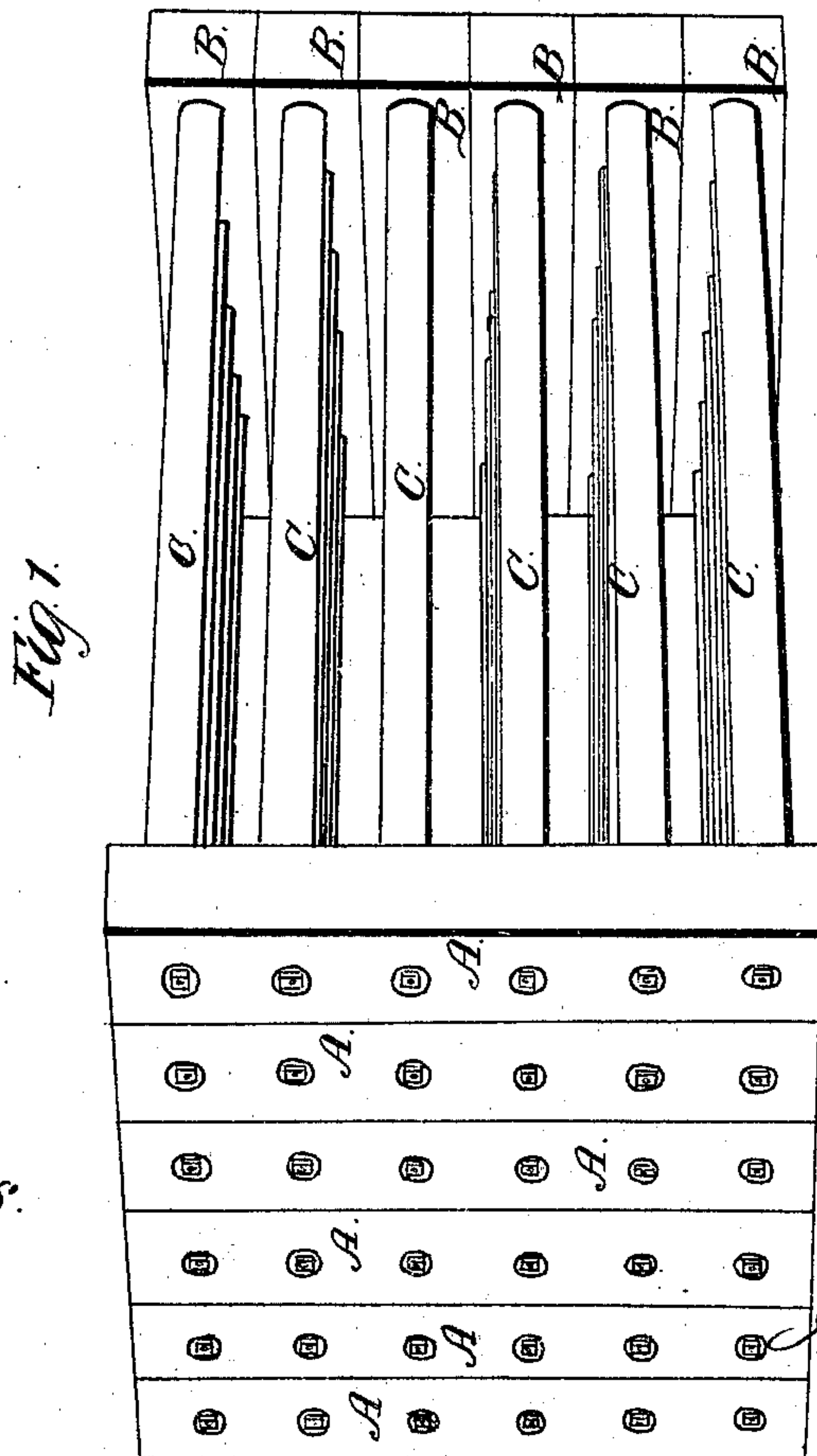
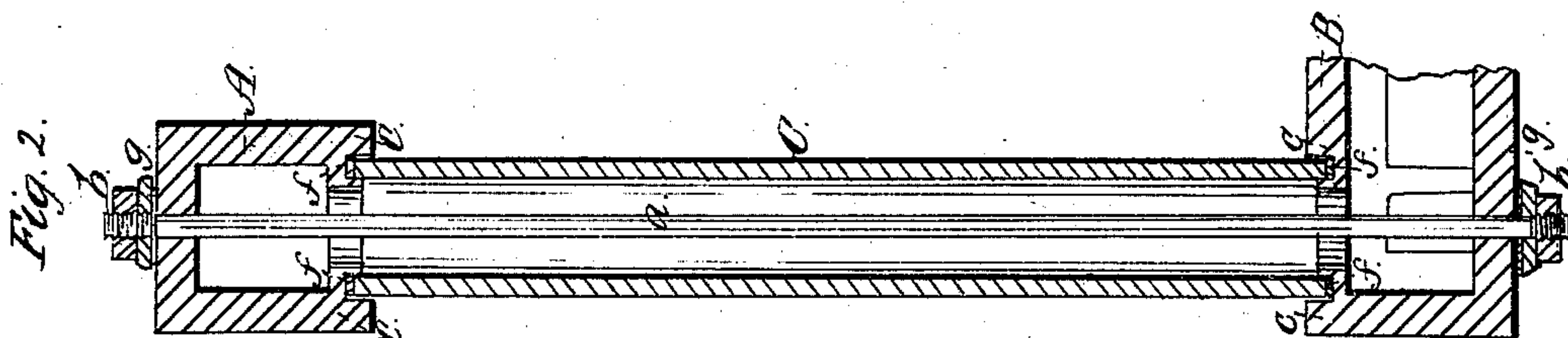


*H. J. Brunner.*

## *Steam Boiler.*

N<sup>o</sup> 88,694.

*Patented Apr. 6, 1869.*



Witnesses:  
F. Beale,  
R. S. Turner.

Henry J. Brunner  
Zyris atty.  
J. S. Brown

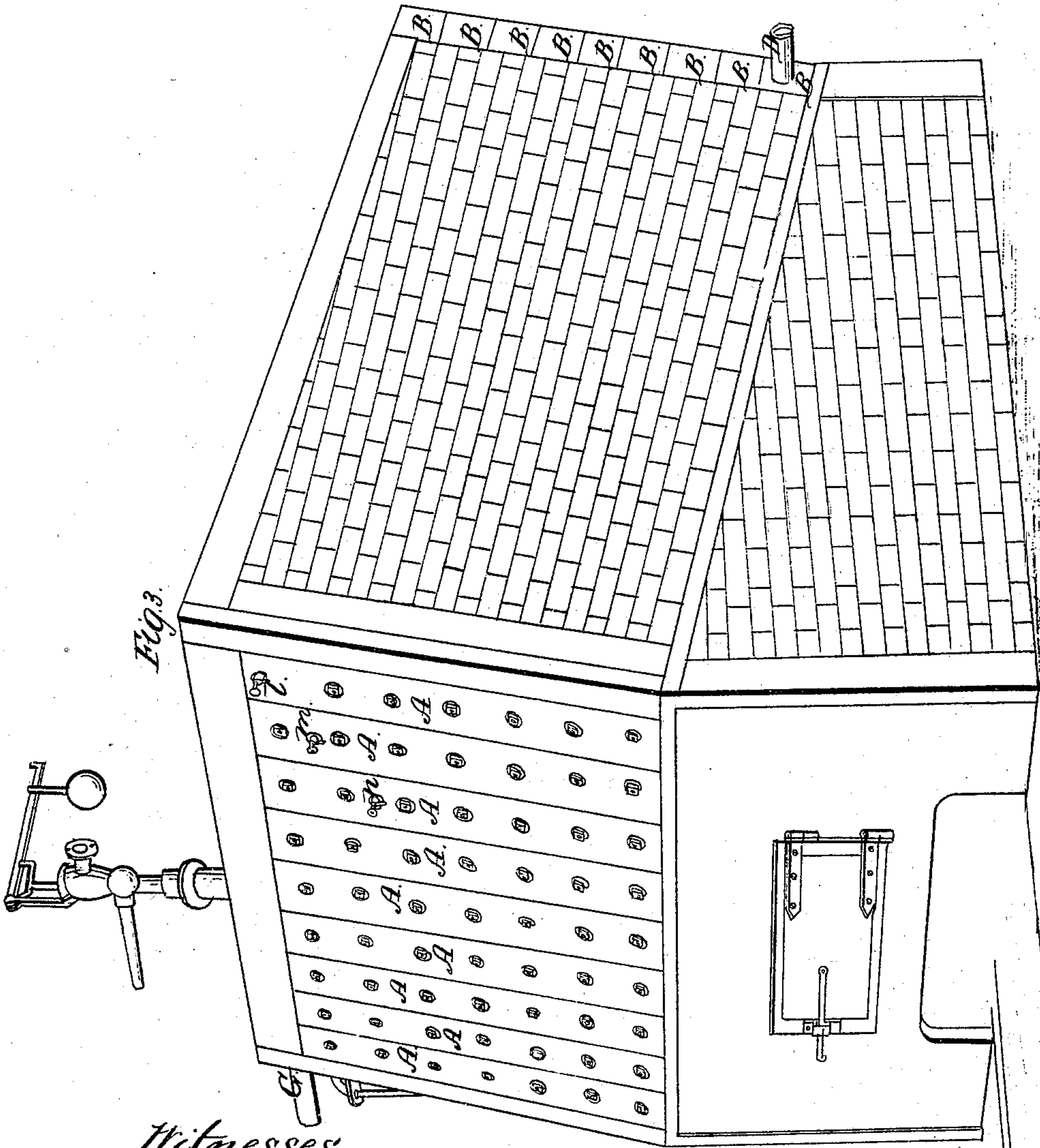
Sheet 2-2 Sheets.

H. J. Brunner

Steam Boiler

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Inventor  
Henry J. Brunner,  
By his atty,  
J. S. Brown



# United States Patent Office.

HENRY J. BRUNNER, OF NAZARETH, PENNSYLVANIA.

Letters Patent No. 88,694, dated April 6, 1869.

## IMPROVEMENT IN STEAM-GENERATORS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern :

Be it known that I, HENRY J. BRUNNER, of Nazareth, in the county of Northampton, and State of Pennsylvania, have invented an Improved Steam-Boiler; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making part of this specification—

Figure 1 being a view, in perspective, of the boiler, showing its construction.

Figure 2, a central longitudinal section through one of the tubes, and through the adjoining water or steam-boxes.

Figure 3, a view, in perspective, of the boiler when set in the furnace.

Like letters designate corresponding parts in all of the figures.

My improved boiler is of the class called "sectional boilers," being composed wholly of a series of water and steam-boxes, A A and B B, at the ends, connected by series of tubes C C, the end boxes forming independent sections of the boiler, and being either of cast-iron or wrought-iron, while the tubes are, as usual, of wrought-iron.

The method of connecting the pipes and boxes may be as shown in the section, fig. 2, or any other suitable one.

As shown, the ends of the tubes fit into annular grooves *c c*, in the sides of the boxes, there being packing-rings *f f* in the bottom, to tighten the joints.

An iron rod, *a*, extends through the middle of each tube, and projects through the contiguous boxes, so as to receive tightening-nuts *b b* on the projecting ends, provided with screw-threads, with packing-washers *g g* under the nuts.

The nature of my invention consists in the relative arrangement of the two series of boxes A A and B B, at the two ends of the boiler, namely, at one end (the front, as shown,) the boxes A A are vertical, or upright, and at the other end (the rear, as represented,) the boxes B B are horizontal.

With this arrangement, no two tubes C C are connected with the same boxes at both ends. By this construction, therefore, the tubes may all expand unequally, without straining the boiler, one or the other of the boxes or sections connected with any tube allowing the unequal expansion without being constrained by other tubes; and if, as is most likely, a whole layer, or row of tubes, expand together, or equally, the box which is connected with all at one end, allows such expansion without the other parts of the boiler being in the least affected thereby.

Another advantage of this construction is, that any single tube may be removed for repair, or replaced, by taking off only one box.

Finally, this construction insures great strength, and is as free from any strain as can well be.

The boiler may be placed in a horizontal position, or it may be somewhat inclined from front to back, as represented in fig. 3, the supply-pipe D entering the lower rear horizontal box B, at one corner of the boiler, and the steam issuing at the pipe G from the vertical box A, at the upper corner of the boiler, diagonally opposite to the supply-pipe.

The arrangement of the try-cocks *l m n*, and other fixtures of the boiler, may be as indicated.

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

The arrangement of the two series of boxes, A A and B B, and the series of connecting-tubes C C, so that the boxes A A, at one end of the boiler, are vertical, or upright, and the boxes B B, at the other end, horizontal, substantially as herein specified.

In witness that the above is a true specification of my improved steam-boiler, I hereunto set my hand, this 28th day of November, 1868.

HENRY J. BRUNNER.

Witnesses:

J. E. W. MILLER,  
JOHN W. BRAM.