D. GOFF.

BOILER FEED AND WATER HEATER.

APPLICATION FILED SEPT. 28, 1908.

932,777.

Patented Aug. 31, 1909.

3 SHEETS—SHEET 1.

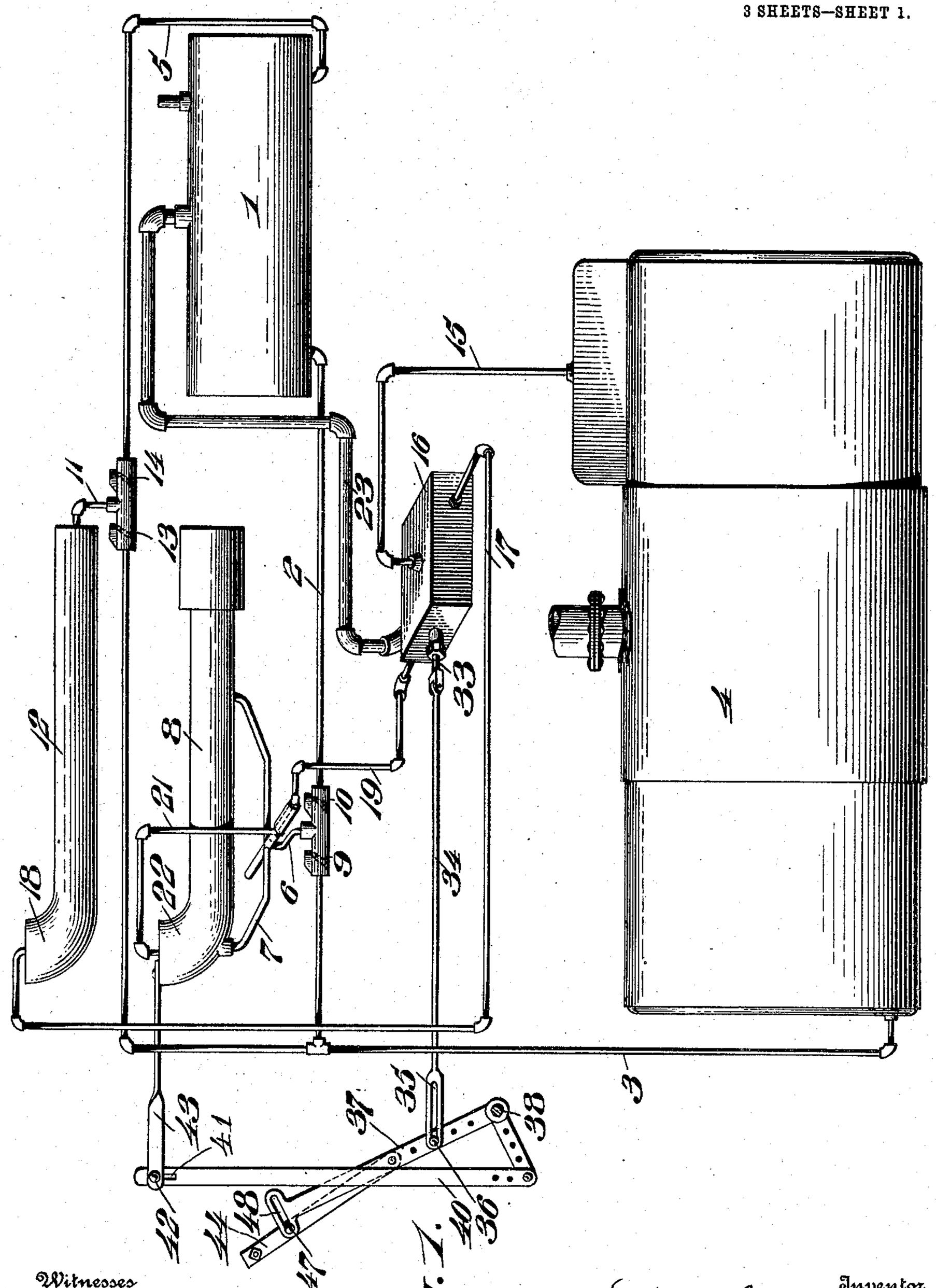

Fig. 1.

Witnesses

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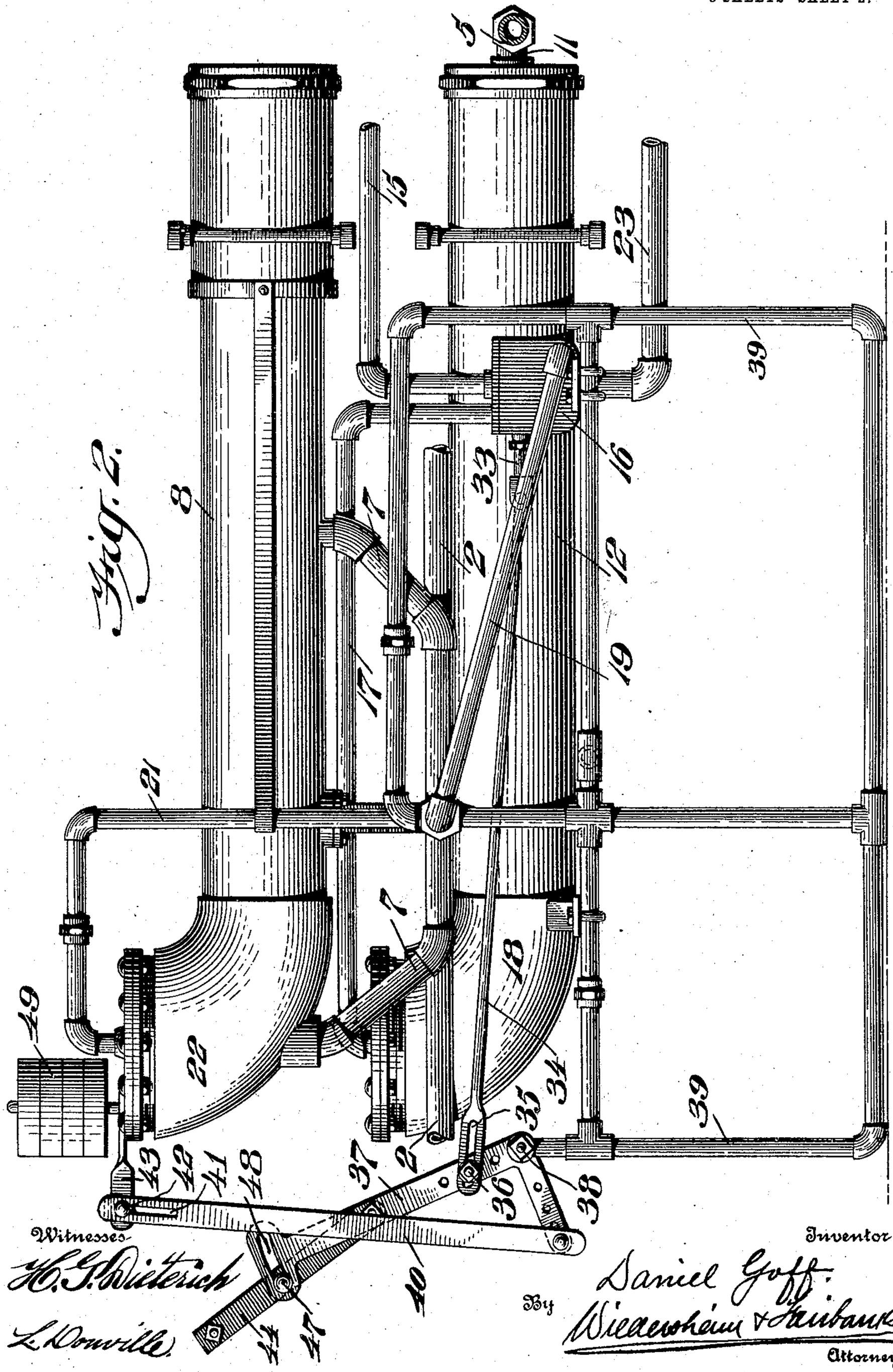
3 SHEETS—SHEET 2.

Fig. 2.



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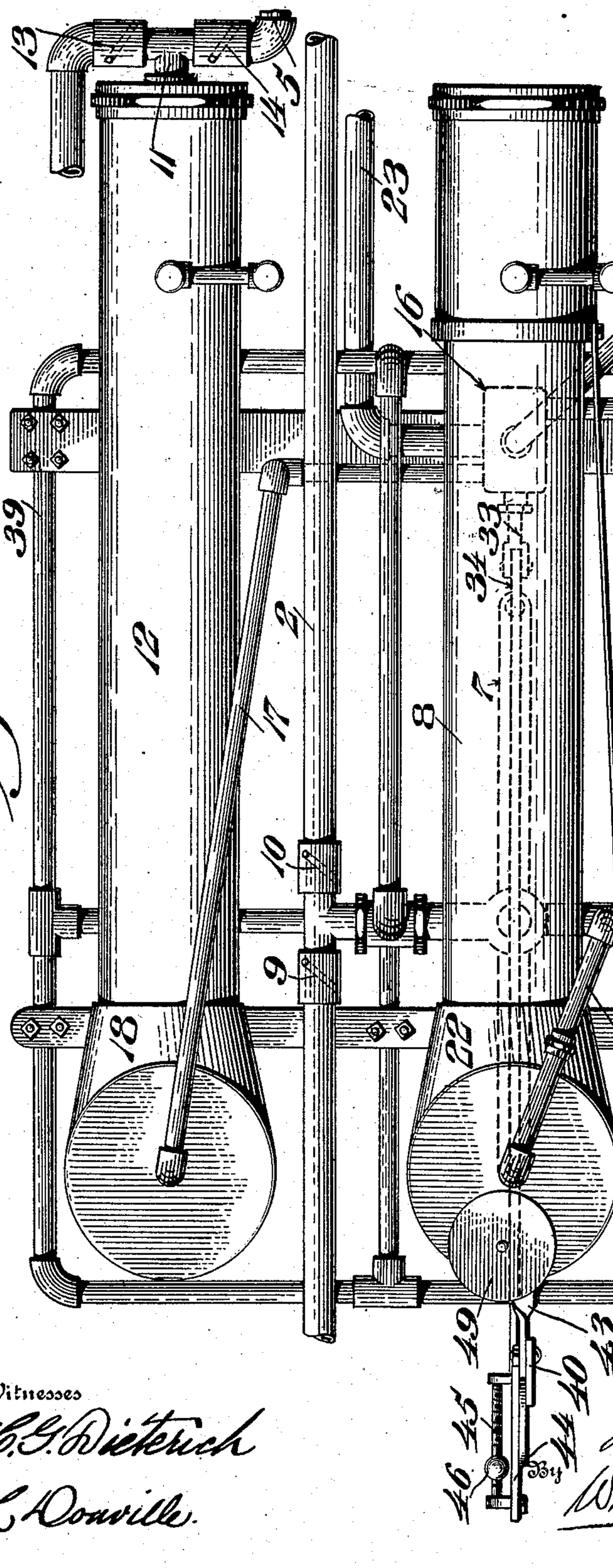

Fig. 3.

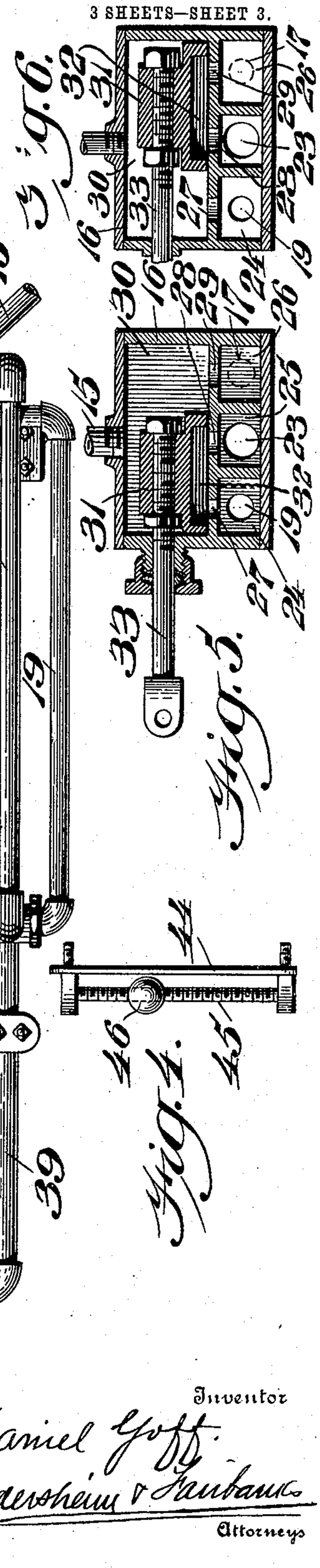

Fig. 4.

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UNITED STATES PATENT OFFICE.

DANIEL GOFF, OF MILLVILLE, NEW JERSEY.

BOILER-FEED AND WATER-HEATER.

932,777. Specification of Letters Patent. Patented Aug. 31, 1909.

Application filed September 28, 1908. Serial No. 455,073.

To all whom it may concern:

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

My invention relates to a new and useful boiler feed and water heater consisting of means for utilizing pressure from the boiler for forcing the water thereinto.

It further consists of means for heating the water which is fed to the boiler.

It further consists of means for supplying the heated water without the use of floats.

It further consists of other novel features of construction, all as will be hereinafter fully set forth.

Figure 1 represents a diagrammatic view showing a boiler and the connections embodying my invention. Fig. 2 represents a side elevation of the controller on an enlarged scale, showing a portion of the supporting frame. Fig. 3 represents a plan view of the controlling mechanism. Fig. 4 represents an elevation of a counterweight employed. Figs. 5 and 6 represent sectional views of the steam chest showing the valve in different positions therein.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings, I have found in practice that it is of great advantage to automatically feed a boiler with warm or hot water and in the drawings I have shown a device which is successful in operation and by which I am enabled to utilize the pressure from the boiler to assist in supplying it with water.

It will be understood that various changes may be made in the construction and other instrumentalities may be employed which will come within the scope of the invention and I do not therefore desire to be limited in every instance to the exact construction as herein shown and described but desire to make such changes as may be necessary.

1 designates a water tank or reservoir which is supplied with water from any suitable source, not shown, in any desired manner.

2 designates a pipe leading from said water tank 1 which communicates at a suitable point with the water inlet pipe 3 which latter is in suitable communication with the boiler 4. 5 designates a second pipe leading from said water tank 1 which also communicates at a suitable point with the water inlet pipe 3 leading to the boiler 4.

6 designates a branch pipe leading from the water supply pipe 2, which communicates with the water inlet and exhaust pipe 7 which communicates with the interior of a cylinder 8 which is movably supported as will be hereinafter described.

Situated at a suitable point in the pipe 2, or in a connection thereof, are the check valves 9 and 10 which are situated upon the opposite sides of the point at which the branch 6 communicates with the water supply pipe 2.

11 designates a branch pipe connected with the water supply pipe 5 and with the interior of a cylinder 12 which is stationarily supported in a suitable manner.

13 and 14 designate check valves which are situated at a suitable point in the pipe 5, or in a suitable connection thereof, it being noted that the said valves are placed upon opposite sides of the point at which the branch 11 communicates with said pipe 5.

15 designates a steam pipe which communicates at one end with the interior of the boiler 4 and at the opposite end with the interior of a steam chest 16, which is suitably supported, whereby it will be seen that steam from the boiler will pass through the supply pipe 15 and into said steam chest.

17 designates a pipe leading from a suitable point from the steam chest 16 having communication with a compartment therein and is in communication with the interior of the stationary cylinder 12, it being noted that the said pipe 17 discharges into the upper portion of the curved and enlarged end 18 of said stationary cylinder 12 for reasons as will be hereinafter described. 19 designates a second pipe leading from the steam chest 16 and is in communication with a compartment therein and which communicates with the interior of a pipe 20 which is mounted in suitable bearings on the frame of the device so that said pipe serves as the axis, rock arm or support for the movable cylinder 8 while leading from said pipe 20 is a pipe 21 which communicates with the upper portion of the curved and enlarged end 22 of the movable cylinder 8.

23 designates a pipe which is in suitable communication with the interior of the steam

chest 16 and which is adapted to serve as an exhaust from said steam chest and carry the steam therefrom and direct the same into the upper portion of the water tank or reservoir 1.

The steam chest 16 is provided with a compartment 24 with which the pipe 19 communicates, the compartment 25 with which the exhaust pipe 23 communicates and the compartment 26 with which the pipe 17 communicates. Suitable ports 27, 28 and 29 are formed in the partition, in the steam chest, which partition is between the said compartments 24, 25 and 26 and the upper chamber 30 of said steam chest with which the pipe 15 communicates. 31 designates a valve which is movable in said steam chest and is provided with a port or passage 32 which is of suitable extent as to form a communication between two of the openings of the partition, that is, either openings 27 and 28 or openings 28 and 29.

33 designates a rod which is in suitable connection with the valve 31 and passes through a stuffing box in the steam chest and has pivotally connected therewith the rod 34 which has a slot 35 therein in which moves a screw or pin 36 which is connected with an elbow lever 37, the latter being pivoted at 38 to the frame 39 of the device. Pivotally connected with the other arm of the elbow lever 37 is a link 40 which has a slot 41 therein in which moves a pin 42 carried by the arm 43 which is connected with an end of the movable cylinder 8.

Pivotally connected with the elbow lever 37 is a bar 44 which carries the threaded rod 45 upon which is mounted a counterweight 46, said bar 44 having a pin 47 movable in a slot 48 in the elbow lever 37, in order to permit certain movements of the parts.

Suitably mounted upon the movable cylinder 8 are the weights 49 which are preferably mounted upon the enlarged head 22 of said cylinder, it being noted that the pivotal point of the cylinder is so situated that the enlarged head 22 will substantially balance the remaining portion of the opposite side of the pivotal point and that the weights 49 tend to lower that end.

The operation of the parts just described will be apparent. Referring to Fig. 1 and Fig. 5 it will be understood that the valve 31 is in the position seen in said Fig. 5, that is to say, the port 32 thereof forms a communication between the ports 27 and 28 of the compartments 24 and 25. The steam from the boiler passing through pipe 15 will be directed into the chamber 30 of the steam chest and will pass through port 29 into the compartment 26 and thence through the pipe 17 and will be directed upon the upper portion of the water in the stationary cylinder 12, it being understood that this cylinder meantime has been filled with water. This pressure of steam upon the water in said cylinder will force the same therefrom through branch 11 and by reason of the construction of the check valves 13 and 14 the pressure of the water will close the check valve 14 and open the check valve 13 which will cause the water to pass through pipe 5 to the water inlet pipe 3 thence to the boiler 4. The water from the water tank or reservoir 1 in the meantime will pass through pipe 2, will open check valve 10 and by reason of the pressure of the steam etc., upon the opposite side of the check valve 9, the water cannot open this latter valve, and hence will pass through branch 6 and inlet water pipe 7 and will be directed into the movable cylinder 8, it being understood that the head end 22 of the latter having been previously lowered as there is no water in said cylinder and the weights 49 will depress this end. The water entering said movable cylinder 8 will fill the same and overcome the weight 49 thus causing the opposite end of said cylinder to be lowered and raising the head end 22 thereof. This will actuate the bar 43 and through the medium of the link 40 will rotate the elbow lever 37, which will actuate the rod 34 and thus change the position of the valve 31 moving the same over to the opposite side of the steam chest, as seen in Fig. 6, and causing the port 32 to form a communication between the ports 28 and 29 and the steam from the compartments 25 and 26 and that which is forced from the cylinder 8 will thus pass through pipe 23 and be directed upon the upper surface of the water in the water tank 1 which will assist in forcing the water therefrom. By reason of this action the water will be forced from the tank 1 through the pipe 5 and will open the valve 14 and by reason of the pressure upon the opposite side of the valve 13 it will remain closed and the water will be directed through the branch 11 into the stationary cylinder 12. The port 27 of the compartment 24, however, being now in communication with the chamber 30 of the steam chest 16 the steam from pipe 15 will pass through pipe 19, pipe 20 and pipe 21 and will be directed upon the upper surface of the water in the movable cylinder 8. By reason of this pressure the water from this cylinder 8 will be forced out through pipe 7 and through branch 6 and as check valve 10 will be closed by this pressure the water will open the check valve 9 and pass through pipe 2 into the water inlet pipe 3 and be directed to the boiler, it being understood as soon as the water passes from the movable cylinder 8 that the weights 49 will again depress the head end 22 of said cylinder 8, which causes the rod 43 and link 40 to actuate the elbow lever 37, which actuates the rod 34 to return the valve to the position seen in Fig. 5 when the operation pre-

viously described will again take place. By this means it will be seen that the water is continually passing in proper amounts from the water tank 1 into cylinders 8 and 12 alternately and from thence will be directed into the boiler 4 while at the same time the exhaust from the boiler, the cylinders and from the steam chest will be directed upon the upper surface of the water in the water tank or reservoir 1 so that the same is heated.

It will be understood that by reason of the connection between the rod 34 and the elbow lever 37 and the lever 40 and the rod 43 a certain amount of movement is permitted before the rod 34 is actuated, this being done in order that as soon as the parts reach the proper position, the valve will be quickly actuated to move across to its proper position in order that this movement will not consume much time. The weight 46 is adjusted so that it permits the filling of the cylinder to the proper point while movement of the pin 42 in the slot 41 occurs without changing the position of the valve 31, and at the proper time the slot 48 permits the weight 46 to be thrown over the center which thus causes the weight 46 to assist in the quick movement of the valve. By reason of the use of the counterweight 46 the elbow lever 37 will be held in its lowermost position until the pins in the slots 35 and 42 have reached their proper position at which time, by reason of the elevation of the headed end 22 of the movable cylinder 8 the said elbow lever 37 is quickly actuated in order to make the same quick action of the valve this being further assisted by the movement of the weight 46. The position of the counterweight 46 can be varied upon the rod 45 depending upon requirements. The advantage derived from the use of the upwardly curved heads 18 and 22 on the cylinder is that the steam is directed upon the upper surface of the water therein which is of small extent so that with a given amount of pressure better results are obtained than if the said pressure had to be exerted over a large surface of the water in said cylinders.

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

1. In a device of the character described, a boiler, a water tank, a plurality of cylinders, one of the cylinders being movable, means for conducting water alternately into one or the other of said cylinders, means for conducting steam from the boiler alternately into one or the other of said cylinders, for forcing the water therefrom into the boiler, and means controlled by the movable cylinder for directing the exhaust steam from said cylinders into said water tank to assist in forcing the water therefrom.

2. In a device of the character described, a boiler, a water tank, a stationary cylinder, a movable cylinder, means for conducting water alternately into one or the other of said cylinders, means for conducting steam from the boiler alternately into one or the other of said cylinders for forcing the water therefrom into the boiler, means for conducting the exhaust from said cylinders into the said water tank, and means controlled by the movement of said movable cylinder for properly directing the steam into said cylinders.

3. In a device of the character described, a boiler, a water tank, a plurality of cylinders one of the cylinders being movable, a pipe serving as a water inlet to said boiler, a pipe leading from said water tank and communicating with said water inlet, a communication between said pipe and one of said cylinders, a second pipe leading from said water tank and communicating with said water inlet pipe, a communication from said second mentioned pipe to the other cylinder, check valves in each of said water tank pipes for controlling the communication to the cylinder and means actuated by the movable cylinder for controlling the flow of water from one cylinder or the other into the boiler.

4. In a device of the character described, a boiler, a water tank, a plurality of cylinders one of said cylinders being movable, a pipe forming a water inlet for said boiler, a pipe leading from said water tank and communicating with said water inlet pipe, a communication from said pipe to one of said cylinders, a second pipe leading from said water tank and communicating with said water inlet pipe, a communication between said second water tank pipe and the other cylinder, means controlled by said movable cylinder for controlling said communications, and a steam pipe leading from said boiler and communicating alternately with one or the other of said cylinders, whereby the water is forced therefrom.

5. In a device of the character described, a boiler, a water tank, a plurality of cylinders one of said cylinders being movable, a pipe forming a water inlet for said boiler, a pipe leading from said water tank and communicating with said water inlet pipe, a communication from said pipe to one of said cylinders, a second pipe leading from said water tank and communicating with said water inlet pipe, a communication between said second water tank pipe and the other cylinder, means for controlling said communications, a steam pipe leading from said boiler and communicating with each of said cylinders, and means actuated by the movable cylinder for controlling said steam pipe, whereby the steam is directed into one or the other of said cylinders.

6. In a device of the character described, a boiler, a water tank, a stationary cylinder, a movable cylinder, a pipe forming a water

inlet for said boiler, a pipe leading from said water tank and communicating with said water inlet pipe, a communication from said pipe to one of said cylinders, a second pipe leading from said water tank and communicating with said water inlet pipe, a communication between said second water tank pipe and the other cylinder, means for controlling said communications, a steam pipe leading from said boiler and communicating with each of said cylinders, and means actuated by the movable cylinder for controlling said steam pipe, whereby the steam is directed into one or the other of said cylinders.

7. In a device of the character described, a boiler, a water tank, a stationary cylinder, a movable cylinder, a pipe leading from said water tank and communicating with said boiler, a branch of said pipe communicating with said stationary cylinder, a second pipe leading from said tank and communicating with the boiler, a branch connecting said second mentioned pipe with the movable cylinder, a steam pipe leading from said boiler, a steam chest with which said steam pipe communicates, a communication between said steam chest and said stationary cylinder, a communication between said steam chest and said movable cylinder, and means actuated by the movable cylinder for controlling said steam chest communications whereby one or the other will direct steam into the proper cylinder.

8. In a device of the character described, a boiler, a water tank, a stationary cylinder, a movable cylinder, a pipe leading from said water tank and communicating with said boiler, a branch from said pipe communicating with said stationary cylinder, a second pipe leading from said tank and communicating with said boiler, a branch connecting said second mentioned pipe with the movable cylinder, a steam pipe leading from said boiler, a steam chest with which said steam pipe communicates, a communication between said steam chest and said stationary cylinder, a communication between said steam chest and said movable cylinder, and means controlled by said movable cylinder for directing steam into the proper cylinder.

9. In a device of the character described, a boiler, a water tank, a stationary cylinder, a movable cylinder, a pipe leading from said water tank and communicating with said boiler, a branch communicating with said pipe and connected with said stationary cylinder, a pipe leading from said water tank and communicating with said boiler, a branch leading from said second mentioned water pipe and communicating with said movable cylinder, a steam chest, a pipe forming a communication between said boiler and the upper portion of said steam chest, a plurality of compartments in said steam chest, a pipe leading from one of said compartments and communicating with said stationary cylinder, a pipe leading from another of said compartments and communicating with said movable cylinder, a valve controlling said compartments and a communication between said valve and said movable cylinder for actuating said valve.

10. In a device of the character described, a boiler, a water tank, a stationary cylinder, a movable cylinder, a pipe leading from said water tank and communicating with said boiler, a branch communicating with said pipe and connected with said stationary cylinder, a second pipe leading from said water tank and communicating with said boiler, a branch leading from said second mentioned water pipe and communicating with said movable cylinder, a steam chest, a pipe forming a communication between said boiler and the upper portion of said steam chest, a plurality of compartments in said steam chest, a pipe leading from one of said compartments and communicating with said stationary cylinder, a pipe leading from another of said compartments and communicating with said movable cylinder, a valve controlling said compartments, a communication between said valve and said movable cylinder for actuating said valve, and an exhaust pipe leading from said steam chest and communicating with said water tank for directing exhaust steam thereinto.

11. In a device of the character described, a boiler, a water tank, a plurality of cylinders one of said cylinders being movable, means for conducting water alternately into one or the other of said cylinders, means for conducting steam from the boiler alternately into one or the other of said cylinders for forcing the water therefrom into the boiler, means actuated by the movable cylinder for controlling the steam conducting means, and a series of levers having a suitable amount of play therebetween for actuating said controlling means at the proper time.

12. In a device of the character described, a boiler, a water tank, a plurality of cylinders, one of said cylinders being movable, means for conducting water alternately into one or the other of said cylinders, means for conducting steam from the boiler alternately into one or the other of said cylinders for forcing water therefrom into the boiler, means operated by the movable cylinder for controlling said steam conducting means, levers for actuating said controlling means and having sliding engagement with each other, and a counterweight carried by said controlling means and adapted to be thrown across the pivotal center at the proper time for assisting in the quick movement of said controlling means.

13. In a device of the character described, a boiler, a water tank, a plurality of cylin-

ders one of said cylinders being movable, means for conducting water alternately into one or the other of said cylinders, means for conducting steam from the boiler alternately into one or the other of said cylinders for forcing water therefrom into the boiler, means operated by the movable cylinder for controlling said steam conducting means, levers for actuating said controlling means and having sliding engagement with each other, and an adjustable counterweight carried by said controlling means and adapted to be thrown across the center at the proper time for assisting in the quick movement of said controlling means.

14. In a device of the character described, a boiler, a water tank, a plurality of cylinders, one of said cylinders being movable, means for conducting water alternately into one or the other of said cylinders, means for conducting steam from the boiler alternately into one or the other of said cylinders, for forcing water therefrom into the boiler, means operated by the movable cylinder for controlling said steam conducting means, a lever pivotally supported, a communication between said controlling means and said lever having a sliding connection therewith, a link communicating with said lever, and a counterweight pivotally connected with said lever and adapted to be thrown over the center for assisting in the quick movement of said controlling means.

15. In a device of the character described, a boiler, a water tank, a stationary cylinder, a movable cylinder, means for conducting the water alternately into one or the other of said cylinders, means for conducting steam from the boiler alternately into one or the other of said cylinders for forcing water therefrom into the boiler, a valve controlling said steam conducting means, a rod connecting said valve having a slot therein, a lever pivotally supported and having a pin movable in said slot, a link connecting with said lever and having a slot therein, an arm connecting with said movable cylinder and having a pin movable in the slot in said link, and a counterweight pivotally carried by said lever and having a pin movable in a slot in said lever.

16. In a device of the character described, a boiler, a water tank, a stationary cylinder, a movable cylinder, means for conducting the water alternately into one or the other of said cylinders, means for conducting steam from the boiler alternately into one or the other of said cylinders for forcing water therefrom into the boiler, a valve controlling said steam conducting means, a rod connecting said valve having a slot therein, a lever pivotally supported and having a pin movable in said slot, a link connecting with said lever and having a slot therein, an arm connecting with said movable cylinder and having a pin movable in the slot in said link, a counterweight pivotally carried by said lever and having a pin movable in a slot in said lever, and weights carried by said movable cylinder.

17. In a device of the character described, a boiler, a water tank, a plurality of cylinders one of the cylinders being movable, means for conducting water alternately into one or the other of said cylinders, means for conducting steam from the boiler alternately into one or the other of said cylinders for forcing the water therefrom into the boiler and means actuated by the movable cylinder for controlling said steam conducting means.

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