

G. H. BABCOCK & S. WILCOX.
Sectional Steam-Boilers.

No. 134,505.

Patented Jan. 7, 1873.

Fig. 2.

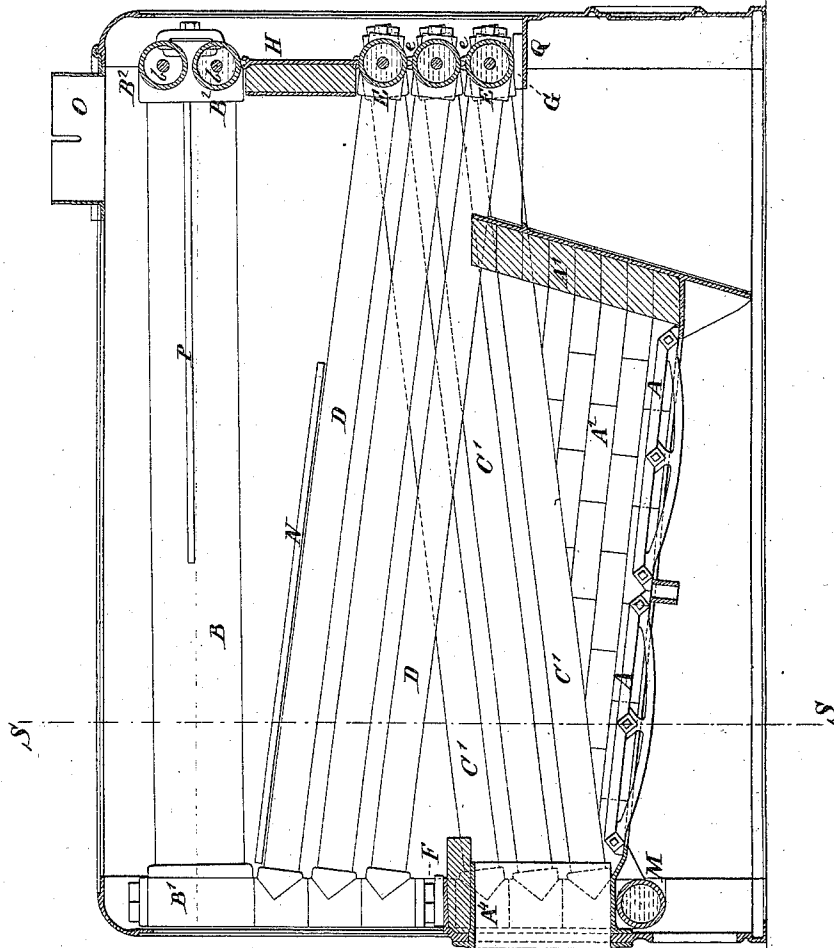
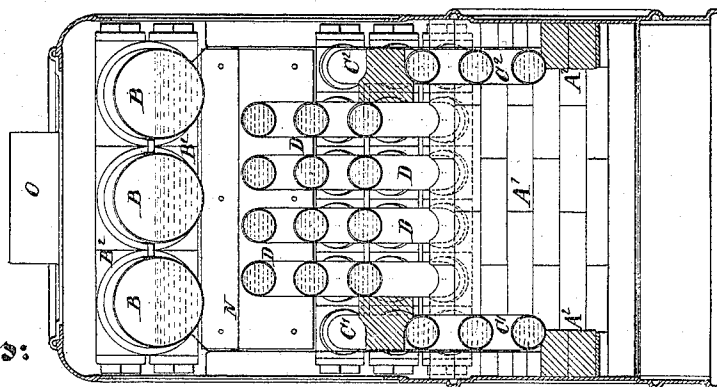


Fig. 1.



Witnesses:

Amos H. Horwath.

W. C. Dey

Inventors:

Geo. H. Babcock and Stephen Wilcox

by their attorney, *T. L. Stetson*
New York

UNITED STATES PATENT OFFICE.

GEORGE H. BABCOCK, OF PLAINFIELD, NEW JERSEY, AND STEPHEN WILCOX, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN SECTIONAL STEAM-BOILERS.

Specification forming part of Letters Patent No. 134,505, dated January 7, 1873.

To all whom it may concern:

Be it known that we, GEORGE H. BABCOCK, of Plainfield, Union county, New Jersey, and STEPHEN WILCOX, of Brooklyn, Kings county, New York, have invented certain Improvements in Steam-Boilers, of which the following is a specification:

We employ a series of elongated chambers or tubes arranged side by side, and so connected together and to a series of steam-generating tubes below as to secure a complete system of circulation through all the tubes and chambers, while, the steam-generating tubes being above and each side of the furnace, the hot products of combustion are efficiently applied to the heating-surface.

The following is a description of what we consider the best means of carrying out the invention.

The accompanying drawing forms a part of this specification.

Figure 1 is a vertical cross-section on the line S S in Fig. 2. Fig. 2 is a central longitudinal section.

Similar letters of reference indicate like parts in both the figures.

A is the grate; A¹, a slightly-inclined wall forming the back of the furnace; and A² A² are the sides of the furnace. These walls of the furnace are of brick, and are inclosed, as is also the entire structure, in a casing of iron, partly wrought and partly cast, as will be understood from the drawing. The casing may be double, with an air-space between, or other provisions may be made for retarding the escape of heat through this casing. B B B are slightly-inclined cylindrical vessels, in which the separation of the steam from the water is effected. As ordinarily worked these vessels are nearly or quite half filled with water. They are connected at one end by stout cast-iron heads, held together by transverse bolts b, of which there are two, one above the other, passing through larger cylindrical connections, through which the water and steam may freely circulate. This construction is shown clearly in Fig. 2. The castings which form the front heads of these pipes or cylindrical vessels B are marked B¹. From each depend two sets of short tubes, forming, respectively, the heads of other series of inclined tubes. There are

six sets of these inclined tubes. One set, composed of three, one above the other, is marked C¹, and is mounted on one side of the furnace. Another corresponding set, marked C², is mounted on the other side of the furnace, and four sets, marked D, are mounted between them. The sets C¹ C² are inclined in the opposite direction to the other sets D. The tubes C¹ C² are lowest at their forward ends, and the steam which is generated in them moves backward in rising and enters a series of back connections, E. In this the steam mingled with water moves horizontally a little distance, and thus obtains access to the lower ends of the several tubes D. These tubes are inclined in the opposite direction, their front ends being highest, and the mingled steam and water rising in these tubes D moves forward actively to the highest tubes or connections B at the front of the boiler, in which latter the mingled steam and water rises to be distributed and separated in the top series of vessels B. We provide liberally for the descent of the water to complete the circulation by vertical connections F at each side of the front. Through these the dense water descends freely, and is presented again at the lower front ends of the respective side tubes C¹ C² to again commence its upward circuitous journey. The front of the furnace is formed of brick resting on an arch casting, A⁴. There are one or more doors, not represented, which close the mouth in the ordinary manner. The air is supplied to the furnace by natural draft or otherwise in the ordinary or any suitable manner. The heat from the incandescent fuel is radiated upon the side pipes C¹ C²; also upon the central pipes D. Only a small amount of this radiant heat is allowed to pass through the spaces between the pipes, and this is received on the brick or other surfaces, and is stored and reflected or radiated back, so that it is efficiently utilized. A thin deflecting-plate, N, mounted above the front half of the tubes D, arrests the products of combustion and detains them under it, allowing them to be discharged upward only at the back end. The gases rising in rear of the back edge of the plate N are again arrested and retained by thin metal stops P resting on the tubes B at the back part of their length, and allowed to rise only

through the spaces between the tubes or vessels B near the front. From thence they flow back again to the uptake or chimney O, which is represented as provided with a notch to receive a damper, and may have a chimney, of iron or other material, leading up therefrom, as will be understood. The stops P are light and cheap. They are merely pieces of sheet-iron, bent in the form of slightly-flaring troughs, and are dropped down into the spaces between the cylindrical vessels B. Ashes and dust will accumulate upon these stops in course of time, or a quantity of such material may be deposited there at the commencement when the structure is new, if preferred. The side bricks A² are supported on internal shelves formed in the castings of the casing. The back ends or junctions E of the several sets of tubes C¹ C² D are supported upon a corresponding shelf formed in the back of the casing. The lowermost of the back connections E rest directly upon the shelf, or on bricks, or the like resting thereon; and the several back connections above rest upon it and upon each other, as clearly shown in Fig. 2, where G are thin pieces of brick or metal resting directly on the shelf Q, and supporting the lowermost of the back connections E, and e are ridges cast on the several back connections, which aid to support the back connection immediately above it. A vertical plate, H, is introduced above to fill the space between the uppermost of the back connections E and the lowermost of the cross-connections B² above. This is represented as lined with fire-brick, and that again with metal. The ends of the larger vessels B are constructed with hand-holes, provided with proper means for securing the same, as represented. The sides of the back connections are stopped simply with large screw-plugs. M is

a cylindrical vessel, serving as a mud-drum. It extends across the front of the boiler, under the fire-doors, and may connect to the front ends of the side tubes C¹ C² with any ordinary or suitable provision for removing at intervals the solid material which tends to collect therein. The water in the mud-drum is at rest; in all the other vessels it is moderately moving. It moves backward through the central vessel of the upper series B, and forward again through the outer portion of the respective side vessels of that series. It descends thence through the connections F at each side, and thence rises and moves backward through the side inclined pipes C¹ C², and, moving laterally in the back connections E, rises again and moves forward in the central inclined sets of pipes D, to be delivered with its steam in the front chamber B¹ of the top vessels B again.

We claim as our invention—

1. The within-described series of pipes D C¹ C² with the front connections F and back connections E arranged relatively to each other and to the furnace, and to suitable provisions for allowing the steam and water to separate, substantially as herein specified.

2. In combination, the central and side vessels of the upper series B, the connections F at each side, the side inclined pipes C¹ C², and the opposite inclined sets D, all as and for the purposes herein specified.

In testimony whereof we have hereunto set our hands this 15th day of July, 1872, in the presence of two subscribing witnesses.

GEO. H. BABCOCK.
STEPHEN WILCOX.

Witnesses:

W. C. DEY,
ARNOLD HÖRMANN.