Sheet 1-2 Sheets.

C. H. Ford,

Steam-Boiler Water-Feeder

No. 52,115, Patented Jan. 16, 1866.

Fig. 2.

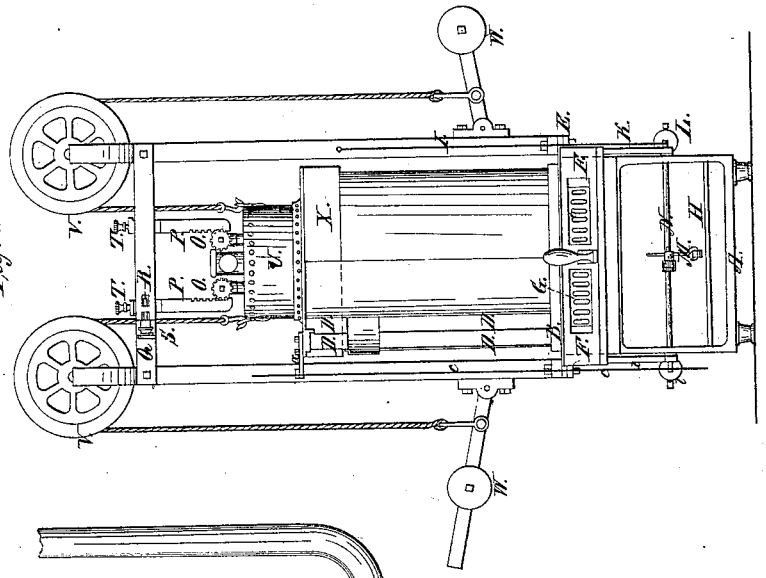
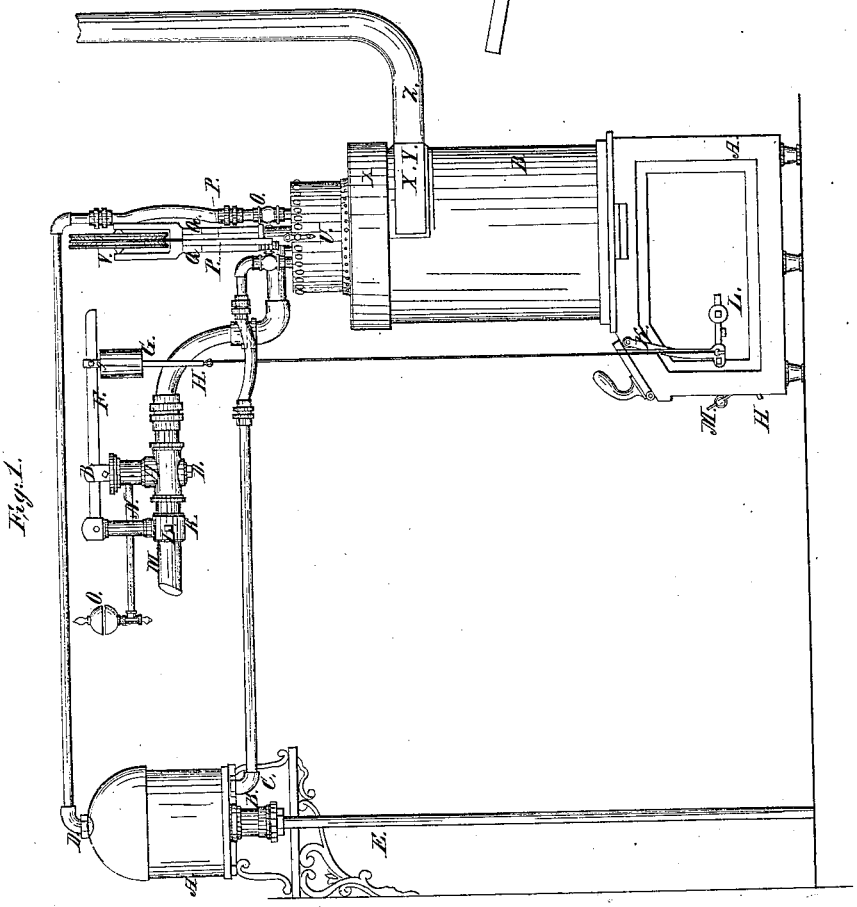


Fig. 1.



Sheet 2 · 2 Sheets.

C. H. Ford,

Steam-Boiler Water-Feeder,

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Fig: 3.

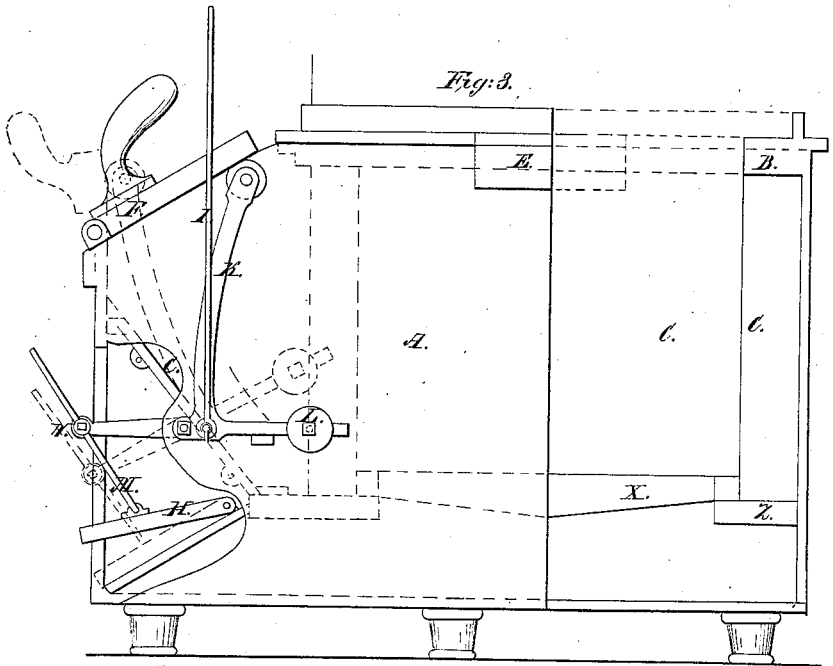


Fig: 4.

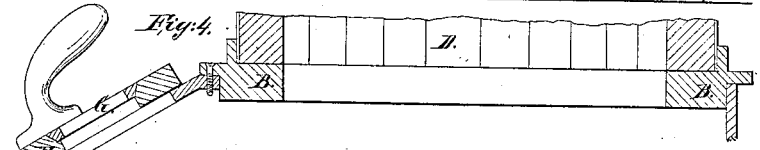
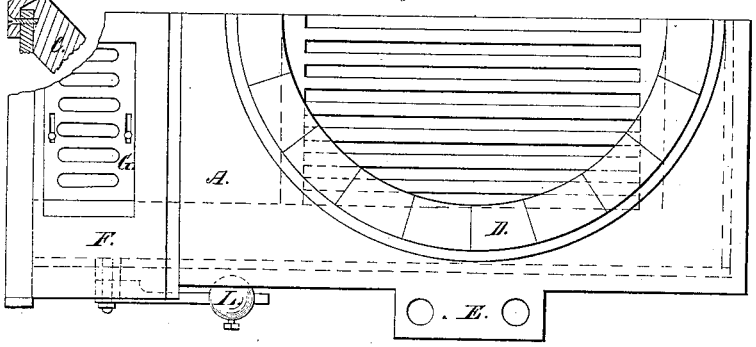


Fig: 5.



UNITED STATES PATENT OFFICE.

CHARLES HENRY FORD, OF BALTIMORE, MARYLAND, ASSIGNOR TO HIMSELF, HAYWARD HUTCHINSON, JESSE C. HUTCHINSON, AND ELIAS S. HUTCHINSON, OF SAME PLACE.

IMPROVEMENT IN AUTOMATIC STEAM-GENERATORS.

Specification forming part of Letters Patent No. **52,115**, dated January 16, 1866.

To all whom it may concern:

Be it known that I, CHARLES HENRY FORD, of the city and county of Baltimore and State of Maryland, have made a new and useful Automatic Steam-Boiler; and I do hereby declare the following to be a full, clear, and exact description of the nature, construction, and operation of the same, sufficient to enable one skilled in the art to which it appertains to construct and use the same, reference being had to the accompanying drawings, which are made part of this specification, and in which—

Figure 1 is a side elevation, and Fig. 2 is a front elevation, being partly in section to expose the working parts. Figs. 3, 4, and 5 are views of the furnace.

The invention consists in the means described for suspending and balancing a boiler above the fire in such a manner that it shall be depressed or raised, respectively, by the supply or loss of water, and shall, by its vertical motion, be enabled to operate devices which regulate the supply of water and control the damper and furnace-openings which affect the consumption of the fuel and the area of the openings by which air is admitted to the fire.

In the drawings, Fig. 1 represents a side view of the furnace, boiler, steam-valves, &c.

A, Fig. 1, is the lower section of the furnace; B, the upper or jacket, to which is attached a smoke-box, Y, and pipe or flue Z. Both the upper and lower parts of the furnace are lined with fire-brick, as shown in Fig. 2, at D.

U is the steam-boiler, which has riveted to it a flange, supporting it, when at rest, on the upper part of the furnace, B. To this flange is attached a sheet-iron cylinder, of a few inches in depth, and an inch or two larger in diameter than the upper part of the furnace, and forms, in connection with the flange, a cap to prevent the escape of heat and smoke during the automatic action of the boiler.

V V are cords or chains attached, by hooks and lugs, to the boiler, and, passing over pulleys *v v*, are connected by suitable yokes and pins to the levers W W, which have weights movable and adjustable by set-screws, their fulcrums being attached to the iron supporters of the pulleys.

O O are ball-valves, of the usual construction and form, having pinion-wheels attached to their spindles, which operate by the racks P P. One of these valves is for the outlet of steam and the other for the inlet of water, and communicate with the feed-water apparatus, Fig. 6, by short pieces of flexible or jointed pipe, connected by couplings with the steam and water pipes C and D, indicated on the figure.

It will be perceived, by reference to Fig. 2, that the racks P P are affixed to bars connecting the two supports for pulleys, and are rendered accurately adjustable by means of screws, there being a slit in each bar, through which passes a stud, R, attached to the rack P P, and to the sides of the bars there are fixed supporters for micrometer-screws S S, which, passing through female screws in the studs, admit of the adjustment of the rack to the pinion laterally, while set-screws T, passing through a flange on top of the rack, answer a like purpose vertically, there being sufficient play in the studs allowed for the purpose.

On the top of the flange X of the steam-boiler, and conveniently situated in reference to the furnace-door and damper, is attached a holder, *x*, for a rod, *c*, Fig. 2. The upper end of this rod is threaded, and adjustable by a nut resting upon the holder. The lower end has a flat part, in which there is a slot, through which a pin attached to the damper apparatus passes, and at a given point is set in motion by the rod, as will be explained.

Figs. 3, 4, and 5 represent, in detail, the several parts of the apparatus for opening or closing the furnace doors and dampers.

The rod *c* passes from the holder *x* on the flange of the boiler, and is connected to an arm on the shaft N, by the rotation of which the furnace-door F and the damper H are opened and closed. This shaft N is rotated, as has been described, by the raising of the boiler; but it is likewise connected to the steam-pressure safety-valve lever by a rod, I, which I do not here particularly describe, as it forms the subject of a separate and contemporary application for patent. The shaft N has

rock-shafts on each end. The one on the left side, Fig. 2, is operated from the boiler, but is otherwise similar to the device shown in elevation in Fig. 1, and more explicitly in Fig. 3. Its upper arm, K, has a roller, which impinges upon the under side of the furnace-door to open it, and its lower arm has a counterpoise weight, L, to close it. This device is duplicated on the other side, the arm being designated by *k*, and the weight by *l*. In the middle of the shaft N is an arm, to which a rod, M, is attached, which, being connected to the damper H, opens and closes the latter on the rotation of the shaft N.

The operation of the complete apparatus may be now understood by the following explanation. The weight of the boiler with its attachments being known, and that also of the water when at the required level, the weighted levers W are adjusted so that the flange on the boiler rests upon the upper section of the furnace. On the loss, by evaporation, of an appreciable quantity of water, the weights W W exceed the weight of the boiler, and cause it to rise from its seat. In doing so the pinion-wheel O O, operated upon by the racks P P, open the valves, and steam from the one being admitted through a short piece of flexible pipe connected with it and the steam-pipe D of the feed-water apparatus, the other valve being also opened by similar means, the pressure of steam is equalized, and, by its own gravity, water from the cistern A flows into the boiler through the pipe C, connected, also, by a short piece of flexible pipe with the valve to which it leads, and this action continues until the boiler resumes its former state of rest. In descending, the pinions are again set in motion, and the reversed action closes the valves, which so remain until the action of the boiler, &c., again takes place.

The main steam-pipe for service is connected with the regulator by a flexible or jointed pipe.

The above device of water-supply is shown as a practicable mode, but forms the subject of a separate and contemporary application.

Any appropriate kind of boiler-supply may be used, the means for causing the influx and closing the supply being under regulation from the automatic boiler.

The steam and water connections with the boiler may be made by elastic pipe, or by hinged or jointed pipe, allowing a certain amount of play to the boiler.

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

1. A suspended boiler so arranged relatively to the fire and counterpoise-weights that by evaporation and loss of water, or by the influx of feed-water, it shall rise or fall, respectively, and by said motion actuate devices to open or close the apertures which regulate the supply of water, substantially as herein set forth.

2. In combination with a steam-boiler which is vertically adjustable, as described, the devices which operate to open and close the dampers or furnace-doors, whereby to control the draft or supply of air to the furnace, substantially as herein set forth.

CHARLES HENRY FORD.

Witnesses:
JOHN W. HUTCHINSON,
W. H. HAYWARD.