K. Frazer, 2 Sheets. Sheet 1.

Steam Boiler Condenser.

No. 106,759. Patented Aug. 23. 1870.

Fig. 1

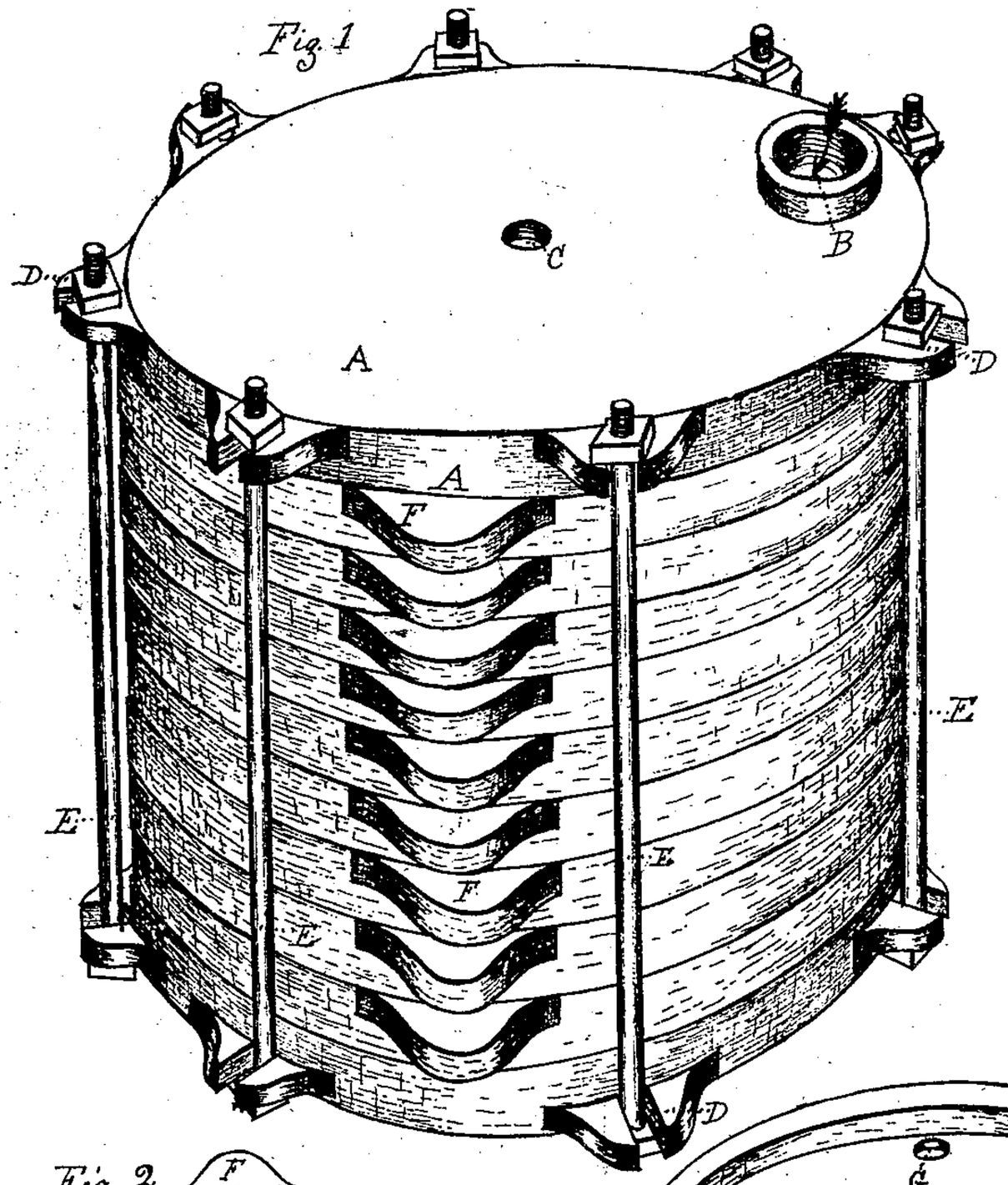


Fig. 2

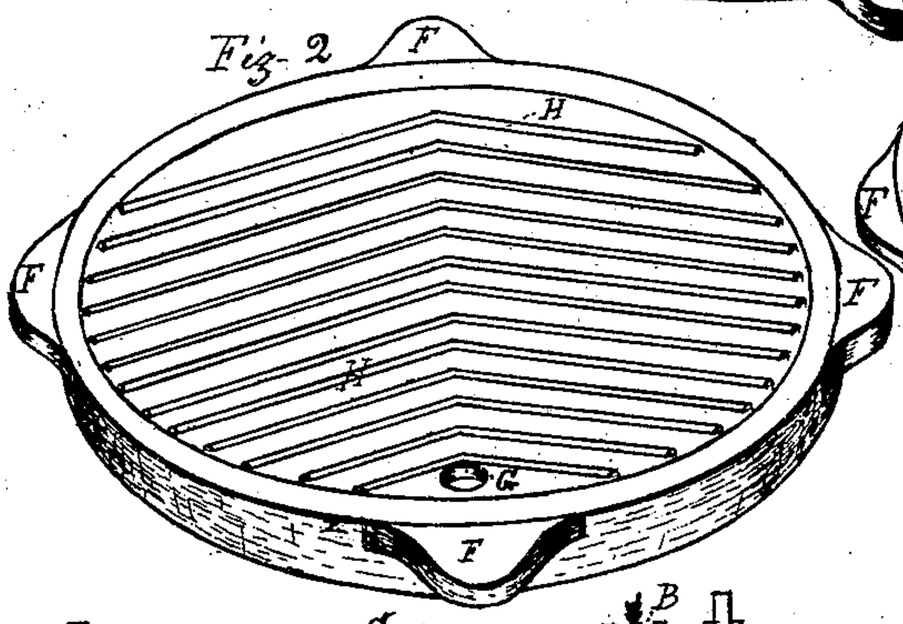
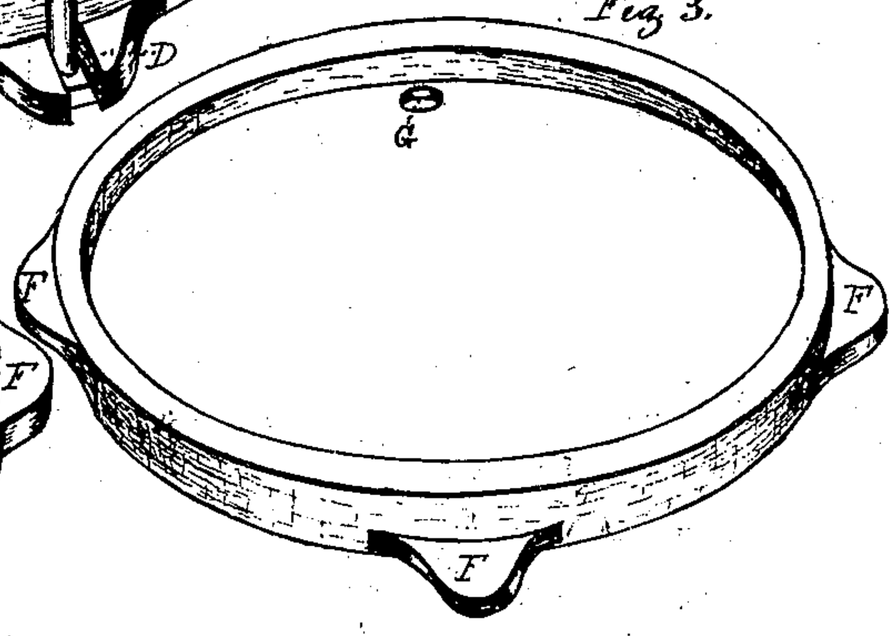
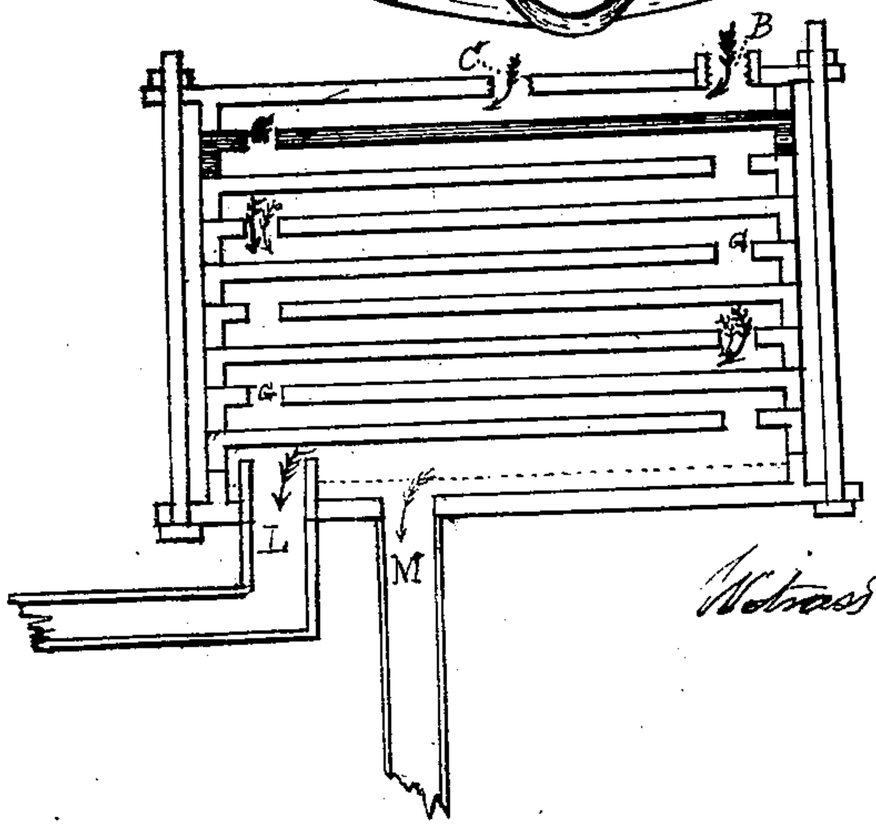


Fig 3.





Witness: R. F. Stevens
H. A. Branch

Kapon Frazer
Syracuse. N. Y.

K. Frazer, 2. Sheets. Sheet. 2.

Steam Boiler Condenser.

No. 106,759 Patented Aug. 23. 1870.

Fig- 4.

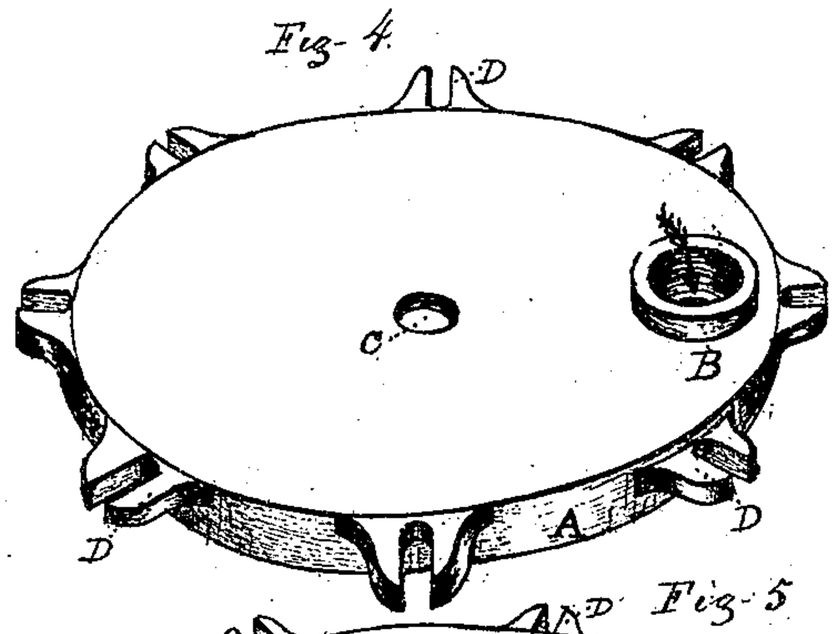


Fig- 5

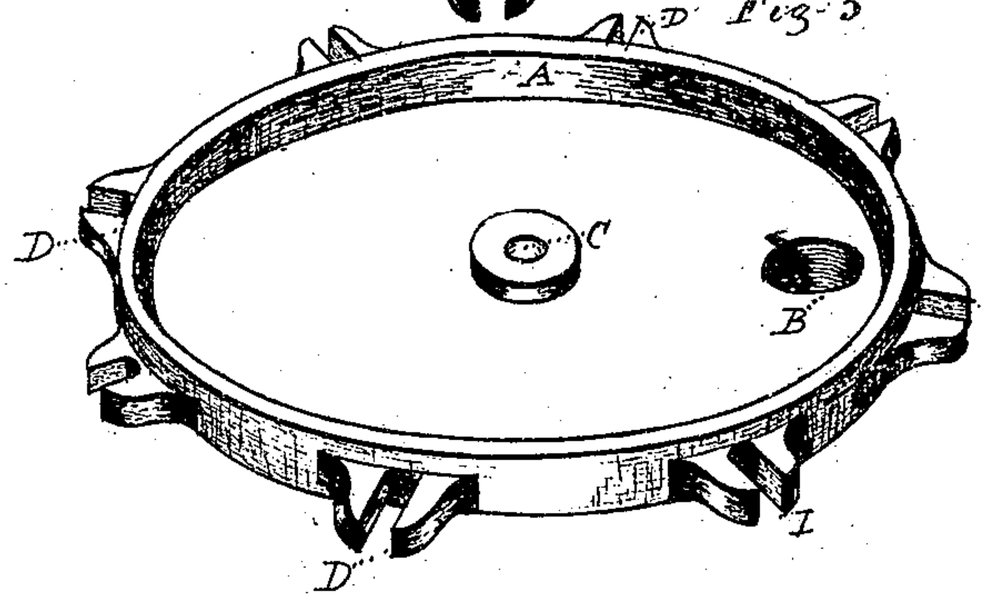
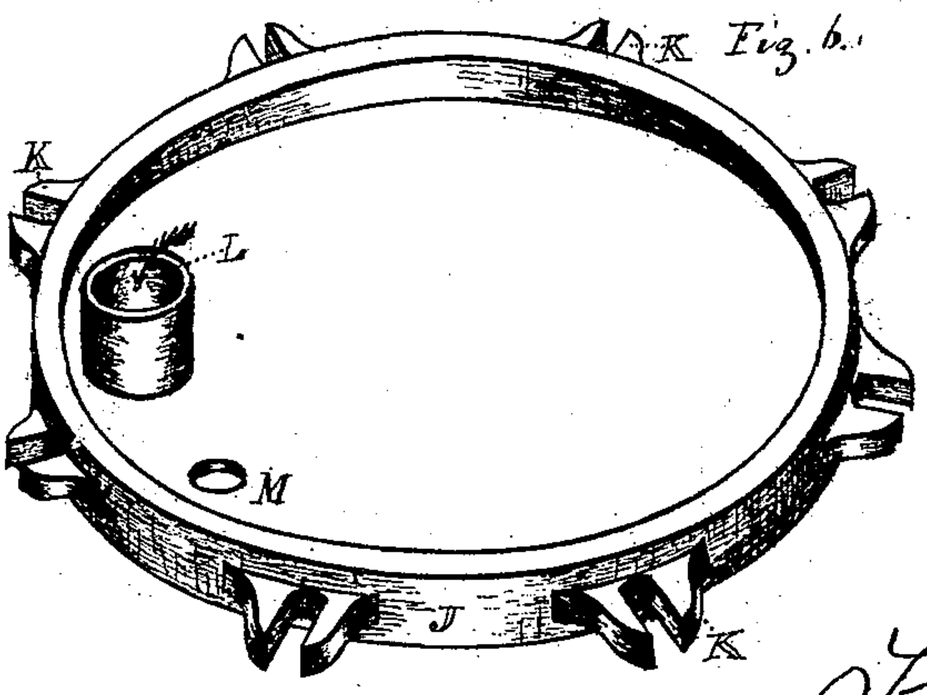


Fig. 6.



Witness { K. F. Steven
H. A. Branch

Kasom Frazer

UNITED STATES PATENT OFFICE.

KASSON FRAZER, OF SYRACUSE, NEW YORK.

IMPROVEMENT IN DEVICES FOR REMOVING LIME FROM HARD WATER.

Specification forming part of Letters Patent No. **106,759,** dated August 23, 1870.

I, KASSON FRAZER, of Syracuse, in the county of Onondaga and State of New York, have invented certain new and useful Improvements for Removing Lime from Hard Water, of which the following is a specification:

My invention relates to the construction of a device for removing lime from hard water; and consists, essentially, of a series or pile of horizontal sections, constructed and arranged as hereinafter stated.

In the drawing, Figure 1 is a perspective view of the device. Fig. 2 shows the upper surface of one of the intermediate sections; Fig. 3, the under surface of the same. Fig. 4 shows the upper surface of the top plate. Fig. 5 shows the under surface of the same. Fig. 6 shows the bottom section. Fig. 7 is a cross-section of the device.

To make my invention, construct the upper section, Fig. 4, with a rim, A, projecting downward, having the opening B, for the connection of a steam-pipe, and the opening C in the center, for the connection of a water-pipe. To the outer edge of the upper section attach the slotted ears D, to receive the connecting-bolts E. Make the intermediate sections, Figs. 2 and 3, with ears F upon the outer edge, for the purpose of lifting and handling the section, and with the opening G near the outer side. Upon the upper surface of the intermediate sections attach the ribs H, arranged in angles from the center, as shown, and extending to near the outer edge of the section. The under surface of the intermediate sections may be made plain, as shown in Fig. 3. Make the lower section, Fig. 6, with a rim, J, projecting upward, forming a pan or receptacle for the water. On the outer edge make the slotted ears K, corresponding with the slotted ears on the upper plate, to receive the bolts E. Near the side make the outlet L, for the escape of the steam, and the outlet M, for the escape of the water, and to each of these outlets attach a pipe to conduct the steam and water to any point desired.

To operate the invention, pass the water which is to be purified into the machine through the opening in the center of the upper plate, and at the same time pass a current of steam (which may be the escape-steam from an engine) into the opening near the side of the upper plate or section. The several sections are so placed together that the opening in each is opposite that of the one next above, by which the steam and water are together forced to traverse the whole of the ribbed surface of the intermediate plates or sections. The water, by the ribs, is spread and exposed to the direct action of steam, the effect of which is to cause a deposit of the lime contained in the water upon the ribs and upper surface of the plates.

Where the steam is hottest, the lime deposits in the largest quantity, and by passing hard water exposed in this manner to the action of steam through and between a sufficient number of the sections, the entire amount of lime may be deposited, and the water rendered soft.

The advantage of this sectional structure is the facility with which the whole may be taken apart for removing the lime, the rim of the sections constituting the barrel or inclosure for the sections, and the advantage of having the steam pass in the same direction and in conjunction with the water is, that it causes a more thorough and continuous mixing of the steam with the water, and largely converts the latter into spray during its passage through the various sections of the device, and this prevents more or less the accumulation of the water in pools, particularly in the first section, which is usually the result where the steam in its ascending course actively comes in contact only with the falling stream of water, and piles it up to a considerable extent upon the shelves, where the precipitation of the lime is not as active as it is in my machine and by my process, in which the steam continuously decomposes and scatters the water by moving in conjunction with it.

Experience has shown that at the point where the water and steam directly come in contact, and the most thorough decomposition of the water takes place by the action of the steam, there the greatest precipitation of lime will be found on the plates.

The same is true where the steam powerfully acts upon and produces the greatest pressure upon the water in the orifices or pipes, whether straight or crooked, through which they pass, or at the point of any head, bend, or other place where the joint current of steam

and water is met by any resistance, which operates to decompose the water, and precipitates the lime therein on the inner surface, until the whole is substantially extracted from the water, the greatest amount of lime being found immediately after the junction takes place, and the same diminishing in amount as you approach the farther extremity, and this continuous action of the steam upon the water in the way described, to keep it as far as possible in the form of spray, also causes more or less precipitation of the lime upon the whole surface of the chamber.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The construction and combination of the sections, substantially in the manner and for the purpose set forth.

2. An apparatus with separate steam inlet and outlet and water inlet and outlet, through which water and steam are passed conjointly, and in the same general direction, for the purpose of precipitating the lime rapidly and more perfectly, substantially in the manner described.

KASSON FRAZER.

Witnesses:
D. P. COWL,
J. D. PATTEN.