J. E. JONES.

STEAM ACTUATED WATER TRAP.

APPLICATION FILED FEB. 7, 1910.

982,967.

Patented Jan. 31, 1911.

4 SHEETS—SHEET 1.

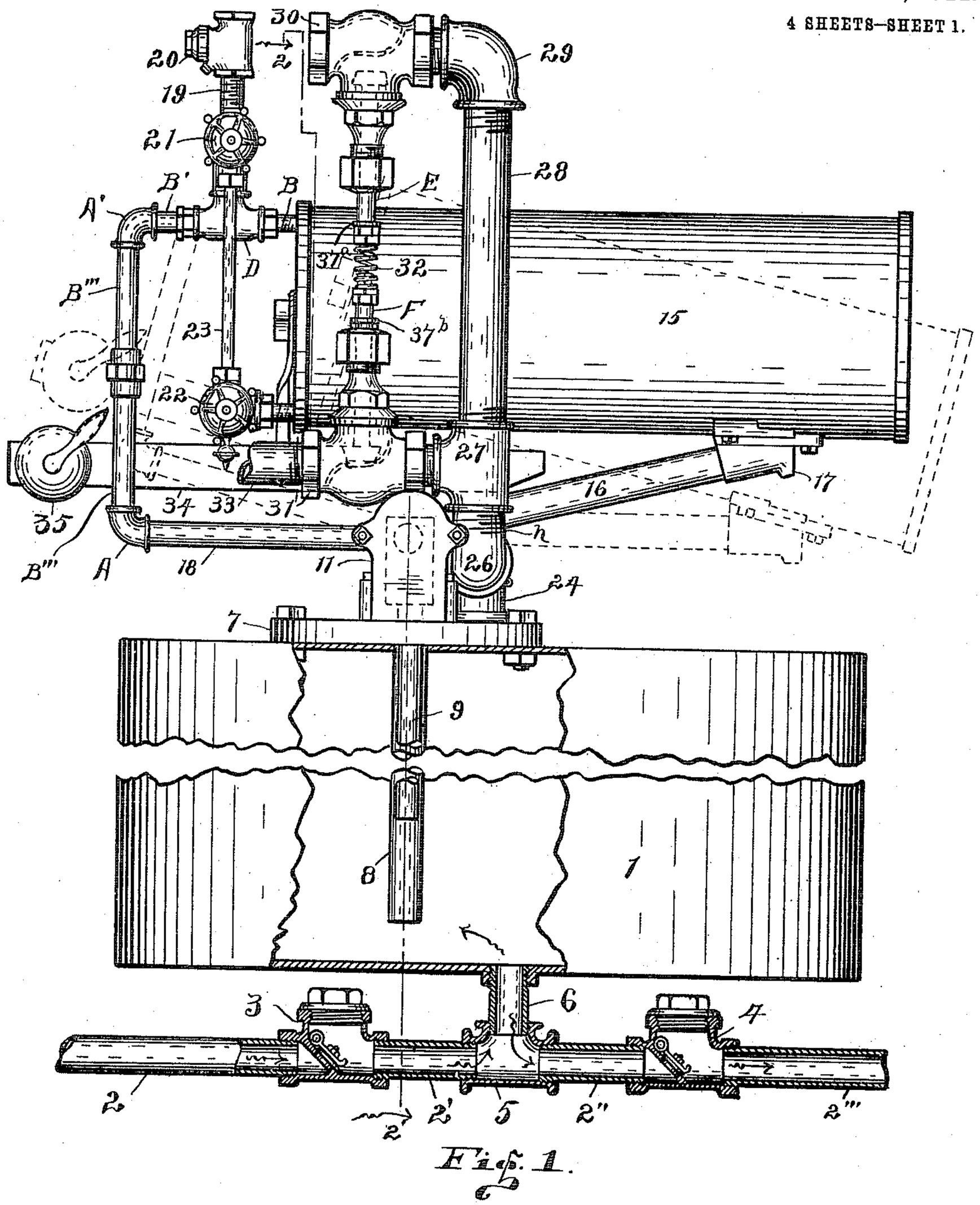

Fig. 1.

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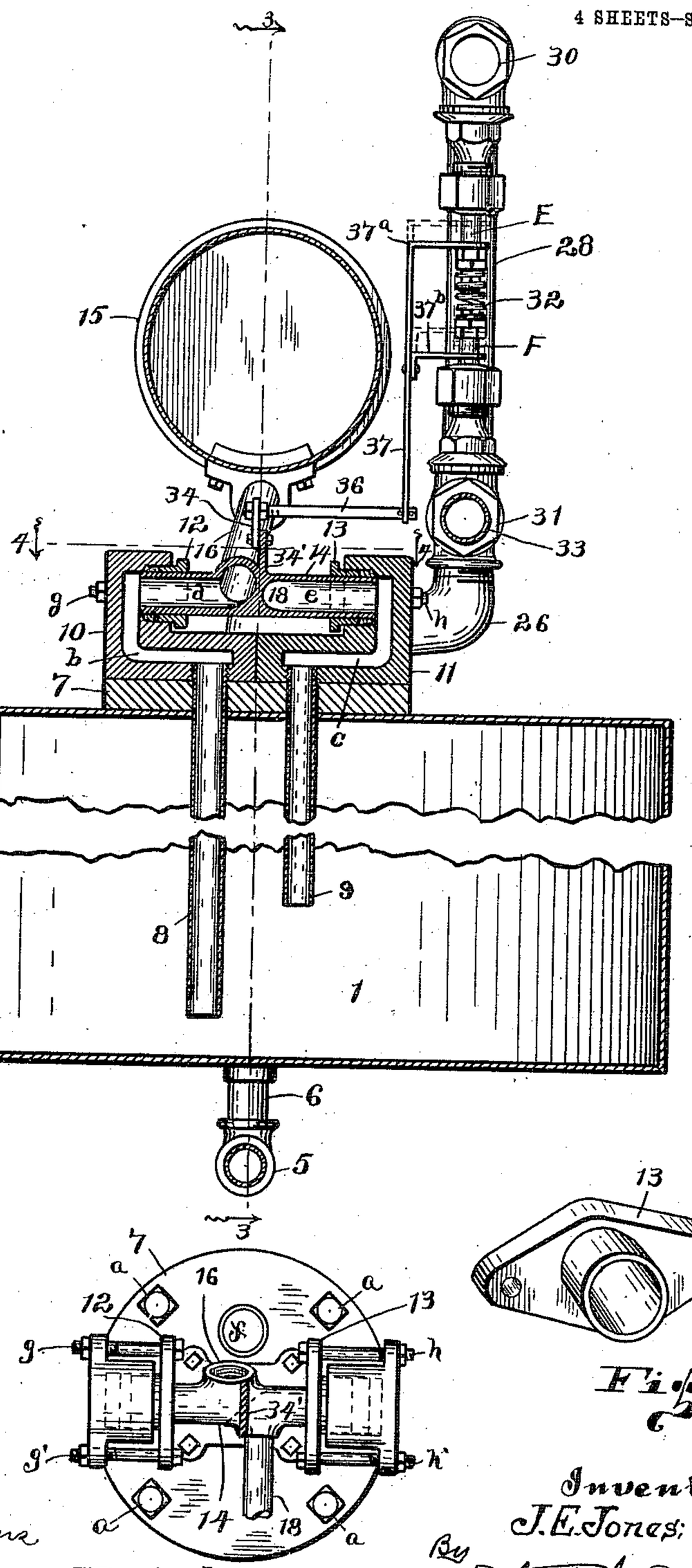

Fig. 2.

Fig. 5.

Fig. 4.

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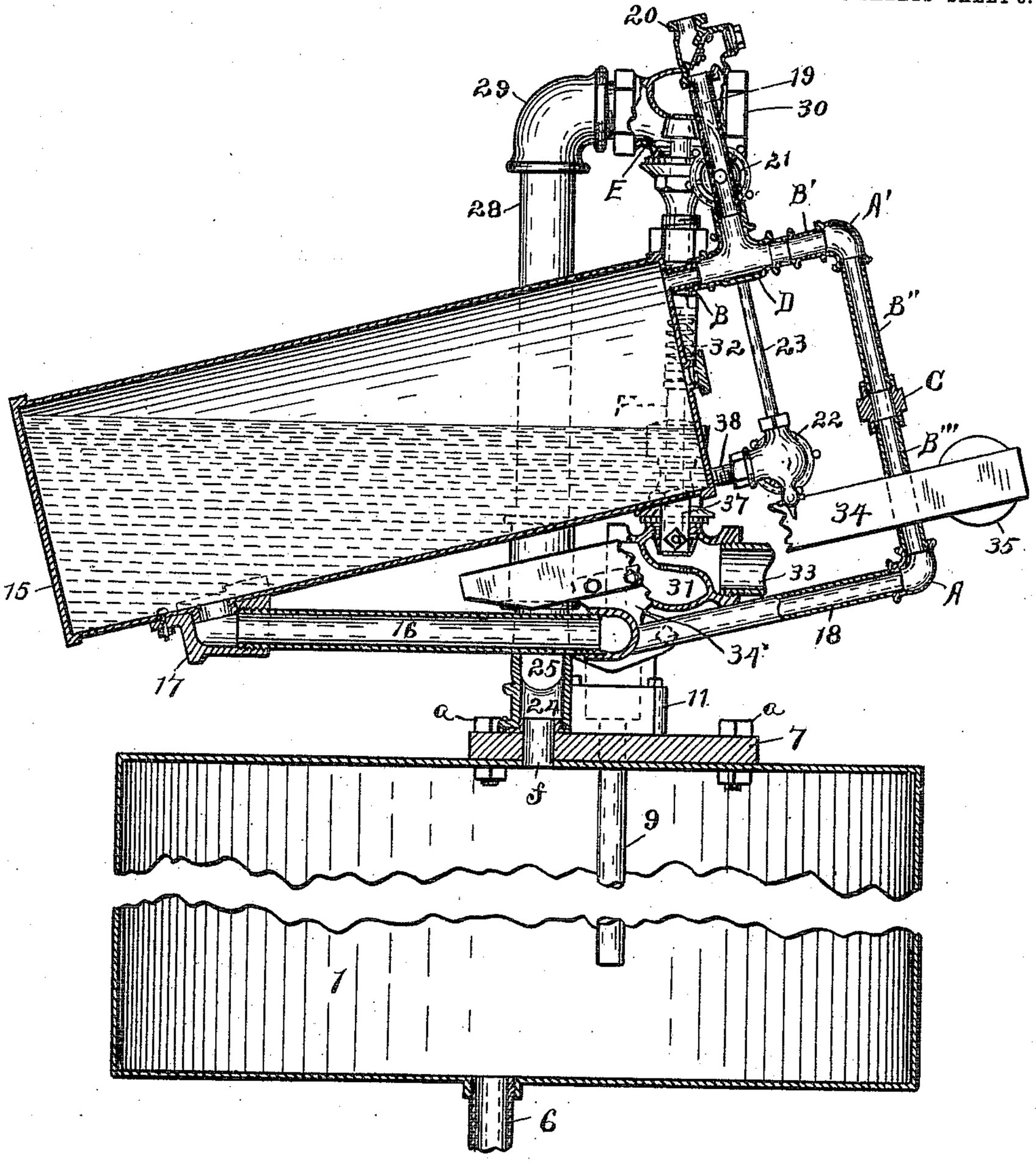

Fig. 3.

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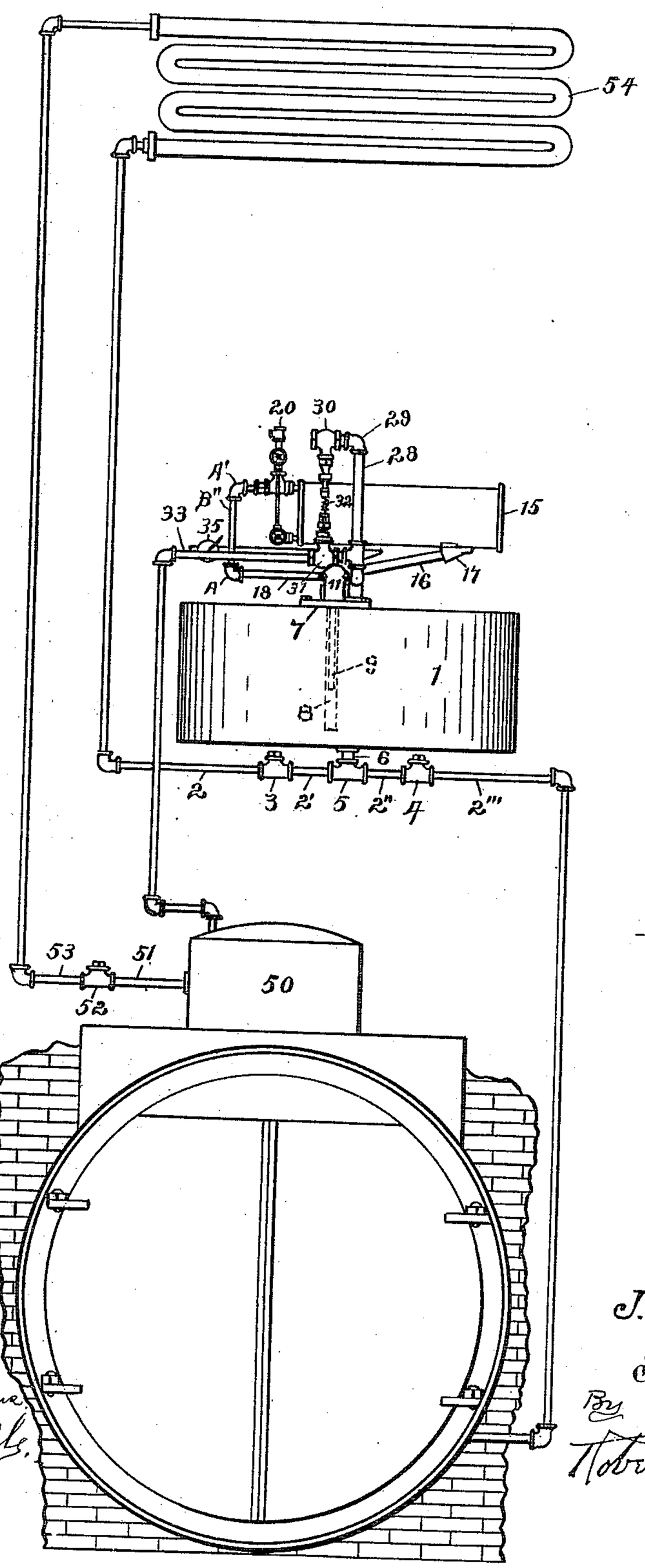

Fig. 6.

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UNITED STATES PATENT OFFICE.

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STEAM-ACTUATED WATER-TRAP.

982,967. Specification of Letters Patent. **Patented Jan. 31, 1911.**

Application filed February 7, 1910. Serial No. 542,395.

To all whom it may concern:

Be it known that I, JAMES E. JONES, a citizen of the United States, residing in Richmond, in the county of Wayne and State of Indiana, have invented a new and useful Steam-Actuated Water-Trap, of which the following is a full, clear, and comprehensive exposition and specification, being such as will enable others to make and use the same with absolute exactitude.

It is a well known fact that in steam-heating plants, especially where there is a very long line of radiating pipes, as in greenhouses or the like, that it takes considerable time for the pipes to heat to the desired sufficiency, for the reason that there is cold, cool, or dead air in the pipes, and the back pressure from the boiler into the return pipes is so great as to retard a rapid circulation. To relieve this back pressure and allow the free escape of the cold or dead air from the pipes, and at the same time trapping the condensation and returning it to the boiler under pressure, is the primal object of this invention.

Further objects of my invention, broadly stated, are to provide a steam actuated water trap for steam heating plants or the like, which will be positive in action, strong and durable in construction, easily operated and installed, adapted to allow the radiation to attain its maximum of efficiency in a minimum of time, and which can be manufactured and sold at a comparatively low price.

More particularly stated my object is to provide a trap for gathering the accumulating moisture in steam-pipes and delivering the same to the boiler, and that without retarding the circulation through the pipes from and to the boiler.

Another object is to provide means for establishing an uninterrupted circulation of steam from and to the boiler, whereby the pipes will heat in a minimum of time, and to provide for trapping the condensations which accumulates in the pipes and returning it to the boiler automatically by means of the direct pressure of live steam through an auxiliary circuit intermittently established.

Other specific objects and particular advantages of the invention will be brought out in the course of the following specification, and that which is new will be correlated in the appended claims.

The preferred manner for carrying out the objects of my invention in a practical manner, and that which I have determined will be the most mechanically efficient in practice is shown most clearly in the accompanying drawings, in which—

Figure 1 is a side elevation of the trap proper, certain parts thereof being shown in section. Fig. 2 is a central sectional view taken through the shaft of the tipping-tank, same showing a cross section of the tipping-tank. Fig. 3 is a side elevation of the trap as taken from the opposite side from that of Fig. 1, and showing the tank tipped or turned, same being partly in section, as taken on line 3—3 of Fig. 2. Fig. 4 is a top plan view, partly in section as taken on line 4—4 of Fig. 2. Fig. 5 is a detail perspective view of one of the trunnions. And Fig. 6 is a diagrammatical view of the entire system, showing my trap in its relative position in connection therewith.

Similar indices denote like parts throughout the several views.

In order that the construction and operation of my invention may be fully understood I will now describe the several mechanical features and the several operations thereof as briefly and as comprehensively as I may.

Numeral 1 denotes the receiving tank or reservoir, which may be of any desired shape and capacity, depending on the simultaneous plant with which it is to be employed.

In Fig. 1 indices 2, 2′, 2″ and 2‴ denote portions of the return steam-pipe. Interposed between sections 2 and 2′ is the check-valve 3; and a short distance therefrom and interposed between sections 2″ and 2‴ is the check-valve 4. Said check-valves are substantially identical with each other, each allowing passage therethrough from left to right but preventing passage in the reverse direction. Disposed between the said check-valves and connecting the sections 2′ and 2″ is the T-fitting 5. Secured in and extending up from said fitting 5 is the nipple 6 with its upper end secured to and opening into the bottom of the tank 1, all substantially as shown in Fig. 1.

Mounted on top of the receiving tank 1 is the base-plate 7 which is rigidly secured to said tank by a plurality of bolts *a*. Extending down through said plate 7 and the top of the tank, are the two pipes 8 and 9, the former extending inside said tank 1 to near the bottom thereof, and the latter termi-

nating some little distance above the pipe 8; both of said pipes being open at their lower ends as indicated.

Mounted on top of plate 7 are the two oppositely disposed abutments 10 and 11, each of which has a channel-way formed therein, same being denoted by letters *b* and *c*, respectively, and which connect with the upper ends of the respective pipes 8 and 9, as indicated in Fig. 2.

Mounted in the oppositely disposed and spaced apart faces of the upwardly extending portions of the abutments 10 and 11 are the trunnions 12 and 13, which are identical with each other, one of which is shown in Fig. 5. The interiors of said trunnions connect with the respective channels *b* and *c*. Mounted in, carried by, and extending between and into said trunnions is the shaft 14, which is adapted to oscillate therein. Said trunnions also complete the packing-boxes for said shaft 14, they being seated on resilient packing, and they are adapted to be adjustably secured and held against the packing each by means of a pair of bolts *g*—*g'* and *h*—*h'*, respectively. Said bolts being disposed through the wings of said trunnions and through corresponding ears of the abutments 10 and 11, as indicated. The interior of said shaft 14 is hollow, except for a central partition therein which divides the interior of the shaft 14 into two chambers *d* and *e*,—the former connecting with channel *b*, and the latter connecting with channel *c*, all substantially as shown in Fig. 2.

Numeral 15 denotes the tipping-tank, which is of comparatively small size compared with said tank 1. Said tank 15, when empty, is adapted to assume the position shown in Fig. 1, and when containing a predetermined amount of water it automatically assumes the position shown in Fig. 3. The means by which said operations of the tipping-tank may be accomplished, and the function thereof, will be brought out as this description proceeds.

Connected with the shaft 14 and communicating with chamber *d* is the pipe 16 which is connected to the underside of the rear portion of tipping-tank by means of the angular fitting 17, thereby completing the interior communication between the receiving-tank and the tipping-tank.

Connected with the shaft 14 and communicating with the chamber *e* thereof is the pipe 18, which in connection with the ells A, A', the short sections of pipe B, B', B'' and B'''; the union C, and the T-fitting D, extends forward, upward, and then inward, with the pipe B entering the forward end of the tipping-tank near the top thereof, thereby completing the second circuit from the receiving-tank to the tipping-tank, as shown most clearly in Fig. 3.

Extending upward from the T-fitting D is the exhaust pipe 19, on the upper end of which is the swing-check valve 20, which forms a vent particularly for the tank 15.

Interposed in and extending out from pipe 19 is a globe-valve 21, which is directly above and in alinement with the globe-valve 22, the latter having an entrance into the front end of the lower part of the tipping-tank by means of the nipple 38, which latter is directly below the pipe or nipple B. The two globe-valves, 21 and 22, which are hand operative, are connected by the glass tube 23, by means of which the height of the water in the tank 15 may be determined.

Opening into the top of tank 1, through the base-plate 7, is the aperture *f*, as shown in Figs. 3 and 4. Fitted in said aperture *f* is the ell 24, in which is fitted the horizontally disposed section of pipe 25, which latter has on its outer end the ell 26. The fitting 26 is surmounted by the T-fitting 27, and extending upwardly from said fitting 27 is the pipe 28, the latter having the ell fitting 29 attached on its upper end. Mounted horizontally to the ell 29 is the plunger-valve 30, which forms a vent, primarily, for the tank 1. Said valve 30 is provided with the downwardly extending plunger stem E, same having a head formed on its lower end. Secured in the fitting is the horizontally disposed plunger-valve 31, which is similar to the valve 30, except that the stem, F, thereof is directed upwardly opposite to and in alinement with the stem E. Said stem F is provided with a head formed on its upper end as shown.

Disposed between the heads of the stems E and F is a helical spring 32 whose tension is such as to normally press said plunger stems apart, that is inwardly, and thereby closing both valves 30 and 31.

Numeral 33 denotes the live steam pipe, one end thereof being secured in the valve 31 and the other end being connected directly to the boiler and carrying high pressure steam therein.

Extending up from the shaft 14 is the flange 34', to which is secured the adjusting-bar 34, on which bar is slidably mounted the adjusting weight 35. Said bar 34 being located parallel with the tank 15 and it extends a considerable distance forward thereof. By means of said weight the tipping of said tank 15 may be predetermined in order that it may tip when a desired amount of water has accumulated therein.

Rigidly secured to the bar 34, and extending out to one side thereof, is the arm 36 (Fig. 2). Pivoted to and extending up from the arm 36 is the bar 37, said bar being located parallel with and a slight distance from the stems E and F. Said bar 37 is provided with two fingers 37^a and 37^b, through which the respective stems E and F may freely operate, being so arranged

that when said fingers are raised to their limit it will result in opening the valve 31 and closing valve 30, that is by raising the stem F and withdrawing the valve plunger from its seat in valve 31, and at same time closing the valve plunger on its seat in valve 30; and conversely, when said fingers are lowered to their limit it will result in closing said valve 31, also in opening valve 30.

Referring now particularly to Fig. 6 where there is shown a complete heating system employing my invention: Numeral 50 denotes a steam boiler, with the supply steam pipe 51 leading therefrom and entering the pressure reducing valve 52. Passing from the valve 52 is the conveying pipe 53, which leads to the radiator 54. Extending from the radiator is the pipe 2 which enters the check-valve 3 as above set forth. The pipe 33, above referred to, returns to the boiler 50 and it is adapted to supply steam direct to the trap and that under high pressure whereby the pressure in the boiler and that in the tanks 1 and 15 may be equalized and counterbalanced at certain intervals.

Operation: In practice the several parts are preferably located, relatively, as that shown in Fig. 6, from which it is apparent that as steam is developed in the boiler it will pass through the valve 52, which will reduce the pressure to the desired sufficiency. The steam will then pass on to the radiator 54, after which it will be practically transformed into water which, manifestly, will gravitate down, and if there were no pressure in the boiler it would pass through valves 3 and 4 and be deposited in the boiler, but in fact as the pressure in the boiler is greater than it is in the pipe 2 it is evident that the boiler pressure will close valve 4, thereby allowing only one other disposition of the water, that is to pass up into the tank 1, which is accomplished merely by gravity, same being possible by reason of the air exits through the valves 20 and 30 which are both open at this time, therefore there will be no resistance offered to the return pressure or to the water. It should be understood, at this point, that when there is no water in the trap that the weight 35 will be such as to cause the tank 15 to stand horizontal, as in Fig. 1, thereby closing valve 31 and opening valve 30, and retaining the latter open until the tank is tipped.

By means of my construction the steam will be allowed to more quickly make the circuit, for the reason that the cool air in the pipes and the radiators will be forced ahead, passing the valve 3, and by reason of least resistance will pass up through pipe 6 into the tank 1, then through the various avenues to the atmosphere by way of the valves 20 or 30, thus allowing an uninterrupted vent for the cold, cool, or dead air, but at same time the water which has condensed from the steam will be trapped, first filling the tank 1, and as it rises entering the tank 15 rising therein, and, if there was no movement of the tank 15 the water would fill the tank 15 and finally flow out of the valves 20 and 30, however, when the water has accumulated in tank 15 to a certain height then the weight 35 will be overbalanced by the weight of the water in the tank 15, resulting in causing the tank 15 to tip to the position shown in Fig. 3. The tipping or turning of tank 15 to the position shown in Fig. 3 will manifestly result in lifting the bar 37, thereby causing the fingers 37^a and 37^b to lift the stems E and F resulting, simultaneously, in closing valve 30 and in opening valve 31. The inrush of steam under high pressure will close the swinging-valve 20. Therefore the high pressure steam and the tipping of tank 15 will result first in closing the two exits 20 and 30, thereby shutting off these avenues for its escape, thereby causing it to pass into tank 1 and thus equalizing the pressure in tank 1 with the pressure in the boiler, and therefore as there will then be no back pressure on valve 4 it will allow the water in tank 1 to gravitate through valve 4 back to the boiler without resistance. It is now apparent that as the valves 20 and 30 are closed that there is no way for the water to get out of tank 15 except through the pipes 8 and 9, and as the lower ends of said pipes are closed by the water in tank 1 it is evident that the water will remain stationary in tank 15 until the water in tank 1 has been lowered below the lower end of pipe 9, thereby causing the tank 15 to remain tipped until tank 1 has been practically emptied. Now when the water has receded in tank 1 to a point below the lower end of pipe 9 then, it is evident that ventage will be given to tank 15 through pipe 9 and allow the water to gravitate therefrom through pipe 8 into tank 1. As soon as the water has receded from tank 15 enough to influence the weight 35 then said weight will cause the tank 15 to turn back to its normal position, as in Fig. 1, thereby resulting in closing valve 31 and shutting off the high pressure steam, at same time opening valve 30, which will allow the high pressure to escape from tanks 1 and 15; allow the valve 20 to swing open, as soon as the pressure is reduced; and at same time the back pressure from the boiler will close valve 4. The several movements last stated will, it is evident, again place the mechanism as in Fig. 1 and allow the device to operate as before in the collection of water.

The above mentioned operations will follow each other automatically in progressive succession, thereby allowing the radiating

pipes to heat rapidly, by reason of the free vent through the valves 20 and 30, in place of the steam having to force its way along against the back pressure from the boiler.

I would have it understood that the crux of this invention lies particularly in the two propositions: (*a*) that the tipping-tank absolutely controls the entrance and the exit of water to and from the receiving-tank; and (*b*) that the body of water which causes the tipping tank to actuate remains therein until the receiving tank is practically emptied.

Having now fully shown and described my invention and its operation, what I claim and desire to secure by Letters Patent of the United States is—

1. In a system of the kind described a stationary tank having a water inlet and a water outlet and also having a steam inlet and a valve for controlling said steam inlet, a movable tank connected to said valve for operating the same to admit steam to the stationary tank and force the water therefrom, means for conducting water from the stationary tank to the movable tank to actuate the latter, means for conducting steam from the stationary tank to the movable tank to force the water therefrom, the inlet to said last named means being so positioned that steam can not enter the same until the level of water in the stationary tank has reached a predetermined point.

2. In a system of the kind described comprising, in combination with a boiler, a receiving tank having a water inlet and a water outlet and also having a steam inlet and a valve for controlling said steam inlet, a tipping tank connected to said valve for operating the same to admit steam to the receiving tank and allow the water to gravitate therefrom into the boiler, means for conducting water from the receiving tank to the tipping tank to actuate the latter, means for conducting steam from the receiving tank to the tipping tank to allow the water to gravitate therefrom, the inlet to said last named means being so positioned that steam can not enter the same until the surface of the water in the receiving tank has reached a predetermined level.

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

JAMES E. JONES.

Witnesses:

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