

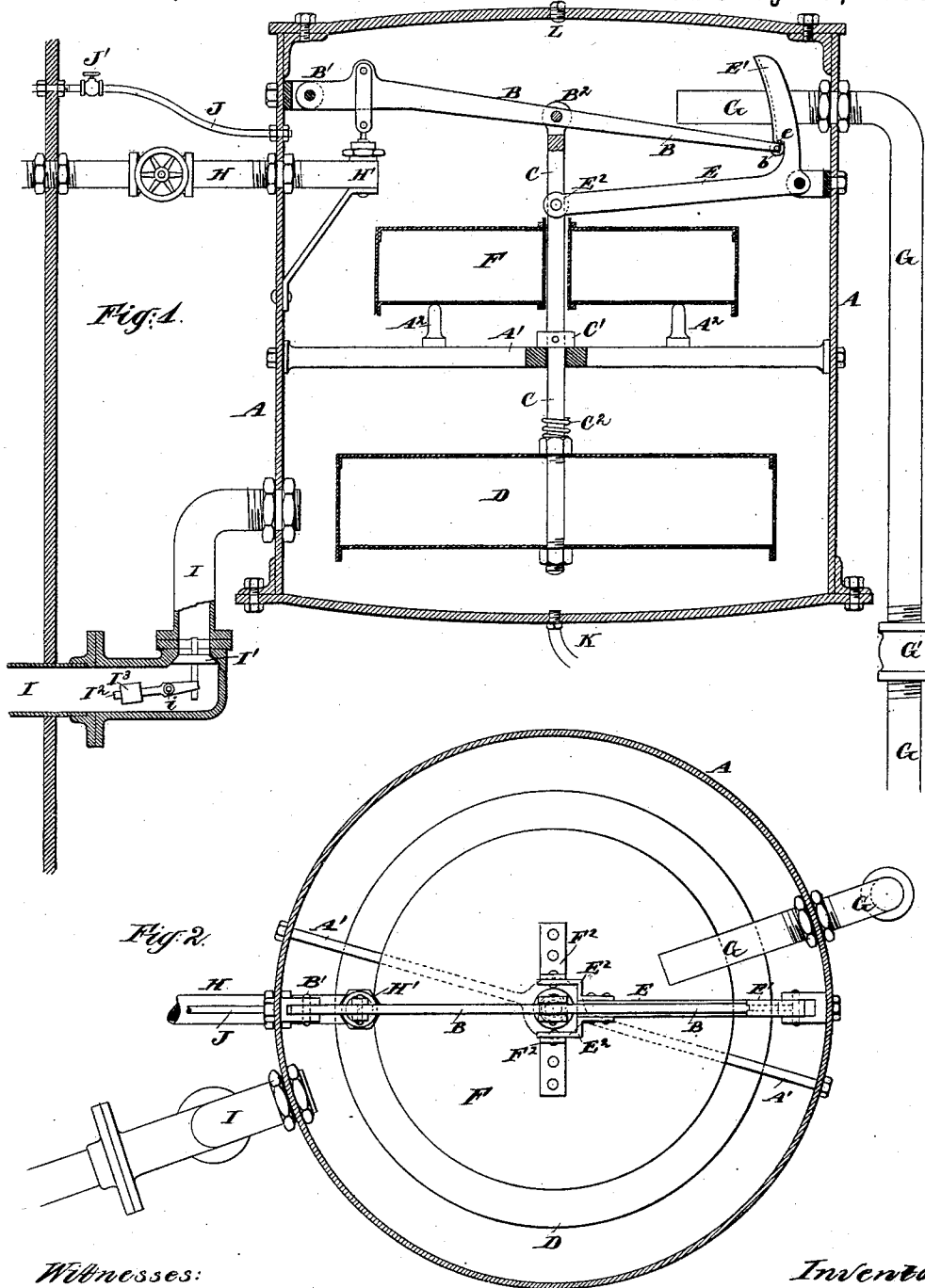
(No Model.)

T. T. CLARKE.

APPARATUS FOR FEEDING STEAM BOILERS.

No. 346,146.

Patented July 27, 1886.



Witnesses:
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UNITED STATES PATENT OFFICE.

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APPARATUS FOR FEEDING STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 346,146, dated July 27, 1886.

Application filed April 3, 1886. Serial No. 197,647. (No model.) Patented in England June 6, 1885, No. 6,892.

To all whom it may concern:

Be it known that I, THOMAS TRACY CLARKE, of Meldrum, Kilbeggan, in the county of Westmeath, Ireland, gentleman, a citizen of the United Kingdom of Great Britain and Ireland, have invented a certain new and useful Apparatus for Automatically Feeding Steam-Boilers; and I do hereby declare that the following is 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.

The construction and operation of my said invention will be readily understood by referring to the accompanying drawings, in which—

Figure 1 is a central vertical section showing the mode of application and connections of the apparatus with a boiler on the left-hand side; and Fig. 2 is a plan of the apparatus with the top removed.

Similar letters of reference indicate corresponding parts in both the figures.

A represents a chamber of any suitable material and size.

B is a lever working on a knuckle-joint, B', attached to the side of the chamber. At a point, B², of this lever is suspended by a vertical rod, C, the float D. To the opposite side of the chamber is pivoted a second lever, E, provided with a curved tail-piece, E', the front of which is grooved, as indicated by the dotted lines, to enable the free end of the lever B to slide therein, as hereinafter described. In order to facilitate this sliding motion, a small roller, b, is provided on the end of this lever. To the free end of the second lever E is suspended a second or upper float, F, through the center of which the rod C passes freely. The end of this lever E is forked, as shown at E², Fig. 2, and pivoted to brackets F² on the upper face of the float F.

A' is a guide-stay for the purpose of retaining the rod C in a central vertical position.

C' is a collar fixed on the rod C, which acts as a stop and relieves the lever B of the weight of the float D when the latter falls to its normal position.

Between the float D and the guide-stay A' is inserted a spiral spring, C², which serves to reduce the concussion caused by the too

sudden rise of the float immediately the lever B is released.

A² A² are two studs, attached to the guide-stay A' for the purpose of receiving the weight of the float F.

The suction-pipe G connects to the chamber A, as shown.

H and I are steam and water pipes communicating with the boiler, as shown. The steam-pipe is provided with an easily-movable piston-valve at H'. The water-pipe I is provided with a delicately-balanced check-valve, I', opening downward, the weight of which is supported and slightly overbalanced by a lever, I², turning on a center, i, and carrying an adjustable weight, I³.

J is a charging or blow-through pipe controlled by a cock, J'. Through this steam is admitted to the chamber in the first instance in order to create a vacuum, as hereinafter described.

K is a pipe for draining the chamber when required.

L is an air valve or plug on the top of the chamber for the purpose of blowing out air with a portion of the uncondensed vapor.

The feed-pipe G, which brings cold water from a tank at a lower level (not represented) is provided with a check-valve at G'.

Now, the action of my invention may be briefly described, thus: Having fixed and connected the apparatus to the boiler steam is in the first instance admitted into the chamber through the pipe J, then the cock J' is shut, and by the natural cooling and condensation a vacuum is created in the chamber. Water will then rise and enter through the suction-pipe G. As it fills the chamber it exerts a tendency to raise the float D; but since the lever B, to which the float is attached, is locked by the shoulder e in the tail-piece E', as shown, it cannot rise until the water has risen far above D and lifted the upper float F, thereby throwing back the tail-piece E' and freeing the lever B. As the end of the lever rises in the end of the tail-piece E' the valve H' will open and steam will rush into the chamber, destroying the vacuum, so that the influx of feed-water is stopped. When the pressure in the chamber A is fully raised to that of the boiler, the water in the chamber being higher

than that in the boiler will flow through the
 pipe I into the boiler, and as the water-level
 in the chamber A sinks, the levers B and E,
 having their floats no longer supported, will
 5 return to their original condition, when the
 apparatus is ready again to work automati-
 cally. It is obvious that as the water sinks
 in the chamber A, the float F will remain in
 its elevated position, owing to the tail-piece
 10 E' pressing against the lever B, and will re-
 main so until the water sinks to such a point as
 to cause the lower float, D, to drop to its nor-
 mal position, then the float F will fall and lock
 again the lever B as before. The latter portion
 15 of the descent of the lower float, D, will, when
 the apparatus is working properly, be delayed
 until the water-level in the boiler has sunk a
 little. The balance-valve I' being of consider-
 able area and delicately balanced will offer
 20 but trifling resistance to the flow of the water
 into the boiler so that the water-level in the
 chamber A will be practically the same as in
 the boiler. The weight of the upper float, F,
 depending on the lever E, induces a pressure
 25 against the end of the lever B, so that not-
 withstanding the roller to reduce friction the
 lower float, D, will be partially suspended.
 The conditions are such that as the water
 sinks, the lower float, D, follows it, but main-
 30 tains a position a little above the proper line
 of floatation. When under these conditions
 the water in the boiler, and consequently in
 the chamber A, has sunk to the proper level, the
 lower float, D, will, notwithstanding its partial
 35 suspension, have sunk sufficiently to bring its
 roller *b* down to the shoulder or offset *e* in the
 arm E'. When this condition is attained, the
 least further sinking of the water brings the
 roller *b* below the shoulder *e*. When this con-
 40 dition is attained, there is a prompt and con-
 siderable movement. The upper float, F,
 drops freely until it is supported on the stops
 A² A². At the same time the lower float, D,
 being relieved from the partial suspending-
 45 force before experienced, and, on the contrary,
 pressed downward by the engagement of the
 offset *e* over the roller *b*, drops promptly a
 few inches down to and perhaps a little below

the ordinary line of floatation, the parts be-
 ing so proportioned and the connection of the
 lever B to the piston-valve H' so adjusted
 50 that this prompt sinking movement which
 terminates the descent of the float D effects
 the complete closing of the valve H'. It should
 not shut at all until the roller *b* descends to
 and is engaged under the offset *e*. Then it
 55 should shut promptly and tightly. The cham-
 ber A being now filled with steam, on its con-
 densation a vacuum takes place, the water is
 again drawn up through the pipe G, and the
 60 operation is repeated. The apparatus con-
 tinues working automatically. While the wa-
 ter in the boiler is at its proper level, the float
 D is kept supported, and the apparatus stops
 working until the water in the boiler sinks to
 65 its normal level.

Having now described the nature of my
 said invention, I would have it understood
 that what I claim is—

1. In an apparatus for automatically feed-
 70 ing steam-boilers, the chamber A, having
 steam-inlet pipe J, the self-acting valve, I',
 balance-lever I², and weight F' controlling the
 water-pipe I, in combination with the steam-
 valve H', adjusted as shown, and with the
 75 lower float, D, and connected lever B, and
 with the upper float, F, and connected lever
 E, the latter having an offset, *e*, to engage the
 point *b* of said lever B, all arranged for joint
 operation, substantially as herein specified. 80

2. In an apparatus for automatically feed-
 ing steam-boilers, the steam-supply pipe J
 and controlling means J', in combination with
 the chamber A and blow-through valve L,
 and with the levers B and E, floats D and F,
 85 and suitable water and steam connections G,
 I, and H, arranged for joint operation as here-
 in described.

Dated this 26th day of February, 1886.

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