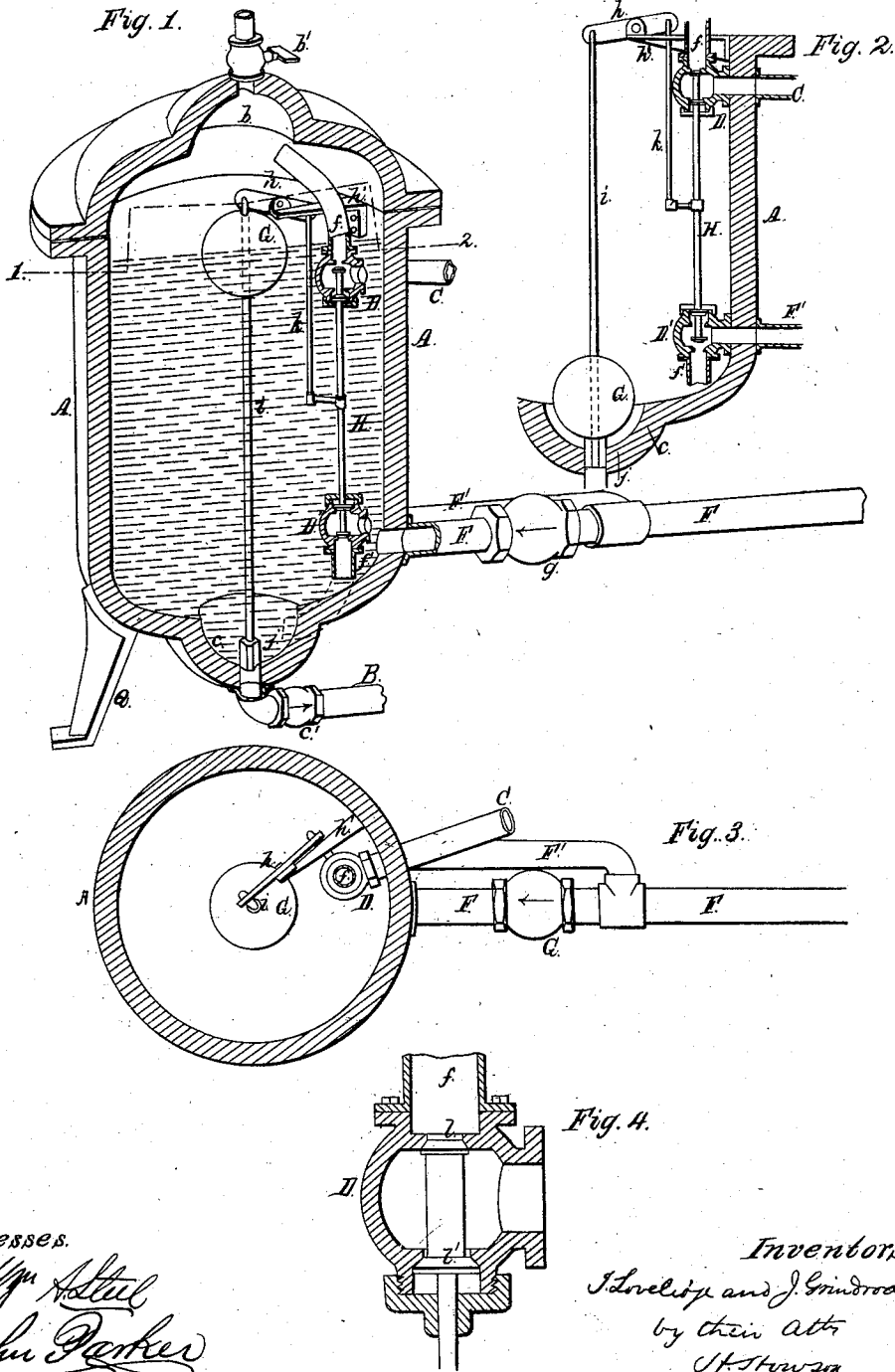


T. LOVELIDGE & J. GRINDROD.  
 AUTOMATIC BOILER FEEDING APPARATUS.

No. 93,826.

Patented Aug. 17, 1869.



Witnesses.

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# United States Patent Office.

THOMAS LOVELIDGE AND JOHN GRINDROD, OF PHILADELPHIA,  
PENNSYLVANIA.

Letters Patent No. 93,826, dated August 17, 1869.

## IMPROVED AUTOMATIC BOILER-FEEDING APPARATUS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that we, THOMAS LOVELIDGE and JOHN GRINDROD, of Philadelphia, Pennsylvania, have invented an Automatic Boiler-Feeding Apparatus; and we do hereby declare the following to be a full, clear, and exact description of the same.

Our invention consists of an apparatus, fully described hereafter, for feeding steam-generators with water, which is simple in construction and arrangement, entirely automatic in its action, and so arranged that it will maintain the water at any desired level in the boiler, so long as the apparatus is itself supplied.

In order to enable others skilled in the art to make and apply our invention, we will now proceed to describe its construction and operation, reference being had to the accompanying drawing, which forms a part of this specification, and in which—

Figure 1 is a sectional perspective view of our improved automatic boiler-feeding apparatus.

Figure 2, a sectional view of part of the apparatus.

Figure 3, a sectional plan view on the line 1-2, fig. 1.

Figure 4, an enlarged sectional view of one of the valves.

Similar letters refer to similar parts throughout the several views.

A represents an upright cylindrical vessel or reservoir, supported, upon legs *a*, at any convenient point adjacent to, but at a higher level than the steam-boiler which is to be fed with water.

At the top of this reservoir is a hemispherical projection, *b*, with which communicates a short tube, provided with a suitable cock, *b'*, and at the bottom of the reservoir is a similar projection, *c*, to which is connected a pipe, B, communicating with the steam-boiler at any convenient point below the low-water line, and provided, close to the reservoir, with a check-valve, *c'*, of ordinary construction, which opens in the direction of the arrow, fig. 1.

C is a steam-pipe, one end of which communicates with the steam-boiler, at the proper water-line, while its opposite end passes through one side of the reservoir A, and terminates, within the same, in a valve-casing, D, the latter having an outlet-pipe, *f*, which projects upward toward the top of the reservoir.

The pipe F, by which water under a moderate pressure is supplied to the reservoir, communicates with the latter near the lower end of the same, and the said pipe is furnished with a branch, F', which also enters the reservoir, and which terminates, within the same, in a valve-casing, D', precisely similar to the casing D, and arranged at a point directly beneath the same, the said casing being also provided with an outlet-pipe, *f'*, which projects toward the bottom of the reservoir.

The supply-pipe F is furnished, at a point between its branch F' and the reservoir, with a check-valve, *g*, opening in the direction of the arrow, and the said pipe should also be provided, at a point beyond the branch F', with a valve, by which the supply of water can either be cut off from the reservoir or regulated, as required.

To a lever, *h*, which is hung to a bracket, *k*, secured to the inside of the reservoir, is connected a rod, *i*, upon which is arranged, to slide freely, a float, G, the rod being guided and maintained in a proper vertical position, by means of a stop, *j*, at its lower end, which enters the passage leading to the pipe B, but is so formed as not to obstruct the same. (See fig. 2.)

To the opposite arm of the lever is hung a rod, *l*, which is connected to the valve-rod H, the latter entering both of the casings D and D', and operating the valves within the same, which are arranged in the following manner:

Each casing is furnished with two valves *l l'*, (see fig. 4,) the former of which is the valve proper, and is adapted to a seat in the passage to the outlet-pipe, while the main object of the latter valve, *l'*, is to replace the packing, which would otherwise be required for the valve-rod, and which would add greatly to the friction of the parts, so that a much larger float would be required to insure the perfect working of the apparatus.

It will be seen, on referring to figs. 1 and 2, that the valves in the casings D and D' are so arranged, in respect to each other, that when one set is open, the other must be closed.

The operation of the apparatus is as follows:

Let it be supposed that the water in the steam-boiler is below its proper level, that the several parts of the feeding-apparatus are in the position shown in fig. 2, and that the regulating-cock or valve, on the pipe F, has been opened, so as to permit water to flow through the same to the reservoir A.

The cock *b'*, at the top of the reservoir, is first opened to permit the air to escape, when the reservoir will be immediately filled with water, which will enter it through the pipe F and its barrel F', the cock *b'* being then immediately closed.

As the reservoir is thus filled with water, the float G rises, sliding on the rod *i*, from the position in fig. 2 to that shown in fig. 1, or until it strikes and turns the lever *h*. This turning of the lever will so operate the valves D and D', as to open communication between the interior of the reservoir and the steam-pipe C, and, at the same time, to cut off the supply of water from the branch F'.

As soon as steam is thus admitted to the reservoir, and the pressure within the same becomes equal

to that in the boiler, the check-valve *c* will be opened, and the water will flow, by its own gravity, through the pipe B into the boiler, the float sliding down its rod, as the water leaves the reservoir, until it strikes the stop *j*.

This striking of the stop *j* will so act on the lever and the valves operated by the same, as to move the latter to their original position, (fig. 2,) or, in other words, the steam will be shut off, and communication with the feeding-branch F' opened.

At first, the pressure of steam within the reservoir will be sufficient to force back the water, but this steam becoming quickly condensed, a vacuum, or partial vacuum, will be formed, and the reservoir will be filled as before, to be again emptied when the lever is turned by the float G, and fresh steam admitted to the reservoir, the operation of filling and emptying the reservoir being continued automatically in the same manner until the boiler has been filled to the proper level.

The steam-pipe C, as before mentioned, communicates with the boiler at the proper water-line, so that as soon as the water rises to this point, steam can no longer pass through the pipe C, to displace the water contained in the reservoir, the latter consequently remaining filled until the boiler again needs replenishing.

It will thus be seen that the above apparatus will not only fill an empty boiler by operating automatically, but will maintain the water at exactly the proper level, so long as the supply is kept up through the pipe F.

A great advantage possessed by our invention over other apparatus of this class, is, that that the valves

and other appliances are contained entirely within and are protected by the reservoir, and, consequently, are not liable to get out of order, while the valves, owing to their peculiar construction, and to the fact that the pressure is nearly equal on all sides of the same, work regularly and without leaking, and do not require any of the usual packing, so that a most delicate operation of the apparatus is insured.

We claim as our invention, and desire to secure by Letters Patent—

1. The float G, arranged in the vessel A, interposed between a steam-boiler and water-reservoir, and communicating with the steam and water-spaces of the boiler, substantially as described.

2. The combination, substantially as herein described, of the float-rod *i*, lever *h*, connecting-rod *k*, and valve H.

3. The valve-casings D and D', each having seats adapted for the reception of two valves *l* and *l'*, arranged substantially in the manner described.

4. The valves D D', arranged within the reservoir A, and operated from a single rod, H, substantially as specified.

5. The arrangement, in respect to the reservoir A, and its valves D and D', of the pipes B, C, and F, and the branch F', substantially as set forth.

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

THOMAS LOVELIDGE.  
JOHN GRINDROD.

Witnesses:

ROBERT THOMAS,  
WM. A. STEEL.