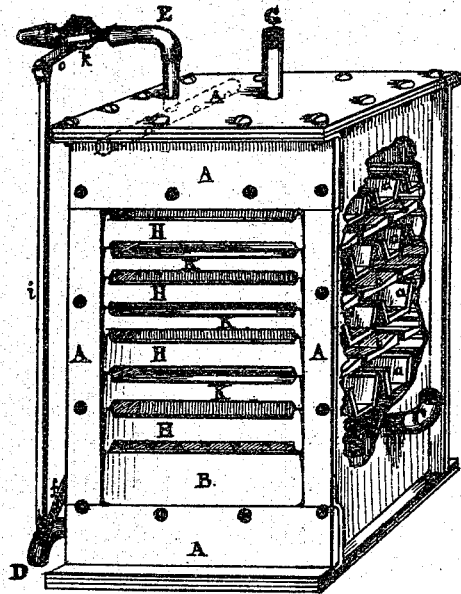


*H. Anderson,*

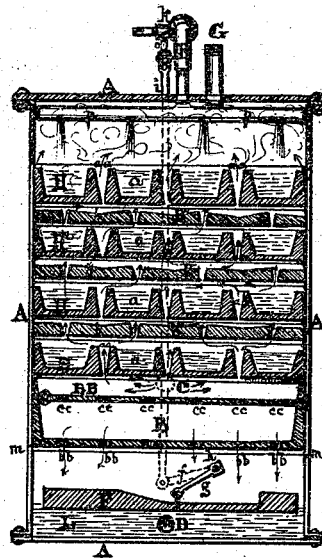
*Steam Boiler Condenser.*

*No. 107,850.*

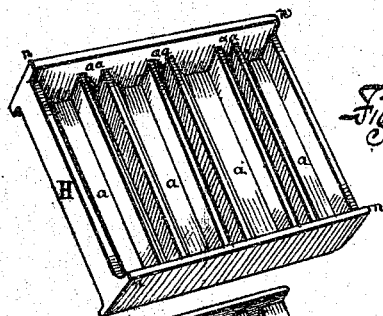
*Patented Oct. 4, 1870.*



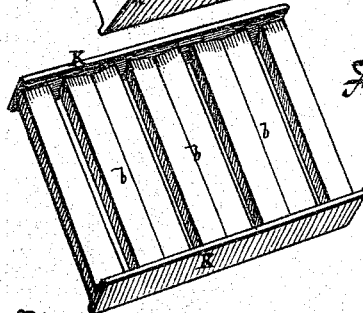
*Fig. 1.*



*Fig. 2.*



*Fig. 3.*



*Fig. 4.*

*Witnesses.*  
*Kenneth W. Kelly*  
*William L. Proff Jr*

*Harrison Anderson*  
*Inventor*

# United States Patent Office.

HARRISON ANDERSON, OF PEORIA, ILLINOIS.

Letters Patent No. 107,850, dated October 4, 1870.

## IMPROVEMENT IN FEED-WATER HEATERS.

The Schedule referred to in these Letters Patent and making part of the same.

*To all whom it may concern:*

Be it known that I, HARRISON ANDERSON, in the city of Peoria, in the county of Peoria, in the State of Illinois, have invented a new and useful Feed-water Heater and Lime-Separator for Steam-Generators; and do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the annexed drawing making a part of this specification, in which like letters of reference refer to like parts, and in which—

Figure 1 represents a perspective view, with the front plate removed.

Figure 2, a sectional elevation.

Figure 3, perspective view of one series of settling-troughs.

Figure 4, perspective view of one series of heating-troughs.

This improvement relates to the retention of the feed-water in a series of parallel troughs, arranged one above the other, separated by intermediate shallower troughs or heaters, to receive the falling water, retard it as much as possible, and offer a larger area for heating the same, and extracting the lime, &c.

A represents the shell of the heater, the sides being parallel, for convenience of the troughs, and having ledges at *m m* to retain the box B.

B is a removable box, with perforated bottom, occupying the whole of the lower area of the shell over the reservoir L, resting, as before said, on the ledges *m m*.

It has, near its top, a perforated tray, B B, which, in the drawing, is hinged to the box.

C is the induction steam-pipe, admitting steam just above the perforated tray B B, on which hay, straw, or other lime-separating material is placed.

D, the eduction water-pipe.

E, the induction water-pipe with a valve, *k*, moved by a lever connected with the float F, within the heater. Said pipe terminates within the heater, at the top, in a horizontal perforated pipe, *p p*.

F, a float attached by a staple or eye and lever to the arm *g* of an axle, to which latter, on the exterior of heater-shell, is fastened the lever *f*, which is connected by the rod *i* with the lever of the valve *k* of the induction water-pipe E.

G, escape-pipe for superfluous steam.

H H H H are a series of troughs, several being united in one set, (see fig. 3,) for facilitating their removal, &c., each set reaching from side to side of the shell A A, and placed one above the other, alternating with the heaters K K K. They may be made about three inches deep by five inches wide, each trough having a separating-space or crevice of about one-fourth of an inch or more, (represented at *a a*.)

The end strips are cast with a shoulder, *n n*, or extension upward and downward of the edges of the said end strips.

K K are sets of shallow troughs, called heaters,

united in sets, similar to H H, &c., intended to offer a large area for heating the inducted water.

The surface of each trough is slightly inclined toward the center, or gutter-shaped, *b b*, &c. They have similar openings between them, similar shoulders, and similar end pieces to those of the troughs H H, &c., and, like the latter, are of metal.

One set of these heaters is interposed between each set of the deeper troughs H H, &c., and so constructed and arranged that the center of each heater is under the opening between the troughs above.

The operation of this heater is as follows:

The steam is inducted through the pipe C under the lowest troughs; the water, through the pipe E and the openings in the perforated pipe *p p*, into the upper range of troughs H, &c., thence, running from these through the crevices *a a*, onto steam-heated "heaters" K, &c., which offer a large heating-surface for the water. This process is repeated until the water reaches the box B, leaving its sediment, lime, &c., in the troughs and heaters, that remaining being deposited on the hay, straw, or other material, placed for this purpose on the perforated tray B B, (see fig. 2,) the water finally reaching the reservoir L at the bottom of the shell A A.

By this arrangement, the advantage of a greater area is afforded by the wide and shallow heating-troughs K K, &c., which delays the too rapid fall of the water to the bottom of the heater before depositing its impurities; also, of the raising and retaining the water at that point (212°) below which it imperfectly deposits lime, &c.; also, the advantage of the float L in governing the too rapid receipt of water, and consequent obstruction of the action of the lime-separating devices.

What I claim as my invention is—

1. The combination of the troughs H H, &c., with the shallow heating-troughs K K, &c., as arranged, and substantially as and for the purposes described.

2. In combination with the troughs H H, &c., and the heaters K K, &c., the float F acting on the cut-off valve *k* in the induction water-pipe E, substantially as described.

3. The combination of the box B, with its tray B B, with the troughs H H, &c., and heating-troughs K K, &c., the shell A A A A, with ledges *m m*, steam induction-pipe C, water induction-pipe E, and its valve *k*; float F, lever *g*, axle *h*, lever *f*, rod *i*, and lever *o*, and water eduction-pipe D; all substantially as described.

In testimony that I claim the foregoing heater and separator, I have hereunto set my hand this 27th day of July, A. D. 1870.

HARRISON ANDERSON.

Witnesses:

HENRY W. WELLS,

WILLIAM L. MOSS, Jr.