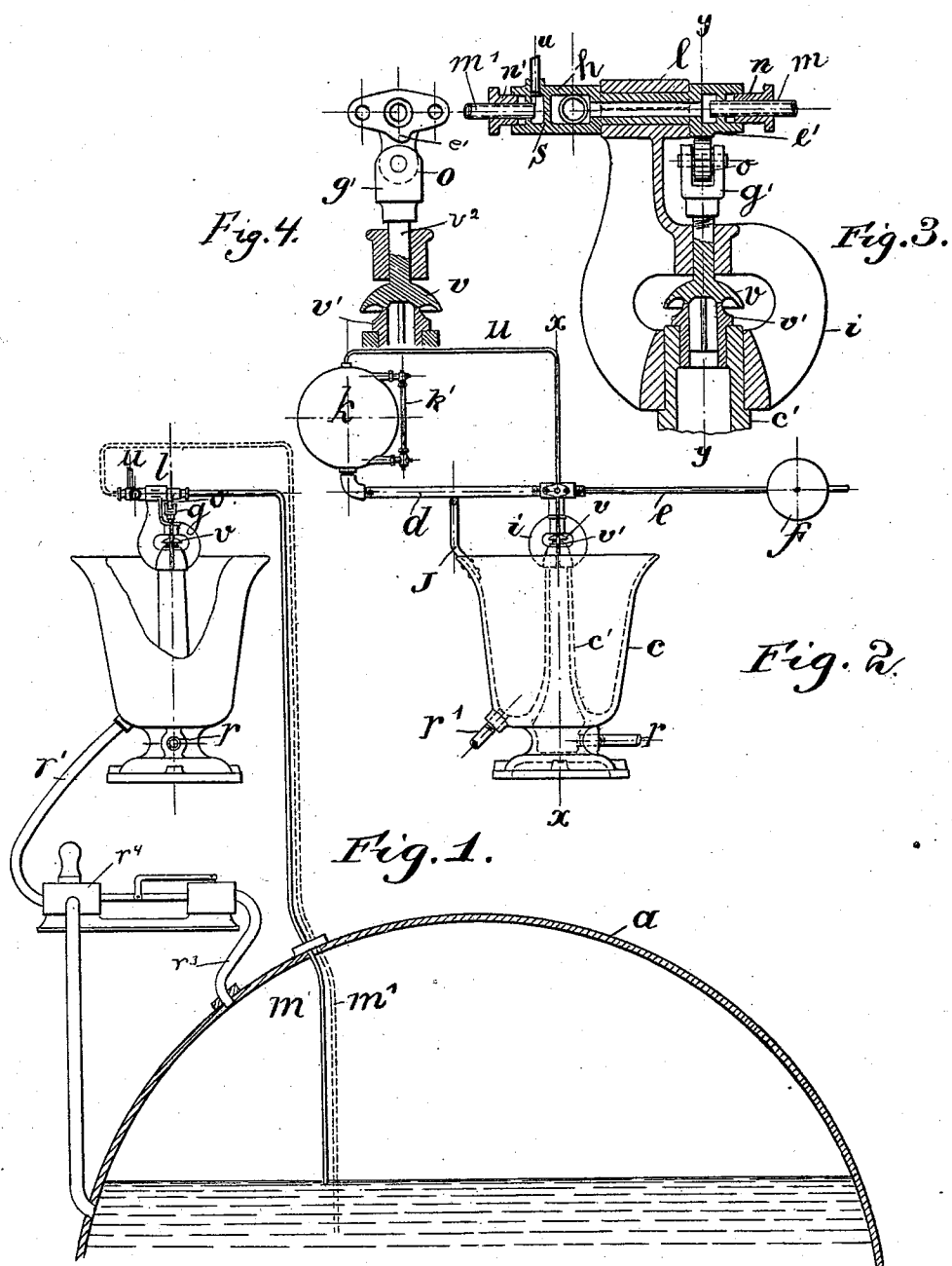


(No Model.)

H. C. LUNGE.
BOILER FEEDER.

No. 522,474.

Patented July 3, 1894.



Witnesses:

J. B. McGirr.

Richard H. J. J.

Inventor.

Hans Christian Lunge
by Frank L. Ayer.

Attorney

UNITED STATES PATENT OFFICE.

HANS CHRISTIAN LUNGE, OF SORÖ, DENMARK.

BOILER-FEEDER.

SPECIFICATION forming part of Letters Patent No. 522,474, dated July 3, 1894.

Application filed March 12, 1894. Serial No. 503,330. (No model.)

To all whom it may concern:

Be it known that I, HANS CHRISTIAN LUNGE, a subject of the Kingdom of Denmark, residing at Sorö, in the Kingdom of Denmark, have invented certain new and useful Improvements in Boiler-Feeders; and I do hereby declare the following to be a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to devices for supplying feed water to steam boilers and has especial reference to that class of boiler feeders that are automatically operated and regulated by the height of the water level within the boiler.

My invention consists generally in employing a reservoir in communication with the boiler by a continuously acting feed pump or injector and having devices to automatically regulate the introduction of water into the said reservoir.

In the accompanying drawings I show the preferable form of my device.

Figure 1 is a front view of the device. Fig. 2 is a side view of a part of the same. Fig. 3 is a sectional view taken on the line $x-x$ of Fig. 2, and Fig. 4 is a sectional view taken on the line $y-y$ of Fig. 3.

In all the above views corresponding parts are designated by the same letters of reference.

a , is a steam boiler which is connected with the horizontal cylinder h , by means of the pipe m , which passes within the boiler and has its lower extremity at or slightly below the water line thereof. This pipe m is connected with the cylinder h , by a stuffing box n , to permit the cylinder to turn freely and still provide a steam tight joint. The cylinder h is mounted within a bearing l , formed integral with the casting i , and is free to revolve therein. Secured to the cylinder h , at right angles to the pipe m , is another pipe d , which connects with the receiver k , shown spherical in shape, and is provided with a water gage k' . On the opposite side of the cylinder h is an arm e , upon which is mounted the counter-balancing weight f , capable of proper adjustment.

Near one extremity of the cylinder h is formed a cam piece e' (Fig. 4) which engages

with a roller o , mounted within the bifurcated portion g' of the valve stem v^2 , which in turn supports the valve v , which is of an umbrella or mush-room shape and rests upon the valve seat v' , preferably removable and adapted to be replaced in event of wear.

r , is a water pipe connected with the source of supply at nominal pressure.

r' is the exit pipe for the water in the boiler and which connects with the feed pump r^4 which is operated by the steam from the boiler through the pipe r^3 . c , is a cup-shape reservoir situated preferably adjacent to the boiler and having a pillar c' mounted within its center.

The brace or bracket j , is mounted upon one side of the reservoir to limit the movement of the tube d .

The operation of the device is as follows: The normal water line of the boiler being above the opening of the pipe m , the pressure of the steam will force water into the pipe m , cylinder h , and tube d , and will completely or partially fill the receiver k against the pressure of the atmosphere, as will be indicated upon the glass k' . This will cause the parts to assume the position shown in Fig. 2, with the valve v , firmly set upon its base and preventing the entrance of water to the receiver. Upon the water line being lowered by the evaporation of the water from the boiler, the opening of the pipe m will be exposed, the pressure of the steam will displace the water wholly or in part within the receiver k . This will lighten the receiver and will cause it to be elevated by the action of the counter-balancing weight f . By this movement the cylinder h will be partially rotated and the cam portion e' acting upon the roller o , will allow the valve v , to be elevated by the pressure of the water within the column c' . Water will now flow into the reservoir and from there will be pumped into the boiler by means of the feed pump r^4 , which operates continuously. This will again raise the water left in the boiler until the opening of the pipe m is immersed, forming a partial vacuum therein, which will cause it to again fill wholly or partially with water from the boiler. Equilibrium being now established, the parts will assume their normal position by the lowering of the receiver, which in turn will close

the valve *v*, and prevent the further admission of water to the reservoir and thence to the boiler.

In order to facilitate the operation of the apparatus I preferably make use of an additional pipe *m'*, which connects with the cylinder *h* by means of the stuffing box *n'* upon the opposite side from the entrance of the pipe *m'*. This pipe *m'* communicates with the receiver *k* by means of a pipe *u*, the partition *s*, preventing communication between the two ends of the cylinder *h*. The lower opening of the pipe *m'* is considerably lower than that of the pipe *m*, and will always be immersed within the water of the boiler.

The operation of the modification is substantially the same as described. When the water is at the proper height, both pipes *m* and *m'* will be filled with water but upon the lowering of the water in the boiler the extremity of the pipe *m* will become exposed, which will free the parts of the water contained therein through the pressure of the steam upon the water contained within the pipe *m'*.

While I have described my invention as used in connection with steam boilers, I do not desire to be limited to such connection, as my device can be employed as well for feeding liquids to vessels containing the liquid and a gas under pressure, as for instance, in the handling of various fermented liquors under pressure; to soda water and for other purposes.

Having now described my invention, what I claim as new therein, and desire to secure by Letters Patent, is as follows:

1. In a feeding device for steam boilers, the combination of the reservoir *c*, connected with the feed pump or equivalent element, a valve *v*, for controlling the supply of water to said reservoir; an oscillating cylinder *h*, mounted above said valve and adapted to open and close the same, a receiver *k*, connected with said cylinder by a pipe *d*, the counter-balancing weight connected with said cylinder at the other side thereof by a lever arm *e*, and a pipe *m*, extending from within the boiler and connected with said cylinder *h*, and communicating with said receiver *k*, substantially as described.

2. In a feeding device for steam boilers, the combination of a reservoir *c*, connected with the feed pump or equivalent device, a valve *v*, for controlling the supply of water for said

reservoir, an oscillating cylinder *h*, mounted above said valve and adapted to open and close the same, a partition in said cylinder for dividing the interior thereof into two parts, pipes *m*, and *m'*, extending from within the boiler at different levels, and leading into the respective ends of said cylinder, a tube *d*, extending out from said cylinder and communicating with one of its parts, a receiver *k*, carried by said tube *d*, and communicating with the same, a pipe *u*, connecting the other part of the cylinder with said receiver opposite to the pipe *d*, and a counter-balancing weight *f*, on the lever *e*, substantially as described.

3. In a feeding device for steam boilers, the combination of a reservoir *c*, connected with the feed pump or equivalent device, a hollow column *c'* in said reservoir connected with the water supply, a valve at the top of said column *c'*, a cylinder *h*, mounted above said valve and adapted to open and close the same, a pipe *m*, extending from within the boiler and connected with the interior of said cylinder, a pipe *d*, extending out from said cylinder, a receiver *k*, carried by said pipe and communicating with the interior of the boiler by means of the pipe *d*, cylinder *h*, and pipe *m*, and a counter-balancing weight *f*, secured to a lever arm *e*, for counter-balancing the receiver *k*, substantially as described.

4. In a feeding device for steam boilers, the combination of the receiver *c*, connected with the feed pump or equivalent device, a hollow column *c'* within said receiver and connected with the water supply, a valve *v*, at the top of said column and provided at its upper end with a roller *o*, an oscillating cylinder *h*, mounted above said valve, a cam *e'* on said cylinder engaging with said roller *o*, a pipe *m*, extending from the interior of the boiler, and connected with the interior of said cylinder, a pipe *d*, extending out from said cylinder, a receiver *k*, on the end of said pipe and communicating with the interior of the boiler by means of a pipe *d*, cylinder *h*, and pipe *m*, and a counter-balancing weight *f*, for counter-balancing said receiver, substantially as described.

This specification signed and witnessed the 23d day of December, 1893.

HANS CHRISTIAN LUNGE.

Witnesses:

C. MENGELBERG,
H. P. LINDEROTH.