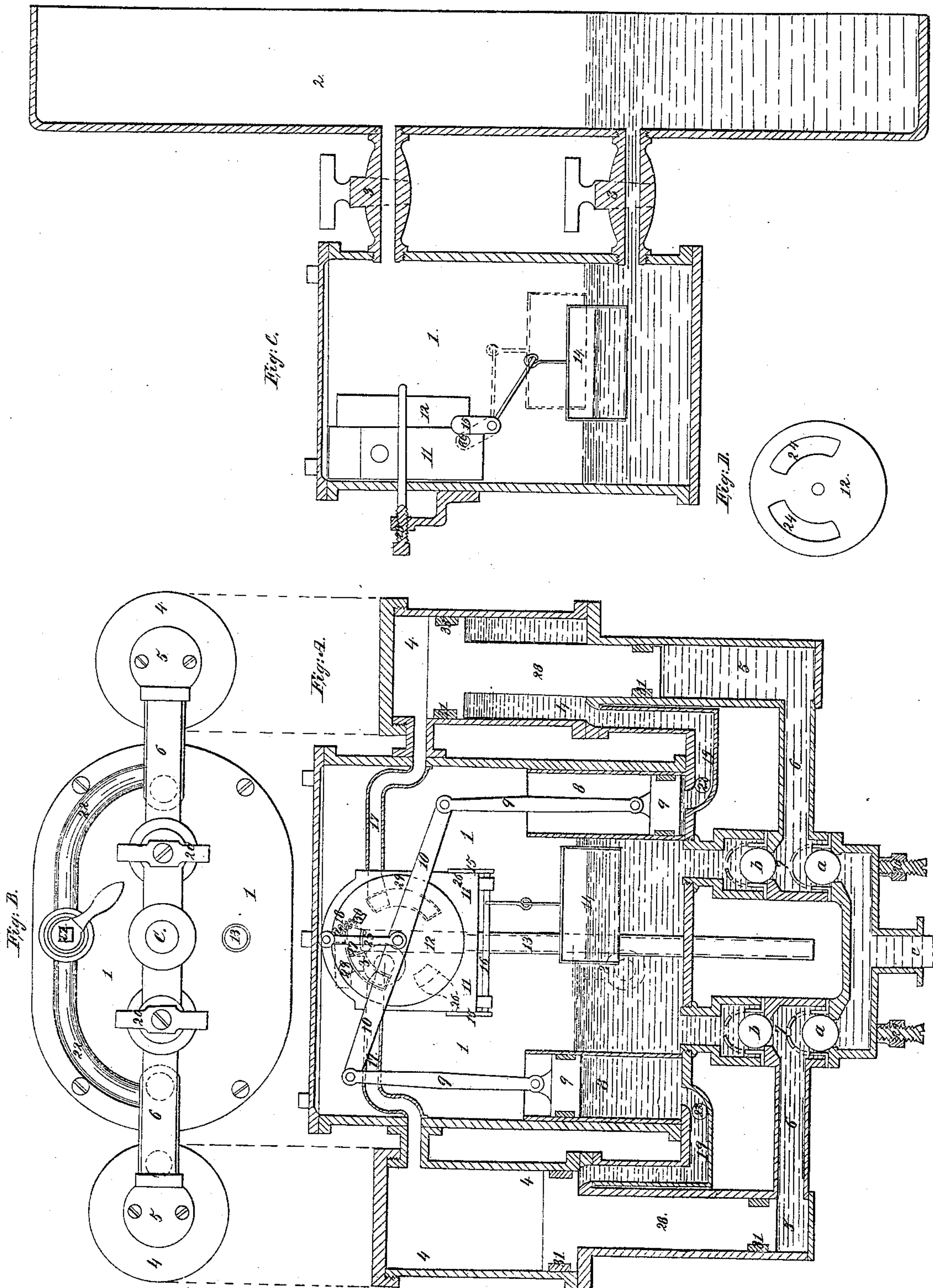


T. Firth,
Steam-Boiler Water-Feeder,

No. 14,191.

Patented Feb. 5, 1856.



UNITED STATES PATENT OFFICE.

THOMAS FIRTH, OF CINCINNATI, OHIO.

FEED-WATER APPARATUS TO STEAM-BOILERS.

Specification of Letters Patent No. 14,191, dated February 5, 1856.

To all whom it may concern:

Be it known that I, THOMAS FIRTH, of the city of Cincinnati, in the county of Hamilton and State of Ohio, have invented a new and useful Improvement in an Apparatus for Supplying and Regulating the Proper Quantity of Water to Steam-Boilers; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, forming part of this specification, and to the letters and figures of reference marked thereon.

The object of my improvement is to supply and regulate the proper quantity of water to steam boilers by an apparatus intended for the purpose, so as to render it self-acting, in order to supply the boiler with water at all times when required, and cut off the supply when necessary, by the self regulating power given (through the agency of steam) to the supplying apparatus.

To enable others skilled in the art to make and use my improvements, I will proceed to describe its construction and operation by referring to the accompanying drawings.

Similar letters and figures refer to corresponding parts.

Figure A, represents a longitudinal sectional elevation of the case, containing the valve and its appendages for admitting the steam to the cylinder, and also a longitudinal sectional view of the steam cylinder pumps and pump chambers. Fig. B, represents a view of the under side of the case. Fig. C, is a transverse sectional view of the case, showing part only of the apparatus, attached to the end of a boiler, with its water and steam connections. Fig. D, represents a face view of the steam valve.

1, 1, represents the case, made of cast or sheet-iron, sufficiently strong, and contains the valve that admits steam to and from the cylinders into which the water is forced by the pump before it enters the boiler.

2, represents the end of an ordinary cylindrical boiler, and the case 1, in connection with it by means of cocks 3, 3, as represented in Fig. C, the lower cock admitting water to the boiler, and the upper one admitting steam to the case.

4, 4, are two steam cylinders, one placed in each side of the case, and each provided with a piston and plunger 28, as shown in Fig. A, and also having pump chambers 5 at their

lower ends which chambers are connected to the valve chambers 7, 7, by means of the pipes 6, 6.

a, a, are the receiving valves, and *b, b,* the discharging valves of the pump.

c, is the pipe which conveys water from the reservoir or supplying source to the apparatus.

8, 8, are small cylinders placed inside of the case, and are furnished with plungers 9, 9, which work the lever 10, water having been admitted into said cylinders, out of the case, by way of the cock 21 and pipes 22, on each side of the said cock. The pipes 22, are connected with pipes 19, as is represented in Fig. A, and when the cylinders 8, 8, and pipes connected therewith are filled with water from the case, the cock 21 is shut off, and the water in the cylinders 8, 8, is used as a medium to transmit the power from one of the steam cylinders 4, to elevate the piston in the opposite steam cylinder and operate the steam valve 12 at the same time that the pressure of water and steam from the case and boiler is entirely shut off from the under part of the plunger 9, 9, in the cylinder 8, 8; and it acts with no effectual pressure only as acted upon by the pistons in the steam cylinder through the water contained in the cylinder 8, 8; and only serves as a medium to transmit motion to the lever 10 that operates the steam valve 12, and elevates the piston in the steam cylinder by forcing the water out of one of the cylinders 8, through the pipe 19 against the under part of the steam portion of the piston 28, the pressure of steam on the top of the piston 9, in the small cylinder 8, giving no effectual resistance either way, being equal on each. But as soon as the cock 21 is opened, and water, with the pressure of steam upon it, allowed to enter the cylinders 8, 8, and pipes connected therewith, the resistance against the lower part of the piston 28, (both pump and steam piston) is equal to the pressure of steam on the upper part of the piston, and will not then give any effectual force, but cause the engine and pump to cease operating, and this method is employed in practice to stop its working.

The lever 10 works freely on its axis and strikes the pins 29, 29, (placed in the circular valve 12,) which moves the valve either way as the case may be until the pin 30, screwed in the valve, passes the vertical center of the valve, when the spring 18, at-

tached to the pin, forces the valve into its right position so that steam can be admitted to and from the steam cylinders through the pipes 17, 17, by the openings 24, 24, 5 made in the valve, and escape out of the opening 27 in the valve face, into the escape pipe 13.

11, 11, represents the valve face, and 26, 26, are openings through the sides of the 10 valve, and extend up to its face, through which steam enters for giving motion to the engine and pump plungers. The said openings are provided with valves 15, 15, which are attached to the shaft 16, and operated and regulated by the float 14. When 15 there is sufficient water in the boiler the float 14 is raised, which turns the shaft 10, and thereby moves the valves 15 over the openings 26, and thus by closing off the en- 20 trance of the steam, stops the operation of the pump. But when the water falls in the boiler, the float falls correspondingly, and draws the valves 15 from over the openings 26, and again sets the pumps in motion.

25 25 is a bar projecting down from the upper end of the valve face, and the axis of the valve works in the lower end of the bar, as shown in Fig. A.

20, 20, represent yokes for holding the 30 valve chambers together.

23, is an adjusting screw for adjusting the valve, and is attached to the outside of the case, as seen in Fig. C.

The operation of the improvement is as 35 follows: The case is properly made and provided with its engine and pumping apparatus. It is then attached to any desired part of the boiler, (the end of the boiler being preferable) and furnished with stop- 40 cocks as represented in Fig. C, of the accompanying drawings, so that water and steam may pass to and from the boiler through the said cocks. Water is then admitted to the small cylinders 8, 8, from the 45 case, through the pipes 22, 22, by means of the stop-cocks 21, and when the cylinder and pipe attached thereto are filled, the cock

21 is shut off and the water in the cylinder 8, 8, below the plunger 9, 9, serves as a medium to transmit motion to the steam 50 valve 12, through the lever 10, pins 29, and spring 18, and force up, or elevate the piston 28 in the opposite steam cylinder, into which the steam is admitted as before described. Thus, the ascent of the pistons 28, 55 draws water into the pump chambers through the receiving valves *a*, and in their descent force water into the case (and from thence into the boiler) through the discharge valves *b*, and in this manner keeps 60 up the required supply of water at all times. Both sides of the case being provided with a steam cylinder and pump, and also means for giving motion to the steam or slide valve 12, steam is alternately admitted into and 65 out of the cylinders, which draw the water into the pumps and force it into the case by means of the piston and plunger 28, 28.

The pistons 9, 9, (working in the valve cylinders 8, 8,) and the beam 10, 10, serve 70 to give the proper motion to the valve 12, for admitting steam to and from the cylinders 4, 4, as before specified. The pistons and plungers 28, 28, are packed at their upper and lower ends, as represented at 31, 75 to prevent the steam from getting below the piston, and the water in the plunger chamber 5, from being forced above the end of the plunger. The plungers 9, in the valve cylinders 8, are also provided with packing 80 as shown in the drawing.

What I claim as my improvement and desire to secure by Letters Patent, is—

The arrangement of the pistons 9, 9, beam 10, pins 29, 29, (attached to the valve 85 12,) and spring 18, or their equivalents, for giving motion to the steam valve 12, for admitting steam to and from the steam cylinders 4, 4, and pipes attached thereto.

THOMAS FIRTH.

Witnesses:

MARTIN BENSON,
L. W. SMITH.