

Steam-Boiler Water-Feeder,

Patented Aug. 28, 1841.



Inventor

UNITED STATES PATENT OFFICE.

ETHAN CAMPBELL, OF NEW YORK, N. Y.

APPARATUS FOR SUPPLYING STEAM-BOILERS WITH WATER.

Specification of Letters Patent No. 2,233, dated August 28, 1841.

To all whom it may concern:

Be it known that I, ETHAN CAMPBELL, of the city, county, and State of New York, philosophical engineer, have invented and made and applied to use certain new and useful improvements in means of supplying steam-boilers with water by attaching to such boilers a self-acting feeding apparatus independent of pumps of any kind and applicable in various forms or modes to any of the several descriptions of boilers now in use, for which improved means I seek Letters Patent of the United States, and that several modes of constructing, attaching, and using the said apparatus are fully and substantially set forth and shown in the following description and in the drawings attached to and making part of this specification; wherein—

Figure 1 is a skeleton plan on the line 1, 2, on Fig. 2; which is a sectional elevation of the parts. Fig. 3 is a general plan of the parts, attached to the boiler, and Fig. 4 is a general elevation of the boiler and parts for use, as first made and used by me.

The other figures in the drawing are hereafter separately referred to; and the same letters and numbers, as marks of reference, apply to the same parts in all the several figures.

A, is a common upright cylinder boiler; or may be any other form of boiler.

B, is the fire chamber; *a* the grate bars; *b* is the flue way; *c*, *c*, are common gage cocks; *d*, the water line in the boiler.

C, is a buoy float, made of any proper form and material, and constructed so as to allow the introduction of a quantity of lead to give the needful weight and immersion for the required purposes. This buoy float is mounted on a guide rod *e*, the lower end of which slides in a guide carriage *f*, below the boiler; the upper end of the rod *e* passes out of the boiler and slides in the stuffing box *g*; and above that is connected to the steelyard lever *h*; this is jointed on the small standard *i*, and carries the descending valve rod *k*, the lower end of which slides in the stuffing box *l*, and carries the inner feed valve *m*, mounted in a seat in the inner connecting or feed pipe *m*¹; next this is the valve way and outer valve seat *n*, which contains the outer feed valve *o*, made as a screw valve, for purposes hereafter stated; and opening from the crooked outer connecting pipe *p*. These parts are shown in plan; in

the detached Fig. 5; the other end of the outer connecting pipe *p* is connected and opens into the lower end of the feeding cylinder D, made of metal, air and water tight. Within this is a small guide frame *q*, through the center of which passes a vertical rod *r*, made with a cross *r*¹ at the lower end; and a cross *r*² next below the frame *q*; the lower cross *r*¹ is fitted to allow of the feeding float E, having the rod *r* passed through a tube in the float, on which the float slides up and down and then the cross *r*¹ is screwed fast.

On the underside of the top of the cylinder D, a small hanging standard *v* carries one end of a counter valve lever *u*, through which the rod *r* passes, with a collar below the lever *u*, and above this the rod *r* has an expansive spiral spring between the lever *u*, and a second collar, and above this finishes in the steam valve *w* opening upward toward the boiler; the other end of the lever *u* carries the rod and water valve *x*; the steam pipe F allows steam to pass from the boiler to the cylinder by the valve *w*, and the screw valve *y* allows, or shuts off, the access of steam to the cylinder D when the valve *w* is shut. The curved water pipe *a*¹ leads to any reservoir, or supply of water, and has at the top a funnel G, with a screw valve *z* between the pipe and funnel; at the bottom of the pipe *a*¹ is a counter valve *a*², to retain the water in the pipe, and below this a perforated ball, or rose strainer *a*³, to prevent loose or foreign substances passing in.

When thus constructed and fitted to the boiler, this apparatus is to be used as follows. The screw valve Z, in the funnel G, and the steam valve *y*, are to be opened, the float will be at the bottom of the cylinder D, (as shown by dotted lines) on the cross *r*¹, the water valve *x*, open, the steam valve *w*, shut the screw feed valve *o* open, and the buoy float *c*, being unsupported by water, will be down, and the feed valve *m* will be open. Water is now to be poured through the funnel G, in sufficient quantity to pass through the pipes *p*, and *m*¹, and partially fill the boiler.

Fire is now to be applied, to raise a small pressure of steam, and when this is enough to drive out the air from the cylinder D, by the valves *y*, and *z*, these are to be closed, the funnel G, is now to be filled with cold water, and the valve Z, opened again. This

will allow the cold water from the funnel to enter and condense the steam in the cylinder D, and the valve Z is to be quickly closed again, to shut out the air; the water in the reservoir will now rush in, through the pipe a^1 , to fill the vacuum in the cylinder D, and continue to run into that, and flow through the pipes p , and m^1 , until the boiler is so far full, that the buoy float C, rises and shuts the valve m . The water will still flow into the cylinder D, until it raises the float E, up to the point where it strikes the cross r^2 , and then the buoyancy of the float E, will carry the rod r , up and open the steam valve w , closing the water valve x , at the same time; the pressure of the steam from the boiler will now equalize itself in the boiler and cylinder D, and the water will go off to supply the boiler by the difference of level or hydrostatic pressure through the pipes p and m^1 as the progress of evaporation causes the float C, to descend, and open the valve m and this will continue, until the float E, again resting on the cross r^1 , draws down the rod r , shuts the steam valve w and opens the water valve x . The water in the pipe a^1 , will now enter by the valve x , and condense the steam in the cylinder D, causing a vacuum, which the water from the reservoir will again rush in, to fill up, and raise the float E, until the operations before described are repeated; from this point, the feeding of water into the boiler will be continuously repeated, whenever the water in the boiler sinks by evaporation, so as to lower the float C, and open the valve m .

It is not necessary to have the feed valves o , and m , outside the boiler, when only used for feeding the water into the boiler, as one of my arrangements has been made, to place all that part of the apparatus entirely inside the boiler, thereby avoiding the friction of the stuffing box g , and making the valves o , and m , water valves, as shown in the detached Fig. 8, wherein a third valve o^1 , is placed in the pipe p outside the boiler to serve the purpose of extinguishing fire as hereafter alluded to.

In all cases, where it may be convenient, it will be the best mode to place the float C, with the rods and lever and the valves m , and o , in a separate vessel, as shown in the detached Fig. 12, wherein I, is an intermediate cylinder, between the feeding cylinder D, and the boiler x , and connected to the boiler by the water pipe K, and steam pipe L, the other references remaining the same, and the apparatus retaining the same effect, as if it were within the boiler, with these advantages, that it is capable of supplying more than one boiler, it is more readily accessible for examination, adjustments, or repairs, as the communication to the boiler may be closed by the valve s , and t , and

when applied to the boilers of marine steam engines, the movement of the buoy float C, will be scarcely affected (if at all) by the rolling or pitching of the ship. This mode of fitting will be found the best in practice with any sort of boiler when it can be used conveniently. On the rod r , above the frame g , a latch catch 3, and on the frame g , a hooked latch 4, may be fitted; the tail of this keeps the latch hook 4 to the rod r , when ascending or descending until the catch 3, comes down so as to allow the hook to catch it, and hold it in this position, with the water valve x , open and the steam valve w shut until the float E, rises so as to lift the tail and disengage the latch 4, from the catch 3. This mode of keeping the water valve x , open, and the steam valve w , shut, is shown in the detached Fig. 7.

In place of the crooked latch 4, a beaked latch may be used, as shown in the detached Fig. 11, by which the steam valve w may be kept closed, the latch coming on the collar r^2 , on the rod r , by the descent, and being released by the ascent of the float E, in the same way, as the latch 4, and catch 3, or, instead of these, a spiral expansion spring t^2 , equal to the weight of the rod and valve may be placed round the valve rod r , between the frame g , and a collar r^3 , and if needful, another spring t^3 , equal to the weight of the lever u , and valve x may be placed upon the stem above the water valve x , these will effect the opening of the steam valve w and close the water valve x on the rising of the float E, this mode of fitting is shown, in the detached Fig. 13, and is that which may be, generally, preferable in use, to any of the modes before described.

The valve r , Fig. 4 and o^1 , Fig. 8 has the rod made to screw through the stuffing box, with a shoulder above the valve, which allows it to slide in the valve when open, but when screwed down and the hose H attached as shown in Fig. 4, this portion of the apparatus may be used for extinguishing fire, by the steam driving out the water in the cylinder D, through the valve o^2 , and hose H, on to any incipient fire, the access of air being prevented by a reverse valve (not seen in the drawing) in the joint of the hose H, the movements of the float and valves within the cylinder D, being exactly the same as when feeding the boiler. For this application of the apparatus it is my intention to seek a separate patent.

In practice for this purpose it will be needful to have the outer valve o , Fig. 2, and o^1 , Fig. 8 fitted so, that it shall both move freely, and be readily screwed down, if found needful. Two modes of fitting this are shown in the detached Figs. 9 and 10, the first of which represents the valve, made with the lower stem piece as usual, but the body of the valve is hollow above, and has

an inverted cup screwed into it, with a head above, through which the cup receives the upper or movable stem, having on it, a bail, working within the chamber formed by the valve and cup, the upper and movable end of the stem, working through a screw, in the stuffing box above.

In Fig. 10, the top of the stem works in a round socket, made in the bottom of the upper or movable stem, the socket being made deep enough, to allow the play of the valve in work. By either of these, or by any similar mode, the valve *o* and the third valve *o*¹, can be made effective for its general purposes.

I do not intend to confine myself to the specific arrangements of the several parts, which are shown in the drawings, but to vary the same, as required, according to the form of boiler, or the particular situation, in which the apparatus is to be placed, still retaining the substantial character thereof.

I do not claim to have invented the valves, floats or cylinders, or any of the parts here-

in described as employed by me for these purposes. But

I do claim as of my own invention—

The several modes of combining the operations of the float *E*, and valves *w* and *x* to admit alternatively water and steam into the feeding cylinder *D*, and the mode of combining these parts with the float *C*, and valves *m* and *o*, so as to furnish a continuous supply of water to steam boilers of any form, including any mechanical variations in the arrangement of the parts, which shall be substantially the same as is herein described, in the means employed, and the effects produced.

In witness whereof, I the above named ETHAN CAMPBELL have hereunto set my hand in the city of New York this thirtieth day of September in the year one thousand eight hundred and forty.

E. CAMPBELL. [L. s.]

Witnesses:

WM. TERRELL,
JAMES E. TERREL.