UNITED STATES PATENT OFFICE.

DAVID P. STEWART, OF BUFFALO, NEW YORK.

FEED-WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 232,563, dated September 21, 1880.

Application filed July 22, 1880. (No model.)

To all whom it may concern:

Be it known that I, DAVID P. STEWART, of the city of Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Feed-Water Heaters, of which the following is a specification, reference being had to the accompanying drawings.

The object of this invention is the construction of a simple and cheap apparatus, whereby the feed-water is brought into intimate contact with the exhaust-steam and thoroughly heated, and whereby the water is completely separated from the exhaust-steam before the latter is permitted to escape.

My invention consists of the particular construction of the device, whereby the exhaust-steam is brought in contact with the feed-water, and the combination of this device with the casing of the heater, as will be hereinafter set forth.

In the accompanying drawings, Figure 1 is a sectional elevation of my improved feed-water heater. Fig. 2 is a cross-section on an enlarged scale in line *x x*, Fig. 1. Fig. 3 is a bottom-plan view, on an enlarged scale, of the device, whereby the feed-water and exhaust-steam are brought in contact with each other.

Like letters of reference refer to like parts in the several figures.

A represents the case or shell of the heater, which may be of cylindrical or other suitable form, and be constructed of iron, wood, or other suitable material. As shown in the drawings, it is composed of a cylindrical shell, *a*, of sheet-iron, and an upper head, *b*, and lower head, *c*, constructed of cast-iron, and secured in the ends of the shell by rivets.

D is the exhaust-pipe which enters the upper part of the case A, preferably through the upper head, *b*, as shown, with its end opening downwardly.

E represents an enlarged extension of the exhaust-pipe, which is removably secured to the end of the latter within the casing A, either by a screw-thread, as shown, or by flanges and bolts. The end of the exhaust-pipe D is provided with an exterior screw-thread, which engages in an internal screw-thread formed in the opening in the head *b*, through which the pipe D passes, and is furthermore secured by a jam-nut, *f*, applied to the threaded portion of the pipe on the upper side of the head *b*, while the extension E is secured to the threaded portion of the pipe D, below the head *b*, as clearly shown.

G represents the feed-water pipe, which enters the casing A through its side and turns upward within the casing, and projects into the extension E of the exhaust-pipe, where it terminates in a conical spray-nozzle, H. The upright portion *g* of the feed-water pipe is secured with its lower end by means of a screw-thread in a bridge-piece, I, which is secured across the open lower end of the extension E by bolts *j*. The extension E is enlarged where it surrounds the nozzle H and upright portion *g* of the feed-water pipe, so that the flow of the exhaust-steam through the extension E is not obstructed or retarded by these parts.

K represents a pipe leading from the upper part of the casing A to the open air, and through which the exhaust-steam, which has not been condensed by contact with the feed-water, is permitted to escape.

L is the pipe, through which the heated feed-water passes from the lower part of the casing A to the feed-pump.

M is the waste-pipe, secured in an upright position in the lower head, *c*, and provided at its upper end with a valve, *n*, which is opened and closed by a lever, N, carrying at the end of its long arm a float, O. The mouth of the waste-pipe M is arranged at a considerable distance below the open end of the extension E, so as to leave a large space between the latter and the water-level, in which the steam issuing from the extension E can expand and free itself completely from the finely-divided feed-water, with which it is mixed.

The feed-water is broken up in the nozzle H into a fine spray and brought into intimate contact with the exhaust-steam in the extension E, which forms a mingling-chamber, in which the caloric passes from the exhaust-steam to the feed-water during the descent of the steam and water through the lower portion of the extension E. The mixture of steam and water issues from the latter in a downward direction, and all the watery particles are thrown down into the lower part of the casing A by the combined action of gravity

(No Model.)

D. P. STEWART.

Feed Water Heaters.

No. 232,563. Patented Sept. 21, 1880.

Fig. 1.

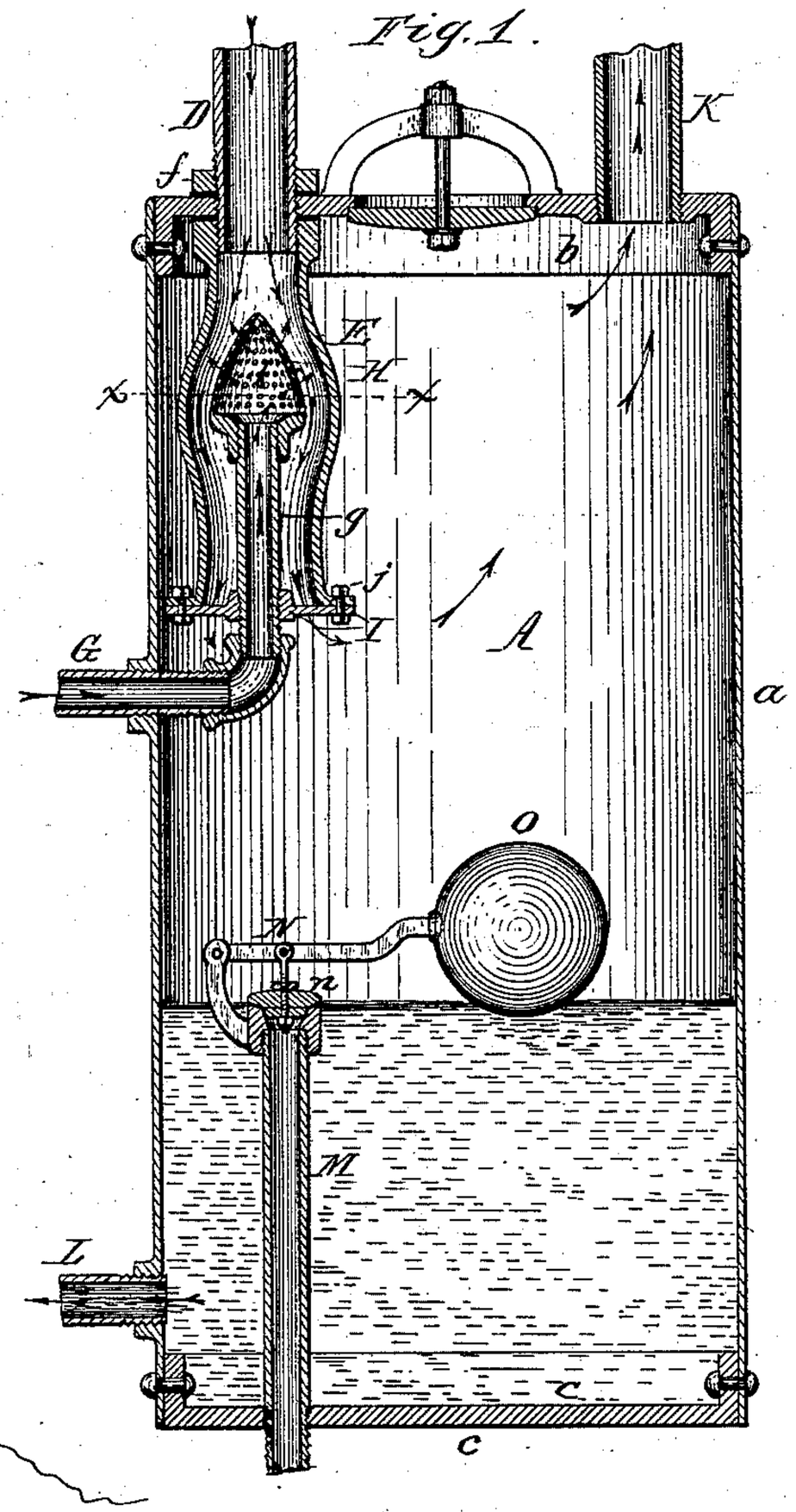


Fig. 2.

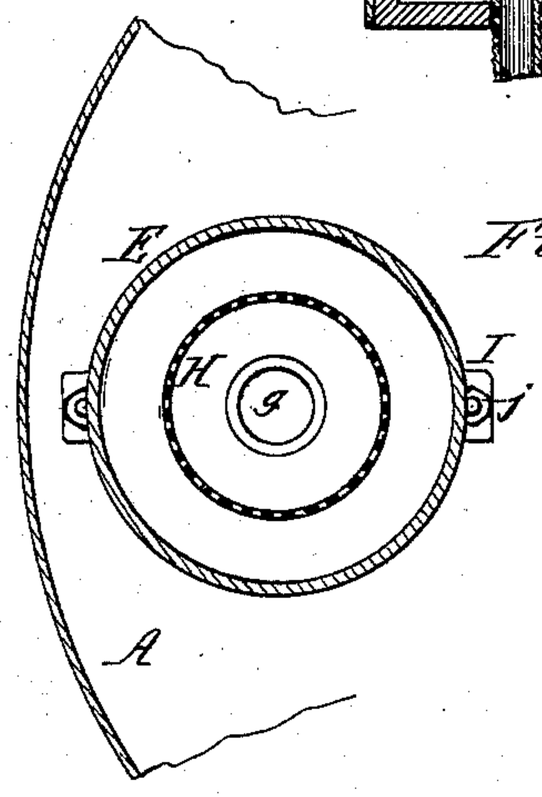
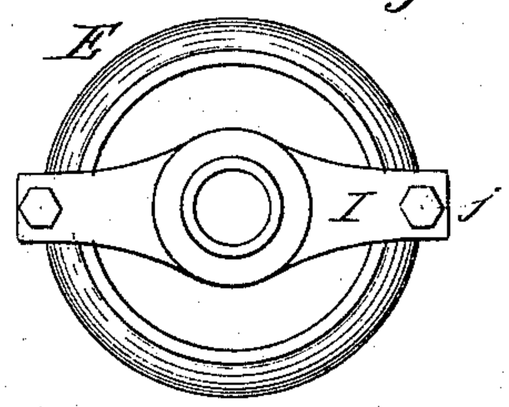


Fig. 3.



Witnesses:
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of a vibratory funnel, I, carrying a sieve, with the hopper B and funnel G, substantially as specified.

3. The combination of the hopper B, having a central vertical partition, with the partition C, having a central opening, the slide-valves E, the funnel G, the sieve H, secured upon a vibratory funnel, I, and the pitman R, connecting with the vibratory funnel by a connecting-rod and with the crank-arm of one of the actuating gear-wheels, substantially as specified.

In testimony that I claim the above I have hereunto subscribed my name in the presence of two witnesses.

PEARLEY J. SPRAGUE.

Witnesses:
JAMES W. HURST,
W. H. LIGHT.