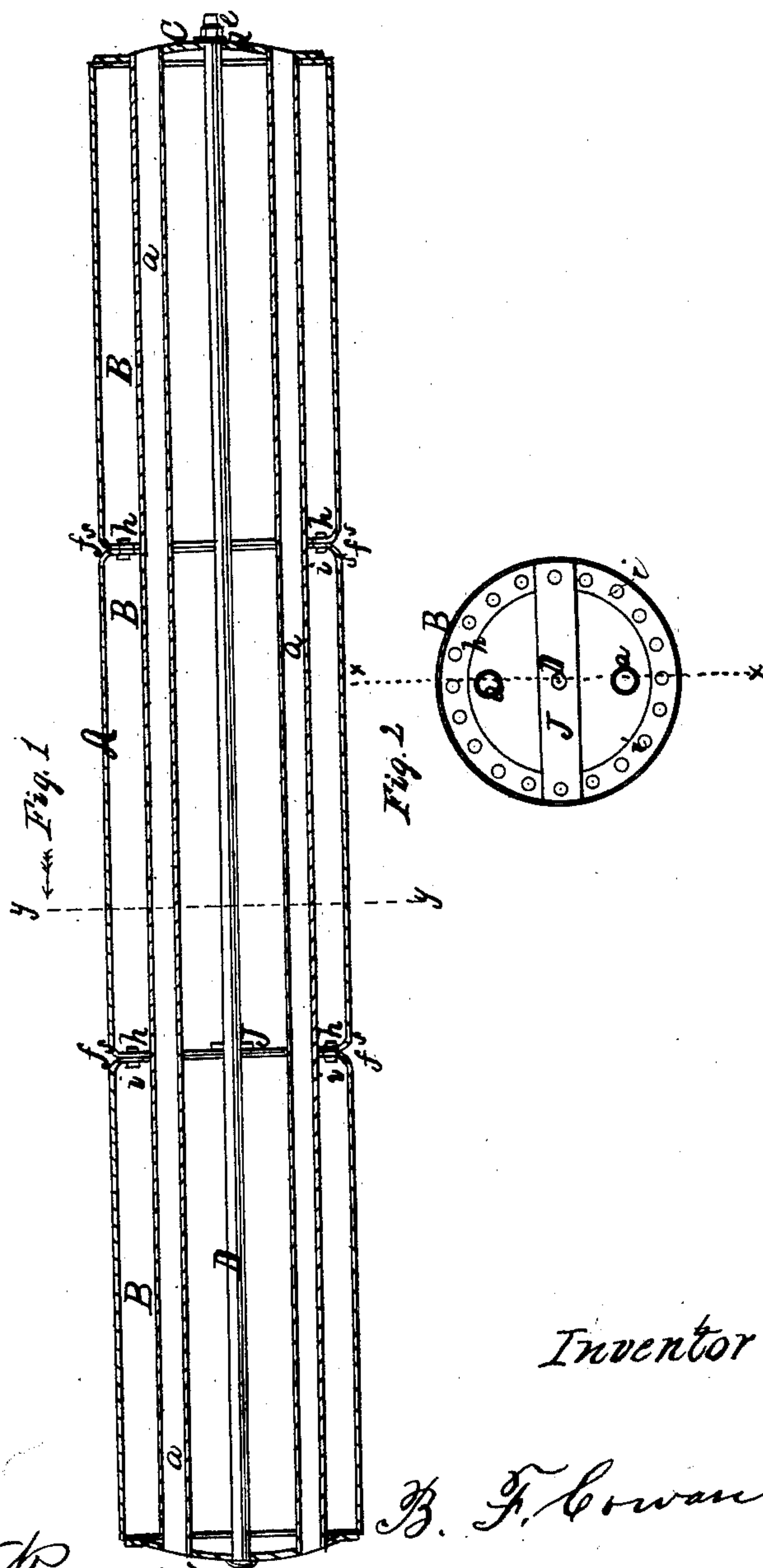


*B. F. Corran,*  
*Sectional Steam Boiler.*  
*N<sup>o</sup> 45,589.      Patented Dec. 27, 1864*



*Witnesses*  
*Theo. Tusch*

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# UNITED STATES PATENT OFFICE.

BENJAMIN F. COWAN, OF NEW YORK, N. Y.

## IMPROVEMENT IN STEAM-BOILERS.

Specification forming part of Letters Patent No. 45,589, dated December 27, 1864.

*To all whom it may concern:*

Be it known that I, BENJAMIN F. COWAN, of the city, county, and State of New York, have invented a new and useful improvement in steam-boilers, soda-fountains, and other vessels which are required to sustain great pressure, made of wrought or malleable metal; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable any person skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 represents a longitudinal vertical section of my invention on the line *x* of Fig. 2 of a steam-boiler constructed after my invention, and Fig. 2 represents a transverse section of the boiler on the line *y* of Fig. 1.

Similar letters of reference indicate like parts.

In this illustration of my invention, A represents a steam-boiler composed of three sectional parts, B, which, when properly constructed and joined together, make up the body or shell of the boiler. The outer sections, B, have heads C C', in which are secured the flues *a*, only two of which are shown. The sections B are to be made in any proper manner, as by riveting or otherwise; but I prefer that their sides should be closed by welding instead of riveting.

The several sections B of which the boiler is to be composed are held together by means of a stay-rod, D, which passes through the center of the boiler-heads C C', its head *b*, which is to be made of more than usual strength, abutting upon the outside of the head C', and the other end of the rod being fitted with a nut, *e*, by which the rod is screwed up and the sections brought snugly together. A washer, *d*, is interposed between the nut and the boiler-head C to make a tight joint.

The sections B are joined together at *f* by means of flanges *h*, which are bent over on a curve, so that their flat faces shall meet on a line a little within the circumference of the sections, and so that the outer sides, *s*, of the joint shall be flaring, as seen in Fig. 1. The flanges *h* are to be secured by riveting from the inside of the boiler. In ordinary boilers the rivets lie in directions at right

angles to the line of the axis of the boiler, whereby they are subjected to all the strain which arises from the longitudinal expansion of the boiler, as well as that which arises from lateral expansion and from unequal expansion and contraction of the lapped edges of the boiler-plates, and are thereby frequently broken, causing leakages and making the boiler unfit for duty. I aim to avoid these evils by an improved way of making the sectional joints.

The flanges *h*, being formed within the circumference of the sections, are bent, so that their inner flat sides lie in planes at right angles to the axis of the sections. They are then riveted together by rivets *i* in the inside of the boiler, the rivets being parallel with the axis of the boiler. It is evident that the rivets are not in this construction subjected to any strain from expansion or contraction, the whole energy of the longitudinal expansion being expended upon the stay-rod and the contraction being resisted by the flanges themselves. The rivets are drawn upon only when the sections of the boiler are deflected from a straight line, or, in other words, when the boiler is subjected to vibration, as hereinafter stated.

An anchor or stay piece (only one being shown in the drawings) like J is secured within the boiler and across it, upon the flanges *h*, by means of the rivets *i*, which hold the flanges together. These anchors may be placed at each sectional joint, or they may be placed at less distances apart, according to the degree of stiffness it is desired to give to the boiler. One chief advantage which results from the use of the anchors is that they counteract the lateral strain upon the boiler. The stay-rod D passes through this anchor, and is thereby steadied and held in place. The hole which is cut through the boiler-head C for the passage of the stay-rod D is to be made of greater diameter than what would be necessary for that purpose in order that it may also serve as a man-hole, the nut and washer being removed and the chain withdrawn sufficiently to clear it. No other opening, therefore, need be made in the boiler with the view of making a man-hole. The washer and nut must be of suitable size and strength to make a strong and tight joint, notwithstanding the enlargement of the hole in the head C.



By using the perforation in the head C as a man-hole I avoid the cutting an additional hole in the boiler for that purpose, and thereby save not only that expense, but also the expense of packing it and the liability of leakage from that source. Either of the perforations through the heads C C' may be enlarged for this purpose, and it will of course be most convenient to employ that one of the holes therefor which is to be covered with the washer and nut of the stay-rod.

In practice this boiler may be of any convenient length and diameter, and if its diameter shall be three to four feet, or thereabout, the stay-rod should be about three and one-half inches in diameter, so as to have sufficient strength to hold the sections together against the pressure of the steam, and also against the shocks and jar which would come upon it when the boiler is used upon locomotives.

The heads C C' should be arched to sustain the strain of the stay-rod. As the expansion of the sides of the boiler will be greater than that of the stay-rod, a constant strain will be made upon the boiler-heads C C' by means of the head *b* and nut *e* of the stay-rod, and the joints *f* will by that means be the more compressed and tightened. The curved or flaring corners or angles of the joints *f* have the effect of giving a degree of elasticity to the joints, which will prevent the joints from being rent by this compression, while this elasticity has no tendency to open the joints at any point.

When the boiler is used for locomotives, it will withstand the jars and shocks and torsion to which boilers of that class are subjected without any tendency to leak, for the reason that the joints *f* will permit of considerable vibration of the different sections by reason of their flaring or curved corners *s*, the joints *f* being still kept tight when the adja-

cent sections B are bent out of a straight line, because the outer sides of the joints will then approach each other or roll over, as it were, toward each other on the side of the flexure of the boiler, while the riveted flange *h* will still keep the joint tight on the side of the deflexure.

My invention is applicable to all vessels which are to be subjected to the pressure of steam or water or air or gas. It can be used also in the construction of soda-fountains.

I disclaim the invention shown in the application of E. Howe, Jr., rejected June 27, 1859, and also the invention shown in Fig. 3, Plate 17, of Peclet's "Traité de la chaleur," where is shown a boiler made of cast-iron sections united within by means of interior flanges.

My invention applies to boilers and other vessels made of materials possessing elasticity or flexibility, and I aim to provide for and control the flexure of the sides of the boiler by means of the curved angles of the flanges of the various sections, as above explained.

I claim as new and desire to secure by Letters Patent—

1. Combining, in sectional steam-boilers and other vessels of wrought or malleable metal for sustaining pressure from within, a stay-rod D extending through the same, with the flaring joints *f* and the flanges *h* of the sections, substantially as described.

2. The sectional joints *f* of the several sections of the boiler, made with curved or flaring edges projecting inwardly, substantially as and for the purpose described.

3. Placing anchors, like J or its equivalent, across the boiler or other vessel in the line of its diameter, substantially as above described.

BENJAMIN F. COWAN.

Witnesses:

WM. F. McNAMARA,  
THEO. TUSCH.