

No. 633,337.

Patented Sept. 19, 1899.

M. CORYELL.

TUBE HEADER.

(Application filed June 21, 1899.)

(No Model.)

2 Sheets—Sheet 1.

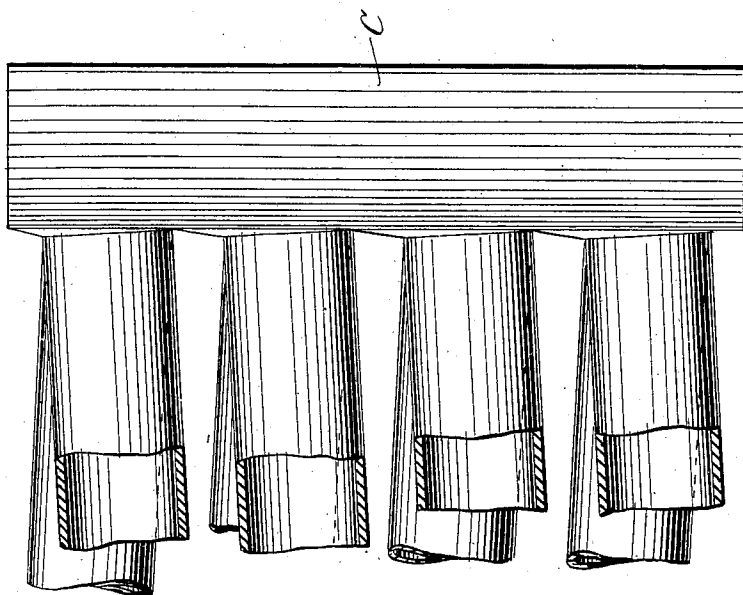
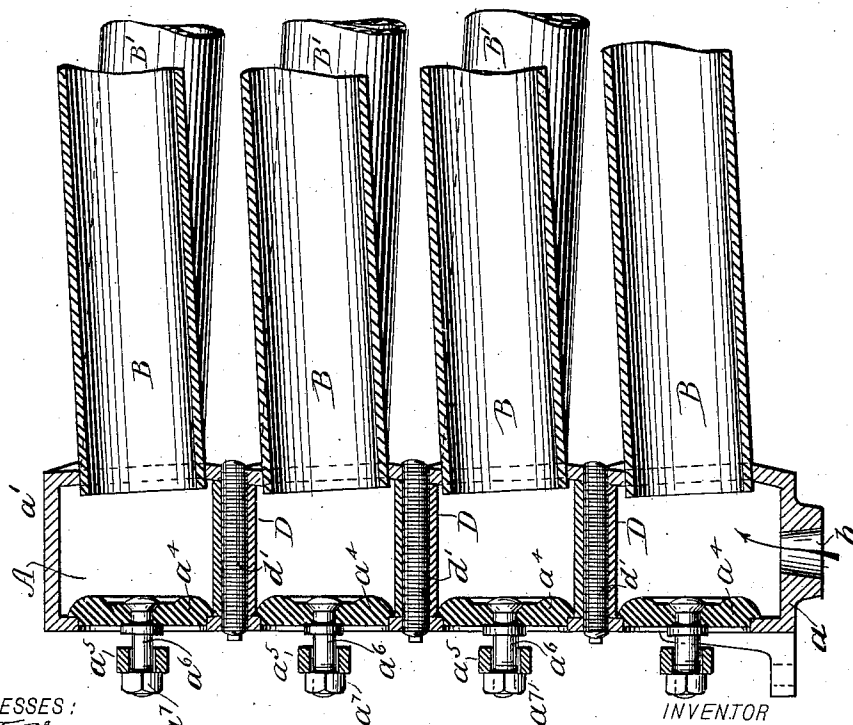


Fig. 1



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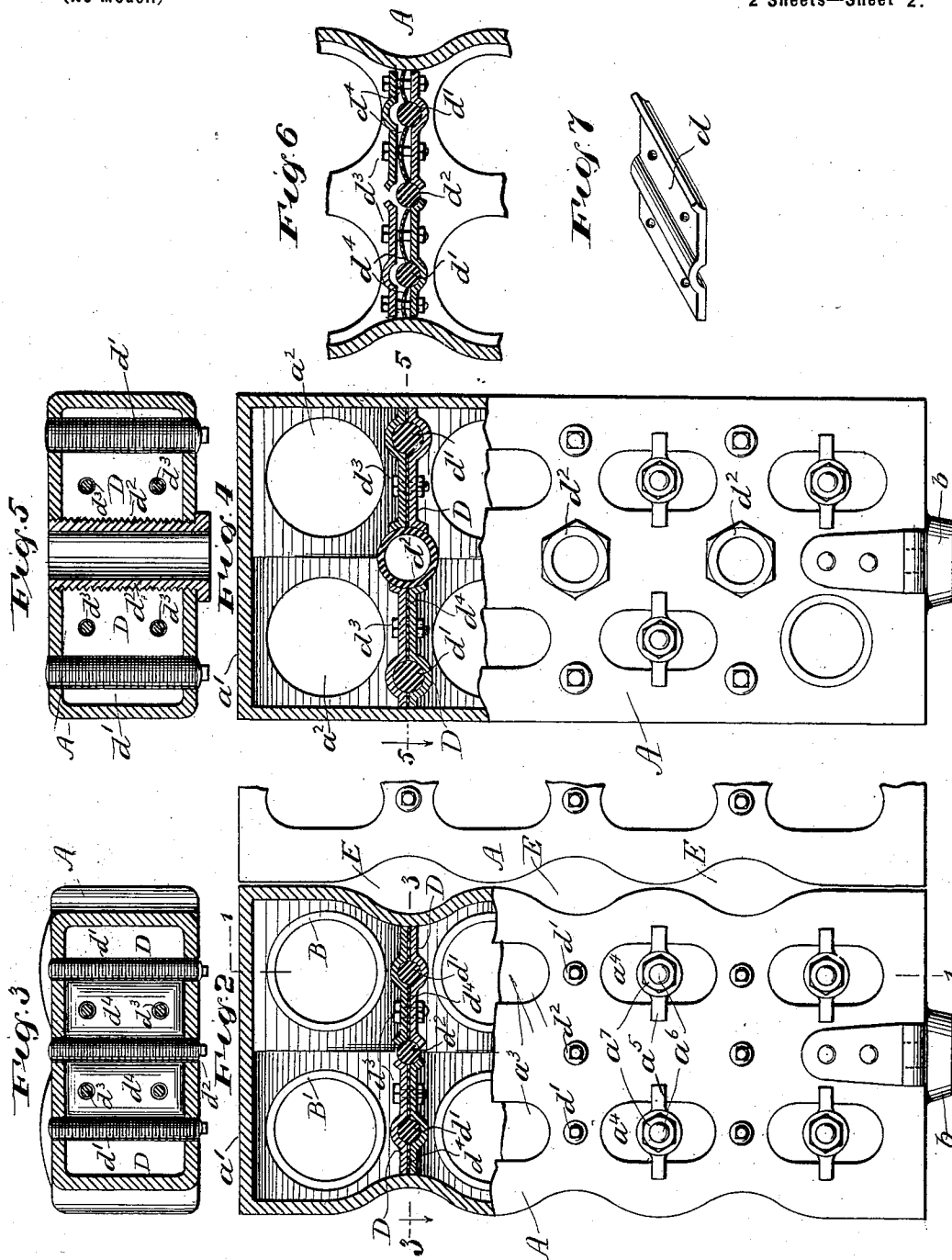
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UNITED STATES PATENT OFFICE.

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TUBE-HEADER.

SPECIFICATION forming part of Letters Patent No. 633,337, dated September 19, 1899.

Application filed June 21, 1899. Serial No. 721,401. (No model.)

To all whom it may concern:

Be it known that I, MIERS CORYELL, a citizen of the United States, and a resident of the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Tube-Headers for Boilers and the Like, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to boilers of the water-tube class in which the tubes are arranged in sections or elements, and although its use is not restricted thereto it is particularly adapted to the well-known "Belleville" boiler.

In connection with the description of my invention it is to be understood that I do not intend to limit its use to what is generally known as a "steam-boiler," since it is adapted for other similar structures—such as heaters, condensers, evaporators, &c.; but for convenience I will describe the invention as applied to a sectional water-tube boiler of the Belleville type. In these boilers the tubes are arranged in sets or elements and the water entering the lower tube of each element or section flows back and forth through the furnace or combustion-chamber in an ascending column and the steam from each set of tubes passes into a collector or drum above the tubes. Some means for directing the circulation and compelling the water and steam to pass directly from one tube to another are therefore essential and are usually provided in the form of cast couplings, into which the adjacent ends of the tubes are secured. These couplings are usually termed "headers" or "junction-boxes," and until recently have usually been constructed of cast metal and the tube ends were secured therein by threaded joints; but the increasing employment of higher steam-pressures has demonstrated that this method of construction is unreliable, and it is now almost imperative that castings and threaded joints should be discarded in practical and efficient boiler construction. The object of my invention is the accomplishment of this result—that is to say, to provide a header for sectional water-tube boilers which may be constructed and fitted in place economically and efficiently and which may be made entirely of wrought or forged metal instead of being cast, thus permitting the tube

ends to be expanded into the headers instead of being secured therein by threaded joints. 55

In the accompanying drawings, Figure 1 is a side view, partly in section, of a structure embodying my invention. Fig. 2 is a front view, also partly in section. Fig. 3 is a horizontal section on the line 3 3, Fig. 2. Fig. 4 is a front view, also partly in section, of a modified construction. Fig. 5 is a horizontal section on the line 5 5, Fig. 4. Figs. 6 and 7 show details of construction. 60

Similar reference characters are employed to designate corresponding parts in all the views. 65

In the drawings, A is the front header, B the direct tubes leading to the rear header C, and B' are the return-tubes leading from the rear to the front header. For convenience I have shown only four tiers or pairs of tubes; but in practice a greater number is usually employed. The water enters through the inlet b, passes through the lower tube B into the rear header, thence into the other tube B' of this pair to the front header, and so on until it enters the steam drum or collector (not shown) at the top of the boiler in the form of steam. 70 75 80

The header A is constructed of wrought or forged metal and may be made of wrought steel or iron tubes rectangular in cross-section. The ends a a' are secured in place by welding, and the rear wall of the box-like structure forming the header is suitably offset, as shown in dotted lines, to receive the tubes at right angles. The tube-holes a^2 are then formed in the offset portions of the rear header, and suitable hand-holes a^3 are provided in the front wall of the header, which are fitted to receive the hand-hole covers a^4 , which are secured in place by the yokes a^5 , bolts a^6 , and nuts a^7 in the usual manner. Within the header and between the different pairs of tubes is secured a plate D, which fits closely to the sides of the header and forms a horizontal partition across the same. As the function of these plates is the division of the header into as many separate compartments as there are pairs of tubes in the element, I use the term "separator-plates" to designate them. As shown, each of the separator-plates D consists of four separate plates d , formed to encircle the stay-bolts d' and to engage the stay-bolts d^2 , all which pass through 85 90 95 100 105

the header. The plates d are preferably just long enough to pass through the tube-holes a^2 before the tubes are secured therein and after being fitted in place around the stay-bolts are secured there by the bolts d^3 . It is not in all cases essential that the edges of the separator-plates D and the walls of the header should meet in an absolutely-tight joint; but where such a joint is desirable or necessary I place between the plates d a thin sheet or disk of copper or other suitable material d^4 , slightly dished in form and in its dished form of the same size as the spaces formed by the header-walls and the stay-bolts. As the plates d are drawn together by the bolts d^3 the disks d^4 are flattened out and their edges are forced tightly against the header-walls and the bolts and insure a tight joint at all points. These disks d^4 are shown in section in Fig. 6, and Fig. 3 contains a plan view of two of them.

The headers are placed side by side, there being as many pairs of headers as there are sections or elements in the boiler, and in order to facilitate the cleaning of the exterior of the tubes I corrugate the sides of the front headers, as shown in Fig. 2, thus furnishing an opening E between the headers through which the cleaning implements may be inserted and operated. In Figs. 4 and 5 I have shown a modified construction in which the corrugations are dispensed with and the stay-bolts d^2 are made hollow and of increased diameter. In this modified structure the cleaning implements are inserted and operated through the hollow stay-bolt d^2 . This modification permits the use for the headers of rectangular wrought tubes which can be purchased in lengths and saves the expense of the special forging required to produce the corrugations.

The stay-bolts d' d^2 are, as shown, suitably headed to receive a wrench, which, if desired, will permit the removal of the bolts. The ends of said bolts preferably project slightly beyond the walls of the header, so that they may be upset against the header-walls where extraordinarily high pressures are employed, thus strengthening the structure and obviating any possibility of leakage at this point.

It is to be understood that the rear header C is similar in construction to the front header B except that no inlet-opening is provided, and as no means are required for permitting access to the interior through the rear header the hand-holes and corrugations or hollow stay-bolts are omitted.

One important advantage of my invention is the facility with which a defect either in the metal forming the header or in the welding thereof may be detected before the expense of the labor required to erect the header in place has been incurred. After the box-like structure constituting the header has been formed and the ends welded in and before any of the tube or hand holes have been formed therein it may be connected with the

hydrostatic testing apparatus and subjected to the usual test, and if any defect exists in the structure it will be revealed before the expense required to erect and connect the header has been incurred. This particular advantage would not of course be achieved where it is desired to form the deflector-plates D of one piece instead of a number of separate pieces, as shown. In such case the separator-plates D may each be made of a casting of suitable shape to fit the header, cored to receive the stay-bolts, and the plates may be secured in place before one end of the header is welded to the structure.

Having thus shown and described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a header for water-tube boilers and the like, the combination with a box-like structure formed to receive the tube ends, of bolts passing through the walls of the header and a separately-constructed separator-plate, carried by said bolts and fitting the interior walls of the header, substantially as shown and described.

2. In a header for water-tube boilers and the like, the combination of a box-like structure formed to receive one end of the tubes in each element, a series of bolts passing through the walls of said header and a separate plate constructed in sections and secured within the header by said bolts, substantially as shown and described.

3. In a water-tube boiler or like structure, the combination with a series of tubes forming an element arranged so that the adjacent ends of each pair lie in the same horizontal plane, of a box-like structure within which all the adjacent tube ends of the element are secured, a series of plates and a series of bolts securing said plates in place to form horizontal partitions in the header and separate the tubes into pairs, substantially as shown and described.

4. In a header for water-tube boilers and the like, the combination of a box-like structure formed to receive the tube ends, a series of separator-plates fitting the interior walls of the header, a series of hollow stay-bolts serving to support said plates and extending through the walls of the header, substantially as shown and described.

5. In a header for water-tube boilers and the like, the combination of a box-like structure formed to receive the tube ends, a series of bolts passing through the walls of said header, a separator-plate formed in sections having opposing flat surfaces, a dished metal disk arranged between said surfaces and means for clamping said disk between said surfaces and causing it to engage the interior walls of the header, substantially as shown and described.

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Witnesses:

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