said purge-tank in the operation of cleaning out the same.

By the arrangement above described of the
 50 purge-carrying pipe 24 within the pipes 10 and 11 a heating of the passing purge compound to a temperature approaching that existing within the main heater-chamber is attained, which preheating of the purge compound I find by practical experiment increases the efficiency
 55 of the same to a very considerable extent.

29 is a rotary agitator having horizontal rotation preferably in a hopper-shaped bottom portion of the purge-tank 19.

30 is a shaft carrying the agitator 29 and
 60 extending up vertically through the purge-tank and through a stuffing-box 31 at the top of the same.

32 is a motor-wheel formed with peripheral vanes secured to the upper end of the shaft
 65 30 and arranged within a motor-casing 33, as shown in Figs. 4 and 5.

34 is the pressure-chamber of such casing,

receiving a supply of steam or other motive fluid from any suitable source through the supply-pipe 35 and provided with a tangent
 70 jet-opening 36, adapted to discharge a jet of motive fluid tangentially against the vanes of the motor-wheel 32 to impart rotation to the same.

37 is exhaust-steam chamber of the motor-
 75 casing 33, provided with an exhaust-pipe 38, which preferably extends to and discharges into the interior of the main heater-casing, as shown in Fig. 2 of the drawings.

39 is a throttle-valve in the pressure-sup-
 80 ply pipe 35, which in some cases may be regulated by hand. It is, however, preferable to control the same automatically and in unison with the water-level-control mechanism, heretofore described, or a duplicate of the same,
 85 if the particular circumstances may so indicate. In the drawings I have shown the throttle-valve 39 provided with a bell-crank operating-lever 40, the free arm of which is
 90 arranged in the path of a tappet 41, adjustably secured upon the link connection 16 of the heretofore-described automatic float mechanism by which the feed-water inlet is controlled and regulated. The arrangement in
 95 this connection is such that with a downward movement of the float 14, responsive to a fall in the water-level in the main heater-chamber, the tappet 41 will contact with the
 100 lever 40 to open said valve 39 to start the motor-engine of the stirring mechanism of the purge-tank, the operation continuing until the float 14 again rises to permit a closing of the said throttle-valve and a stoppage of the motor-engine. It will be observed that
 105 by the described automatic connections the opening and closing of the regulating-valve of the feed-water inlet and the opening and closing of the throttle-valve of the motor-engine of the purge-stirring mechanism takes
 110 place in unison with each other.

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

1. The combination with the main feed-water chamber provided with a steam-inlet
 115 neck and a steam-outlet neck, of a feed-water-inlet pipe provided with a regulating-valve, a float-chamber secured to the side of the main heater-casing and having equalizing connections therewith by a water pipe or
 120 passage extending to the lower portion of the heater-casing and a steam pipe or passage extending to the upper portion of the heater-casing, a float arranged in said float-chamber, operative connections between the float
 125 and the regulating-valve in the feed-water-inlet pipe, a purge-tank, and a purge-outlet pipe connecting with the feed-water-inlet pipe and arranged in the equalizing-pipe connections of the float-chamber, substantially
 130 as set forth.

2. The combination with the main feed-water chamber provided with a steam-inlet neck, a steam-outlet neck, and a feed-water-

inlet pipe, of a purge-tank, an outlet-pipe from the purge-tank connected to the feed-water-inlet pipe, and a tubular casing surrounding the purge-outlet pipe, said casing having communication with the main heater-casing, substantially as set forth.

3. The combination with the main feed-water chamber provided with a steam-inlet neck, a steam-outlet neck and a feed-water-inlet pipe, of a purge-tank, an outlet-pipe from the purge-tank connected to the feed-water-inlet pipe, and a vertical pipe or passage connecting with the top and bottom of the main heater-chamber and inclosing the purge-outlet pipe, substantially as set forth.

4. The combination with the main feed-water chamber provided with a steam-inlet neck, a steam-outlet neck, and a feed-water-inlet pipe, of a purge-tank, an outlet-pipe from the purge-tank connected to the feed-water-inlet pipe, means for forcing the purge compound from said tank, and means for agitating the contents of the purge-tank, the same comprising a rotary agitator arranged in said purge-tank, and a motor-engine connected to said agitator and secured to the upper end of said tank, substantially as set forth.

5. The combination with the main feed-water chamber provided with a steam-inlet neck, a steam-outlet neck and a feed-water-inlet pipe, of a purge-tank, an outlet-pipe from the purge-tank connected to the feed-water inlet, means for forcing the purge compound from said tank, and means for agitating the

contents of the purge-tank, the same comprising, a rotary agitator arranged within the tank, a motor-engine having operative connection with said agitator and provided with motive-fluid inlet and outlet passages, and a pipe connecting the outlet-passage with the interior of the feed-water chamber, substantially as set forth.

6. The combination with the main feed-water chamber provided with a steam-inlet neck, a steam-outlet neck and a feed-water-inlet pipe, of a purge-tank, an outlet-pipe from the purge-tank connected to the feed-water inlet, means for forcing the purge compound from said tank, means for agitating the contents of the purge-tank, the same comprising, a rotary agitator arranged within the purge-tank, a motor-engine having operative connection with said agitator and provided with motive-fluid inlet and outlet passages, and means for automatically controlling the operation of said motor-engine, the same comprising a valve in the motive-fluid-supply passage, a float-chamber connected with the main heater-chamber, a float in said chamber, and operative connections between said float and said valve, substantially as set forth.

In testimony whereof witness my hand, this 24th day of July, 1901, at St. Louis, Missouri.

JOHN ANGELL.

In presence of—

MORTON JOURDAN,
STEPHEN C. ROGERS.