

No. 756,948.

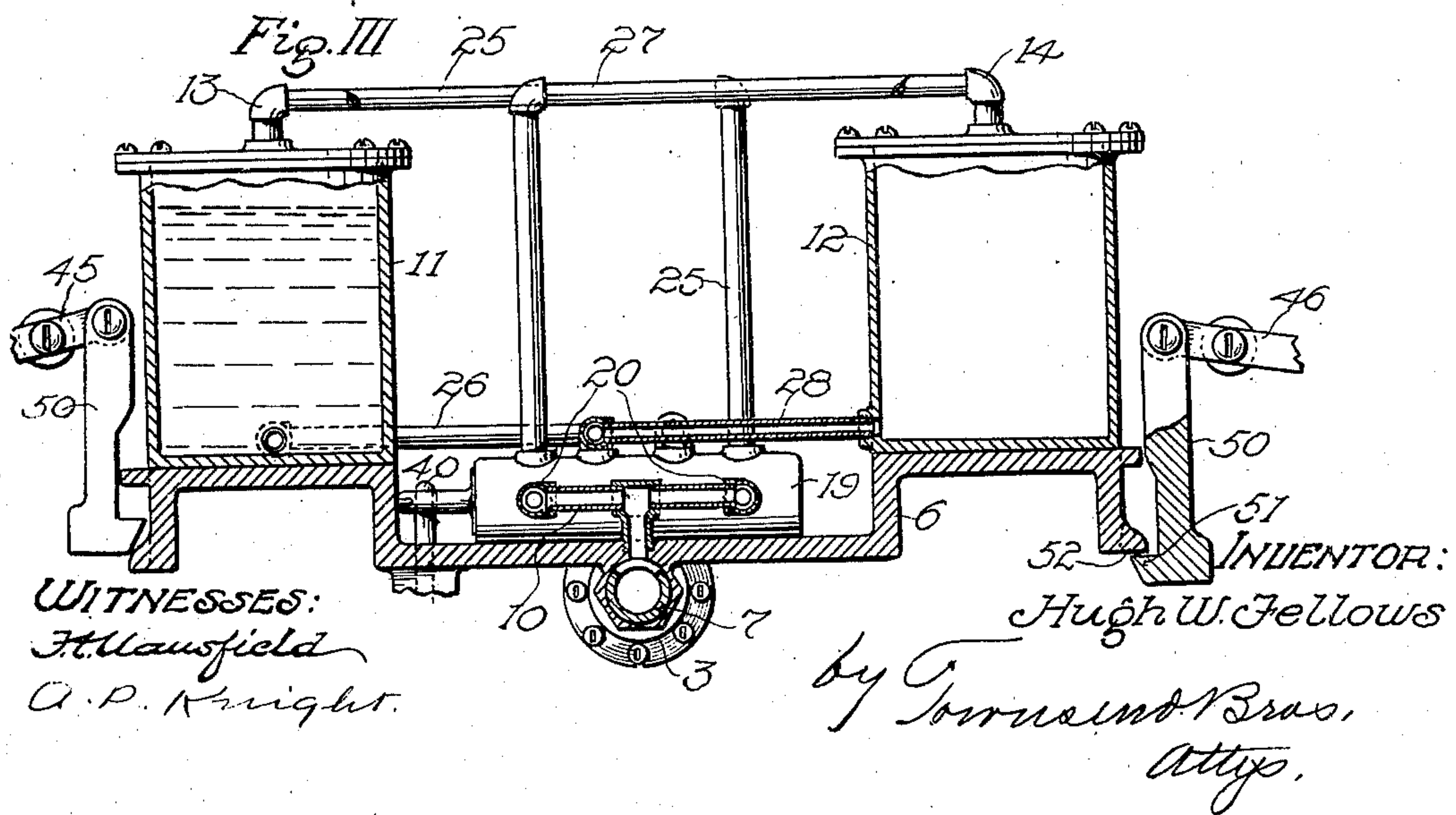
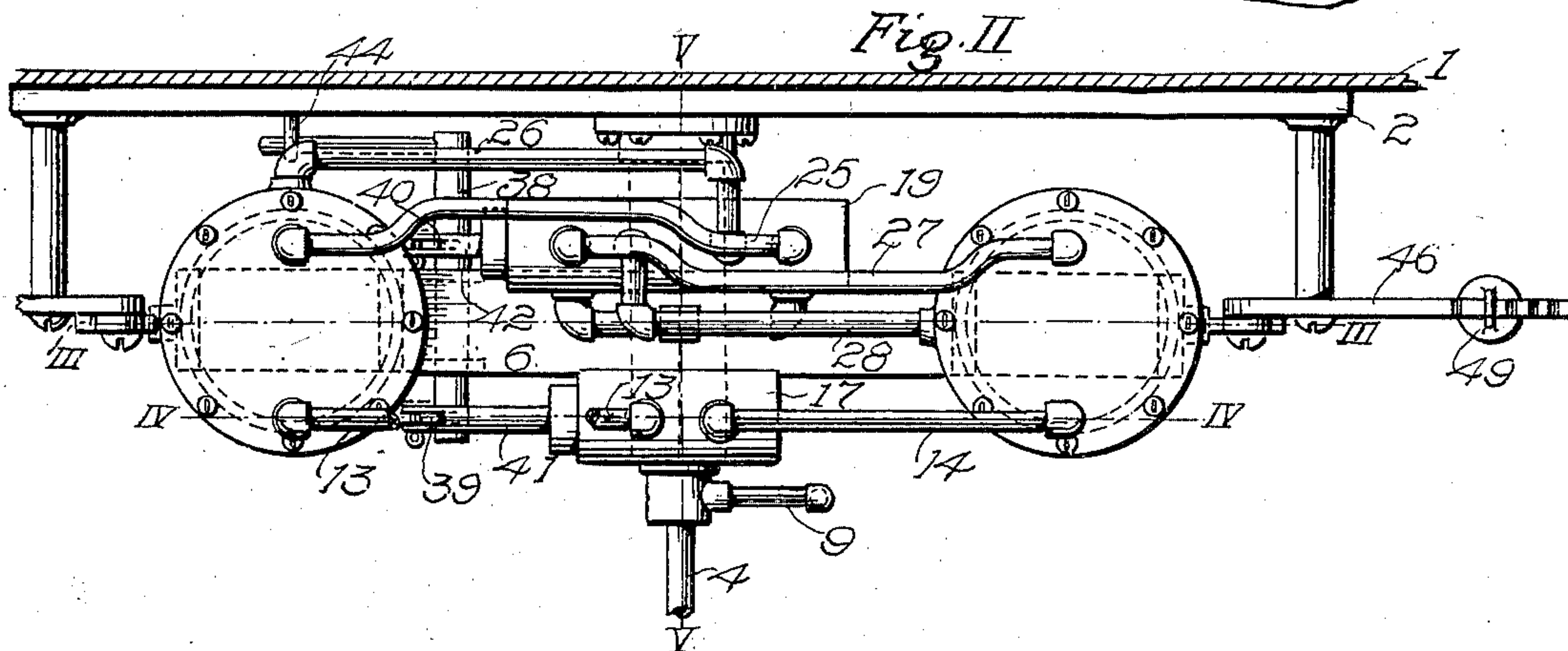
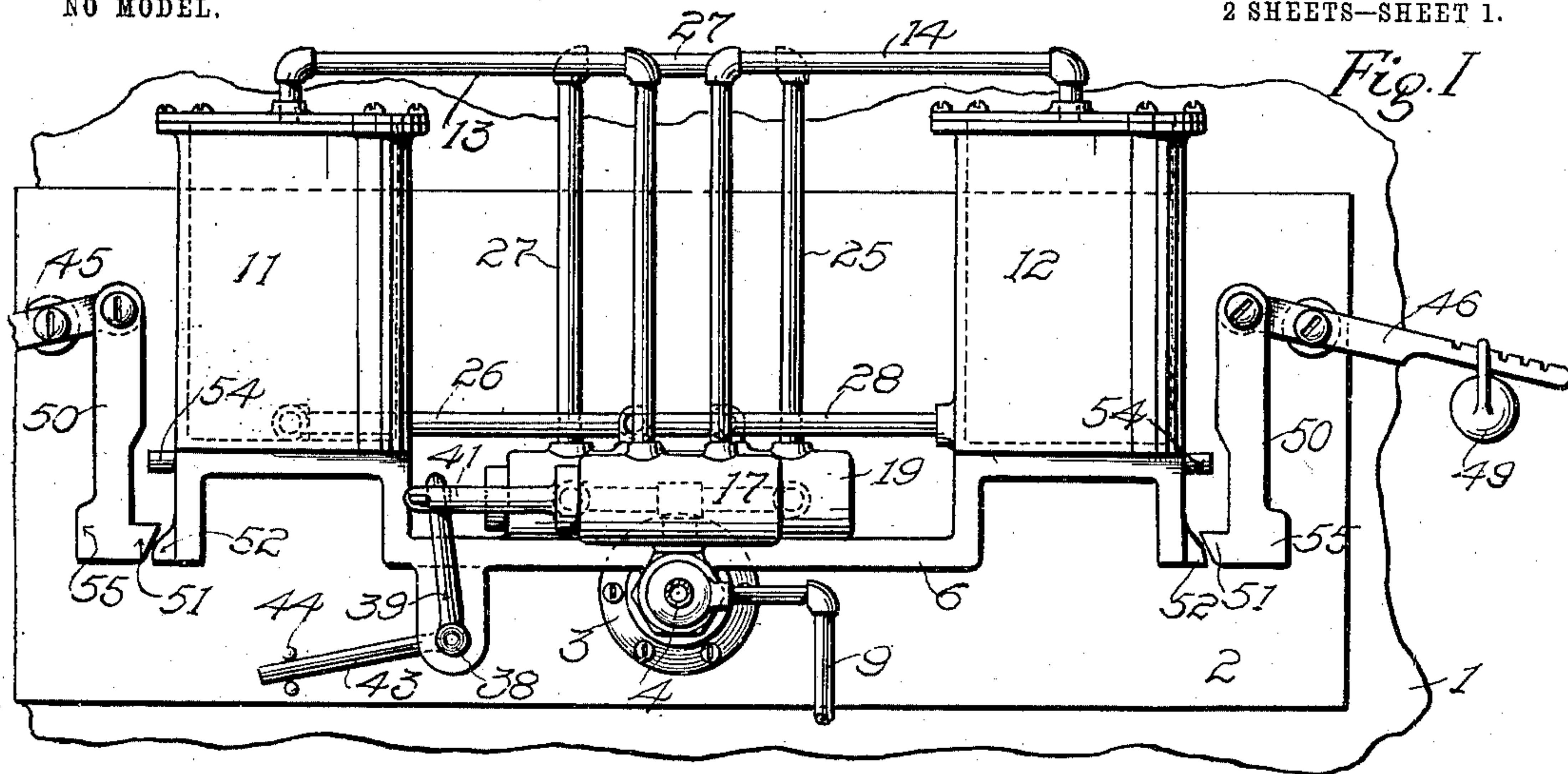
PATENTED APR. 12, 1904.

H. W. FELLOWS.  
AUTOMATIC FEED FOR STEAM BOILERS.

APPLICATION FILED OCT. 7, 1903.

NO MODEL.

2 SHEETS—SHEET 1.



WITNESSES:

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INVENTOR:  
*Hugh W. Fellows*

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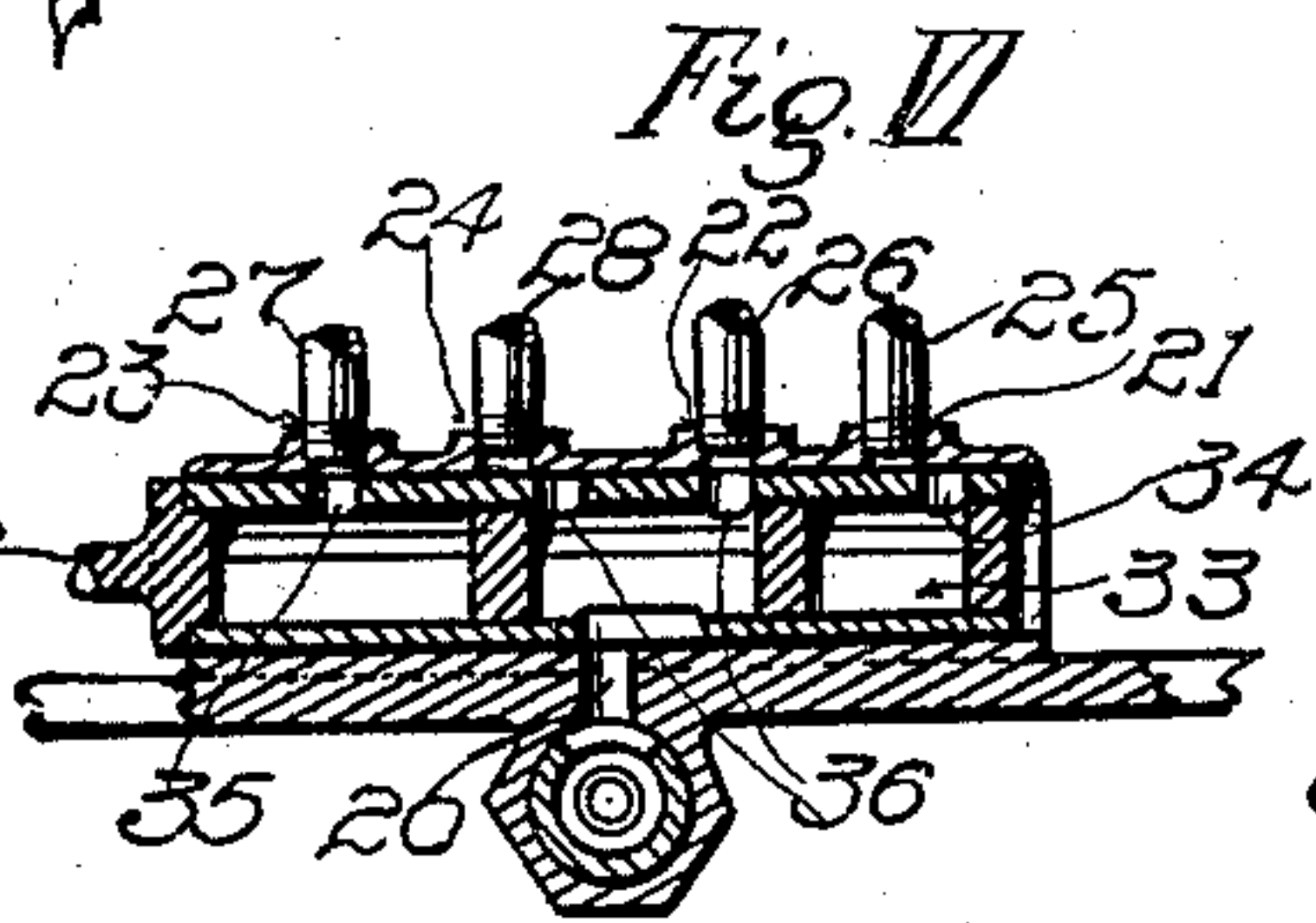
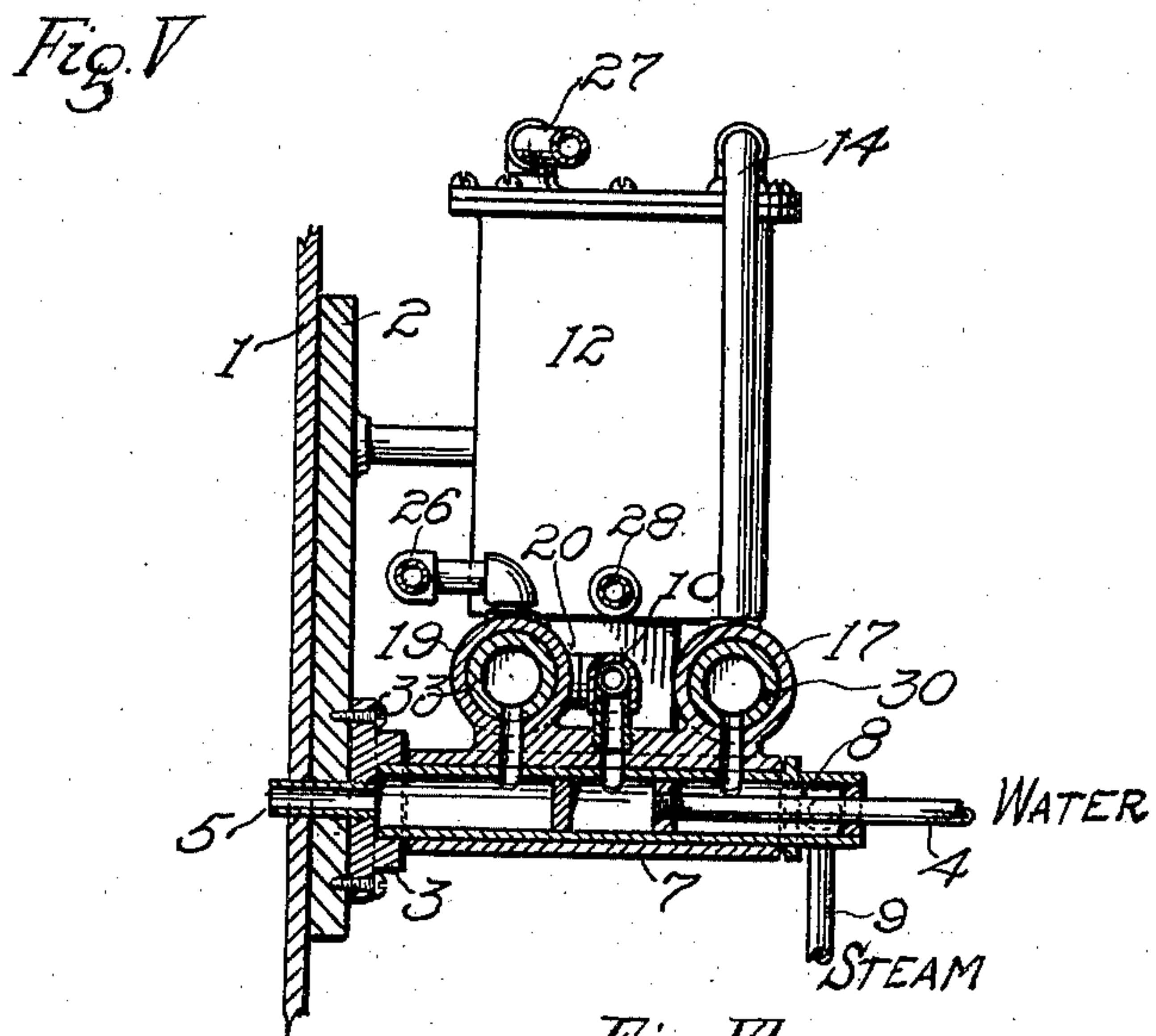
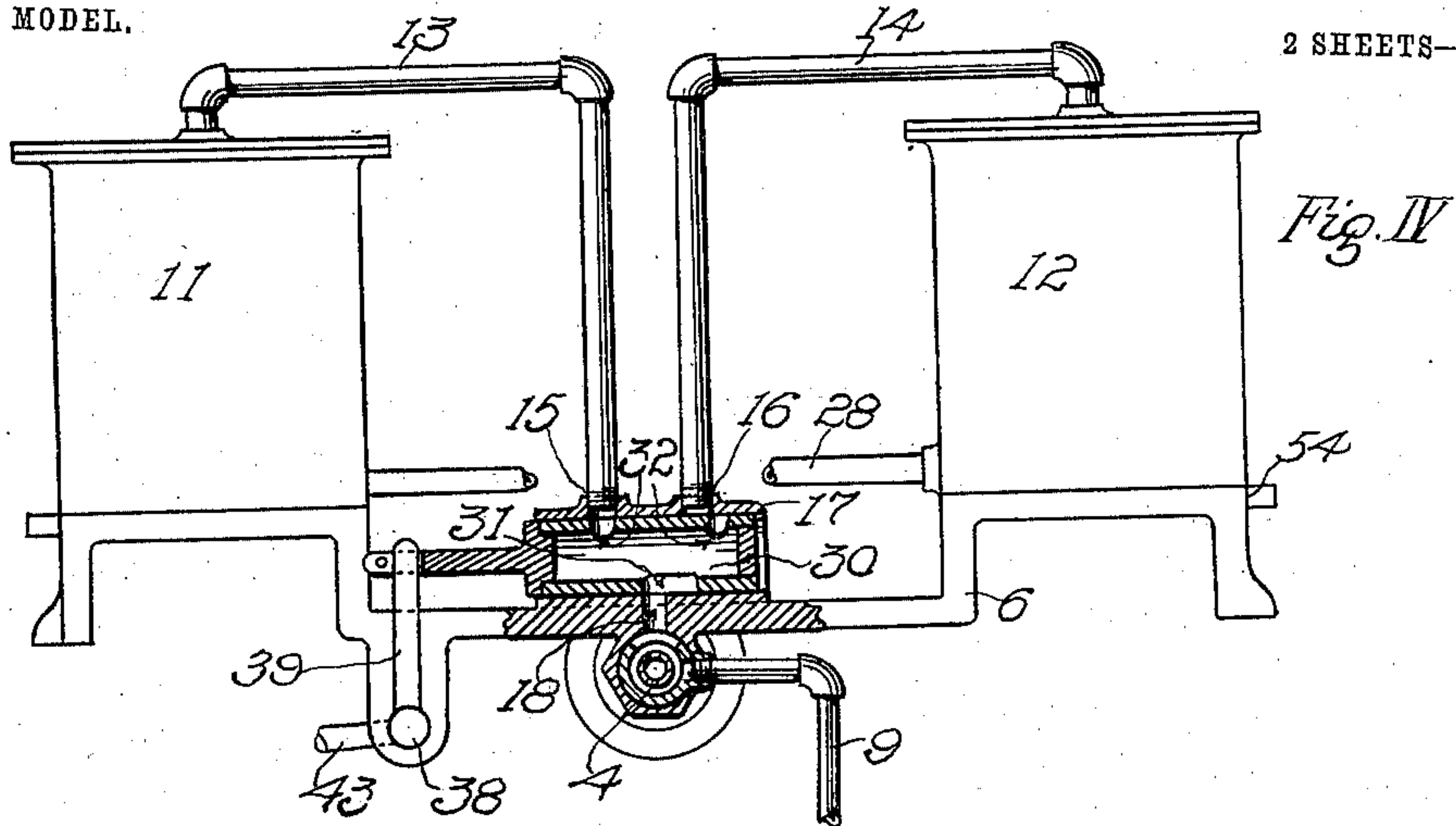
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# AUTOMATIC FEED FOR STEAM BOILERS.

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**WITNESSES:**

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# UNITED STATES PATENT OFFICE.

HUGH W. FELLOWS, OF LOS ANGELES, CALIFORNIA, ASSIGNOR OF ONE-HALF TO HENRY COGSWELL, OF LOS ANGELES, CALIFORNIA.

## AUTOMATIC FEED FOR STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 756,948, dated April 12, 1904.

Application filed October 7, 1903. Serial No. 176,024. (No model.)

*To all whom it may concern:*

Be it known that I, HUGH W. FELLOWS, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Automatic Feed for Steam-Boilers, of which the following is a specification.

An object of this invention is to provide improved means for injecting or forcing water into a steam-boiler or other receiver under pressure in such a manner that the level of the water in such boiler or receiver will be maintained at a definite and constant height or level.

A further object of this invention is to provide water-feeding apparatus which will feed the water in different weighed quantities, and in this connection my invention provides for adjustment or variation of the weighed quantity, so as to adjust the capacity of the device to feed different amounts of water in a given time.

Further objects of the invention will appear in and from the accompanying description and claims.

The accompanying drawings illustrate the invention.

Figure I is a front elevation of the boiler-feed apparatus. Fig. II is a plan. Fig. III is a vertical section on line III III, Fig. II, showing the water connections. Fig. IV is a section on line IV IV, Fig. II. Fig. V is a longitudinal section of the steam-valve and its connections on the line V V in Fig. II. Fig. VI is a longitudinal section of the water-valve.

1 designates a portion of the wall of the boiler or receiver that is to be supplied with water, it being understood that such boiler or receiver is under pressure requiring the water to be forced therein by application of pressure sufficient to overcome that of the boiler.

2 designates a plate or base that is attached to a suitable support—for example, to the boiler itself—said plate or base carrying the various parts of the feed mechanism herein-after described.

A stud or tubular pivot 3, projecting from

plate 2, is provided with a pipe 4 at its outer end, serving as a water-inlet, being connected with a suitable source of water-supply, and a bore or passage 5 at the inner end of said stud communicates with the boiler or receiver 1. A rocker or balance-beam 6 is pivoted on stud 3 by means of a sleeve or cylinder 7, having bearings fitting on said stud and constituting a steam-tight jacket around said stud. A steam-chamber 8 is formed in said stud, communicating with a steam-supply pipe 9, leading from the boiler 1.

11 and 12 designate two reservoirs or water-receptacles, located at opposite ends of the balance-beam 6 and connected at their upper portions by pipes 13 14 with ports 15 16 of a steam-valve 17, secured or formed on the balance-beam 6 and provided with a steam-inlet port 18. A water-valve 19, also secured on said balance-beam, is provided with inlet-ports 20, communicating by connection 10 with the pipe 4 aforesaid and with ports 21, 22, 23, and 24, controlling communication with pipes 25 and 26, leading, respectively, to the top and bottom of tank or receptacle 11, and pipes 27 and 28, leading, respectively, to top and bottom of tank or receptacle 12. These valves may be of any suitable construction, but are shown as slide-valves, the valve 17 having a slide-plug 30, provided with passages 31 32, controlling passage of steam from inlet-ports 18 to outlet-ports 15 16 alternately, and the water-valve 19, having a sliding plug 33 with passages 34 35 36, controlling passage of water from pipe 4 to the two receptacles 11 12 alternately and from said receptacle 11 alternately to the boiler-connection passage 5.

Means are provided for operating the steam and water valves aforesaid by the rocking movement of the balance-beam 6. For this purpose a rock-shaft 38, pivoted on said balance-beam 6, is provided with arms 39 and 40, pivotally connected with the operating-rods 41 42 of the respective valves 17 and 19, and also has an arm 43 engaging a suitable fixed means, such as pins 44 on base-plate 2, to hold the rock-shaft from rotation while permitting its movement bodily with the balance-beam. Consequently when the balance-beam rocks from



one side to the other this rock-shaft will be given a partial rotation relative to the balance-beam, and the sliding plugs 30 and 33 will be operated to change the steam and water connections.

Latches 45 46 are provided at the respective ends of the balance-beam for retaining said beams in either position to which it may have been tilted until said latches are tripped or released. Said latches are shown as levers extending horizontally and outwardly and supporting weights 49, which are adjustable thereon, and having pivoted to their inner ends downwardly-extending arms 50, having shoulders or projections 51, engaging with projections 52 on the respective tanks or receptacles 11 12 and also having portions adapted to engage pins or projections 54 on said receptacle. Depending arms 50 are weighted, as at 55, to cause them to swing inwardly toward the balance-beam.

The construction and arrangement of these parts are such that the end of the balance-beam when it rises to its uppermost position is caught by projections 52 on the corresponding latch engaging under projection 52 at that end of the balance-beam, this being effected by the action of weight 49 forcing the latch toward the projection 52; but when owing to the passage of water into the receptacle at this end of the balance-beam the load or weight thereon is sufficient to overcome the upward pressure of shoulders 51 on projections 52, due to the action of counterweight 55, then this end of the balance-beam will descend and the arm 50 of the latch will be engaged by the pin 54 to force the arm 50 from the balance-beam and release the engagement between projections 51 and 52.

The water-feed apparatus above described is attached to the boiler or other suitable support at such height that the level of the water in the receptacles when full—that is, when they are about to be rocked by the operation of the weighing means—is the same as the desired high-water level of the boiler. Assuming that the plant is in operation and that the level of the water in the boiler has sunk below the level desired, the operation will be as follows: The receptacle—say 11—that is at the depressed end of the beam will be full of water and the one at the other end will be empty. The steam-valve will establish communication from the steam-pressure supply-pipe 9 to the top of the receptacle 11, and at the same time the water-valve 19 will establish communication from the bottom pipe 26 of said receptacle to the feed connection. The level of the water in the receptacle being higher than in the boiler and approximately equal pressure existing in the receptacle and boiler, water will flow from said receptacle through pipe 26 and valve 19 to the boiler. While this is taking place the other receptacle 12 is being filled with water from water-supply pipe 4, the wa-

ter-valve 19 establishing communication from said pipe to pipe 27, leading to the top of the receptacle 12. When receptacle 11 has thus been emptied and receptacle 12 filled, the pressure or weight on the end of the balance-beam which carries receptacle 12 will be sufficient to depress and then push outward the latch-arm 50, allowing the balance-beam to rock to a position reverse to that shown in Fig. III, whereupon the steam and water valves will be operated by the rocking device to reverse or alternate the connections above described, allowing the full receptacle 12 to discharge into the boiler and the empty receptacle 11 to be filled. This action will take place repeatedly, the capacity of the device being such that the boiler will thereby be filled at a rate greater than the evaporation in the boiler, so that sooner or later the water-level will be brought up to its desired height. When this occurs, the level of the water in the receptacle which is at that time depressed will be the same as the level of the water in the boiler, and the flow from said receptacle to the boiler will therefore cease or at least will be only sufficient to allow the water-level in the receptacle to fall in accordance with the fall of water-level in the boiler. Also the flow of water to the other receptacle will be arrested as soon as said receptacle is filled and the feeding action as a whole is suspended until the water-level in the boiler falls sufficiently to allow the depressed receptacle to be emptied, whereupon the other receptacle will overbalance it and start the operation anew.

By adjusting the position of the weight 45 on the arm 46 the amount of water required to overbalance this weight and cause release and tipping over of the balance-beam may be adjusted or varied as desired, so as to vary the amount of water passed into the boiler or receiver at each operation.

The arrangement of the valve-chambers 17 and 19, separate from the pivotal chamber 7 and connected thereto, as stated, has the advantage that such valve-chambers and the valves working therein are thereby freed from the wear due to the weight of the balance-beam bearing on the pivot members thereof. With a construction wherein such pivot members themselves form the valves the wear due to the pressure on such pivot members soon leads to such looseness in the valve parts that steam will pass or leak through the same.

My invention is applicable to other purposes besides feeding steam-boilers. In fact it may be used wherever it is required to retain a given level of water in a receiver or to supply water in definite weighed quantities. The adjustment of the weighing device in any case permits the amount of water fed by the apparatus to be accurately adjusted according to the requirements.

What I claim is—

1. A feeding apparatus comprising a rock-



ing balance-beam, receptacles carried by said balance-beam, a tubular pivot for the balance-beam, valves supported on the balance-beam exteriorly of the tubular pivot, water inlet and outlet connections leading through said tubular pivot to and from one of said valves, a pressure connection leading through said tubular pivot to the other of said valves, connections from said valves to the upper and lower parts of the aforesaid receptacles, valve-operating means connected with said valves, and fixed means engaging said valve-operating means substantially as and for the purpose set forth.

2. A feeding apparatus comprising a rocking balance-beam, receptacles carried by said balance-beam, a tubular pivot for the balance-beam, valves supported on the balance-beam exteriorly of the tubular pivot, water inlet and outlet connections leading through said tubular pivot to and from one of said valves, a pressure connection leading through said tubular pivot to the other of said valves, connections from said valves to the upper and lower parts of the aforesaid receptacles, a rock-shaft carried by the balance-beam and having arms engaging said valves, and an operating-arm; fixed means engaging said operating-arm to operate the rock-shaft and valves.

3. A water-feed apparatus comprising a movable receptacle, adjustable means for weighing the water-supply to the receptacle and a valve connected to be operated by the weighing movement of the receptacle, connections controlled by said valve for admitting water to the receptacle when the valve is in position corresponding to unloaded condition of the receptacle and to establish a feed-supply connection from the receptacle when the valve is in the position corresponding to the loaded condition of the receptacle and a valve connected with a pressure-supply and controlled by the weighing movement of the receptacle to establish a condition of pressure on the water in the receptacle.

4. An automatic feed apparatus, a balance-beam, latches engaging the respective ends of the balance-beam and weighted to respond to a definite pressure, receptacles carried by the respective arms of the balance-beam, a valve controlled by the movement of the balance-beam and pipe connections controlled by said valve to establish alternately water-supply connections to, and water-feed connections from said receptacles and a valve having a pressure-supply connection and controlled by the movement of the balance-beam to admit pressure to the water in the receptacle on the depressed end of the balance-beam.

5. An automatic feed apparatus, a balance-beam, adjustable weighing means provided with latches engaging the respective ends of

the balance-beam and weighted to respond to a definite pressure, receptacles carried by the respective arms of the balance-beam, a valve controlled by the movement of the balance-beam and pipe connections controlled by said valve to establish alternately water-supply connections to, and water-feed connections from said receptacles, and a valve having a pressure-supply connection and controlled by the movement of the balance-beam to admit pressure to the water in the receptacle on the depressed end of the balance-beam.

6. An automatic feed apparatus, a balance-beam, weighing-arms provided with adjustable weights and with latches engaging the respective ends of the balance-beam and weighted to respond to a definite pressure, receptacles carried by the respective arms of the balance-beam, a valve controlled by the movement of the balance-beam and pipe connections controlled by said valve to establish alternately water-supply connections to, and water-feed connections from said receptacles, and a valve having a pressure-supply connection and controlled by the movement of the balance-beam to admit pressure to the water in the receptacle on the depressed end of the balance-beam.

7. In combination with a rocking balance-beam, receptacles on the respective arms thereon, a water-valve carried by the balance-beam, a rock-shaft carried by the balance-beam and having an operating-arm and connected to said valve, and fixed means engaging said operating-arm to operate the rock-shaft and valve.

8. A water-feed apparatus for steam-boilers comprising a balance-beam means for adjustably weighing the pressure on the arms of the balance-beam, receptacles on the arms of said balance-beam having their upper portions at the desired water-level in the boiler, water-pipe connections to and from the upper and lower parts of the respective receptacles, a valve having a water connection and a connection from the boiler, and controlling said pipe connections to the receptacles alternately to put said receptacles alternately in communication with the water-supply and the boiler, and a valve having a steam-supply connection from the boiler and connected to the respective receptacles to put said receptacles alternately in communication with the boiler steam-pressure.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, at Los Angeles, in the county of Los Angeles and State of California, this 22d day of September, 1903.

HUGH W. FELLOWS.

Witnesses:

ARTHUR P. KNIGHT,  
JULIA TOWNSEND.