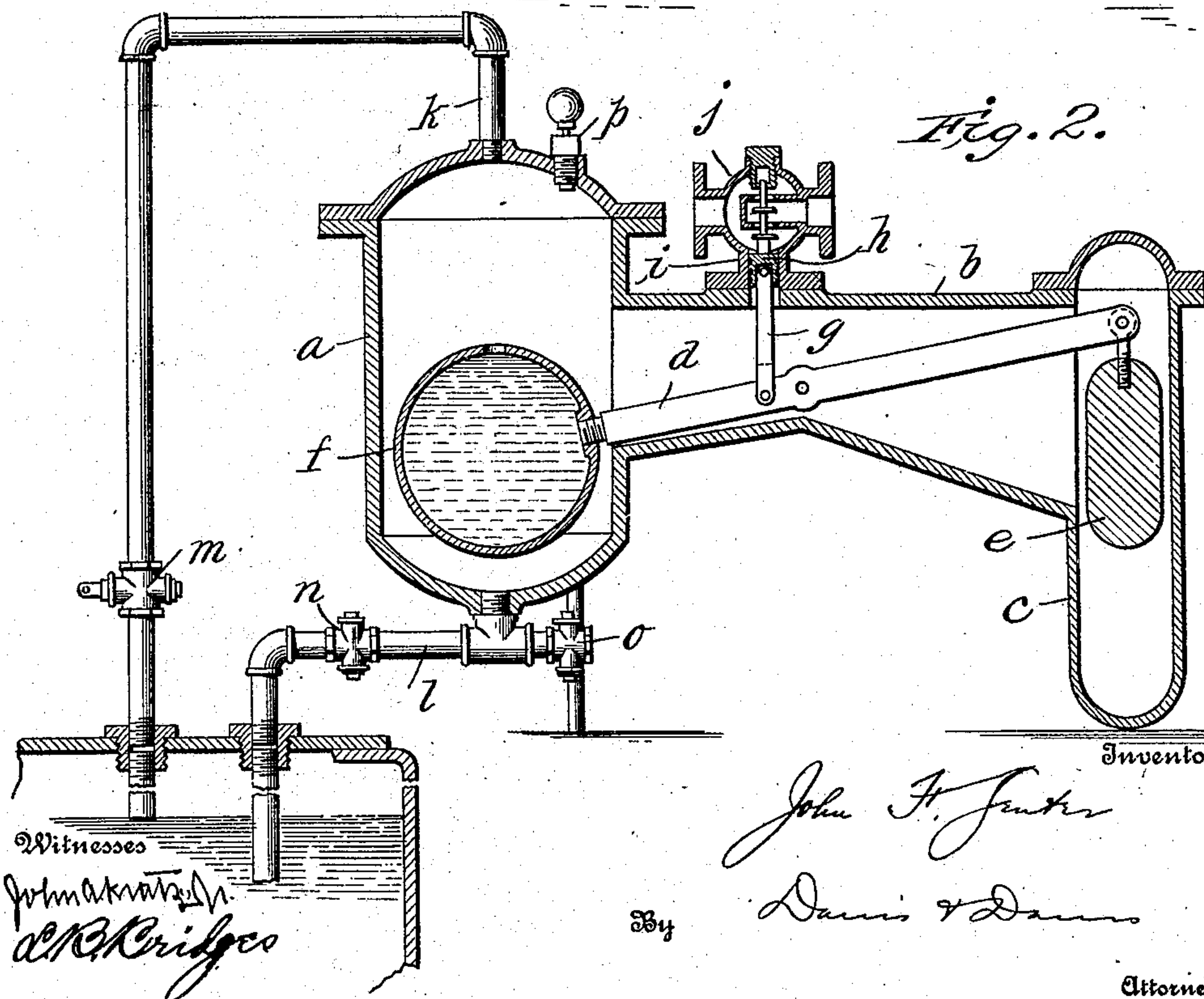
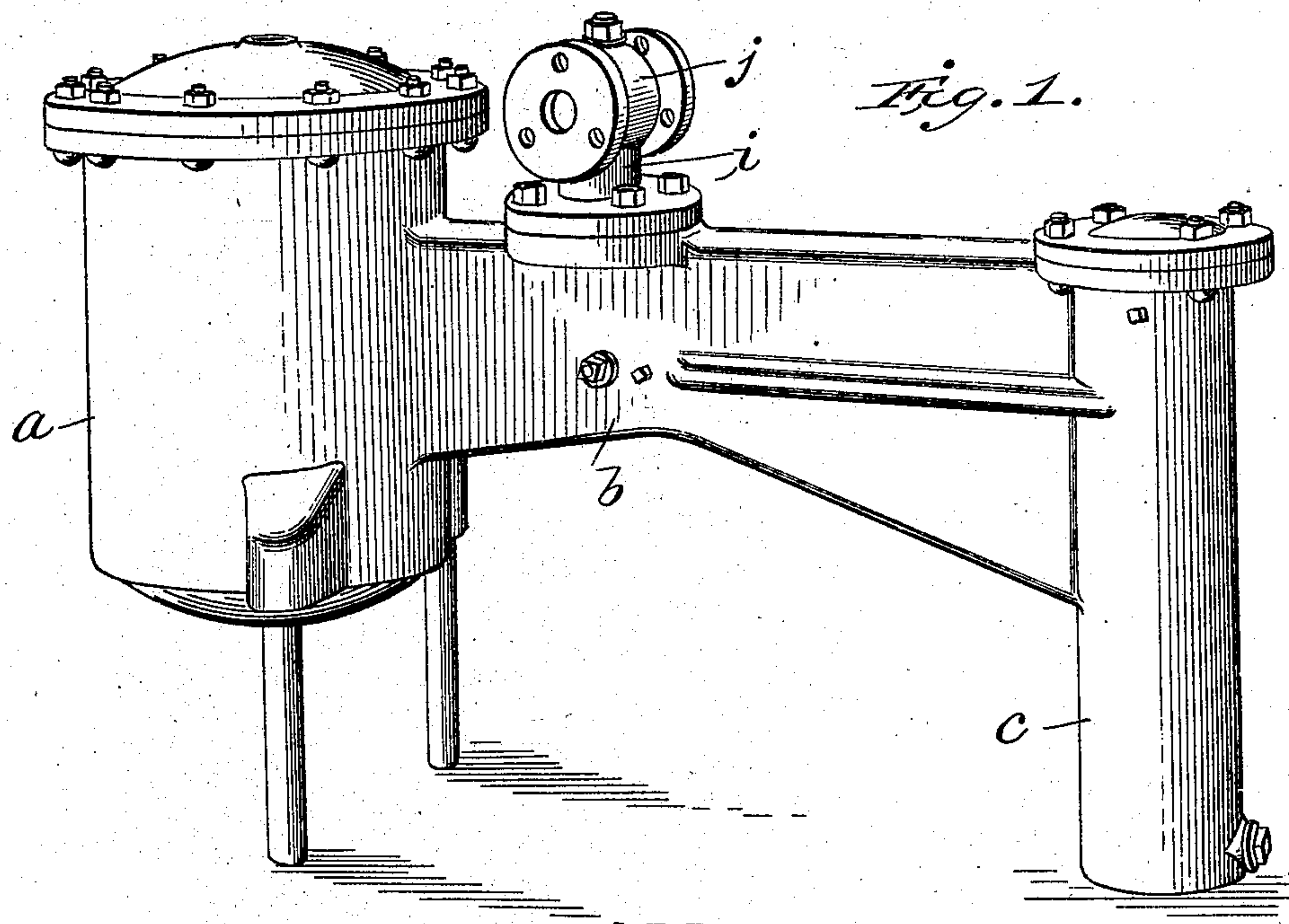


J. F. SENTER.
BOILER FEEDER.

APPLICATION FILED APR. 18, 1908.

911,768.

Patented Feb. 9, 1909.



UNITED STATES PATENT OFFICE.

JOHN F. SENTER, OF CHATTANOOGA, TENNESSEE.

BOILER-FEEDER.

No. 911,768.

Specification of Letters Patent.

Patented Feb. 9, 1909.

Application filed April 18, 1908. Serial No. 427,915.

To all whom it may concern:

Be it known that I, JOHN F. SENTER, a citizen of the United States of America, and a resident of Chattanooga, county of Hamilton, and State of Tennessee, have invented certain new and useful Improvements in Boiler-Feeders, of which the following is a full and clear specification, reference being had to the accompanying drawings, in which—

Figure 1 is a perspective view; and, Fig. 2 is a vertical sectional view of my improved apparatus.

The object of this invention is to provide a simple reliable and durable device adapted for attachment to any steam generator to automatically maintain any predetermined level of water therein, as more fully hereinafter set forth.

The casing of the apparatus consists of a main vertical cylindrical portion *a*, a lateral passage or chamber *b* and a vertical weight chamber *c* attached to the outer end of this passage. In the passage *b* is mounted on a horizontal pivot a lever *d* which carries at each end a weight, one of the weights (*e*) being hung in chamber *c* and the other weight (*f*) being suspended in chamber *a*.

The weight *e* is solid and the weight *f* is hollow and filled with water, and when thus filled the weight *f* is heavier than the weight *e*. Attached to lever *d* between its pivot and the weight *f* is a link *g* whose upper end is pivotally attached to the piston *h* working in a cylinder *i* bolted to the upper face of the top wall of the passage *b*, said cylinder being formed integral with the valve *j* inserted in the waterline leading to the boiler. The valve proper is attached to the piston *h* so that when the piston is in its lower position the valve will be open.

A pipe *k* extends from the top of the main portion *a* of the casing downwardly into the boiler and terminates at the desired waterline. Another pipe *l* extends from the bottom of this chamber *a* down into the boiler to a point below the water-level. The pipes *k* and *l* are provided with suitable cut-off valves *m* and *n*, and the pipe *l* is extended beyond its point of connection with the casing *a* and is provided with a blow-off cock *o*. In the top of the casing *a* is a relief valve *p*. The cocks *m* and *n* permit the apparatus to be cut off entirely from the boiler, and the blow-off cock *o* permits the sediment in the chamber *a* to be blown out without dis-

mantling the apparatus, and by placing this blow-off in an extension of the pipe *l* it will be necessary to provide but one opening into the chamber *a* at its lower end.

When the boiler is first filled it will be observed that the normally open relief valve *p* will permit the escape of air from the boiler and thus permit the boiler to be filled to the desired line, but when a slight steam pressure, say a pound or two, has been raised the pressure will close this relief valve and hold it closed as long as there is at least that much pressure in the boiler. It will therefore be observed that whenever there is sufficient pressure in the boiler to close the relief valve the feeder will be in working order. The inlet of the feed valve is connected to any sort of water-supply and the outlet thereof leads to any point it is desired to have the water enter the boiler. When the boiler has been filled with water to the point where it barely seals the lower end of pipe *k* the pressure in the boiler will force the water up through pipe *l* into chamber *a*. As the water rises in chamber *a* it partially immerses the water-filled weight *f* and thus reduces the gravitational force of said weight. When this reduction reaches a point where the other weight *e* preponderates, the weight *f* will be raised sufficiently to close valve *j* and thus stop the feed to the boiler. It will be observed that weight *f* is not buoyant and is therefore not floated by the incoming water but its weight relative to the weight *e* is simply reduced sufficiently to permit weight *e* to fall. By thus doing away with a float I render the apparatus more reliable in action as floats are liable to spring a leak or be crushed.

When the water in the boiler has evaporated a small amount its level falls slightly below the end of pipe *k* and thus permits steam to enter the top of casing *a* through pipe *k*, whereby the pressure on the water in this chamber is equalized and the water is permitted to rapidly run back by gravity into the boiler, until the level in the boiler is raised sufficiently to again seal the end of pipe *k*. This is repeated until the housing is emptied of water sufficiently to permit the weight *f* to fall far enough to open the feed valve, whereupon the water is again forced into the boiler from the supply source to again fill the housing and the pipes with water. It will thus be seen that by this construction it is possible to renew evapo-

rated water by the injection of very small quantities of water at a time, thus maintaining an accurate level of water in the boiler and assisting in maintaining the desired pressure of steam.

When it is desired to control a boiler where there is a steam pump for the boiler, steam from the boiler is piped from the feed valve just as is the water in the manner just described, and when the pump fills the boiler the weight *e* falls and shuts off the flow of steam through the feed valve and thus stops the pump. It will be observed that all stuffing boxes are eliminated thus avoiding friction and sticking in the opening and closing of the feed valve. It will be observed that when the feed valve is open and is thus subjected to the pressure of the steam or the feed water, the pressure on the piston *h* is thus substantially equalized, leaving the valve free to be controlled by the action of the weights alone.

It is obvious that it is not essential that the weight *f* be water-filled since it is only necessary that this weight shall be of the proper avoirdupois and displacing capacity to be overcome by the weight *e* when it is partially immersed.

A feature of importance is the peculiar manner of constructing the housing. It will be observed that the lateral passage *b* is so connected to the vertical main chamber *a* that the bottom of the passage opens into the main chamber at a point below the closing level of the water,—that is, a point up to which the water must rise in order to raise the weight *f* to the point where the feed valve will be closed, whereby with each operation the water will be caused to flow through the passage into the depending weight chamber, thus keeping this chamber filled with water

at all times, so that the gravitational force of the weight *e* remains practically the same during all its movements. This construction and operation insures uniformity of operation.

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

The combination with a boiler, a housing supported above the normal water-level thereof and pipe connections between this housing and the boiler, whereby when the level of the water in the boiler rises above a predetermined point water from the boiler will be forced up into the housing, said housing consisting of a vertical main chamber to which said pipe connections are connected, a lateral passage connected to said main chamber at a point below the closing level of the water therein, and a depending chamber connected to the outer end of said lateral passage, whereby said depending chamber shall be kept constantly filled with water, a feed valve and means for opening and closing the same consisting of a lever pivoted in and extending through said lateral passage, means connecting this lever to the feed valve, a weight connected to the outer end of the lever and working in the water-filled depending chamber, and a weight attached to the lever and working in the main chamber, this latter weight being larger and heavier than the aforesaid weight, for the purposes set forth.

In testimony whereof I hereunto affix my signature in the presence of two witnesses this 15th day of April 1908.

JOHN F. SENTER.

Witnesses:

E. N. CHAMBERS,
T. J. WILLIAMS.