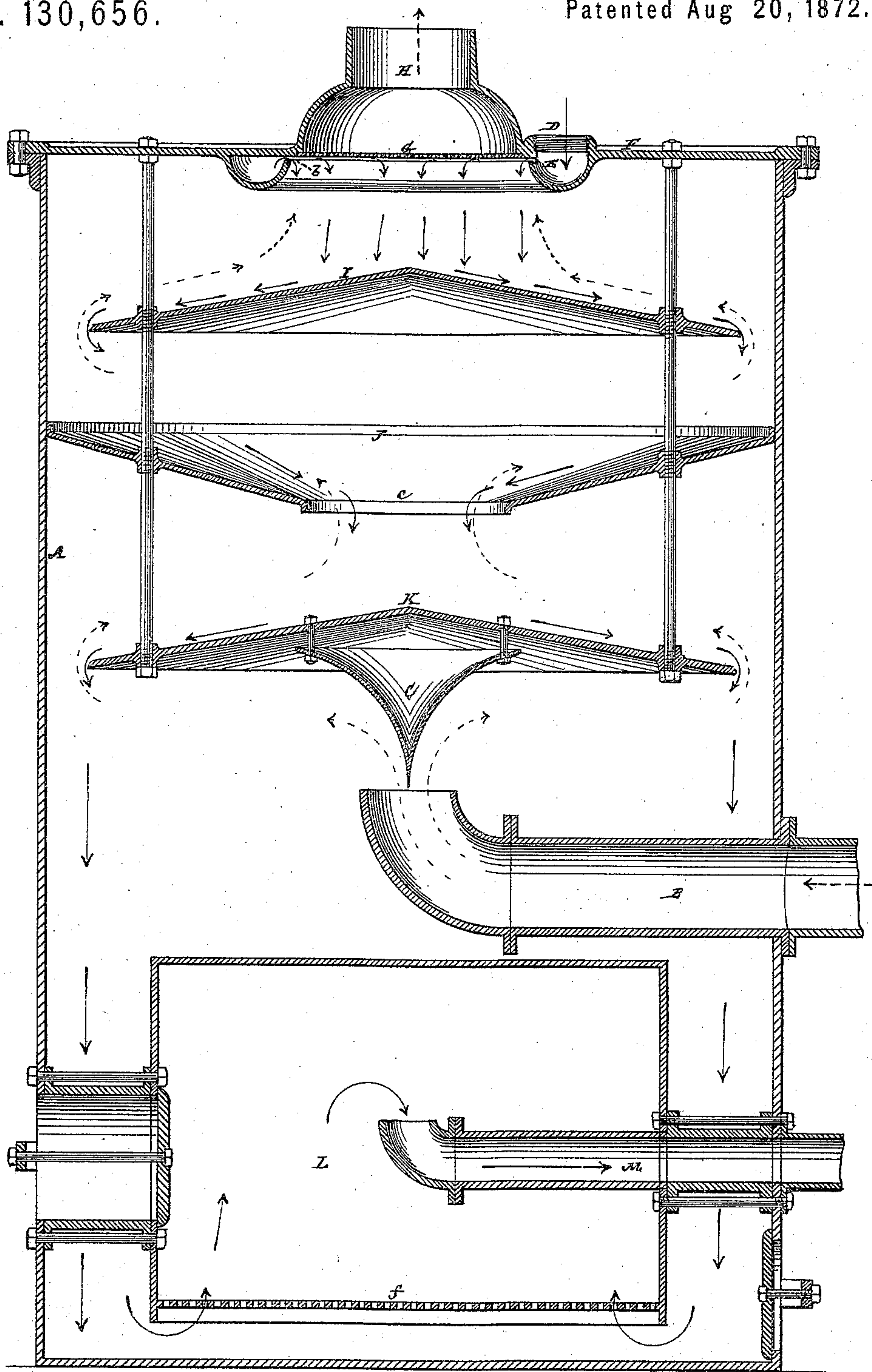


B. N. PAYNE & D. W. PAYNE.
 Improvement in Feed-Water Heater and Steam-Condensers.
 No. 130,656.

Patented Aug 20, 1872.



Witnesses:

Frederick Haynes
Wm. H. Ruben

Benjamin W. Payne
David W. Payne
 per *Wm. Lombard & Co* Attorneys

UNITED STATES PATENT OFFICE.

BENJAMIN N. PAYNE AND DAVID W. PAYNE, OF CORNING, NEW YORK.

IMPROVEMENT IN FEED-WATER HEATERS AND STEAM-CONDENSERS.

Specification forming part of Letters Patent No. 130,656, dated August 20, 1872.

Specification describing certain Improvements in Feed-Water Heaters and Steam-Condensers, the invention of BENJAMIN N. PAYNE and DAVID W. PAYNE, both of Corning, in the county of Steuben and State of New York.

This invention is mainly designed as a feed-water heater for steam-boilers, but is also applicable as a steam-condenser, or both combined, and, if desired, includes also the action of a filter to the water passing through it. The invention consists in various peculiarities of construction and combinations of details, whereby the apparatus generally as a heater and condenser is improved, the same including, among other features or elements, a perforated plate or surface to prevent the feed water from escaping with the steam used to heat the water, and which may be the exhaust steam of an engine; an advantageous mode of introducing the feed water in a thin sheet against a volume of escaping steam under conditions most favorable to the transfer of the heat in the latter; a system of cones or pyramids and truncated cones or pyramids, arranged so that the escaping steam is forced to pass through the water as the latter passes from one conical surface to another; also various attachments and combinations for facilitating the removal of the cones, the filtering of the water, and for spreading the steam at its entry within the heater.

The accompanying drawing, which forms part of this specification, represents a sectional elevation of a feed water-heater constructed in accordance with the invention.

A is the outer case or shell, which is arranged to occupy an erect position, and may be of cylindrical construction. B is the exhaust steam-pipe of an engine, fitted to enter the shell A at its side, and projecting within the same to or about its center, likewise bent to present an upward delivery. C is an inverted cone, arranged over the mouth of the pipe B, and serving to spread the exhaust steam as it enters the heater. D is the inlet for the feed water. This inlet communicates with an annular channel, E, on the under side of the top F of the heater, and which is in communication with the interior of the heater by a single or divided opening, *b*, on the inside upper edge of the channel, immediately below a perforated plate or surface, G, circumscribed

by the channel and covering the outlet H for the escaping steam. This perforated plate G serves to prevent feed water from escaping with the steam, thereby avoiding the waste of heated water and the unpleasantness of a shower or mist in the vicinity of the outlet for the exhaust steam, or such of the latter as is not condensed in its passage through the heater. The introduction of the feed water through the overflow opening *b* causes it to be forced in a thin sheet into and against a volume of escaping steam, where the water will absorb the most heat and the steam part with its heat most readily. I is a cone arranged below the perforated plate G at any suitable distance from it, and which may extend to within a short distance of the sides of the outer case or shell. Below this cone I is an inverted hollow truncated cone, J, having an opening, *c*, at its center. This hollow truncated cone may be of the same diameter as the interior of the shell. Below, again, the truncated cone J is another cone, K, similar to the cone I, and to which may be attached the steam-scattering cone C. Such system of cones and truncated cones may be extended so as to include any number, and the order or disposition may be more or less changed; but it is important that there should be no central continuous opening through the cones for the steam in its course to the outlet.

By this system or arrangement of devices for distributing and directing the courses of the water and steam in reverse directions, the one with the other, as shown by the arrows in full lines and dotted lines, the full-lined arrows representing the courses of the water and the dotted arrows those of the steam, not only is an advantageous distribution of the water and steam effected and the water caused to course in alternate outward and inward directions over and within the cones, but the escaping steam is forced to permeate the water as the latter passes from one cone to the other, and the steam and water brought into the most intimate contact, the passage of the steam past the outer edges of the cones, or certain of them, in a reverse direction to the flow of the water being a conspicuous feature. The cover F of the heater is made removable, and the several cones and distributing devices generally are attached to it, which facilitates the

cleaning of the heater on removing said top or cover.

L is a filter arranged near the bottom of the heater and insulated, as it were, within it, so as to form a mud-chamber in the bottom of the heater and insure a free exposure of all the sides of the filter for a free passage of the water down past the filter and up through its perforated bottom *f*, the filtered or pure and heated water finally passing off by a feed-pipe, M, to the boiler or elsewhere.

What is here claimed, and desired to be secured by Letters Patent, is—

1. The perforated plate or surface G, arranged within or at the receiving end of the outlet H for the escaping steam, substantially as and for the purposes herein set forth.

2. The channel E, arranged in relation with the outlet for the steam and provided with an overflow opening, *b*, whereby the feed water

is introduced in a thin annular sheet against or so as to intercept the escaping steam, essentially as described.

3. The combination of the perforated plate or surface G and steam-outlet H with the channel E and its overflow opening or outlet *b*, for introduction of the feed water to the heater, substantially as specified.

4. The cone C, in combination with the cones I J K, by which the water and steam are directed in their courses through the heater, all arranged as shown and described.

5. The steam-distributing cone C, in combination with the exhaust-pipe B within the heater, essentially as described.

B. N. PAYNE.

D. W. PAYNE.

Witnesses:

FRANCIS CRATSLEY,
A. S. KENDALL.