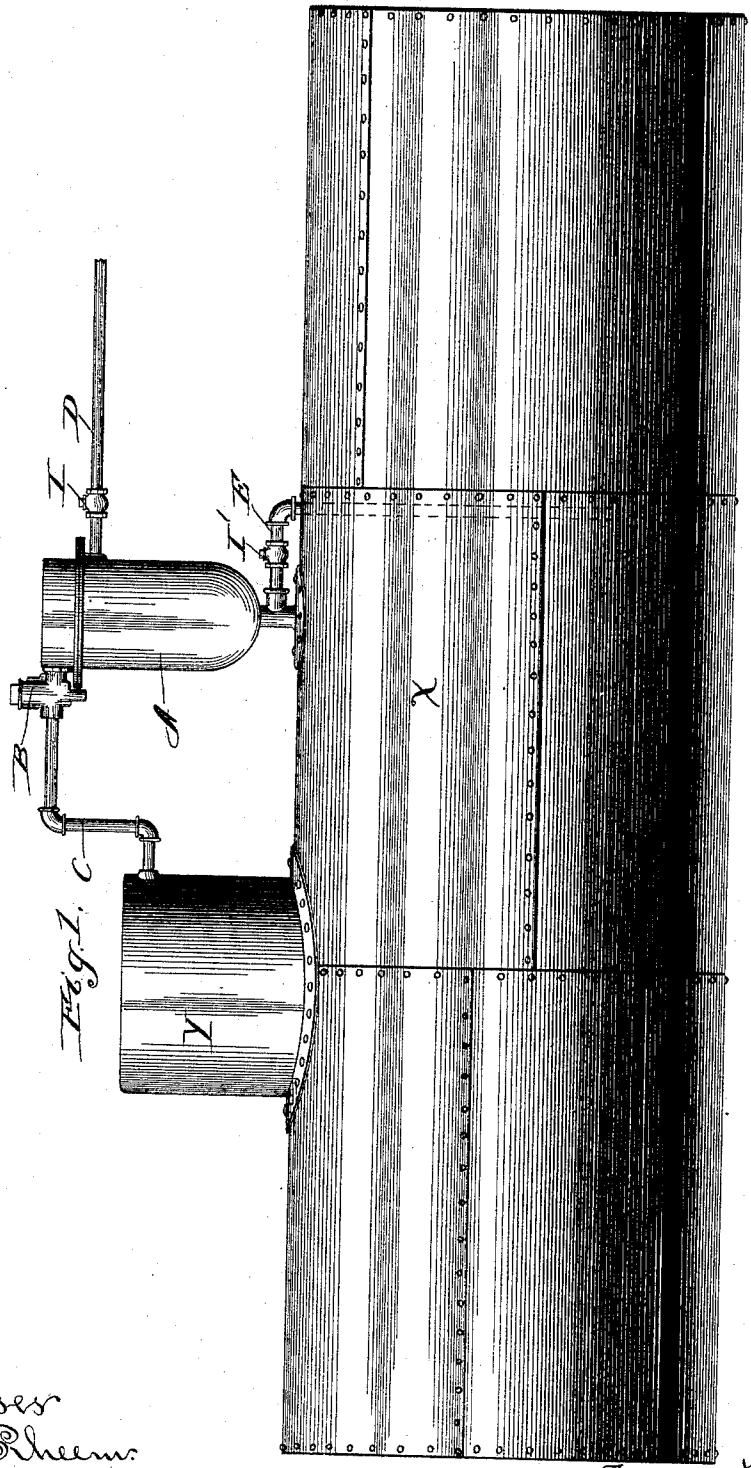
(No Model.)

2 Sheets—Sheet 1.

C. E. VAN AUKEN.

BOILER FEEDER.

No. 487,305. Patented Dec. 6, 1892.



Witnesses
Wm. A. Rheem.
Wm. F. Hemming

Inventor
Clarence E. Van Auken,
By Charles Turner Brown, Atty.

(No Model.) 2 Sheets—Sheet 2.

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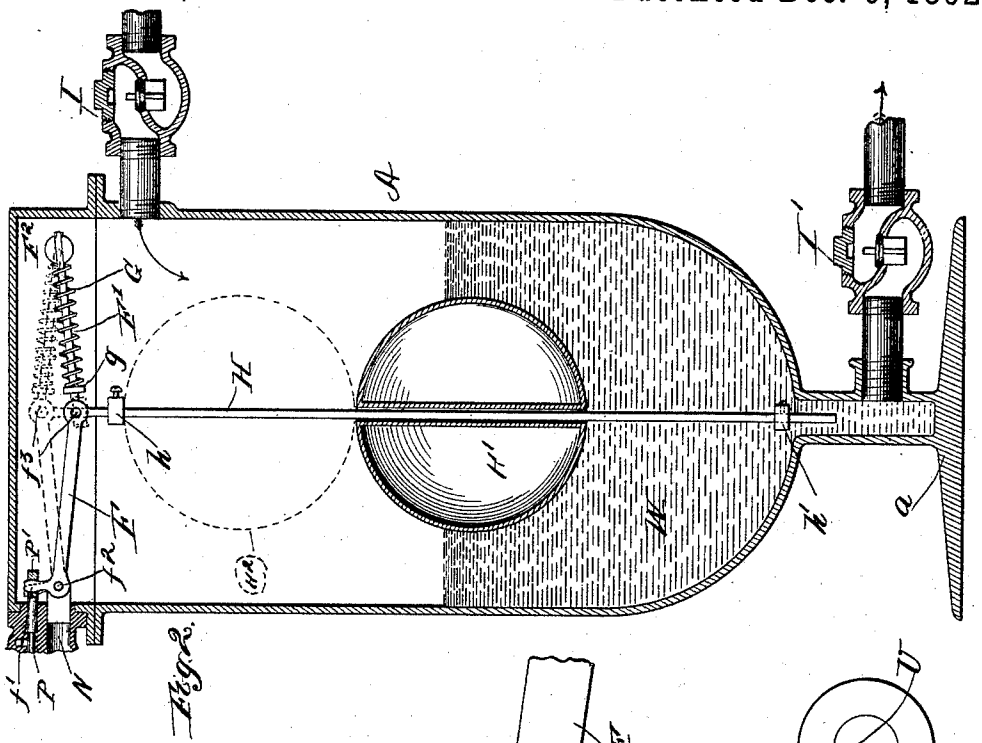

Fig. 2.

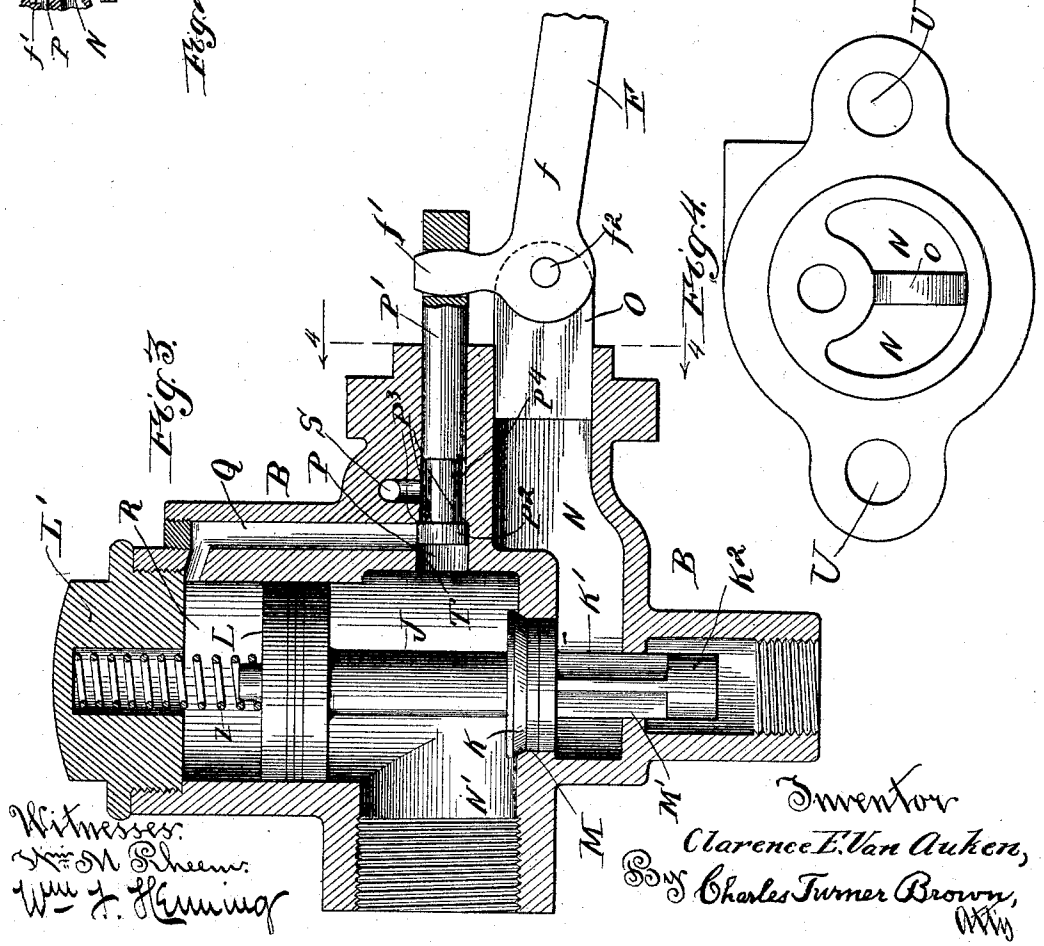

Fig. 3.

Fig. 4.

Witnesses:
Wm. M. Sheem.
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Clarence E. Van Auken,
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UNITED STATES PATENT OFFICE.

CLARENCE E. VAN AUKEN, OF CHICAGO, ILLINOIS.

BOILER-FEEDER.

SPECIFICATION forming part of Letters Patent No. 487,305, dated December 6, 1892.

Application filed April 9, 1892. Serial No. 428,452. (No model.)

To all whom it may concern:

Be it known that I, CLARENCE E. VAN AUKEN, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Automatic Boiler-Feeders, of which the following, when taken in connection with the drawings accompanying and forming a part hereof, is a full and complete description, sufficient to enable those skilled in the art to construct and use the same.

The object of my invention is to obtain an automatic boiler-feeder, into which water may flow intermittently and not under pressure and from which such water shall be, when the shell or case forming such automatic boiler-feeder is substantially filled thereby, automatically discharged into the boiler against the pressure contained therein whatever the same may be.

In the drawings referred to as forming a part of this specification, Figure 1 is an elevation of a boiler and of a device embodying my invention secured thereon and showing by dotted lines so much of the pipe extending from such device into the boiler as is contained therein; Fig. 2, a vertical sectional view of the shell or case of the reservoir of the device and of the parts contained therein; Fig. 3, a vertical sectional view of the valve forming a part of the device on an enlarged scale, and Fig. 4 a cross-sectional view on line 4 4 of Fig. 3.

The same letter of reference is used to indicate a given part where more than one view thereof is shown in the several figures of the drawings.

X is the boiler, and Y is the steam-dome thereof.

A is the shell or case forming a part of the device embodying my invention; B, the valve forming a part thereof; C, a pipe extending from the steam-dome Y to valve B; D, a pipe extending from the feed-supply into the shell or case A, and E a pipe extending from the shell or case A into the boiler X. The feed-supply from which pipe D extends may be a reservoir containing water of condensation from exhaust-steam or other water, as desired.

The shell or case A, forming the reservoir, is for convenience mounted on base *a*, adapted to fit on the top of the boiler X and be riveted thereto; but it is not essential that such shell or case A be mounted on the boiler, as it may be placed in any position adjacent to the boiler convenient or desirable.

In the shell or case A there is contained the right-angled lever F, having arms ff', fulcrumed on pivot f^2, and to the free end of such lever F there is attached by pivot f^3 the lever F′, the other end of such lever F′ sliding freely into rotatable socket F^2.

G is a spring on rod F′, abutting at one end against stop *g* and at the other end against the rotatable socket F^2.

H is a rod suspended from pivot f^3, such rod having thereon stops h h' and float H′.

The valve B is actuated by the right-angled lever F, as will be hereinafter explained. The movement of such lever F and the manner in which such movement is obtained and controlled will, however, be here explained. The float H′ in shell A floats upon the water W contained therein, and as water flows into the shell through pipe D from the feed-supply thereof such float rises with the water until it has assumed the position illustrated by the dotted circle, (lettered H^2,) when the upper edge of such float will be in contact with the under side of the stop h on rod H. Further rising of the water W will continue to carry the float therewith, together with the rod H and pivot f^3, to which such rod is secured, thereby turning the right-angled lever F on pivot f^2. As the right-angled lever F turns on its pivot f^2, the rod F′ will be forced or slid into the rotatable socket F^2 and the spring G thereby compressed until the pivot f^3 has passed above a point on the straight line joining pivot f^2 and the rotatable socket F^2, after which such spring can and will extend until the pivot f^3 has obtained its highest determined position. The spring G should be and is by me made of sufficient strength to maintain the levers F F′ in position, so that the pivotal point f^3 thereof will remain in substantially the place indicated by the dotted lines in Fig. 2, and hold suspended the rod H on such pivot f^3 until the whole or a substantial part of the float H is also suspended thereon, when, as will be hereinafter described, the water W recedes or flows from

the shell or case A through pipe E into the boiler X, such receding water carrying therewith the float H′. When, however, the float H′ rests upon the upper face of the stop *h*′, such float H′ and rod H are sufficient to overcome the resistance of the spring G, exerted in the manner herein described, and such float H′, rod H, right-angled lever F, and rod F′ will assume the position in which such rod H, right-angled lever F, rod F′, and spring G are illustrated by full lines in Fig. 2.

I is a stop-valve in the pipe D, opening toward the reservoir A, so as to permit water to flow from pipe D into such reservoir and to close against water or steam flowing from the reservoir into the pipe D, and I′ is a like stop-valve in pipe E, arranged to permit the water in the reservoir A to flow through pipe E in the direction indicated by the arrow at the end of such pipe in Fig. 2 and into the boiler and to prevent steam or water extending from the boiler X into the reservoir A. The valve B, interposed between the reservoir A and the steam-dome Y of the boiler, is actuated by the hereinbefore-described movement of the crank-lever F, so as to be alternately opened and closed to admit steam from the dome Y into the reservoir and to shut steam off from extending from such dome to such reservoir. When the crank-arm F is in the position indicated by dotted lines in Fig. 2, the valve B is opened, and when in the position illustrated by the full lines thereof such valve is closed. When the steam is shut off, as stated, water may flow into the reservoir A from pipe B, and when the valve B is opened, so that the steam can pass therethrough, such steam will enter the reservoir above the water contained therein, thereby closing the valve I and equalizing the pressure in the reservoir A with the pressure in the boiler X, and the water in the reservoir A will then flow by gravity into the boiler X until the float H′ has fallen, so as to shut off such steam. After the steam is shut off from entering into the reservoir A the steam contained therein may be exhausted therefrom through the valve B, as will be hereinafter shown, or may be allowed to remain in the reservoir A until it has formed water of condensation. In either event, the pressure being thereby relieved in the reservoir A, water will again flow into the reservoir through the pipe D, valve I′ being closed by the pressure of the contents of the boiler X against anything entering such reservoir from the boiler.

The auxiliary valve B, I have found very effective in practice, although I do not confine myself to the use of this particular form of valve in the construction of that portion of the device embodying my invention.

J is a plunger having at the lower end thereof valve K, spider K′, and valve K^2, and at the upper end thereof disk L.

l is a spring abutting against the disk L and against the cap L′. The purpose of this spring is merely to steady movement of the plunger J, valve K, spider K′, valve K^2, and disk L thereon, and may be omitted, if desired.

M is the valve-seat of valve K, and M′ is a hole forming the valve-seat of the valve K^2. The spiders K′ are of proper length, so that when the valve K is seated the valve K^2 is unseated sufficiently to allow steam to pass through it from reservoir A through passage-way N, and when valve K is unseated valve K^2 is seated, so that such steam cannot pass therethrough, but must extend through passage-way N into reservoir A. The disk L is larger in area than the valve K, and hence when steam is not contained behind the disk L the pressure of the steam in passage-way N′ of the valve B opens the valve K by moving disk L upward into chamber R.

O is an abutment in valve B, on which the right-angled lever F is pivoted, as hereinbefore described, and P is a passage-way in which is placed the piston P′, actuated by arm *f*′ of the crank-lever F.

P^2 is a valve on the inner end of piston P′, and P^3 is the valve-seat of valve P^2.

P^4 is a portion of the piston P of lesser diameter than the remainder of the piston, so that a passage-way is left between such piston at such part thereof and the wall of the passage-way P.

Q is a passage-way in valve B, extending from passage-way P to chamber R behind the disk L. S is an opening from passage-way P in that part of such passage-way in which is placed the part of piston P′, whereof the diameter is less than the diameter of the passage-way, as described, and forms, in connection with passage-way Q and portion of passage-way P, when the valve P^2 is unseated by the movement of the crank-arm F, an exhaust-passage for chamber R. When the piston P′ is pushed forward, and thereby valve P^2 unseated from seat P^3, such piston is again seated on or in seat T, and the passage-way Q is thereby closed.

When the several parts of the valve B are in the position illustrated by the full lines in Fig. 3, the valve P^2 is seated on seat P^3 and passage-way Q is opened into passage-way N′ and steam from the dome Y may and will enter the passage-way N′ and extend therefrom into passage-way Q and to chamber R, thereby closing the valve K, because of disk L being of greater area than said valve K. When the piston P′ is pushed forward, so as to close passage-way Q, as described, the steam contained in the chamber R can escape therefrom through exhaust S and the steam from the dome Y contained in the passage-way N′ will also, because of such disk L being of greater area than valve K, raise valve K from its seat and close valve K^2, and such steam will then enter the reservoir A. The valve B is secured to the reservoir A by bolts passing through holes U and corresponding holes in the cover of the reservoir A.

I have described my device as attached to

a steam-boiler having a steam-dome and have stated that the pipe C extends into the steam-dome. It is, however, evident that in boilers not having steam-domes the pipe C may extend to any part thereof above the water-line in such boiler, and, if desired, in a boiler having a steam-dome such pipe can extend to some other part of such boiler above the water-line therein.

It will be understood that the total quantity of water flowing through the pipe D from the feed-water supply into shell or case A should in no case exceed the quantity of water evaporated in boiler X. Where the herein-described apparatus is employed in returning to the water of condensation obtained from water evaporated in the boiler, the supply of water furnished through pipe D to shell or case A will be necessarily less than the quantity of water evaporated in boiler X. Where other than such water of condensation is supplied through pipe D to shell or case A and the quantity of water supplied is greater than the capacity of the boiler X to evaporate, such supply must be regulated and controlled, as by an ordinary valve in pipe D; but as the controlling of such supply is easily effected and forms no essential part of my present invention means for attaining the same are not herein illustrated or particularly described.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an automatic boiler-feeder, a reservoir having a pipe extending thereinto from the feed-water supply, a valve in such pipe permitting fluid to flow into the reservoir and preventing fluid from flowing out of the reservoir, and a pipe extending from a boiler above the water-line thereof, a valve interposed in such pipe between the boiler and the reservoir, and a pipe extending out of the reservoir to the boiler, having a valve therein, permitting fluid to pass from the reservoir into the boiler and preventing fluid from passing from the boiler into the reservoir, in combination with a lever in the reservoir fulcrumed at one end to a rigid abutment and at the other end pivoted to a second lever movably fulcrumed in a rotatable socket, a spring mounted on the second lever and abutting at one end against an abutment on the lever and at the other end against an abutment not connected to such lever, a rod suspended at the point of connection of the two levers within the reservoir, stops on the rod, and a float, the float adapted to slide between the stops and actuate the rod and levers when moved by water contained in the reservoir, and the first-named lever attached to and operating by its movement the valve interposed between the reservoir and the boiler, substantially as described.

2. In an automatic boiler-feeder, a reservoir, a pipe extending thereinto from the feed-water supply, a valve in such pipe permitting fluid to flow into the reservoir and preventing it from flowing out of the reservoir, a pipe extending from the reservoir to a boiler, a valve in such pipe, permitting fluid to pass from the reservoir into the boiler and preventing fluid from passing from the boiler into the reservoir, a lever in the reservoir, fulcrumed at one end to a rigid abutment and at the other end pivoted to a second lever movably fulcrumed in a rotatable socket, a spring mounted on the second lever and abutting at one end against an abutment on the lever and at the other end against an abutment not connected to such lever, a rod suspended at the point of connection of the two levers within the reservoir, stops on the rod, and a float, the float adapted to slide between the stops and actuate the rod and levers when moved by water contained in the reservoir, in combination with a valve attached to the reservoir above the water-line thereof, such valve consisting of a plunger, a valve on the plunger, and a disk on the plunger of greater area than the valve, a chamber above the disk, a passage-way extending from such chamber into the main passage-way of the valve between the valve and the disk, and a piston adapted to open and close the passage-way extending from the chamber above the disk, such piston actuated by the first-named lever contained in the reservoir, and a pipe extending from the valve to the boiler above the water-line of such boiler, substantially as described.

3. A valve for an automatic boiler-feeder, consisting of a casing, a plunger movable in the casing, having a valve at one end thereof and a disk of greater area than such valve at the other end thereof, a chamber above the disk, a passage-way extending from the chamber to the passage-way between the valve and the disk, a movable piston adapted to alternately close such passage-way extending to the chamber above the disk and to open the exhaust from the chamber, and a valve-seat for the valve, whereby when the piston is moved so as to open the passage-way into the chamber above the disk the valve on the plunger is closed on the seat therefor by the steam extending into such chamber, and when such piston is moved so as to permit the steam to be exhausted from such chamber above the disk the valve is opened by the pressure of the steam on the under side of the disk, substantially as described.

4. A valve for an automatic boiler-feeder, consisting of a casing, a plunger movable in the casing, having a disk at one end thereof and a valve of less area than such disk at the other end thereof, an extension on the under side of the valve, and a second valve on the end of such extension, a chamber above the disk, a passage-way extending from the chamber to the passage-way between the valve and the disk, a movable piston adapted to alternately close such passage-way extending to the chamber above the disk and to open the exhaust from the chamber, and valve-seats for such valves in the passage-

way extending from the valve-casing, such valve-seats being arranged so that when the valve of one thereof is seated the valve of the other is unseated, whereby when the piston is moved so as to open the passage-way into the chamber above the disk the upper valve on the plunger is closed by the steam extending into such chamber and the lower valve is opened, and when such piston is moved so as to permit the steam to be exhausted from such chamber above the disk the upper valve is opened and the lower valve is closed by the pressure of the steam on the under side of the disk, substantially as described.

CLARENCE E. VAN AUKEN.

In presence of—
CHARLES TURNER BROWN,
KATIE A. HARGADEN.