

No. 896,820.

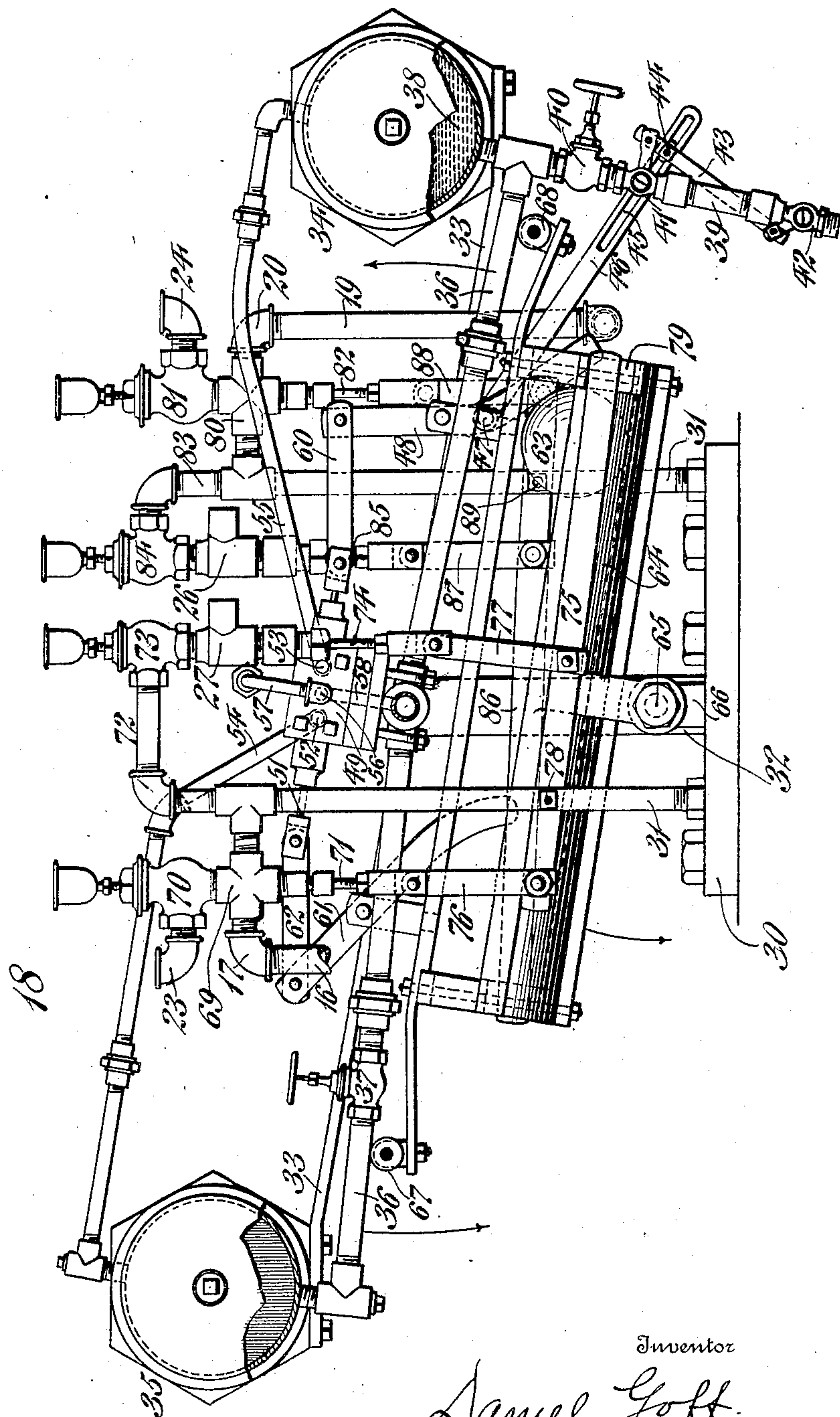
PATENTED AUG. 25, 1908.

D. GOFF.  
BOILER FEED.

APPLICATION FILED JULY 8, 1907.

4 SHEETS—SHEET 1.

*Fig. 1.*



Witnesses

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4 SHEETS—SHEET 2.

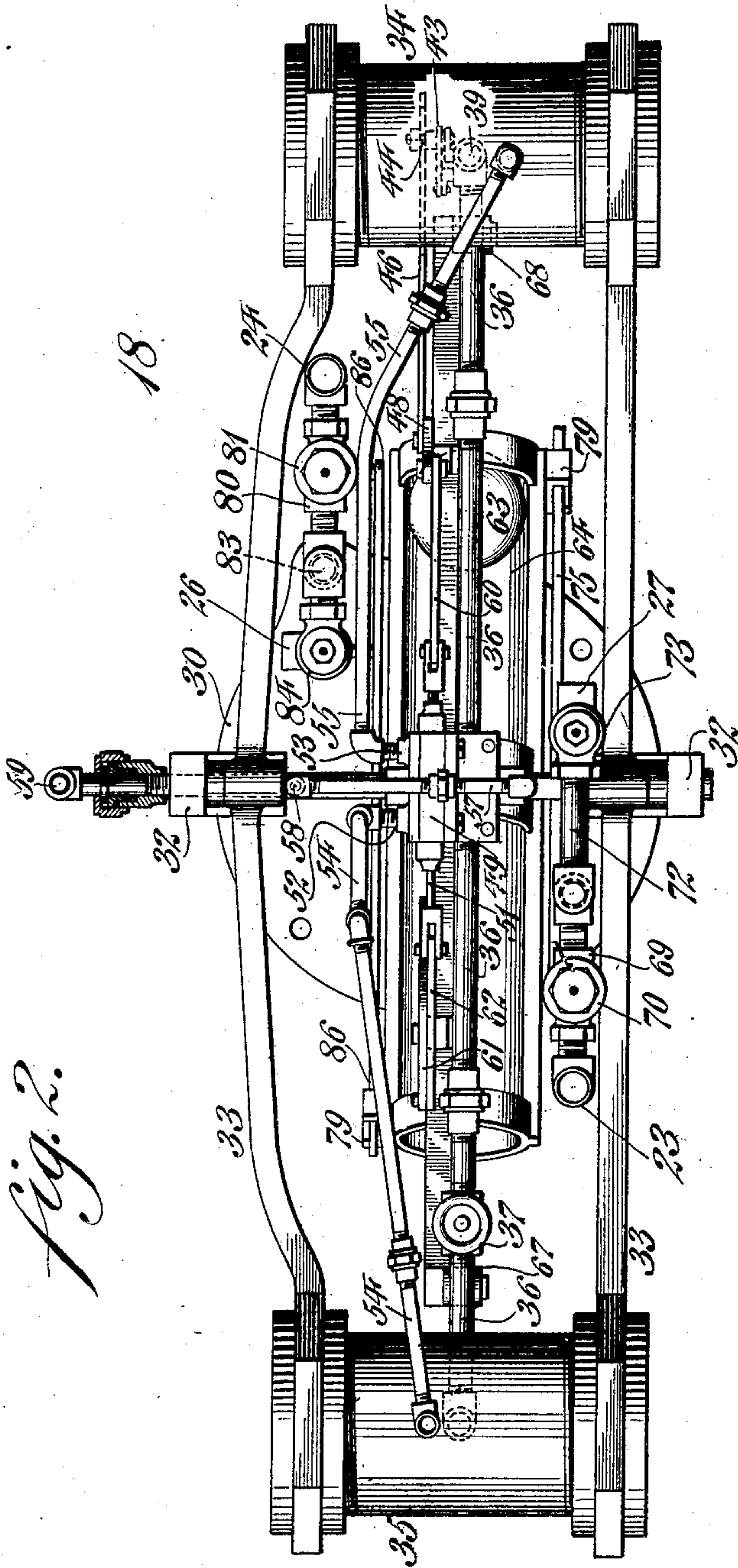


fig. 2.

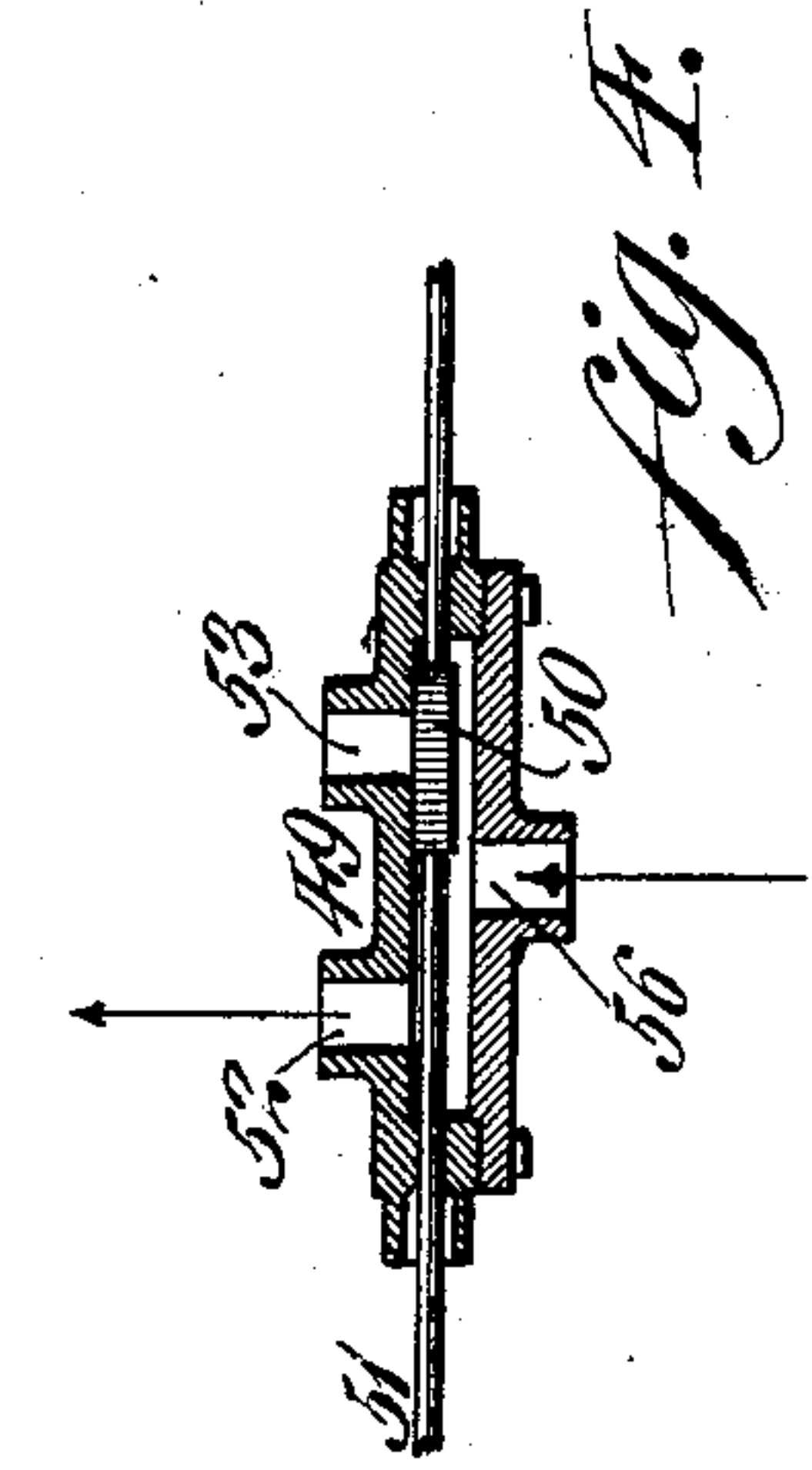


fig. 4.

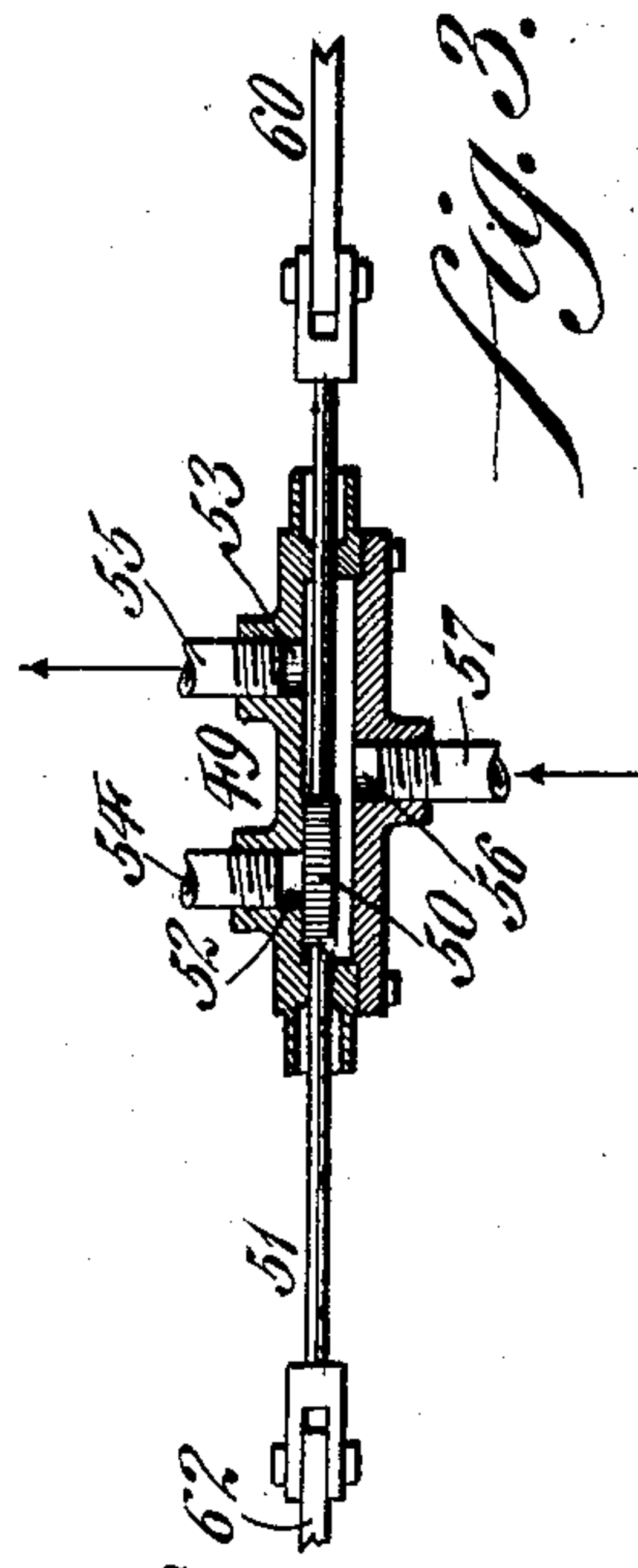


fig. 3.

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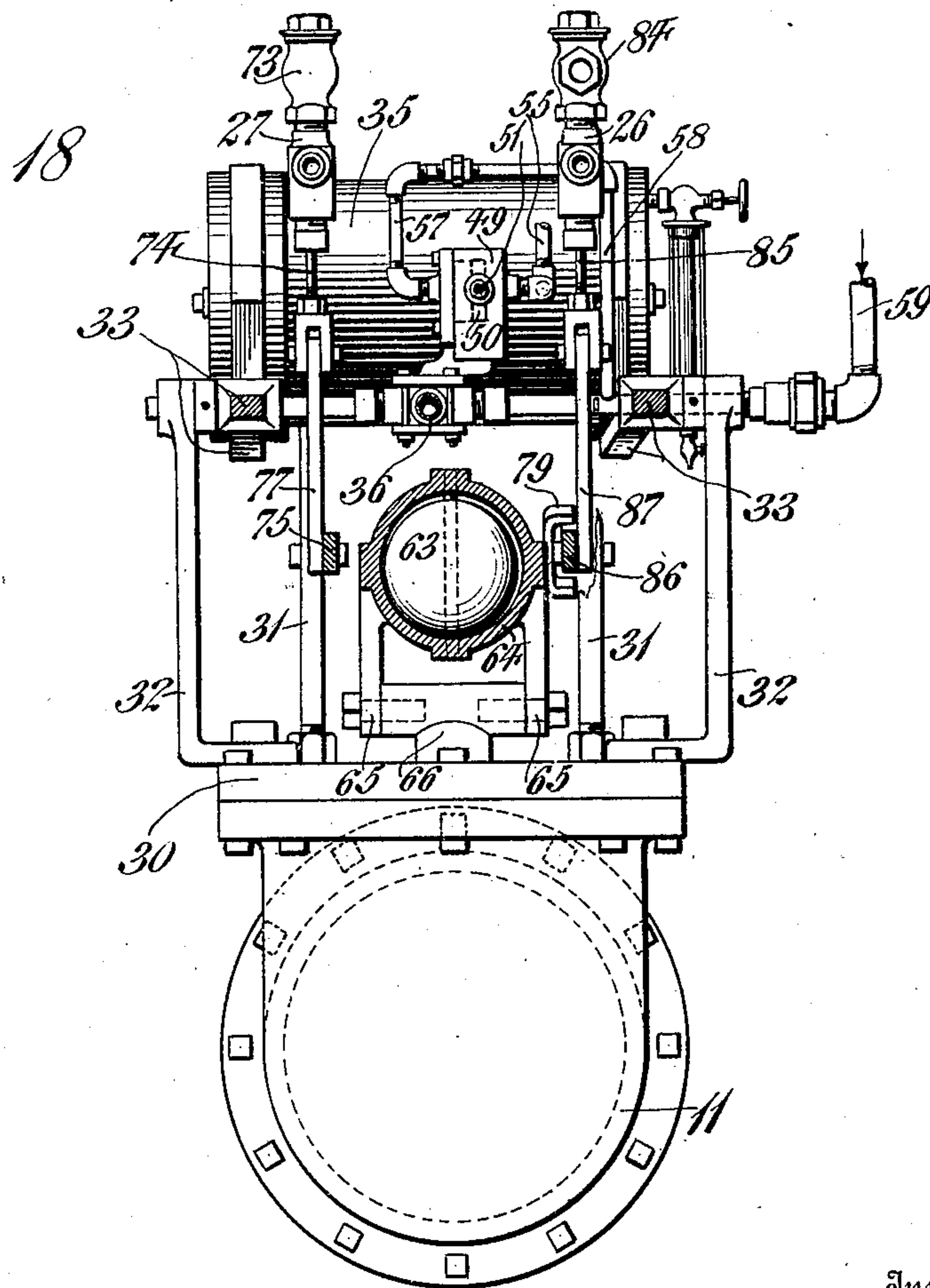
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4 SHEETS—SHEET 3.

*fig. 5.*



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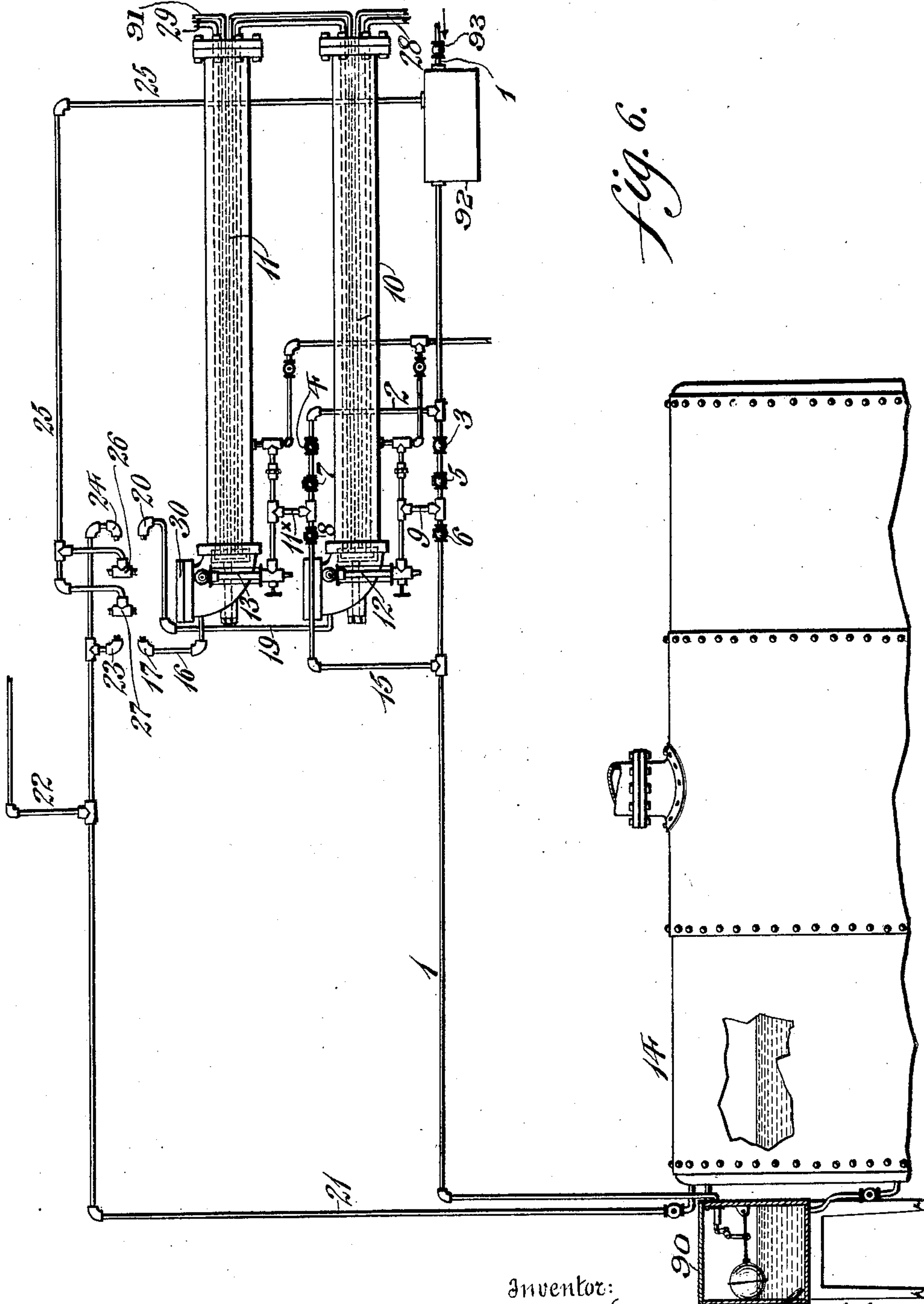
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4 SHEETS—SHEET 4.



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# UNITED STATES PATENT OFFICE.

DANIEL GOFF, OF MILLVILLE, NEW JERSEY.

## BOILER-FEED.

No. 896,820.

Specification of Letters Patent.

Patented Aug. 25, 1908.

Application filed July 8, 1907. Serial No. 382,737.

*To all whom it may concern:*

Be it known that I, DANIEL GOFF, a citizen of the United States, residing in the city of 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 relates to a new and useful boiler feeder and water heater and consists of means for utilizing the pressure from the boiler for forcing the water thereinto.

It further consists of means for heating the water before it 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 side elevation of the controller employed, showing parts of the device broken away. Fig. 2 represents a plan view thereof. Figs. 3 and 4 represent sections of a slide valve employed showing the parts in different position. Fig. 5 represents an end view thereof partly in section. Fig. 6 represents a diagrammatic view, showing a boiler and the connections, omitting the controller, as shown in Fig. 1.

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 by which I am enabled to utilize the pressure from the boiler to assist in supplying it with water.

It will be evident that various changes may be made in the construction and other instrumentalities may be employed 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 that I have herein shown and described, but desire to make such changes as may come within the scope of my invention.

Referring to Fig. 6, I will first describe the connections from the boiler.

1 designates a pipe leading from a suitable source of water supply (not shown), which has a branch 2 leading therefrom, and at suitable points in the pipes 1 and 2 I place globe valves 3 and 4, respectively, and I further provide the check valves 5 and 6 in the pipe 1 and the check valves 7 and 8 in the pipe 2.

9 designates a pipe leading from the pipe 1 at a point between the two check valves 5 and 6, which pipe 9 communicates with the interior of a receiver 10, which is suitably supported. Leading from the pipe 2 from a point between the check valves 7 and 8, therein, is a pipe 11<sup>x</sup> which communicates with the interior of a second receiver 11, suitable water gages 12 and 13 being placed in communication with the pipes 9 and 11<sup>x</sup>. The pipe 1 communicates with the interior of the boiler 14 below the water line thereof and the pipe 11<sup>x</sup> communicates with a pipe 15 which is also connected with the pipe 1 at a suitable point between the check valve 6 and the boiler 14. Communicating or discharging into the reservoir 11 above the water line thereof is a steam pipe 16 which is connected with the inlet connection 17 which is in suitable connection with the controller 18, not shown in Fig. 6. Communicating with the interior of the reservoir 10 is a pipe 19 which is in suitable connection with the inlet connection 20, which is also suitably connected with the controller 18. Leading from the boiler 14 above the water line is a pipe 21 which conducts the live steam or boiler pressure and which has a pipe 22 leading therefrom and discharging into a steam chest, as will be hereinafter described. Also connected with the live steam pipe 21 is a connection 23 which is in suitable communication with the controller 18 while a second connection 24 is also in suitable communication with the controller 18.

25 designates an exhaust pipe, which communicates with the pipe 1 at a suitable point, which exhaust pipe 25 is in communication with the exhaust connection 26 and exhaust connection 27, which are suitably connected with the controller 18, as will be hereinafter described.

28 designates a pipe which leads from the exhaust of the cylinder of the engine, which pipe enters the reservoir 10 and the reservoir 11 and has an exhaust 29 leading to any suitable point, it being understood that the steam passing through the pipe 28 will heat the water in the reservoirs 10 and 11 when the same is discharged thereinto. The controller 18 is suitably mounted upon one of the reservoirs, in the present instance the reservoir 11, and is provided with a base from which rise the standards or supports and the standards 32. Suitably mounted to rock upon the standards 32 are the bars 33



and upon which bars are mounted the cylinders 34 and 35, while forming a communication between the interior of said cylinders is the pipe 36 which rocks with said cylinders, said pipe being provided with a suitable regulating valve 37 in order to control the passage of water therethrough, it being understood that one of the cylinders, as for example the cylinder 34, is provided with a requisite amount of water 38, which water passes through the pipe 36 to the other cylinder 35 and back again during the operation of the controller, as will be hereinafter explained.

39 designates a pipe which leads from the pipe 36, said pipe 39 being provided with a hand operated valve 40 and with the two valves 41 and 42, which are suitably arranged in order that when one is opened the other is closed, the operating mechanism for these valves in the present instance being a link 43 which is suitably connected with said valves and which is provided with a pin 44, said pin being situated in a slot 45 in a bar 46, which is pivotally connected at 47 to a lever 48, it being understood that the said lever 48, the operation of which will be hereinafter described, imparts movement to the bar 46 and at the proper time the walls of the slot 45 therein contact with the pin 44 in order to impart suitable movement to the link 43 in order to open the valve 42 and close the valve 41, or vice versa.

Mounted on the pipe 36 in order to rock therewith, is a steam chest 49, said steam chest having a steam chest valve 50 therein which is connected with or carried by the piston 51, and said valve controlling the port 52 and port 53 leading from the interior of the steam chest, said ports having suitably connected therewith the pipes 54 and 55 respectively, the former 54 leading to and discharging into the upper portion of the cylinder 35 and the other pipe 55 leading to and discharging into the upper portion of the cylinder 34, said steam chest having the inlet port 56 from which leads a pipe 57, which communicates with a pipe 58 communicating with the pipe 59, which leads to and communicates with the supply pipe 22, which is in communication with the interior of the boiler 14 through the live steam pipe 21, previously described. The lever 48 is in suitable connection with one end of the steam chest piston 51, in the present instance by means of the link 60, while a second lever 61 is in suitable connection with the opposite end of the steam chest piston 51 by means of the link 62, it being understood that by proper operation of the levers 48 and 61 the valve 50 is caused to move in order to close the ports 52 and 53 respectively, as will be seen from Figs. 3 and 4. In order to operate these levers 48 and 61 I provide a ball valve 63 which is suitably mounted in the race or

track 64, the latter being pivoted at 65 to the upright 66 carried by the base 30, it being understood that the levers 48 and 61 are situated in the path of movement of the said ball 63 and the track or race 64 is caused to rock by the movement of the cylinders 34 and 35, said track being provided with the rollers 67 and 68 upon which rests the pipe 36 in order to rock said track.

The connection 23 communicates with the inlet 17 of the pipe 16 through the coupling 69, said coupling being controlled by a valve 70 which is connected with a piston 71, while the exhaust connection 27 is in communication with the coupling 69 through the pipe 72 and situated between said pipe 72 and said exhaust 27 is a valve 73 which is connected with the piston 74, said pistons 71 and 74 being connected with a lever 75 by means of the links 76 and 77 respectively, said lever 75 being fulcrumed or pivoted at 78 between the points of connections of two links 76 and 77, the end of said lever being situated within a yoke 79 carried by the race or track 64, whereby it will be understood that as the race rocks it will elevate and depress the end of the lever, so that when one piston as 71 is elevated, the other piston 74 is lowered, which will have the effect upon the valves 70 and 73 that when one is opened the other is closed. The connection 24 communicates with the inlet 20 of the pipe 19 through the coupling 80, said coupling being controlled by a valve 81 which is connected with the piston 82, while the exhaust 26 communicates with the coupling 80 through the pipe 83 and situated between said coupling 80 and the exhaust 26 is a valve 84 which is suitably connected with a piston 85, said pistons 82 and 85 being suitably connected with a lever 86 similar to the lever 75 through the medium of the links 87 and 88, said lever being pivoted or fulcrumed at 89 and being controlled by the operation of the race or track 64, as already described with respect to the lever 75, so that when one piston 85 is elevated the other piston 82 is lowered, thus controlling the valves 81 and 84 in such a manner that when one is closed the other is opened.

The operation is as follows:—A suitable amount of water 38 is placed in one of the cylinders, as for example 34 and the controller will be assumed to be in the position seen in Fig. 1. The water is now passed from the supply through the pipe 1, the globe valve 4 being first opened while the globe valve 3 remains closed. The water now passes from the supply pipe 1 through the pipe 2 and past the check valve 7, and will be directed through the pipe 11<sup>x</sup> into the reservoir 11, which is shown in Fig. 6 as being filled with water, it being understood that steam is being generated in the boiler 14 and the pressure from the boiler prevents the water passing the check valve 8. The water



in the reservoir 11 is heated by reason of the pipe 28 extending thereinto and through which steam from the exhaust cylinder is passing. The steam which is generated from the boiler passes therefrom through the pipe 21 and through the pipe 22 to the steam chest 49, the valve 50 thereof being in the position seen in Fig. 1. The steam from the pipe 21 will also pass through the connection 23 and as the valve 70 is opened and the valve 73 is closed the steam will pass through the coupling 69 through the inlet 17 and through the pipe 16, from whence it will be discharged into the reservoir 11 upon the upper surface of the water therein. This additional pressure will cause the water to be forced from the said reservoir 11 back through the pipe 11<sup>x</sup> and will overcome the pressure of the boiler against the check valve 8, so that the water will pass therethrough and through the pipe 15 and the pipe 1 into the boiler 14. In the meantime the globe valve 3 having been opened the water from the supply will pass from the pipe 1 through the pipe 9 and will be filling the reservoir 10, the water being prevented from passing the check valve 6 which will be held closed by the pressure from the boiler, it being understood that as the reservoir 11 is emptied of water it will be filled with steam. Steam from the boiler 14 which passes through the pipe 22, as previously stated, will be directed into the steam chest 49 and as the port 53 is open, as will be understood from Fig. 3, the steam will pass therefrom through the pipe 55 and will be directed into the cylinder 34 upon the upper surface of the water and the pressure therein will force the water from the cylinder 34 through the pipe 36 into the cylinder 35, which will immediately be lowered, carrying with it the bar 33 and rocking the parts upon their respective pivots, including the race or track 64. The ball 63 will, in its course, strike the lever 61 and will release the lever 48. This will throw over the steam chest piston 51 carrying with it the valve 50, closing the port 53 and opening the port 52, as seen in Fig. 4. At the same time the bars 75 and 86 will also be rocked upon their pivotal points 78 and 89 respectively, which will cause the piston 71 to be lowered, closing the valve 70 and elevating the piston 74, opening the valve 27, while the bar 86 will lower the piston 85 closing the exhaust 26 and will raise the piston 82, opening the valve 81.

When the valve 73 is open the pipe 16 leading from the reservoir 11 will be in direct communication with the exhaust 27 and the steam from the reservoir 11 will pass through the pipe 16, the coupling 69, the pipe 72 and will pass from the exhaust 27 to the exhaust pipe 25, where it is directed back into the pipe 1, where it will be suitably condensed, as will be evident. At the same time the water from the supply 1 will again pass

through the pipe 2, through the pipe 11<sup>x</sup> and into the reservoir 11, which action will be assisted by reason of the partial vacuum in said reservoir caused by the exit of the steam. At the same time by reason of the change of the position of the controller the steam from the boiler 14 passing through the pipe 21 and pipe 22 will be directed into the steam chest 49, as before, but will pass from the port 52 into the pipe 54, and will be directed upon the top of the water in the cylinder 35, which has been lowered, forcing the water therefrom through the pipe 46 back in the cylinder 34. Just previous to this, however, steam passing through the pipe 21 from the boiler 14 passes through the connection 24 and as the valve 81 has been opened the steam will pass through the coupling 80 and through the pipe 19 into the reservoir 10 upon the upper surface of the water, which latter is forced through the pipe 9 overcoming the pressure of the steam against the check valve 6 and the water from the reservoir 10 will be directed into the boiler 14. As soon as the water has again passed into the cylinder 34 the parts are returned to the position seen in Fig. 1, the valve 81 is closed and the valve 84 is opened so that the steam from the reservoir 10 will pass through the pipe 19 through the inlet 20, coupling 80, pipe 83 to the exhaust 26, from whence it passes through the exhaust pipe 25 back to the pipe. It will thus be seen that by the arrangement of the parts the water from the supply is directed first into one reservoir and then into the other, while the steam from the boiler is discharged upon the upper surface of the water in whichever reservoir it is situated, in order to force the same therefrom into the boiler. At the same time the steam which has been previously directed into the other reservoir is exhausted therefrom and returns to the supply pipe or supply where it is suitably condensed. It will thus be seen that the water is suitably heated and automatically fed to the boiler. In order to provide for the excess of water which might accumulate in the cylinders 34 and 35, by reason of the constant supply of steam which is thrown thereinto, I provide the pipe 39 which is in communication with, in the present instance, the cylinder 34. By opening the valve 40 a predetermined amount of water can be removed or directed to escape from the cylinder, the operation occurring in the following manner, the valve 41 in the position seen in Fig. 1 being closed and the valve 42 being open. When the ball 63 moves to the opposite end of the rack and the lever 48 is thrown over into its opposite position, it carries with it the bar 46 which actuates the link 43 and moves the same in order that the valve 41 is opened and the valve 42 is closed. This permits the water to pass the valve 41 and



be located in the pipe 39. Upon the return movement of the ball 63 it operates the lever 48 in the opposite direction, that is to the position seen in Fig. 1, which moves the lever 46 and link 43 so that it closes the valve 41 and opens the valve 42, so that the water which was in the pipe 39 escapes therefrom, it being understood as previously stated, that the amount of water which is permitted to escape can be predetermined according to requirements.

The controller 18 is constantly caused to oscillate carrying the parts with it and causing the intermittent action of the water and steam, as described.

It will be understood that the operation of the device is automatically controlled by the regulator 90 which is similar in construction and operation to that shown and described in a patent granted to me on the 6th day of June, 1905, No. 791,981, so that the further description of the same is deemed unnecessary at this time.

In order to insure equalization of the heating of the water in the receivers 10 and 11, I employ a second pipe 91 leading from the exhaust, but carries the same first into the receiver 11 and then into the other, so that the contents of both are equally treated. I also place a tank 92 into which the pipe leads and with which the discharge pipe 25 communicates. By this means I provide a body of water which will condense the steam more readily and with the check valve 93 prevents the pressure forcing the heated water back until the pressure is reduced in the tank 92 and is overcome by the water pressure, which forces it into the receivers 10 and 11.

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 plurality of reservoirs, means for conducting water alternately into one or the other of said reservoirs, means for conducting steam from the boiler alternately into one or the other of said reservoirs for forcing the water therefrom into the boiler, a plurality of cylinders adapted to contain water, a pipe forming a communication between said cylinders, and means for discharging steam from the boiler alternately into one or the other cylinder for forcing the water from one cylinder to the other.

2. In a device of the character described, a boiler, a plurality of reservoirs, means for conducting water alternately into one or the other of said reservoirs, means for heating water in said reservoirs, means for conducting steam alternately into one or the other of said reservoirs from the boiler for forcing the water alternately from said reservoirs into said boiler, a plurality of cylinders adapted to contain water, a pipe forming a communica-

tion between said cylinders, and means for discharging steam from the boiler alternately into one or the other cylinder for forcing the water from one cylinder to the other.

3. In a device of the character described, a plurality of reservoirs, means for conducting water into one or the other of said reservoirs, means for conducting steam from the boiler into one or the other of said reservoirs, means for controlling the discharge of the steam into said reservoirs, a plurality of cylinders adapted to contain water, a pipe forming a communication between said cylinders, and means for discharging steam from the boiler alternately into one or the other cylinder for forcing the water from one cylinder to the other.

4. In a device of the character described, a plurality of reservoirs, means for conducting water into one or the other of said reservoirs, means for conducting steam from the boiler into one or the other of said reservoirs, means for automatically controlling the discharge of the steam into said reservoirs, a plurality of cylinders adapted to contain water, a pipe forming a communication between said cylinders, and means for discharging steam from the boiler alternately into one or the other cylinder for forcing the water from one cylinder to the other.

5. In a device of the character described, a boiler, a plurality of reservoirs, means for conducting water into one or the other of said reservoirs, means for conducting steam from the boiler into one or the other of said reservoirs, means for exhausting the steam from said reservoirs, a plurality of cylinders adapted to contain water, a pipe forming a communication between said cylinders, and means for discharging steam from the boiler alternately into one or the other cylinder for forcing the water from one cylinder to the other.

6. In a device of the character described, a boiler, a plurality of reservoirs, means for conducting water into one or the other of said reservoirs, means for conducting steam from the boiler into one or the other of said reservoirs, means for exhausting steam from said reservoirs, means for controlling the supply to and the exhaust from said reservoirs, a plurality of cylinders adapted to contain water, a pipe forming a communication between said cylinders, and means for discharging steam from the boiler alternately into one or the other cylinder for forcing the water from one cylinder to the other.

7. In a device of the character described, a plurality of cylinders pivotally supported and adapted to contain water, a pipe forming a communication between said cylinders, a steam chest, and means in said steam chest for controlling the outlets of the discharges thereof for discharging steam from the boiler alternately into one or the other cylinder for



forcing the water from one cylinder to the other.

8. In a device of the character described, a boiler, a plurality of reservoirs, means for  
5 conducting water alternately into one or the other of said reservoirs, means for conducting steam from the boiler alternately into one or the other of said reservoirs for forcing water therefrom into the boiler, a plurality of cyl-  
10 inders pivotally supported with respect to each other, said cylinders being adapted to contain water, a communication between said cylinders, means for conducting steam from the boiler and discharging the same into one  
15 or the other of said cylinders, and means for controlling the discharge of said steam.

9. In a device of the character described, a boiler, a plurality of reservoirs, means for  
20 conducting water alternately into one or the other of said reservoirs, means for conducting steam from the boiler alternately into one or the other of said reservoirs for forcing water therefrom into the boiler, a plurality of cyl-  
25 inders pivotally supported with respect to each other, a communication between said cylinders, means for discharging steam from the boiler into one or the other of said cylinders, means for controlling said discharge  
30 and means automatically operated for actuating said controlling means to cause the steam to discharge into one or the other of said cylinders.

10. In a device of the character described, a plurality of cylinders pivotally supported  
35 with respect to each other, said cylinders being adapted to contain water, a pipe forming communication between said cylinders, a steam chest adapted to receive steam from the boiler and having two ports, a pipe lead-  
40 ing from one port into one cylinder, and a pipe leading from the other port into the other cylinder, a valve controlling said ports, and means for operating said valve whereby one or the other of said ports is closed.

45 11. In a device of the character described, a plurality of cylinders pivotally supported with respect to each other and adapted to contain water, a pipe forming a communica-  
50 tion between said cylinders, a steam chest adapted to receive steam from the boiler and having two ports therein, a pipe leading from one port to the interior of one cylinder, and a pipe leading from the other port to the other  
55 cylinder, a valve controlling said ports and a ball valve suitably supported and adapted to actuate said steam chest valve to alternately open and close said ports.

12. In a device of the character described, a plurality of cylinders pivotally supported  
60 with respect to each other and adapted to contain water, a pipe forming a communication between said cylinders, means for regulating the passage of the water through said pipe, means for conducting steam from the  
65 boiler and discharging the same into one or

the other of said cylinders and a valve for controlling the discharge of said steam.

13. In a device of the character described, a plurality of cylinders pivotally supported  
70 with respect to each other and adapted to contain water, a pipe forming a communication between said cylinders, a steam chest having two ports therein, a pipe leading from one port and discharging into one cylinder, a  
75 pipe leading from the other port and discharging into the other cylinder, a valve controlling said ports, a lever in suitable connection with opposite sides of said valve, a track pivotally supported and a ball valve movable  
80 in said track and adapted to contact alternately with said levers in order to move said steam chest valve to close first one port and then the other.

14. In a device of the character described, a plurality of cylinders pivotally supported  
85 with respect to each other and adapted to contain water, a pipe forming a communication between said cylinders, means for conducting steam into said cylinders, means for controlling said steam supply whereby the  
90 same is discharged alternately into one or the other of said cylinders, and means automatically controlled for removing a suitable quantity of the water from said cylinders.

15. In a device of the character described,  
95 a boiler, a plurality of reservoirs, means for conducting water into one or the other of said reservoirs, means for conducting steam into one or the other of said reservoirs, a plurality of cylinders suitably mounted with re-  
100 spect to each other, means for discharging steam into one or the other of said cylinders, a valve controlling the supply to said cylinders, suitable means for actuating said valve, and valves, controlling the supply of steam  
105 to said reservoirs, actuated by the movement of said cylinders.

16. In a device of the character described, a boiler, a plurality of reservoirs, means for  
110 conducting water into one or the other of said reservoirs, means for conducting steam from the boiler into one or the other of said reservoirs, means for exhausting the steam from said reservoirs, valves for controlling  
115 the admission of the steam to and of the exhaust from said reservoirs, a plurality of cylinders adapted to contain water, means for discharging steam from the boiler into said cylinders, a valve controlling said discharge  
120 and means in suitable connection with said valve for controlling and operating the same, whereby the steam is discharged into one or the other of said reservoirs and into one or the other of said cylinders.

17. In a device of the character described,  
125 a boiler, a plurality of reservoirs, means for conducting water into one or the other of said reservoirs, means for conducting steam from the boiler into one or the other of said reservoirs, means for exhausting the steam  
130



from said reservoirs, valves for controlling the admission of the steam and of the exhaust from said reservoirs, a plurality of cylinders adapted to contain water, means for  
5 supplying steam from the boiler into said cylinders, a valve controlling said cylinder supply, means in suitable connection with said valves for controlling and operating the same whereby the steam is discharged into one or

the other of said reservoirs, and into one or 10 the other of said cylinders, and means automatically controlled for removing a suitable quantity of the water from said cylinders.

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Witnesses:

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