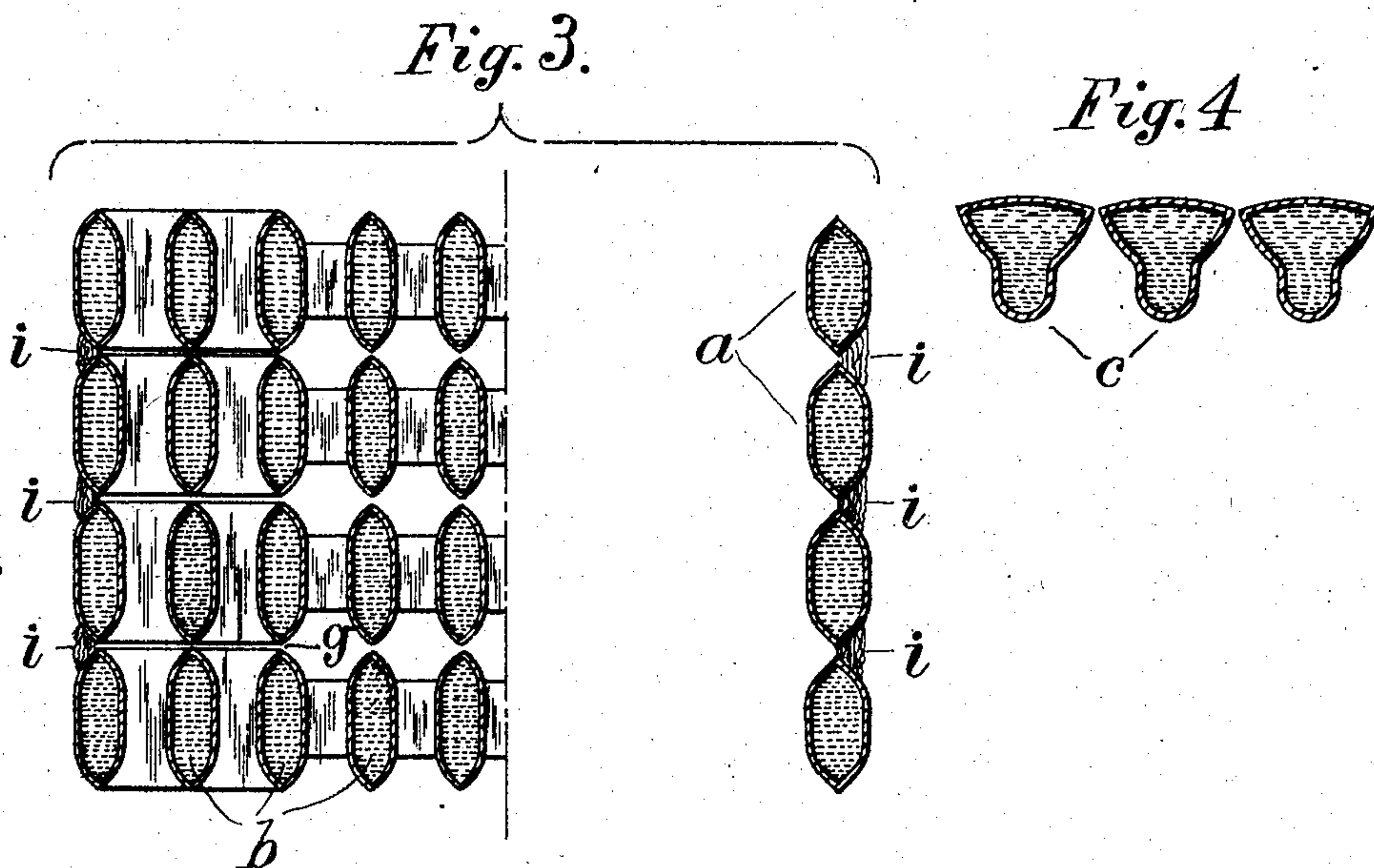
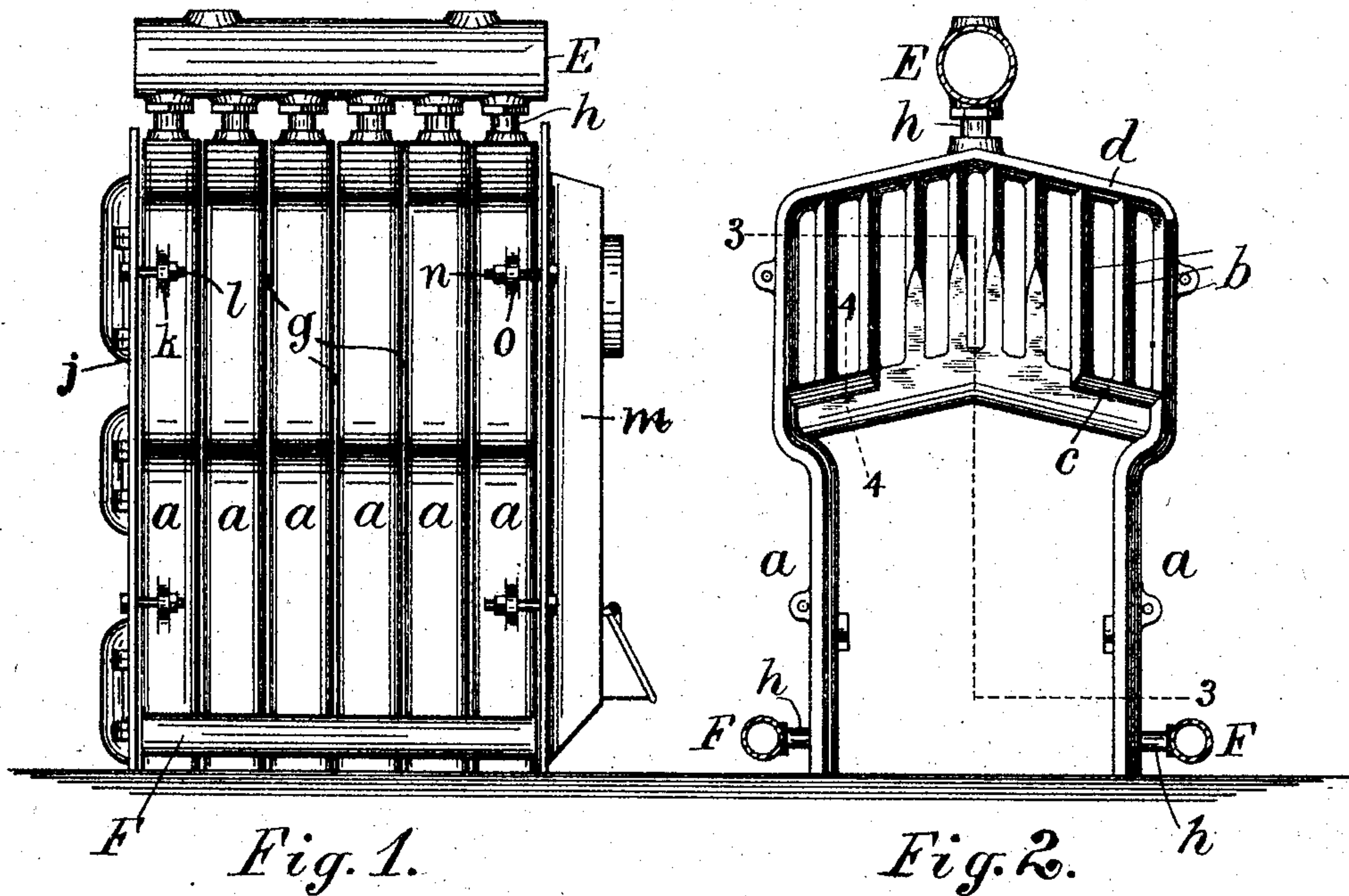


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W. M. MACKAY.
SECTIONAL BOILER.
APPLICATION FILED MAR. 31, 1904.



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UNITED STATES PATENT OFFICE.

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SECTIONAL BOILER.

SPECIFICATION forming part of Letters Patent No. 780,432, dated January 17, 1905.

Application filed March 31, 1904. Serial No. 200,887.

To all whom it may concern:

Be it known that I, WILLIAM M. MACKAY, a citizen of the United States, whose residence and post-office address is 66 James street, Newark, county of Essex, State of New Jersey, have invented certain new and useful Improvements in Sectional Heating-Boilers, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

The present invention relates to that class of cast-iron boilers which is made of flat sections either horizontal or vertical held adjacent to one another and constructed to form a fire-pot and smoke-flues leading therefrom to an outlet. In such boilers it is common to form the sections with contiguous flat surfaces and to secure the sections rigidly together with such flat surfaces in contact or closely adjacent to one another, and in either case the formation of rust upon the flat surfaces operates to crowd the sections apart and often results in the cracking or breakage of sections. When such boilers are standing without fire in the summer-time, they are greatly exposed to dampness, as they are commonly located in cellars or cold situations, and rust invariably forms upon the surfaces unless they are oiled every season, which is very rarely done. Injury to such boiler-sections from this cause is so common that at the close of each summer season it is found necessary to replace many broken sections in boilers of this class at very considerable expense.

My invention consists in providing all the contiguous members, which are placed opposite one another when the sections are assembled, wholly with acute corners, so as to avoid any superficial contact with the adjoining section, and thus avoid any contiguous faces between which rust can accumulate.

To practice the invention in the most effective manner, it is also necessary to wholly remove all water connections from the adjacent faces of the sections to the edges of the sections, as the sections are liable to be crowded apart by rust next the water-joints if flat

faces are clamped or drawn together by connecting water-joints.

The invention is especially applicable to sectional boilers of the class in which no flues or air-passages are desired upon the exterior of the boiler, and no external casing is therefore applied, as the edges of the sections form the shell or casing for the entire boiler. In boilers of this character the edges of the sections are commonly brought close together, so as to prevent the escape of smoke and gases from the interior of the sections, and the face next the edges of the sections if made with flat joints furnish an extended surface for the accumulation of rust. Where sections are formed with flat faces in contact and secured rigidly together, the expansion of the sections where exposed internally to the greatest heat is also liable to strain or crack some of the sections, and damage is also prevented from this cause by securing the sections at a little distance apart, as one-eighth or one-quarter of an inch, (depending upon the magnitude of the boiler,) the sections being held in such relation by the manifold or headers which form the external water connections between the sections. Where sections are formed upon their adjacent faces with tongue-and-groove joints, the groove serves to retain rust to press upon the tongue, with the injurious results which I have described, no matter how acute the edge of the tongue may be. As the opposite sides of the groove are opposed to the opposite sides of the tongue, the accumulation of rust between such opposed faces has the same effect as between opposite flat surfaces. To avoid any rigid connection between the sections, the front and rear plates of the boiler, which contain, respectively, the fire-door and the smoke-box, are connected exclusively with the end sections and no through-bolts are extended from the front to the back plate.

When the boiler is erected, the open spaces of one-eighth or one-quarter of an inch between the joints of the several sections are closed or plastered with putty or asbestos cement, and the escape of smoke from such joints

is thus prevented, while the freedom of the individual sections to expand is maintained.

The invention is applicable to sections of all sizes and shapes and is illustrated in the drawings and in connection with a series of upright sections having all of them vertical and transverse edges beveled to form corners which are adapted to cut the rust if it forms upon such adjoining faces and furnish too small an area for the rust to exert any injurious pressure.

Figure 1 is a side elevation of the boiler. Fig. 2 is a front view of one of the sections. Fig. 3 shows at the right-hand side a horizontal section through the fire-box and at the left-hand side a horizontal section through the water-tubes above the fire-arch. Fig. 4 is a transverse section of several of the fire-arches on line 4 4 in Fig. 2. Figs. 3 and 4 are upon a larger scale than Fig. 2.

a designates the water-legs of the sections, which are beveled, as shown in Fig. 3, to form sharp corners at their adjacent outer edges, and *b* designates the water-tubes extending upwardly between the fire-arch *c* and the water-arch *d*. The water-tubes, which extend to the face of the section, are beveled in both directions to form a sharp corner, and the fire-arch *c* is beveled downwardly, as shown in Fig. 4, to form a sharp corner at its upper edge and retain a substantially flat top surface, which permits the soot and ashes to be most readily cleaned from the tops of these arches.

The sections are shown in Fig. 1 connected by a header or manifold *E* at the top and headers *F* at the bottom upon each side, a nipple being extended from each header into the section and the distances between the nipples *h* upon the headers being so disposed as to hold the edges of the sections a little apart, forming a clearance or interspace *g*, as seen in Fig. 1. Such interspaces are useful to provide for irregularities and variations in the castings of the sections, as well as to permit of expansion by heat and to prevent injury by the accumulation of rust. The water connections upon the edges of the headers are designed and arranged to retain the sections together and to hold all the acute corners upon the edges and upon all other contiguous members of the sections primarily from contact, while it permits them to contact temporarily when expanded by heat and provides for such temporary contact without producing any injurious strain or effect.

Fig. 3 shows the beveled recess between the sections upon the outer sides of the water-legs filled with cement or plaster *i* to prevent the escape of smoke from between the sections. The boiler is shown provided with a front plate *j*, which is attached to ears *k* upon the front section by short bolts *l*, and the rear section is shown provided with a rear plate and smoke-box *m*, connected to lugs *n* upon

the rear section by short bolts *o*. Such bolts exercise no restraint upon the expansion of any of the sections, as the sections are held exclusively by the nipples and headers, and the intermediate clearance between the sections permits them to expand when affected by heat without bending or straining the sections.

The entire absence of water-joints connecting the adjacent faces of the sections avoids the use of any contiguous flat surfaces upon which rust could accumulate, and every member or portion of each section where contiguous to another can thus be reduced to a corner which presents a mere edge or line toward the adjacent section.

My construction will be readily distinguished from those in which sections have been made of diamond shape or with concave sides to fit against an inclosing casing or partition in a fire-box and form flues for the passage of smoke, as the corners of my sections are not used in contact or connection with any casing or partition to form a flue. I am aware that acute corners have been formed upon the edges of water-arches and various members of other cast-iron sections, but not upon members which were opposed directly to one another, as in my construction. Where such acute-edged members have been used contiguous, they have been used in a snugly-fitting joint adapted to retain rust and also in connection with other members having contiguous flat faces held close to one another, so that the accumulation of rust produces injury to the sections or to the water-joints between the sections, and such constructions do not embody my invention nor the advantages of my construction, which removes all contiguous faces from the adjacent sections and provides all the contiguous members with sharp corners, upon which rust cannot press to crowd the sections apart.

Having thus set forth the nature of the invention, what is claimed herein is—

1. A boiler having cast-iron sections with the adjacent faces of the sections provided upon their contiguous members with acute corners, and means arranged and operated to hold the sections primarily from contact, and the interspaces at the edges of the sections closed by suitable cement to prevent the escape of smoke.

2. A boiler formed of cast-iron sections, each section having a member adjacent to the edge forming a casing for the boiler when assembled, and the adjacent faces of the sections provided upon all their contiguous members wholly with acute corners, headers with water connections to the outer edges of the sections arranged to hold the sections with interspaces.

3. A boiler formed of cast-iron sections having their edges adapted to form a casing for the

boiler when assembled, whereby the fire-box and necessary flues are confined entirely within the edges of the sections, and such edges and all contiguous members of the sections 5 provided with acute corners, and headers with water connections to the sections arranged to hold the sections with interspaces between all the contiguous members, and the interspaces at the edges of the sections closed by suitable 10 cement to prevent the escape of smoke.

4. A boiler composed of cast-iron sections, each section having a member adjacent to the edge adapted to form a casing for the boiler when assembled, and the adjacent faces of the 15 sections provided upon all of their contiguous members with acute corners, water connec-

tions upon the outer edges of the sections designed and arranged to retain the sections together and hold the said acute corners upon all of their contiguous members of the sec- 20 tions primarily from contact, and the end sections of the boiler having the front and back plates secured respectively to such end sections, as and for the purpose set forth.

In testimony whereof I have hereunto set 25 my hand in the presence of two subscribing witnesses.

WILLIAM M. MACKAY.

Witnesses:

L. LEE,

THOMAS S. CRANE.