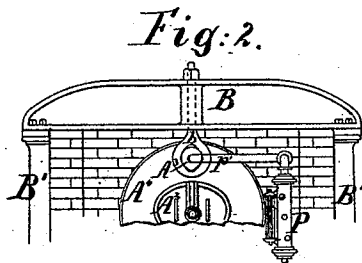
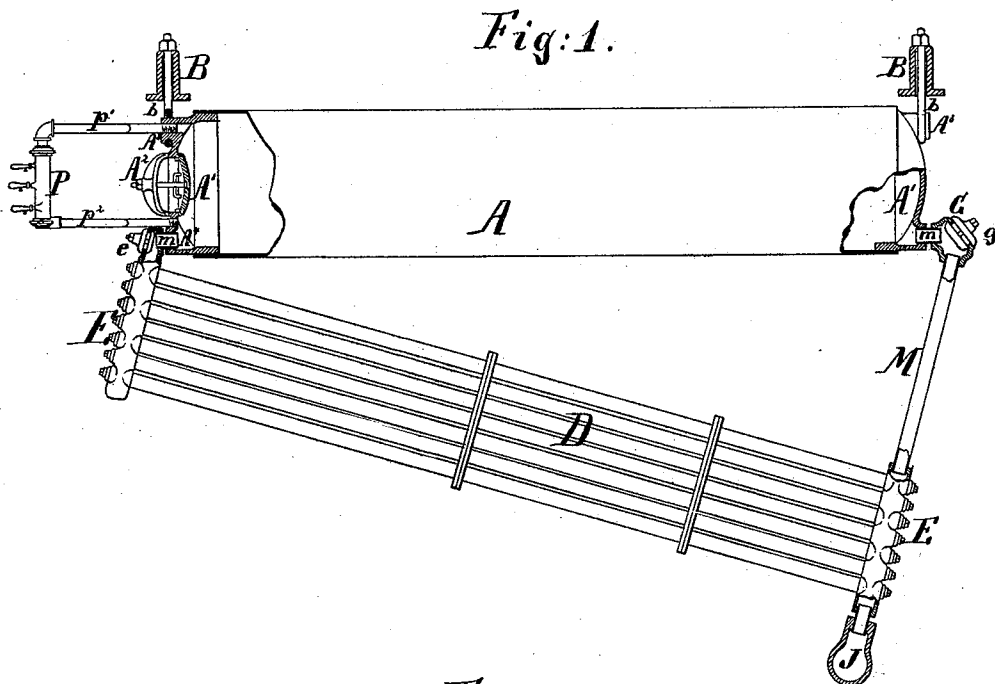


G. H. BABCOCK & S. WILCOX.
SECTIONAL STEAM GENERATOR.

No. 175,548.

Patented April 4, 1876.



Witnesses:
Henry Gardner
A. J. Belden.

Inventors:
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UNITED STATES PATENT OFFICE.

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

IMPROVEMENT IN SECTIONAL STEAM-GENERATORS.

Specification forming part of Letters Patent No. 175,548, dated April 4, 1876; application filed January 12, 1876.

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 Relating to Steam-Boilers, of which the following is a specification:

We have heretofore aided in introducing into extensive use a style of boiler in which the steam is mainly generated in a collection of inclined pipes, connected together at each end and to the horizontal drum above, which serves as a separating-chamber. The water descends from one end of the drum to the lowest ends of the tubes. It moves actively through the tubes, and thence rises through the shorter connection to the other end of the drum. Suitable provisions are made for circulating the products of combustion thoroughly through the spaces between the tubes. The tubes and connections and the lower portions of the separating drum are all effective heating-surfaces.

We have devoted ourselves earnestly to improving and perfecting this class of boilers for a number of years. Our present invention relates to the mode of mounting and supporting such boilers, and to the character of the connections, and to provision for effecting the connections, and is the result of our experience with the boiler patented by us February 18, 1873, No. 135,877; but many of the details may be different therefrom.

For the fire-surface any ordinary tubes may be employed, connected together in any ordinary or suitable manner which will afford a strong and safe construction, and one easily accessible for repairs or renewals. Any suitable construction of the grates, and of the brick and metal work which incloses the whole, may be adopted.

The accompanying drawings form part of this specification, and represent what we consider the best means of carrying out the invention.

Figure 1 is a side elevation, partly in section. Fig. 2 is an end view.

Similar letters of reference indicate like parts in both figures.

Referring to the figures, A represents the

body of the separating-drum, and A¹ A¹ cast-iron ends thereof. The front end is provided with a man-hole and cover, A². Each of the end castings A¹ is, furthermore, formed with a stout horn near the top, indicated by A³, adapted to receive a suspension link, b, from the cross-girder B, resting on columns B¹ B¹. (See Fig. 2.) Each end casting A¹ is, furthermore, equipped with a series of holes, A⁴, near the bottom, properly adapted to receive a tube and allow its union by the process known as "expanding." D are the inclined tubes which form the principle and most efficient heating surface. E E are cast-iron or steel connections, which unite the tubes together, and afford a suitable passage for the circulation of the water and steam.

The front connections E are extended upward considerably above the uppermost of the tubes D, and each is formed with a hollow face matching against the holes A⁴. A hand-hole, e, equipped with a suitable cover, is provided in line with the center of each hole A⁴. Short lengths of tubing m are introduced in the positions represented, and expanded by an expanding-tool introduced through the hand-holes e, so as to form a strong and reliable union. At the back end of the separating-drum corresponding short lengths of tube m similarly connect the separating-drum with hollow castings G. These castings G form a liberal water communication from the separating-drum A through a series of tubes, M, to the connections E at the back ends of the tubes D. The tubes M are nearly upright, and are of considerable length, corresponding to the inclination of the tubes D. The tubes M are united to the castings E and G by being expanded by a tool introduced through hand-holes g. These hand-holes g and their covers are mounted at an angle of about forty-five degrees, and are considerably larger than a tube, m. They are mounted at the intersections of the axes of the tubes m' M, so that on removing these hand-hole covers a tool may be introduced to expand either the connected tube m' or the connected tube M. To the lower end of the connections E, at the back, is a mud vessel, J. This is secured to the connections E by short tubes exactly in line

with the tubes M, and expanded by an expanding-tool introduced through the latter and through the same hand-hole *g*. Through the front horn or projection A³ is a passage communicating with a pipe, *p'*, which leads to the upper end of a gage-stand, P. The lower end of this gage-stand is connected to the boiler below the water-line by a pipe, *p*², which is extended through the boiler and far enough to terminate in dense water.

The extended character of our boiler, and the exposure of its parts to great variations of temperature, render it peculiarly difficult of support by the ordinary means. Our suspension-links from the cross-girders, by taking hold of the projections A³ in the ends of the drum, involve little expense, and allow by their slight swinging capacity for expansion in the length of the drum, as well as in all the parts of the system below.

Our short tubes *m* being fixed in place by an ordinary expanding-tool, there is no necessity for revolving them, or for springing or straining any part in the process of construction, or in any subsequent alterations or repairs.

Our improvement gives an absolutely tight and strong connection with less expense than heretofore for materials or labor. It involves less metal, and the least possible bulk, and allows of elasticity in cases of unequal expansion without causing the joints to leak.

Our projections A³ and suspension-links *b* make the boiler suspension entirely independ-

ent of the brick-work. The boiler being thus suspended, there is no tendency to strain the joints by the expansion and contraction of the boiler being different from that of the brick-work, the boiler being free to expand and contract entirely independently of its surroundings.

We claim as our improvement in boilers—

1. The expanded tube *m*, securing the drum A to the connections E, and thus to the entire heating-surface, in combination with hand-holes in the connections in line therewith, as and for the purposes specified.

2. In combination with the separating-drum A, connected with the inclined tubes D, as specified, the oblique hand-hole *g*, arranged, as shown, relatively to the two sets of tubular connections *m* M, to allow the introduction of an expanding-tool, as and for the purposes herein specified.

3. The projections A³, cast on the ends of the drum A, in combination with the pendent links *b b* and their supporting means, and with the heating parts D E M extending deeply below the drum in inclined positions, as and for the purposes herein specified.

In testimony whereof we have hereunto set our hands.

GEO. H. BABCOCK.
S. WILCOX.

Witnesses:

A. HENRY GENTNER,
C. C. STETSON.