

W. H. Cornell,

Sectional Steam Boiler.

No. 113,857.

Patented Apr. 18, 1871.

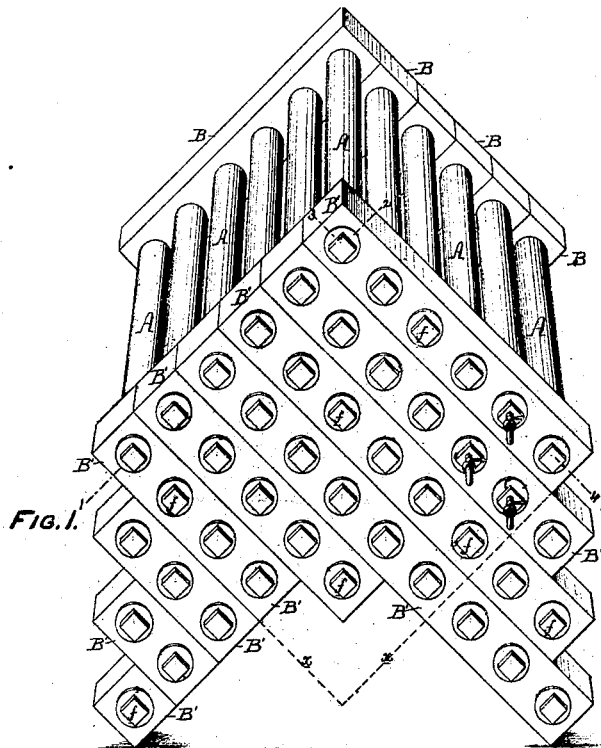


FIG. 1.

FIG. 4.

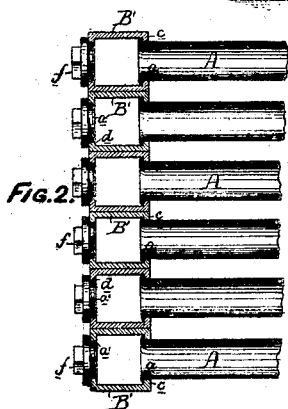


FIG. 2.

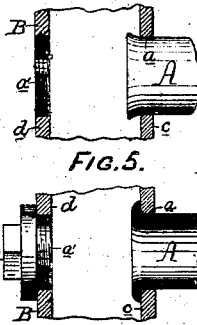


FIG. 5.

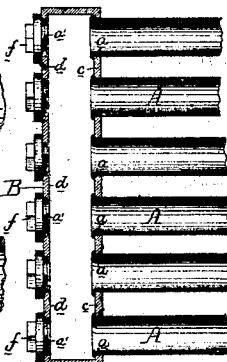


FIG. 3.

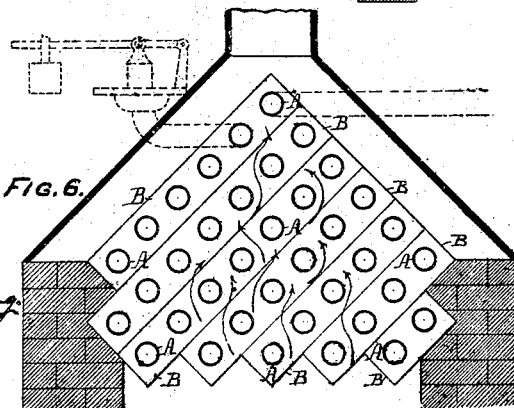


FIG. 6.

Witnesses

J. B. Harding  
John Parker

W. H. Cornell  
by his Attor  
Newman

# UNITED STATES PATENT OFFICE.

WILLIAM H. CORNELL, OF EASTON, PENNSYLVANIA.

## IMPROVEMENT IN SECTIONAL STEAM-BOILERS.

Specification forming part of Letters Patent No. **113,857**, dated April 18, 1871.

I, WILLIAM H. CORNELL, of Easton, Northampton county, State of Pennsylvania, have invented an Improved Sectional Steam-Boiler, of which the following is a specification:

### *Nature and Object of the Invention.*

My invention consists of a sectional steam-boiler composed of horizontal or slightly-inclined tubes connected at their opposite ends to two sets of separate and independent boxes inclined in opposite directions, as fully described hereafter, the whole forming a boiler in which the heat of the furnace is utilized to a greater extent than in ordinary boilers, and in which a perfect circulation is obtained, but in such a manner that the water shall be separated from the steam, so that the latter may leave the boiler in a comparatively dry state.

### *Description of the Accompanying Drawing.*

Figure 1 is a front perspective view of my improved sectional steam-boiler; Fig. 2, a longitudinal section of the same on the line 1 2, Fig. 1; Fig. 3, a longitudinal section on the line 3 4, Fig. 1; Figs. 4 and 5, detached views drawn to an enlarged scale; and Fig. 6, a transverse sectional view of a slightly-modified form of boiler, with a portion of the furnace.

### *General Description.*

The boiler consists of a number of horizontal or slightly-inclined wrought-iron tubes, A, each of which is connected at one end to one of a series of inclined cast-iron boxes, B, and at its opposite end to one of a series of similar boxes, B', inclined in a direction contrary to that of the boxes B.

The inclined boxes of each series are in contact with, but are entirely separate and disconnected from, each other, so that they may expand and contract independently. Free communication, however, is established between all of the boxes of both series, but in an indirect manner, by means of the connecting-tubes.

I adapt each end of each tube to an opening, *a*, formed for its reception in the inner shell, *c*, of its box B or B', and then swage or expand the end of the said tube, in the manner plainly shown in Figs. 2, 3, 4, and 5, so

that it may overlap the edges of the opening *a*, through which it is passed. This swaging is effected by means of an expanding-tool, which is inserted through an opening, *a'*, formed in the outer shell, *d*, of the end box, at a point directly opposite the end of the tube, the said opening, after the swaging of the tube, being closed by a screw-plug, *f*, which can be readily removed when access has to be obtained to the interior of the boiler for purposes of cleansing or repairs.

I have ascertained by practical experience that for this form of boiler the swaged joints at the ends of the tubes are less liable to leak than either threaded or packed joints.

I prefer, for convenience in arranging the boiler within a furnace, that the end boxes should be of different lengths, as shown in Fig. 1 or in Fig. 6; but the said boxes might be all of the same length, as indicated by the dotted lines *xx* in Fig. 1, providing only that their inclined or diagonal arrangement was retained.

The advantages arising from the peculiar arrangement of the tubes and inclined boxes which constitute the boiler will be best understood by referring to Fig. 6, where it will be seen that the tubes, instead of being arranged in horizontal rows and one directly above the other, which would be the case if the boxes at one end were horizontal and those at the other end vertical, are alternated or staggered, (owing to the inclination of the boxes,) so that the heated products of combustion, in passing upward, must impinge against and envelop the tubes instead of passing upward freely between them.

It will be evident that a greater percentage of the heat is utilized by this arrangement than in ordinary boilers of this class.

Another great advantage arising from the inclination of the end boxes, when used in connection with the horizontal or slightly-inclined tubes, is that the lowermost tubes are not in direct communication with the upper or steam tubes, but are connected with the same through several intervening boxes and tubes. This insures a complete circulation within the boiler of the heated water and steam; but, owing to the circuitous course and the constant changing of the direction of

the currents, the steam in its upward passage is separated from the water and passes from the boiler in a comparatively dry state.

*Claim.*

A sectional steam-boiler consisting of tubes A, connected at one end to independent inclined boxes B, and at the opposite end to independent boxes B', inclined in a direction contrary to that of the said boxes B.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WM. H. CORNELL.

Witnesses:

S. MOORE,

A. K. MICHLER.