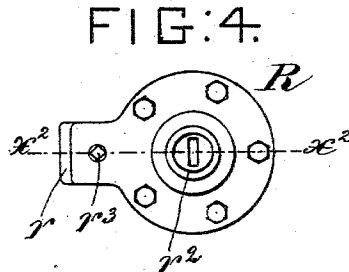
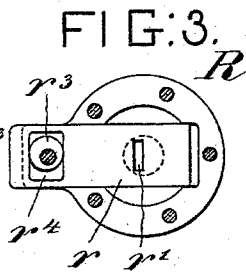
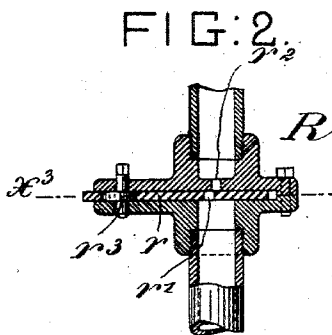
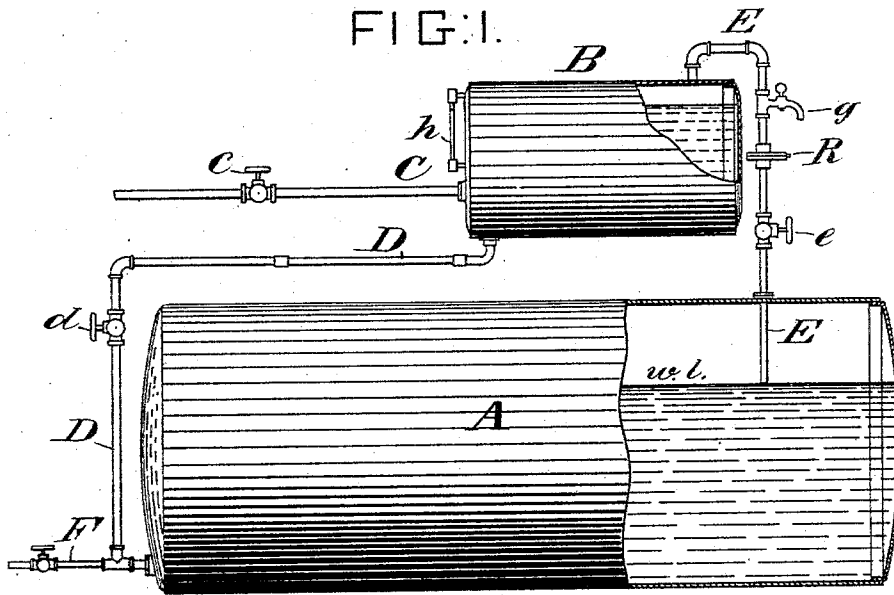


(No Model.)

J. KIRKWOOD.  
STEAM BOILER FEEDER.

No. 597,884.

Patented Jan. 25, 1898.



WITNESSES:

*Peter A. Ross*  
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# UNITED STATES PATENT OFFICE.

JOHN KIRKWOOD, OF LENOX, MASSACHUSETTS.

## STEAM-BOILER FEEDER.

SPECIFICATION forming part of Letters Patent No. 597,884, dated January 25, 1898.

Application filed March 27, 1897. Serial No. 629,479. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN KIRKWOOD, a citizen of the United States, residing at Lenox, Berkshire county, Massachusetts, have invented certain new and useful Improvements in Steam-Boiler Feeders, of which the following is a specification.

This invention relates to the class of feeders for steam-boilers wherein a supply-tank closed steam-tight is arranged, preferably, above the normal water-level of the steam-boiler and is connected with the latter by means of two pipes, one leading from the bottom of the tank to the water-space of the boiler, through which water may flow to the boiler from the tank, and the other leading from about the normal water-level in the boiler to the space above the water in the tank, through which steam may flow to the tank from the boiler when the water falls in the latter and unseals the end of the pipe within the boiler.

Attempts have been made at different periods for a good many years to adapt the principle indicated above to the feeding of boilers; but owing to the disadvantageous arrangement of the parts, the use of automatic valves, floats, and the like, and lack of proper regulation the devices have not, so far as I have been able to ascertain, come into practical use.

In the accompanying drawings I have illustrated an embodiment of my invention.

Figure 1 is a side elevation, partly in section, illustrating, on a relatively small scale, the application of my invention to a boiler. Figs. 2, 3, and 4 are views, on a larger scale, illustrating the regulating-valve in the steam-pipe, Fig. 2 being a vertical transverse section on line  $x^2$  in Fig. 4, Fig. 3 a horizontal section on the line  $x^3$  in Fig. 2, and Fig. 4 a plan.

In Fig. 1, A represents any steam-boiler or steam-generator whatever. I have shown a plain cylindrical boiler, as this form illustrates the application of the invention as well as a more elaborate construction.

Above the normal water-level  $wl$  in the boiler A is situated a steam-tight supply reservoir or tank B, capable of resisting the same internal pressure as the boiler A. I prefer that this tank B, whatever may be its form, shall be near the boiler A and shall have a capacity sufficient to contain as much water

as the boiler will evaporate in a twenty-four-hour run. The tank B is supplied by a service-pipe C from any source.

D is a pipe leading from the bottom of the tank B to the lower part of the boiler A to supply the boiler with water. This pipe is furnished with a cut-off cock  $d$ .

E is a pipe leading from the upper part of the tank B down into the boiler A to a point at or just a little below the normal level of the water in the boiler. In this pipe E is a cut-off cock  $e$ , a regulator-valve R, and a petcock  $g$  above the latter valve.

When the tank B is to be filled, the cocks  $d$  and  $e$  are closed and the cock  $c$  in the service-pipe C opened. The petcock  $g$  may be opened while this is being done in order to allow the air (or steam, if any) to escape. A water-gage  $h$  on the tank will indicate when it is filled to the proper depth. After the tank is filled the cock  $c$  is closed and the cocks  $d$  and  $e$  opened.

The regulator-valve R is illustrated in detail in Figs. 2, 3, and 4. The body of the cock is composed of two flanged sections adapted to be bolted or screwed together and provided with a seat and guideway to receive a slide  $r$ . In the slide  $r$  is a port  $r'$ , adapted to be brought into coincidence or register to a greater or less degree with a port  $r^2$  in a partition across one of the sections of the body of the valve by moving the slide in or out. The slide may be operated by an eccentric  $r^3$ , rotatively mounted in an extension of the flanges on the body, and it occupies a yoke  $r^4$ , Fig. 3, in the slide.

The port  $r^3$ , which constitutes a narrow or contracted passage in the pipe E, is designed for the purpose of regulating the flow of steam through said pipe and to prevent the flowing back of the water from the boiler to the tank, which otherwise would occur occasionally when the water reaches the level of the lower end of the pipe E, the pressure of the steam in the boiler above the water forcing the same up said pipe. In order to make the pipe E practically useful for the passage of steam, but not of water, it is necessary to restrict the area of passage through said pipe.

The valve R, in connection with the port  $r^2$ , provides means whereby the passage through the pipe E may be contracted to the smallest

possible area or the size of said passage regulated to an infinitesimal degree.

As the passage through the regulating-valve is very small, it may at times become 5 choked with sediment or the like carried in by the steam, and to clear it the petcock *g* is opened momentarily, so as to blow steam through the valve *R* from the boiler. This is the main utility of the petcock.

10 When required, the boiler may be filled through the tank *B*, as will be readily understood.

In Figs. 2, 3, and 4 I have shown a form of regulating-valve which will be satisfactory, 15 but I do not wish to limit myself strictly to this construction.

It is important in a feeder of this character that the pipes *D* and *E* shall be separate and be exposed, so that they may be got at conveniently, and it is important also to good results that the pipe *E* shall dip down vertically to the water-level in the boiler and that the feed-water shall enter the boiler near or at its bottom. There may be a blow-off pipe 20 *F* connected with the pipe *D* near the point where the latter enters the boiler, but this is not essential to my invention. The petcock *g* may be a simple cock of any kind.

It will be understood that the regulator *R* is not a device to be operated constantly or one which requires frequent shifting. When once set properly, it may remain so set. It will also be noted that my apparatus is wholly devoid of automatic valves, checks, floats, 25 &c., which are sure to render the feeder inoperative sooner or later. The connecting-pipes in my apparatus are free and open normally or ordinarily, and the cut-off cocks in the pipes are inert when the feeder is in operation. To this fact—the free and open passages through the pipes—I attribute the fact that my feeder operates continuously and perfectly in practice.

Having thus described my invention, I 30 claim—

1. The combination with a steam-boiler and an elevated steam-tight supply-tank having an inlet for water, of an open, unobstructed pipe extending from the lower part of said 35 tank to the lower part of the boiler through which the water is free to flow in both directions, and a normally open pipe, with an unobstructed passage, extending from the upper part of said tank down vertically into the boiler, terminating at about the normal water-level therein, through which pipe a gaseous fluid is free to flow in either direction, said pipe having in it, at some point, a contraction of the passage therethrough which will permit the flow of steam but not of water, substantially as and for the purpose set forth. 40

2. The combination with a steam-boiler and an elevated steam-tight supply-tank having an inlet for water, of an open, unobstructed 45 pipe extending from the lower part of said tank to the lower part of the boiler through which the water is free to flow in both direc-

tions, a normally open pipe *E*, with an unobstructed passage extending from the upper part of said tank down vertically into the 50 boiler and terminating at about the normal water-level therein, through which pipe a gaseous fluid is free to flow in either direction and an adjustable valve in said pipe adapted to regulate a contraction of the pas- 55 sage in the pipe, whereby said passage will permit the flow of steam but not water, substantially as and for the purposes set forth.

3. The combination with a steam-boiler and an elevated steam-tight supply-tank having 60 an inlet for water, of an open, unobstructed pipe extending from the lower part of said tank to the lower part of the boiler through which the water is free to flow in both directions, a normally open pipe *E*, with an unob- 65 structed passage through it extending from the upper part of said tank down vertically into the boiler and terminating at about the normal level of the water therein, through which pipe a gaseous fluid is free to flow in 70 either direction, said pipe having in it a contraction of the passage therethrough for the regulation of the flow of fluid, and a petcock in said pipe *E* above said contraction, said contraction permitting the flow of steam but 75 not of water, substantially as and for the purposes set forth.

4. In an automatic boiler-feeder of the character described, the combination with the boiler *A*, tank *B*, water-supply pipe *D*, and 80 steam-pipe *E*, terminating at its lower end in the boiler at about the normal water-level, of the regulating-valve *R*, having the contracted passage or port  $r^2$  in its body, the slide *r*, provided with the port  $r'$ , arranged to register 85 more or less with the port  $r^2$ , and means for adjusting said slide with its port  $r'$  relatively to the port  $r^2$ , whereby the passage is contracted so as to permit the flow of steam but not water, substantially as and for the pur- 90 pose set forth.

5. In an automatic boiler-feeder of the character described, the combination with the boiler *A*, tank *B*, water-supply pipe *D*, and 95 steam-pipe *E*, terminating at the lower end in the boiler at about the normal water-level, of the regulating-valve *R* having the contracted passage or port  $r^2$  in its body, the slide *r* provided with the port  $r'$  arranged to register more or less with the port  $r^2$ , and the 100 eccentric  $r^3$ , attached to said slide for adjusting the same with its port  $r'$  relatively to the port  $r^2$ , said valve serving to contract the passage in the pipe *E* so as to allow steam but not water to pass, substantially as and for 105 the purpose set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JOHN KIRKWOOD.

Witnesses:

JAS. A. CAMPBELL,  
HARRY E. KENDALL.