

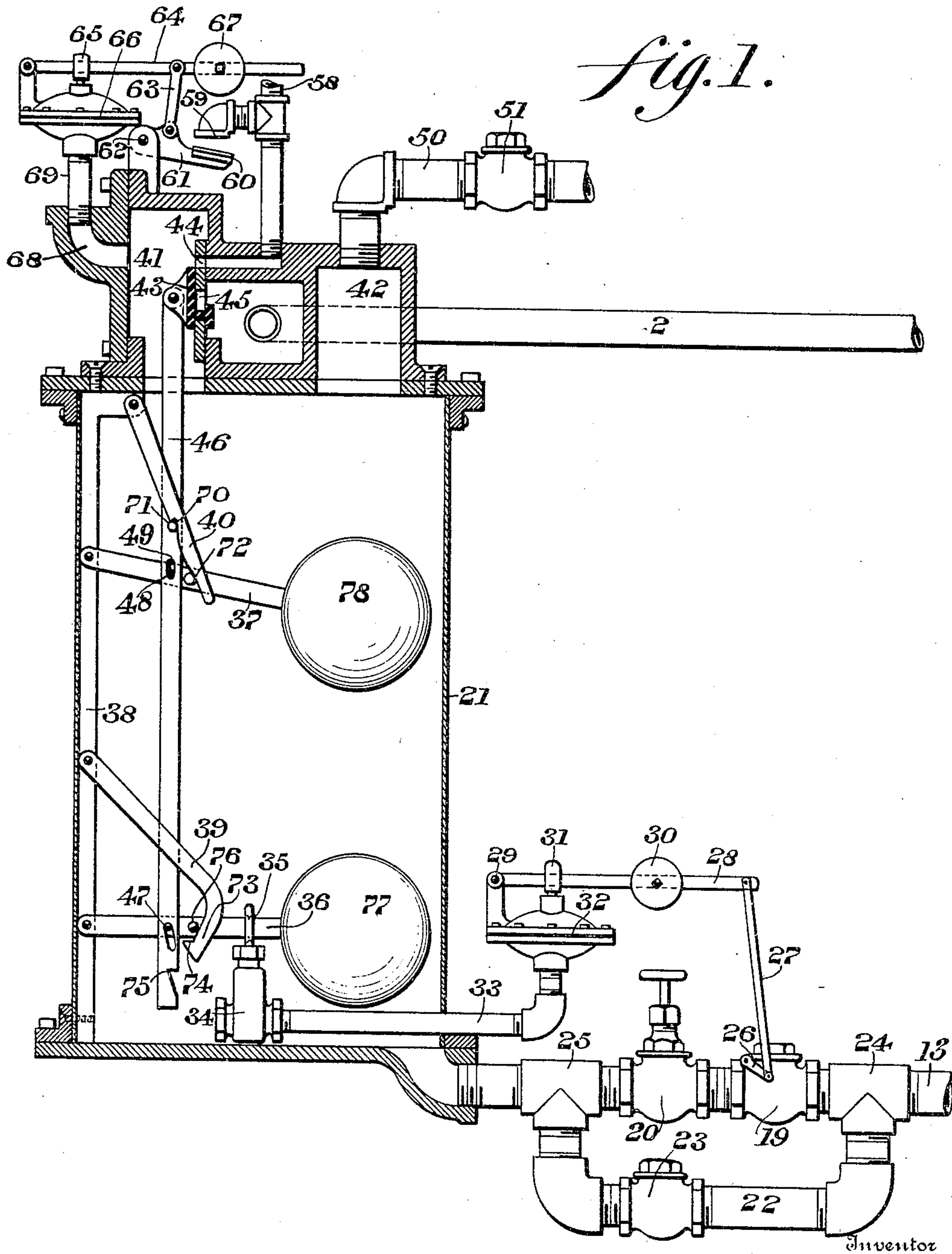
No. 791,981.

PATENTED JUNE 6, 1905.

D. GOFF.  
BOILER FEED.

APPLICATION FILED SEPT. 6, 1904.

3 SHEETS—SHEET 1.



Witnesses

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M. G. Lukens.*

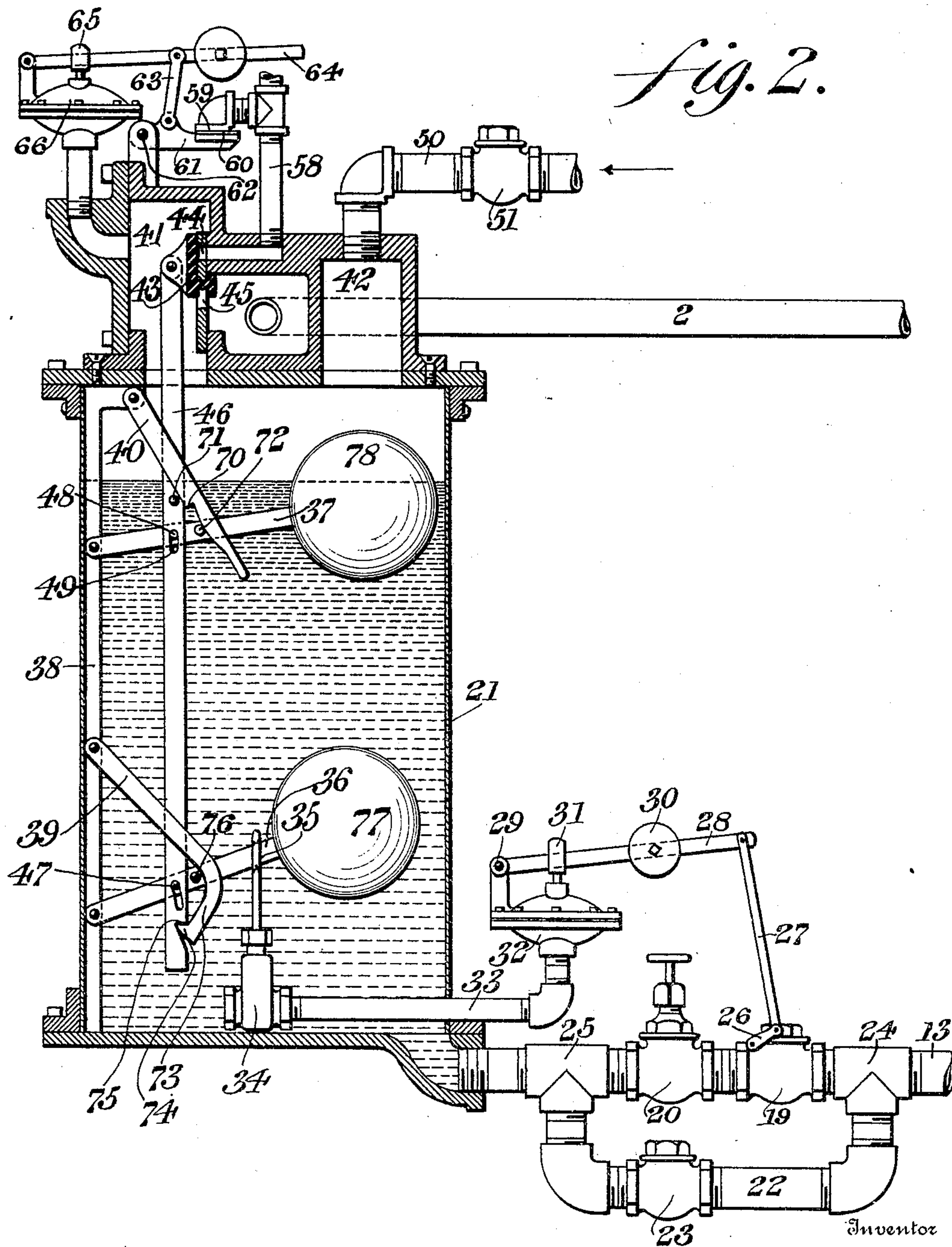
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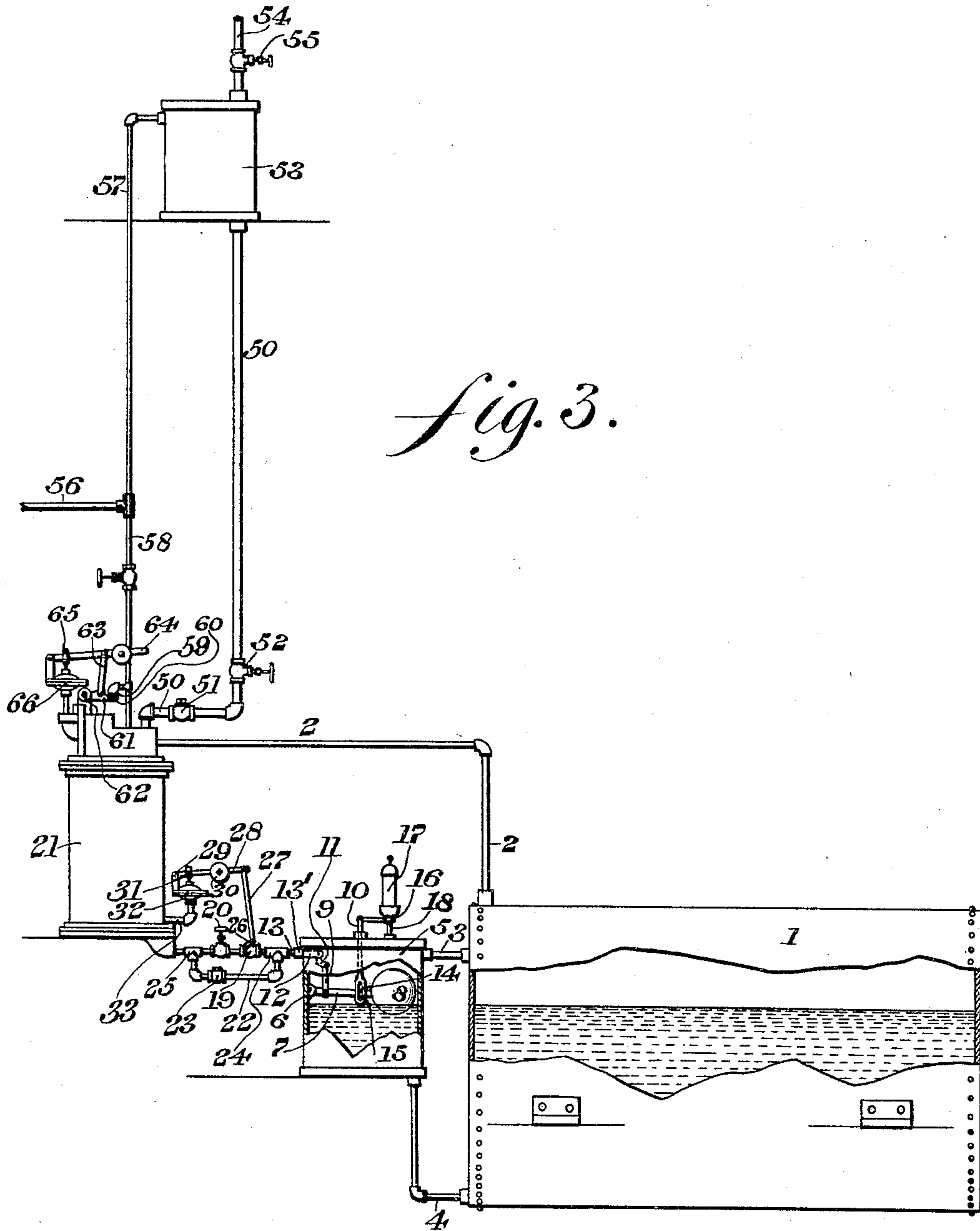
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# UNITED STATES PATENT OFFICE.

DANIEL GOFF, OF MILLVILLE, NEW JERSEY, ASSIGNOR OF ONE-FOURTH TO RETIE M. GOFF, OF MILLVILLE, ONE-FOURTH TO JOHN W. GOFF, OF ATLANTIC CITY, AND ONE-HALF TO FREDERICK FRIES, OF GLOUCESTER, NEW JERSEY.

## BOILER-FEED.

SPECIFICATION forming part of Letters Patent No. 791,981, dated June 6, 1905.

Application filed September 6, 1904. Serial No. 223,360.

*To all whom it may concern:*

Be it known that I, DANIEL GOFF, a citizen of the United States, residing at Millville, county of Cumberland, State of New Jersey, have invented a new and useful Boiler-Feed, of which the following is a specification.

My invention consists of a novel construction of a boiler-feed whereby great safety is obtained.

My invention further consists of novel operating mechanism whereby heated water is intermittently supplied as desired with great regularity.

My invention further consists of novel valve-operating mechanism and lifting and stripping means therefor whereby the intermittent supply of water to the boiler is assured.

My invention further consists of novel features of construction, all as will be herein-after set forth.

Figure 1 is a side elevation and partial vertical section of my feed-water receiver and regulator. Fig. 2 is a view corresponding to Fig. 1, with the operating parts in a different position. Fig. 3 is an elevation and partial section of the entire mechanism, including the boiler.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings, 1 designates a boiler having live-steam pipes 2 and 3 and water-pipe 4, connected therewith. 3 and 4 are connected at their other extremities in the top and bottom, respectively, of an intermediate chamber 5, extending above and below the level of permissible water height of water in the boiler, which agrees with the height of water within this chamber 5.

Between ears 6 is pivoted a float-arm 7, carrying float 8. Intermediate the pivot and float are attached links 9 and 10. Link 9 connects with one end of the bell-crank 11, the other end of which operates rod 12, opening and closing a valve 13' in pipe 13, connected to chamber 5 above the permissible water-level therein. Link 10 is provided with a bifurcated slotted end 14, straddling the float-arm,

in which is located a pin 15, movable in said slotted end. The link 10 at its upper end is connected with a valve 16, which admits steam at both extremities of this movement to whistle 17 through pipe 18. Connecting-pipe 13 leads through valves 19 and 20 to the bottom of the feed-water regulator 21, and branch 22, having therein valve 23, is provided between points 24 and 25 of pipe 13 in order that greater control of this passage may be maintained and that one of these passages may be opened in case of stoppage of the other.

Valve 19 is operated by lever 26 and link 27, which is pivoted at one end thereto and at the other end to lever-arm 28, which in turn is pivoted at 29 and carries, adjustable upon its length, weight 30. Between weight 30 and pivot 29 the lever 28 passes through an aperture in rod 31, which at its lower end is controlled by a diaphragm (not shown) within the pressure-operated regulator 32, which is adjusted to open valve 19 when any desired pressure is exceeded. Pressure-regulator 32 is connected at its lower end, by means of pipe 33, with the interior of regulator 21 through gate-valve 34, the gate-rod of which is pierced at 35 to permit passage of the float-lever 36. This lever and also float-lever 37 are pivoted at any suitable point to attachments or projections 38 within the regulator 21. 38 is here shown as a strip or flange extending throughout the length of said regulator. Latches 39 and 40 are also pivoted at any suitable point within said regulator. At the upper end of this regulator are shown passages 41 and 42, the former of which contains valve 43, controlling exhaust-steam opening 44 and live-steam opening 45, said valve being operated by valve-rod 46, which has slot-and-pin connection at 47 to float-lever 36 and is connected to float-lever 37 by a pin 48 and slot 49, which are here shown in 37 and 46, respectively, but which manifestly may be reversed. The passage 42 permits entrance of feed-water through pipe 50, controlled by valves 51 and 52, from feed-water heater 53, which receives its initial supply of water through pipe 54, controlled by



valve 55. This water is heated in the heater 53 in any suitable manner by exhaust-steam conveyed thereto, as by pipes 56 and 57. A branch 58 leads to exhaust-steam opening 44 and discharge-opening 59. This discharge-opening is controlled by valve-plate 60 upon rod 61, pivoted at its opposite end at 62 upon any suitable part of the frame. This rod 61 is operated by means of link 63, weighted lever 64, rod 65, and pressure-regulator 66 when the pressure within regulator 21, communicated through the passage 68 and pipe 69, exceeds the pressure at which this regulator 66 is set. Live steam is admitted from the boiler to passage 45 through pipe 2.

Latch 40 is provided with a catch 70, capable of engaging pin 71 upon rod 46 in the position shown in Fig. 1, and that portion of latch 40 beyond this catch is engageable with pin 72 upon lever 37 to release catch 70 within the limits of movement of lever 37 permitted by the pin and slot 48 and 49 without said lever 37 operating rod 46. Latch 39 is provided in the form shown with a curved end 73 and nose 74, engaging catch 75 in rod 46 in the position shown in Fig. 2. Nose 74 is disengaged from said catch 75 by the downward movement of rod 36, carrying pins 76 against curved end 73 of latch 39. Rods 36 and 37 are operated in both directions by floats 77 and 78, which fall by their weight and rise with the water in the regulator in the usual manner.

The operation is as follows, the parts being in the position shown in Fig. 1, in which the feed-water regulator 21 is empty, valves 13' and 20 open, and valves 23, 26, and 34 closed: At the beginning let us consider regulator 21 as filled with the live steam which had followed up the receding water during the operation from the position of Fig. 2 to that of Fig. 1 before valve 43 dropped and which begins to exhaust as soon as valve 43 opens the port 44 therefor. The water enters through pipe 50, filling up the regulator. The float 77 has a tendency to rise as soon as it is surrounded by water, but cannot do so beyond the slot limits, owing to latch 40, and remains in the position shown until the water reaches float 78 and lifts it sufficiently to release catch 70. Floats 77 and 78 then unite in lifting rod 46, closing the exhaust-steam port, opening the live-steam-admission port, and opening gate-valve 34. Rod 46 is caught in its raised position, Fig. 2, by latch 39. The pressure of live steam in addition to the weight of the water within the regulator 21 is then sufficient to operate pressure-regulator 32 and open valve 19. The pressure-regulator 66 is also operated and closes valve 60. The weight of the water and pressure of live steam together force water through the pipe 13 into receiver 5 and through to the boiler until float 8 rises sufficiently to close the valve 13' and shut off the flow of water. If this occurs before the water-

level in regulator 21 has permitted float 77 to drop and release catch 75, the water remains in regulator 21 until valve 13' is again opened by operation of float 8, and the remaining water in regulator 21 is fed into the boiler. The lowering of the water-level below float 78 releases this float, which is, however, maintained in the position with pin 48 in engagement with slot 49 of rod 46 until said rod 46 is released by operation of float 77. When float 77 is permitted to lower by passage of the remaining water from regulator 21, latch 39 is released from engagement at 74 with rod 47, and the combined weights of floats 77 and 78, rod 46, and valve 43 operate said rod and valve, closing the live steam and opening the exhaust-steam port and closing gate-valve 34. Pressure-regulator 66 now permits valve 60 to be released by adjustable weight 67 from aperture 59, and the position of Fig. 1 is resumed.

It will be evident that various changes may be made by those skilled in the art which will come within the scope of my invention, and I do not, therefore, desire to be limited in every instance to the exact construction herein shown and described.

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

1. In a boiler-feed water-regulator having live and exhaust steam ports therein, a valve controlling said ports, a valve-rod therefor, and a plurality of floats at different levels in said regulator, an upper of which floats regulates the movement of the valve upon the filling of said feed-water regulator and a lower of which floats regulates the movement of the valve upon the emptying of said regulator.

2. In a boiler-feed water-regulator having inlet steam and exhaust openings, a valve and valve-rod therefor, a plurality of latches engaging said rod and a plurality of means for releasing said latches and operating said rod.

3. In a boiler-feed, a water-regulator comprising a water-reservoir, live and exhaust steam ports thereto, means for closing the one and opening the other of these ports with admission or withdrawal of water from said reservoir, an auxiliary reservoir, connections between said main and auxiliary reservoirs, a valve therein, a pressure-regulator connected with the main reservoir and operating said valve and means within the auxiliary reservoir for admitting or checking the admission of water thereto.

4. In a boiler-feed, a boiler, a reservoir, live and exhaust steam ports thereto, a valve controlling said ports, a plurality of floats at different levels in said reservoir controlling said valve, an auxiliary reservoir connected with said boiler at a height embracing the upper and lower permissible levels of water in said boiler, a float and float-rod within said auxiliary reservoir and audible means oper-



able by both upward and downward movement of said float for indicating the passing of said permissible levels.

5. In a boiler-feed, a boiler, a reservoir, live and exhaust steam ports thereto, a valve controlling said ports, a plurality of floats at different levels in said reservoir controlling said valve, an auxiliary reservoir connected with said boiler and through which the feed-water enters said boiler, a float, and float-rod in said auxiliary reservoir, and independent audible means connected with said float-rod for checking or permitting flow of feed-water thereinto and for indicating the passing of upper and lower permissible water-levels therein.

6. In a boiler-feed, a reservoir, live and exhaust steam openings therein, a valve controlling said openings, a valve-rod therefor, a plurality of floats, and float-rods connected with said valve-rod, means operated by an upper float for permitting the lower float to move said valve-rod and means connected with the lower float for permitting an upper float to move said rod.

7. In a boiler-feed, a reservoir, live and exhaust steam openings therein, a valve controlling said openings, a valve-rod therefor, a float and float-lever having a pin-and-slot connection with said rod, a latch having connection with said rod which prevents upward movement of the same, a lower float, a lever therefor connected to said valve-rod, a latch engaging with said rod for preventing downward movement thereof, means upon said upper-float lever for releasing said first-named latch and means upon the lower-float lever for releasing the last-named latch.

8. In a boiler-feed water-regulator having inlet and exhaust openings, a valve and valve-

rod therefor, means engaging said rod and a plurality of means for releasing the first-mentioned means and operating said rod.

9. In a boiler-feed water-regulator, having live and exhaust steam ports therein, a valve controlling said ports, a valve-rod therefor, and a plurality of floats at different levels in said regulator for actuating said valve.

10. In a boiler-feed, a water-regulator, comprising a reservoir, live and exhaust steam ports therefor, means for controlling said ports for regulating the water-supply in said reservoir, an auxiliary reservoir communicating with said first-mentioned reservoir and means within said first-mentioned reservoir for regulating the feed-water supply therefrom to said auxiliary reservoir, through which latter the feed-water enters the boiler.

11. In a boiler-feed, a main reservoir having ports, a plurality of floats for controlling said ports and an auxiliary reservoir connected with the boiler and the main reservoir through which the feed-water enters said boiler.

12. In a boiler-feed, a reservoir, live and exhaust steam openings therein, a valve controlling said openings, a valve-rod therefor, a plurality of floats and means whereby said floats actuate said valve-rod.

13. In a boiler-feed, a reservoir, live and exhaust steam openings therein, a valve controlling said openings, a valve-rod therefor, a plurality of floats at different levels and means whereby said floats act in unison to actuate said valve-rod.

DANIEL GOFF.

Witnesses:

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WM. S. JACKSON.