

No. 655,064.

Patented July 31, 1900.

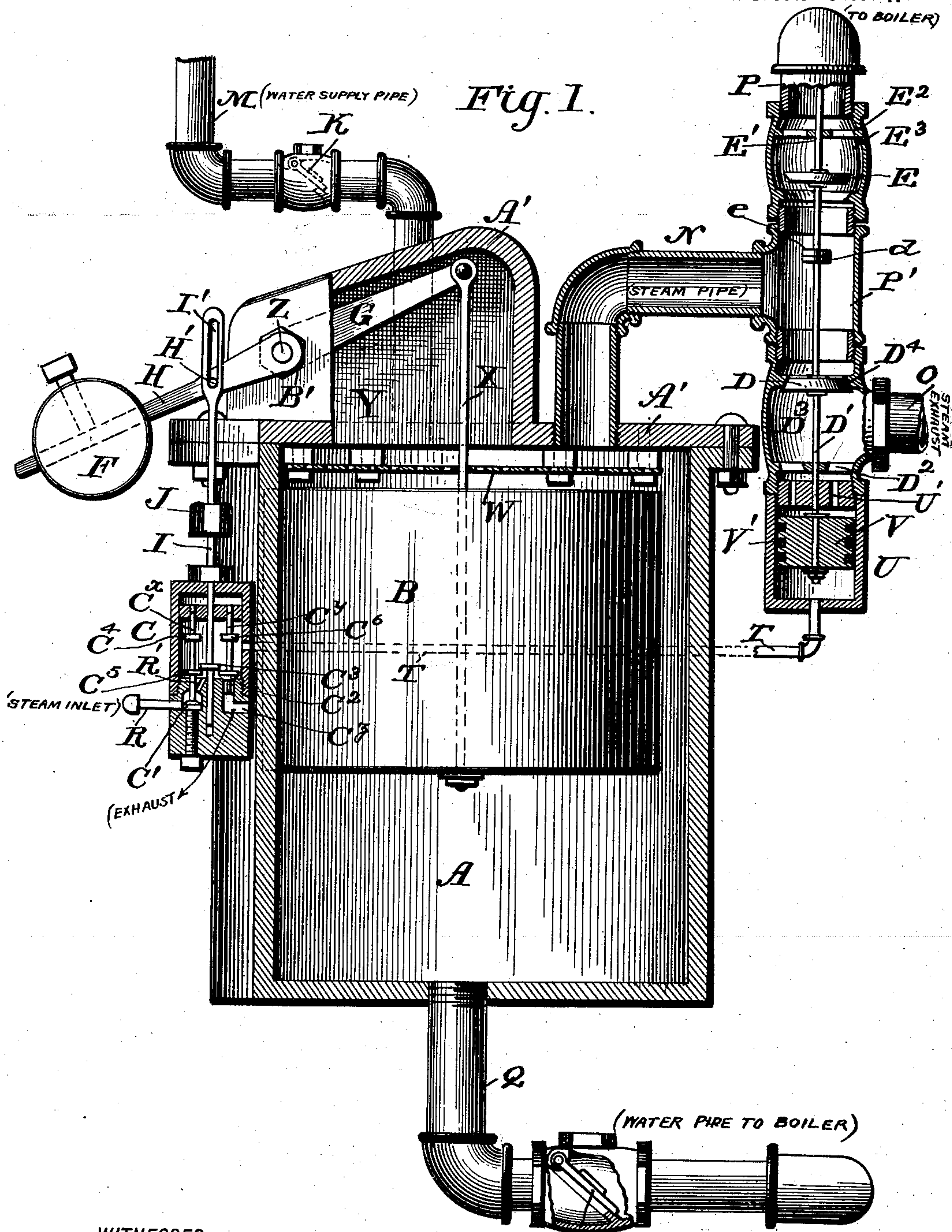
H. J. DAVIS, P. G. AULT, W. W. BAILEY & J. H. WIDEMAN.

BOILER FEEDER.

(Application filed Mar. 16, 1900.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES:

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By *Munn & Co.*  
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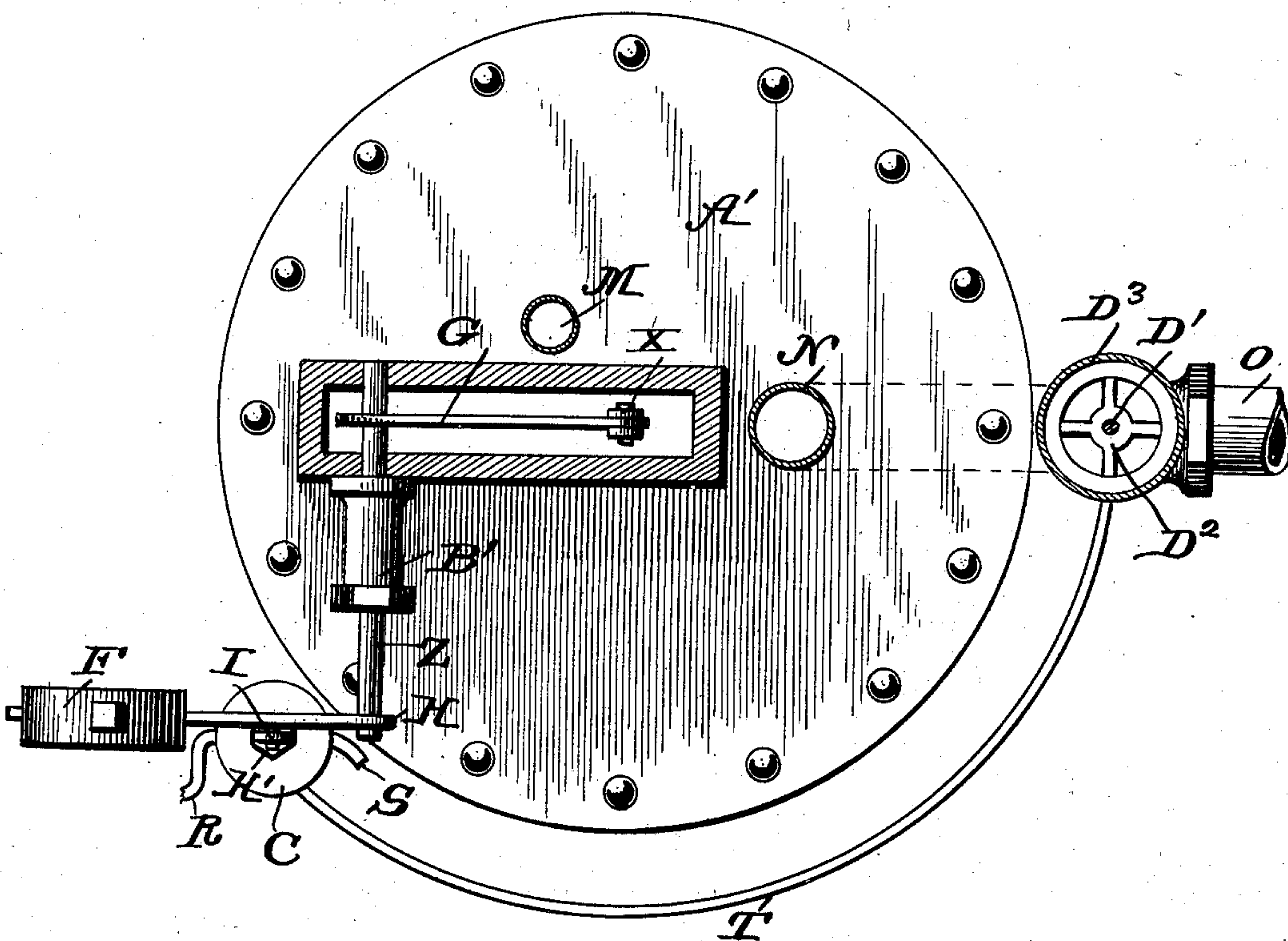
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Fig. 2.



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# UNITED STATES PATENT OFFICE

HENRY J. DAVIS, PLAYFAIR G. AULT, WILBER W. BAILEY, AND JAMES H. WIDEMAN, OF BIRMINGHAM, ALABAMA.

## BOILER-FEEDER.

SPECIFICATION forming part of Letters Patent No. 655,064, dated July 31, 1900.

Application filed March 16, 1900. Serial No. 8,976. (No model.)

*To all whom it may concern:*

Be it known that we, HENRY JACKSON DAVIS, PLAYFAIR GOODWIN AULT, WILBER WHEELER BAILEY, and JAMES HARDY WIDEMAN, of Birmingham, in the county of Jefferson and State of Alabama, have invented a new and useful Improvement in Automatic Boiler-Feeders, of which the following is a specification.

Our invention relates to steam-boilers; and it has for its object an apparatus which will automatically maintain a uniform water-level in a boiler, the level being maintained at any desired height, predetermined before placing the apparatus in connection with the boiler, the variation being effected by moving a counterbalance or governor weight applied to the rocking lever of a weight arranged in the tank that receives the charge of water to be fed to the boiler.

The invention consists in certain combinations and arrangements of the parts and certain details of construction which we shall hereinafter fully describe and claim.

Reference is to be had to the accompanying drawings, forming part of this specification, in which like characters of reference indicate corresponding parts in both views.

Figure 1 is a vertical section of the apparatus with parts in side elevation, and Fig. 2 is a sectional plan view.

Our boiler-feed apparatus is provided with a cylindrical tank A, in which is located a water-displacing weight B, preferably likewise of cylindrical shape and spaced from the walls of the tank A. The weight B is carried by a rod X, fitted through an opening in the cap A' and pivotally connected at its upper end above said cap with one arm G of a counterpoised rocking lever, said arm being inclosed in a chamber Y, formed on the cap A'. The said arm G is secured to a transverse shaft Z, journaled in the side walls of the chamber Y and extending through a stuffing-box B' to the outside, where it has attached thereto the other arm H of the said lever, said arm H having a weight F adjustably held thereon and so arranged with respect to the weight B that the latter will raise the former when it is out of water, but will be itself raised when partly submerged in water. This

weight F is a governor for regulating the level of water in the boiler—that is to say, by adjusting it on the lever-arm H toward the shaft Z the apparatus will feed the boiler (not shown) to a higher level, and by moving it outward on said arm the feed or supply will be less. The arm H is further provided with a pin H', inserted in an elongated slot I' in the upper end of the valve-rod I, which latter passes downward through the stuffing-box J into the valve-chest C. The chest C is connected with a steam-pipe R of small diameter, the steam therefrom passing into the chest through a port R', closed by the upward movement of a valve C' on a stem C<sup>x</sup>, which is formed with abutments C<sup>4</sup> and C<sup>5</sup>, adapted to be engaged by the head C<sup>3</sup> on the valve-rod I to reciprocate the stem C<sup>x</sup>. In the chest C is also fitted a valve-stem C<sup>v</sup>, formed with a shouldered valve C<sup>2</sup>, adapted to govern the exhaust or outlet port C<sup>z</sup>, and having an abutment C<sup>6</sup>, which alternately with the shouldered valve C' is also adapted to be engaged by the head C<sup>3</sup> on the rod I. An exhaust-pipe S, opening into the air, is connected with the outlet-port C<sup>z</sup> of the chest, as shown.

From the steam-space of the chest C a small steam-pipe T extends, opening at its other end into the bottom of a cylinder U, in which is fitted a piston V, provided with packing-rings V' and carried on a stem D', which passes through the upper head of the cylinder, through a bridge D<sup>2</sup> in a chamber D<sup>3</sup>, and is provided with an exhaust-valve D, adapted to fit on a seat D<sup>4</sup> in said chamber. Steam-passages U' are formed in the head of the cylinder U, as shown. The piston and valve-stem D' extends above the valve D into a T P' and is formed at its upper end with a disk d, adapted to abut against a similar disk e on the lower end of the valve-stem E', carrying a valve E, governing the passage through the chamber E<sup>3</sup> and guided by a bridge E<sup>2</sup>. A pipe leads from the chamber E<sup>3</sup> to the steam-space of the boiler. N designates a steam-pipe leading from the T P' and discharging into the upper end of the tank A above a perforated condensing or baffle plate W, held therein, as plainly indicated in the drawings, and M designates the water-supply pipe, provided with check-valve K and also opening



into the upper end of the tank A above the plate W. This baffle-plate is intended, primarily, to receive the force or thrust of the steam entering the tank A through pipe N and also of the water discharged from pipe M, thereby preventing the weight B being suddenly forced downward.

The water is supplied to the boiler by means of a pipe Q, connected to the bottom of the tank A and the water-space of the boiler and provided with a check-valve L.

The steam-chamber D<sup>3</sup> is connected with the outer air by an exhaust-pipe O, as shown in Fig. 1.

The tank A of the apparatus is placed adjacent to the boiler at a height that the surface of the water in the tank when it has receded sufficiently to carry weight B to the limit of its downward stroke shall be practically on a level with the line at which it is desired to maintain the water in the boiler.

The operation is then as follows: Starting with the tank A empty and weight B at the downward limit of its stroke, water is turned on through the pipe M and as it fills the tank A raises the weight B to a point where it causes the arm H of the rocking lever to carry the valve-rod I downward. Such movement of the stem opens the valve C', allowing steam to pass from the pipe R into the chest C, thence through the pipe T into the cylinder U, where it forces the piston V upwardly and closes exhaust-valve D. At the same time the stem D' raises the stem E' and opens the admission-valve E, allowing steam to pass from the boiler, through pipe P and pipe N, into the tank A, thereby equalizing pressure and causing water in the tank A to flow into the boiler by gravity through the pipe Q. As the water recedes in the tank A the weight B moves downwardly, carrying the arm H of the rocking lever upwardly when it is near the terminus of the stroke and raising the valve-rod I. Such use of said rod will close the valve C', which is assisted to its seat by the steam-pressure in the pipe R. Near the completion of the upward movement of the rod I the head C<sup>3</sup> thereof will engage the abutment or collar C<sup>6</sup>, opening the valve C<sup>2</sup>, and thus permitting the steam in the pipe T and behind the piston V to exhaust through the pipe S. The pressure behind the piston V having thus been reduced, the pressure in the pipe P will instantly force the valve E to its seat and open the exhaust-valve D, therefore allowing steam to exhaust from tank A through pipes N and O. As soon as pressure in the tank A is reduced to a point below that in the pipe M water instantly flows from the latter over the baffle-plate W, condensing a portion of the steam in the tank A, and thus raising the temperature of the water. Since the tank A never completely empties, the water remaining therein acquires a temperature approximately the same as the steam. The operation is then repeated until the water in the boiler shall have risen to a point that will not

allow weight to sink low enough to open the valve C<sup>2</sup>, which will stop the apparatus until water in boiler recedes sufficiently to allow the weight B to make its full downward stroke. Thus the apparatus is perfectly automatic, maintaining a constant water-line in the boiler by resupplying the latter as soon as a volume of water has been evaporated equivalent to a charge of the tank A.

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

1. In an apparatus of the character described, a water-tank connected with a boiler, and a water-supply and a water-displacing weight in said tank, a lever-arm connected with such displacing-weight, a governor-weight applied to said arm and adapted for adjustment along the same for controlling automatically the water-level in the boiler, a steam-pipe leading from the boiler and opening into the tank, a valve governing the admission of steam through said pipe, and means for opening and closing said valve by the rise and fall of said weight, as set forth.
2. In an apparatus of the character described, a tank interposed between the boiler and a water-supply, a steam-pipe connection between said tank and the steam-space of the boiler, a steam-cylinder connected with said pipe and having a head provided with passages U', a piston working in said cylinder and carrying valves E and D which govern the admission and exhaust of steam in said pipe, a steam-pipe arranged to supply steam behind said piston, a steam-chest connected to said latter pipe, admission and reducing valves in said chest, and a water-displacing weight in the tank arranged to alternately open and close the last-named valves, steam having free access to the upper side of the piston from the chest containing the said admission and reducing valves, as shown and described, as set forth.

3. In an apparatus of the character described, the combination with the tank connected with a boiler and a source of water-supply, a displacing-weight adapted to rise and fall in said boiler, a rocking lever connected with said weight, and an adjustable governor or counterbalance weight applied to said arm, of a valve-chest, a steam-inlet valve C' and steam-exhaust valve C<sup>2</sup> arranged in said chest and provided with shouldered stems, a slidable rod having a lengthwise slot engaging a pin on said lever-arm, and provided with a shoulder or collar within the valve-chest, which collar is adapted to engage the shoulders on the valve-stems, steam-pipes connecting said chest with the boiler, and a steam-chest having admission and exhaust valves and a piston for operating them, as shown and described.

4. In an apparatus of the character described, a tank having a connection at its bottom with the boiler and provided with pipes at its top, one of said pipes leading from a



water-supply and the other leading from the steam-space of the boiler, a float or weight adapted to control the passage of steam through said latter pipe, and a perforated  
5 baffle-plate fixed in the upper portion of said tank above the float or weight and extending over the same between it and the exits of said pipes, as and for the purpose set forth.

10 5. The combination of a tank interposed between the boiler and water-supply, a steam-pipe leading from the boiler into the top of the tank and provided with an exhaust-pipe, an admission-valve controlling the said ex-  
15 haust, a cylinder connected with said pipes and provided with a piston whose movements alternately open and close said valves, a steam-chest having a connection with said cylinder, a steam-actuated valve in said chest which is closed by action of steam as soon as  
20 lifted off its base, a water-displacing weight in said tank arranged to apply or reduce the pressure in such connection, whereby to move the piston in the cylinder, a lever-arm connected with the displacing-weight, a counter-  
25 balancing-weight arranged to move on said arm and thus used as a governor or regulator,

a valve-rod provided with a slot, and engaging a pin on the lever-arm when the lever-arm is near the end of its stroke, the whole apparatus being so placed that the tank does not com- 30  
pletely empty, thereby always containing a quantity of hot water for heating the water discharging into it and always feeding hot wa-  
ter to the boiler; a check-valve interposed be- 35  
tween the tank and the boiler admitting water to the boiler, but preventing the flow in the opposite direction; and a check-valve inter-  
posed between tank and water-supply, admit-  
ting water to the tank but closing when the 40  
pressure is on the tank, all substantially as set forth and for the purposes specified.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

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WILBER W. BAILEY.  
JAMES H. WIDEMAN.

Witnesses:

GEO. B. TARRANT,  
LOUIS W. TERRILL.