

C. B. MOORE.
REFRACTORY ARCH FOR LOCOMOTIVE BOILER FIRE BOXES.
APPLICATION FILED SEPT. 26, 1910.

996,026.

Patented June 20, 1911.

2 SHEETS—SHEET 1.

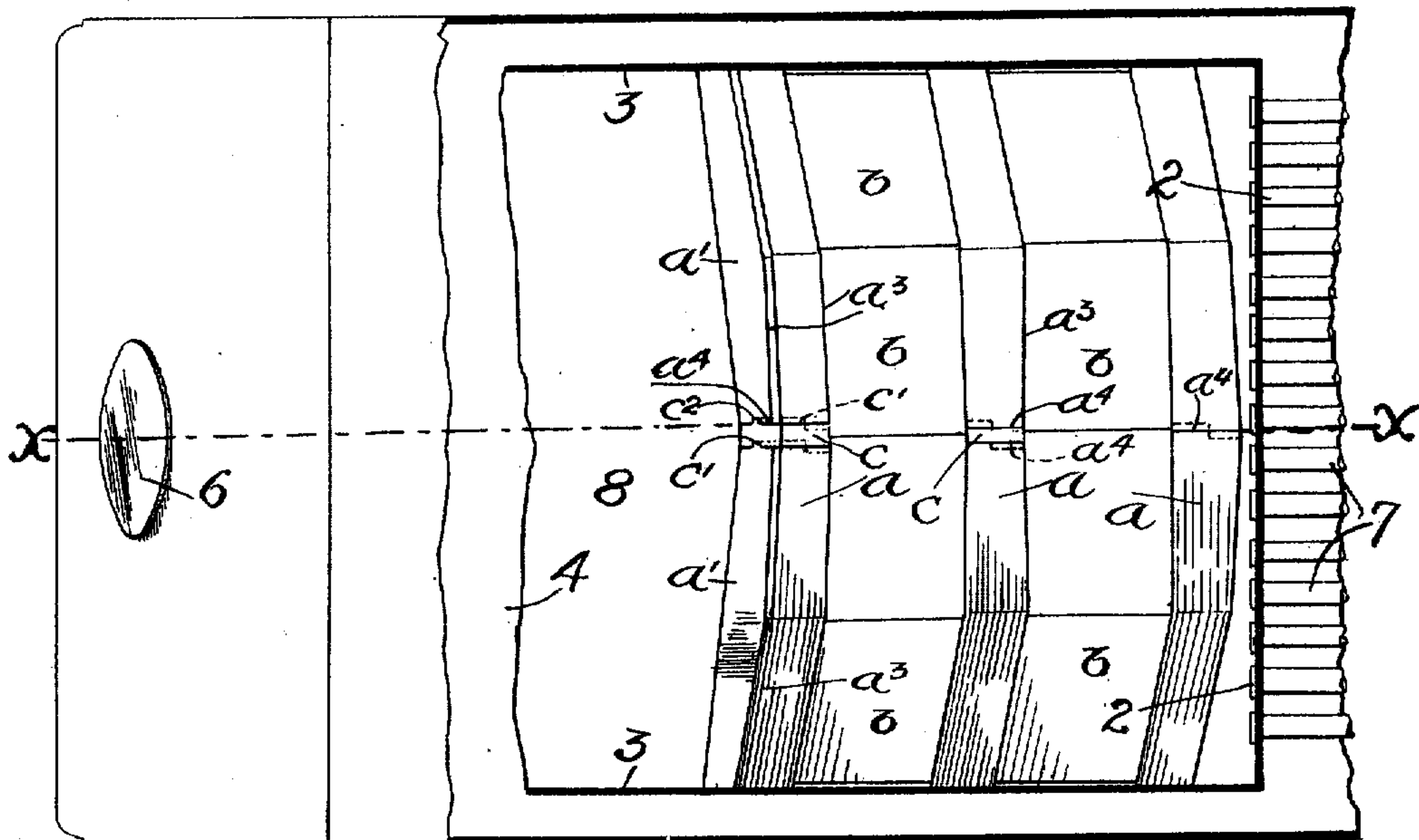


Fig. 1.

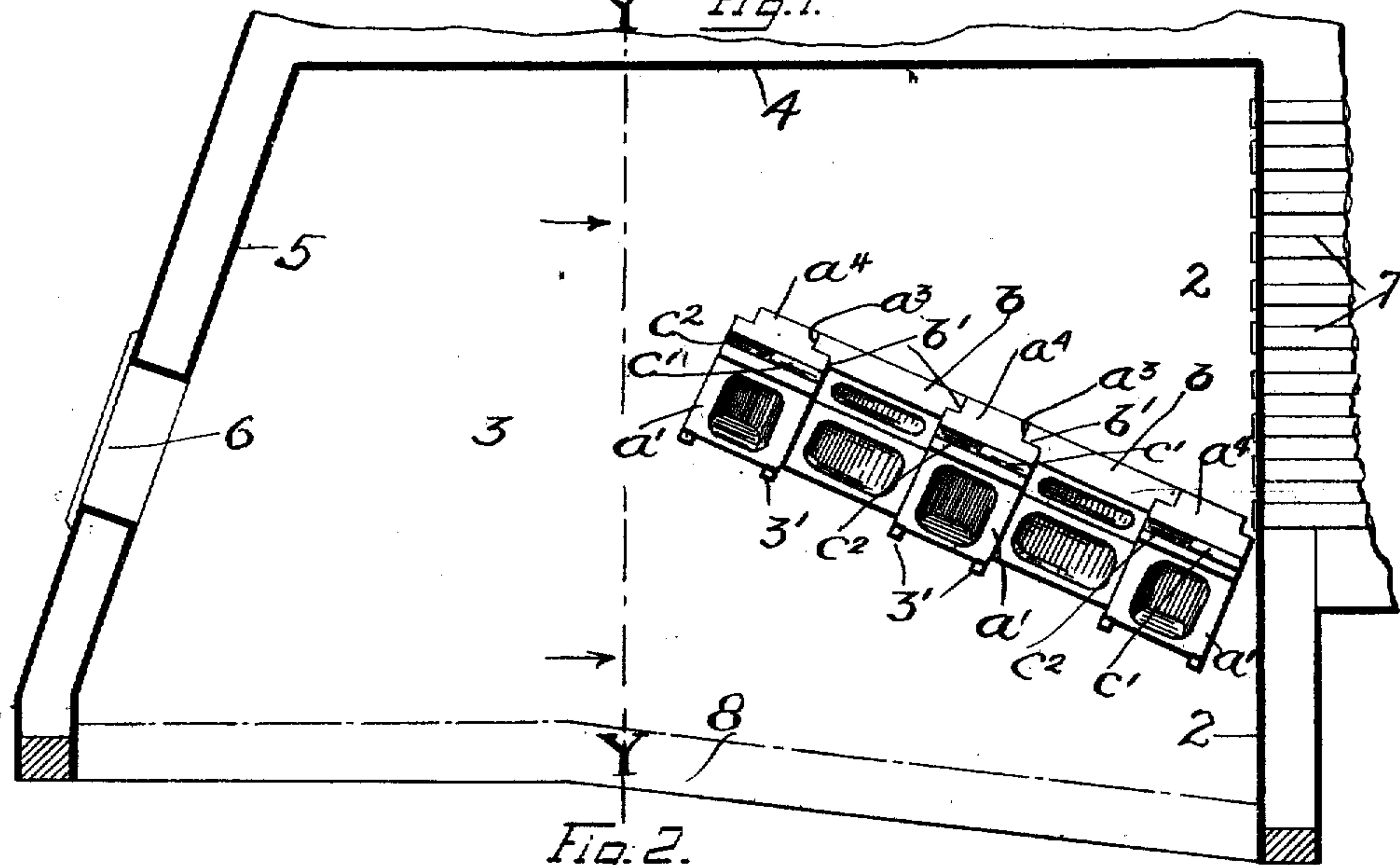


Fig. 2.

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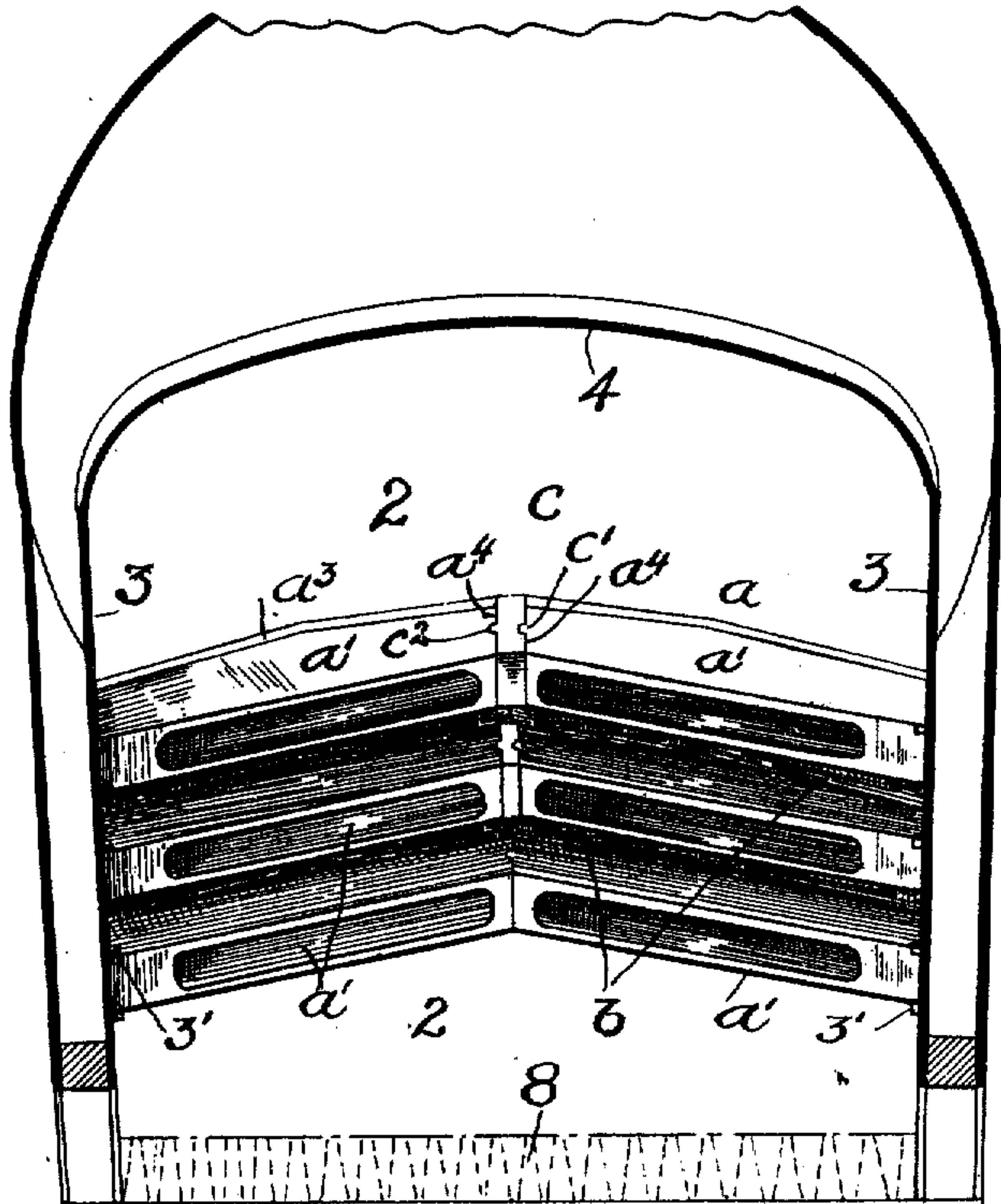


Fig. 3.

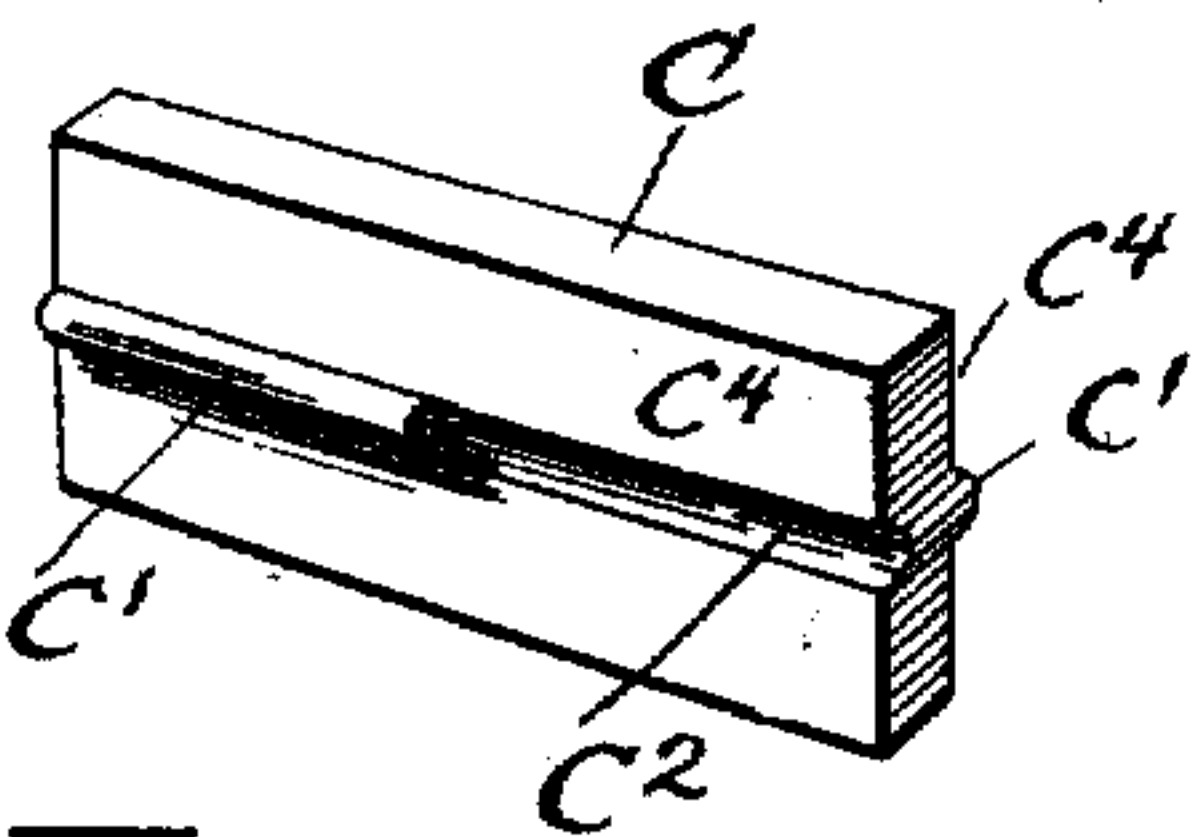


Fig. 4.

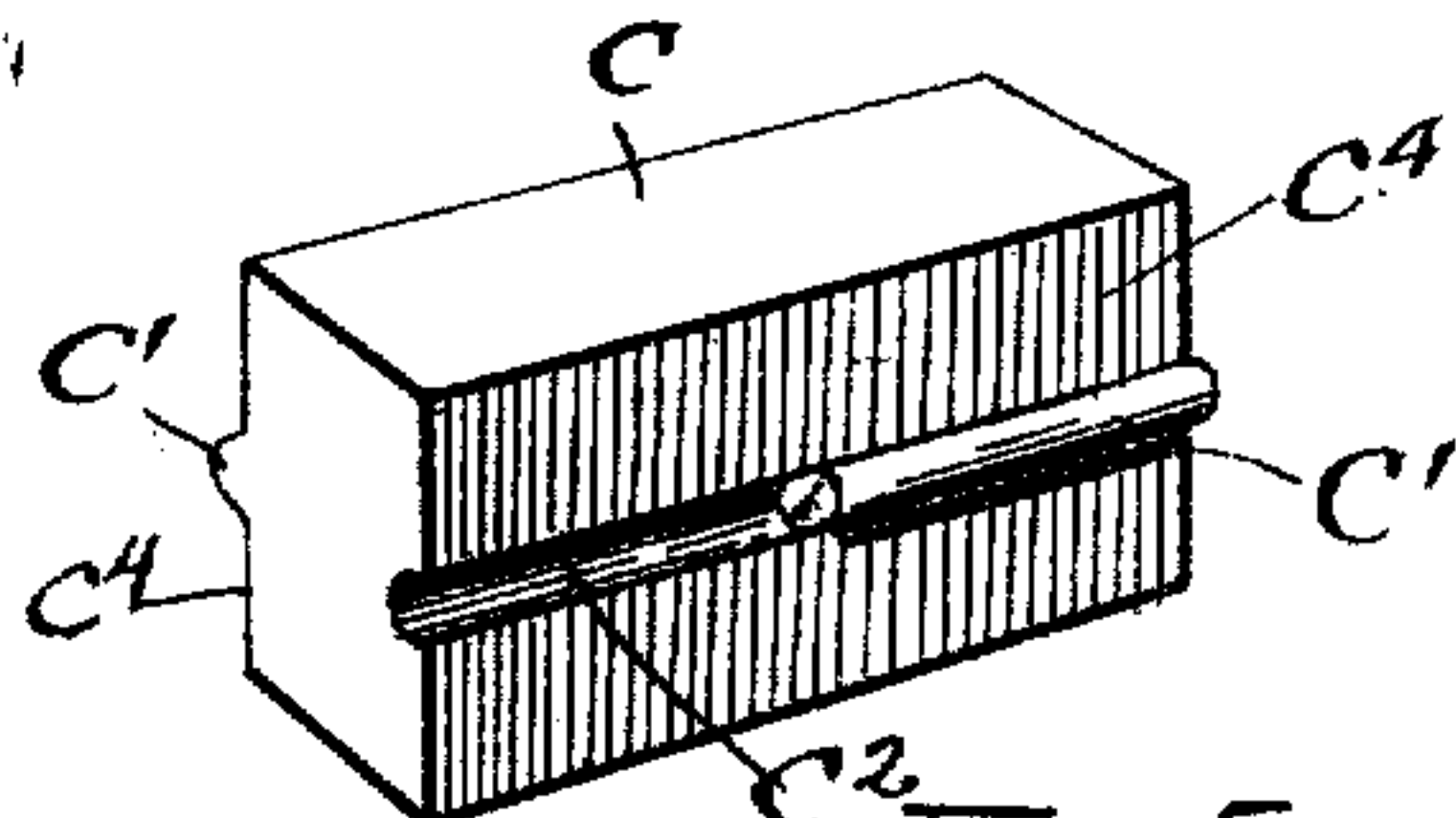


Fig. 5.

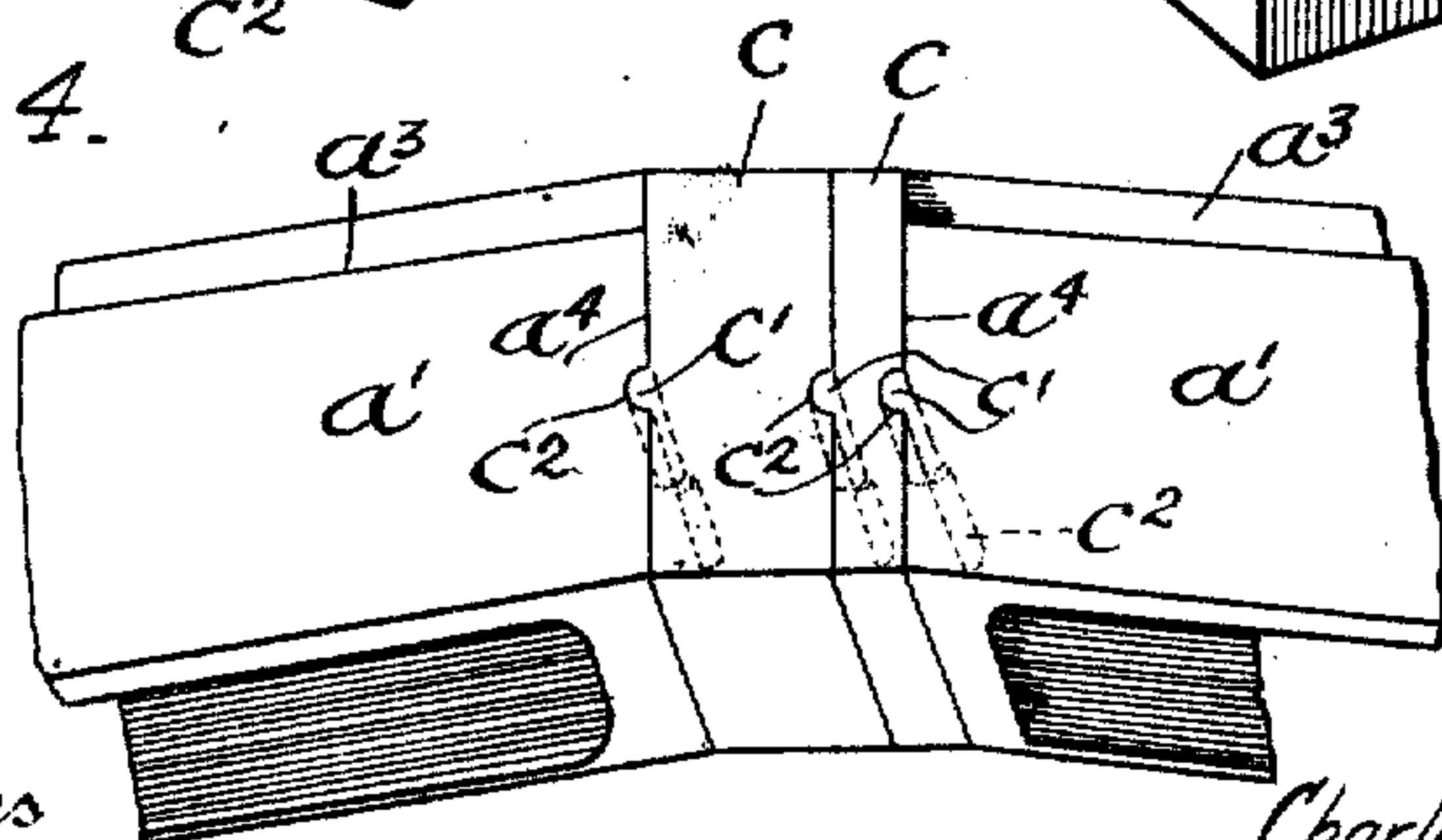


Fig. 6.

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UNITED STATES PATENT OFFICE.

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REFRACTORY ARCH FOR LOCOMOTIVE-BOILER FIRE-BOXES.

996,026.

Specification of Letters Patent. Patented June 20, 1911.

Original application filed September 23, 1908, Serial No. 454,348. Divided and this application filed September 26, 1910. Serial No. 583,763.

To all whom it may concern:

Be it known that I, CHARLES BREARLEY MOORE, a citizen of the United States, formerly a resident of Evanston, Cook county, Illinois, and now a resident of the city of New York, State of New York, have invented certain new and useful Improvements in Refractory Arches for Locomotive-Boiler Fire-Boxes, of which the following is a full, clear, and exact description.

My invention relates to improvements in refractory baffles or deflecting walls, commonly called arches, for the fireboxes of locomotive boilers.

This is a divisional application, the subject matter hereof having been originally disclosed in my copending application Serial Number 454,348, filed September 23, 1908.

The object of this present invention is to provide an improved refractory arch composed of a plurality of large tiles or bricks and which may be easily and quickly installed in locomotive fireboxes and which, once it is installed, will be sufficiently rigid to maintain its form against the usual shocks to which it is subjected.

A special object of my invention is to improve the connections between bricks composing a refractory arch of this kind; and a subordinate object is to provide improved means for interlocking the abutting bricks or tiles composing an arch of the general character disclosed in my aforesaid copending application. In such arches certain abutting bricks bear or carry the weight of complementary panel bricks, and it is especially desirable that the carrying or supporting bricks shall be held against dislodgment or disengagement from one another.

Another object of my invention is to provide an arch which shall be composed of but few kinds or shapes of refractory bricks and yet be adapted to fit fireboxes of different width.

Still further objects of my invention will appear hereinafter.

My invention consists in the several improvements, the various constructions, and the combinations of parts hereinafter set forth and particularly pointed out in the appended claims, and will be readily understood upon reference to the accompanying drawings in which I have illustrated a

structure which in a preferred manner embodies the several features of my invention.

In these drawings, which form a part of this specification, Figure 1 is a plan view of a firebox containing a refractory arch embodying one form of my invention, the crown sheet of the firebox being broken away to disclose the arch; Fig. 2 is a sectional view on the line X—X of Fig. 1; Fig. 3 is a sectional view on the line Y—Y of Fig. 2, looking forwardly toward the arch; Figs. 4 and 5 are perspective views of spacing and interlocking blocks or bricks of different thicknesses, and, Fig. 6 is an enlarged detail showing two spacing bricks between two span members of the arch.

My invention may be embodied in arches composed of bricks of various forms and arranged in various locations and positions in the firebox. I have herein confined the illustration of the invention to so-called self-supporting front arches which extend from side sheet to side sheet of the firebox, and to which my invention is admirably adapted; but I desire it to be understood that my invention is not confined or limited thereto.

A locomotive firebox, as shown in the drawings, is usually made up of a flue sheet 2, the side sheets 3, 3, a crown sheet 4, and a rear sheet 5. The rear sheet contains the fuel door 6. The flues 7 lead forward from the flue sheet. 8 represents the firebox grate.

A so-called front arch usually occupies an inclined position in the front part of the firebox, its lower end closely approaching or being in substantial abutment with the lower part of the flue sheet. Its office is to prevent the direct flow of the gases and combustible particles from the grate to the flues and to force them toward the rear end and side sheets of the firebox and thus cause active combustion to take place throughout the length of the firebox, the object being to insure the uniform distribution of the heat to the walls and crown sheet of the firebox. Such arches, whether of peaked or flat form, cannot be successfully made or used in one piece, and it is also impracticable to make them of very large bricks for the reason that, to be practicable, the largest brick used must be of a size to be passed conveniently through a fuel door opening. In

building these arches I find it desirable that the bricks shall be even smaller, and, in consequence, each of my improved arches comprises a considerable number of separate
 5 bricks. These bricks, in the completed arch, bear one against the other. To retain them in these relations, so that the arch shall not be disrupted by the movement of one brick away from another, I provide my improved
 10 arch bricks with the hereinafter described interlocking devices. I will first describe in detail the make-up of a refractory arch of the type illustrated in the drawings in order that the need for and the general func-
 15 tions and duties of the interlocking devices may be better understood.

Referring now to Figs. 1 to 4, it will be seen that the particular arch there shown is made up of three self-supporting spans or
 20 arch sections, a, a, a , and two transverse rows or courses of thin bricks, panels, or fillers b , the latter being carried by said spans. Each span a is preferably composed of two long refractory spans or bricks a', a' . The lower
 25 ends of these bricks are here shaped to abut respective side sheets 3 of the firebox, and lugs 3', on said side sheets, take or carry the weight of the completed arch. The support-
 30 ing bricks a', a' , as shown in Figs. 3 and 4, are arranged at opposite inclinations and arch or lean against one another, their ends meeting at the middle of the firebox. These bricks a' are of a width preferably exceed-
 35 ing their depth. Preferably, as will be noted, the ends or abutting surfaces a^4 of the bricks a', a' are of full cross section and of the same vertical extent or area. The bricks b are thin slabs of fire clay and are
 40 laid upon the tops of the spans a, a , closing the openings between them, and hence constituting panels or cover members between the supporting bricks. The arch as a whole is pitched or inclined toward the flue sheet.

In the present example, a^3, a^3 represent
 45 shoulders on the supporting members a' , and b', b' represent shoulders on the panel bricks b by which the panels and supporting members are practically interlocked against relative movement longitudinally in the fire-
 50 box. It will now be observed that if the end of one span brick should slip or slide away from the other, the span and the bricks resting thereon would fall upon the grate. To prevent this, and as a means of interlocking
 55 the abutting ends of the bricks or members a' , I tongue-and-groove the ends thereof, as shown in Fig. 3, wherein is represented a tongue on one brick accommodated in a groove of corresponding shape in the other,
 60 and, in order that the bricks may be interchangeable, I provide the end of each with what may be termed half-a-tongue c' and half-a-groove c^2 (see dotted lines Figs. 1 and 5). In other words, I make the ends of the
 65 brick identical in form, each being the com-

plement of the other. An advantage of this form of interlocking device is that it serves to prevent either vertical or lateral displacement of the abutting ends. One of the chief
 70 advantages of my invention is that an arch thus constructed will fit fireboxes of various widths and it is unnecessary to make the component bricks in many sizes. Considerable variation in firebox width may be com-
 75 pensated by increasing or decreasing the pitch or inclination of the members a' , and where the width of the firebox precludes adjustment in this manner I employ one or more small key blocks c between the ends
 80 of the members a', a' . These key blocks (shown in detail in Figs. 4 and 5) I make of various thicknesses, and if one block is not sufficient I use two or more, fitting the same to the space between the ends of the arch
 85 members, as shown in Fig. 6. The sides c^4 of the key blocks c are provided with half-tongues and half-grooves c' and c^2 which correspond with the tongues and grooves in the bricks a' . They therefore interlock
 90 therewith and with one another. Such adjusting or spacing blocks c are of particular advantage in the narrow firebox wherein the width of the upper end of the arch considerably exceeds the width of its lower end.
 95 Whatever the special shape or form of the interlocking ends or surfaces of the bricks may be, I start the half-round projection, tongue or rib c' at the middle of the surface and extend it nearly or quite to the adjacent
 100 edge or corner of the brick, and the groove c^2 begins at the inner end of the locking rib c' and is as long or longer. The tongue and the groove are both straight and they are in alinement. Bricks which are intended to
 105 abut have ribs and grooves of the same dimensions, and the groove c^2 of one is adapted to receive the rib c' of the other. This construction is particularly desirable because it allows the bricks to be inter-
 110 changed from side to side of the box; hence the bricks a' may all be made in one mold, and the use of bricks of two different shapes is avoided. This is also the case with the
 115 special blocks, either side of which will fit either of the main bricks and any other spacing brick. It will be understood that all the bricks herein described are made of fire clay or the like.

As various modifications of my invention will readily suggest themselves to one skilled
 120 in the art, I do not limit the invention to the specific structures herein shown and described.

Having thus described my invention, I claim as new and desire to secure by Let-
 125 ters Patent:

1. The improvement herein described comprising two complementary, firebox arch bricks having surfaces in abutment and pro-
 130 vided with reversely disposed half-tongues

and half-grooves which interfit one with the other and interlock the bricks, substantially as described.

2. The improvement herein described comprising two complementary firebox arch brick having surfaces in abutment and provided with relatively symmetrical reversely disposed half-tongues and half-grooves which interfit one with the other and interlock the bricks in center-line alinement.

3. The herein described new article of manufacture comprising a refractory arch component brick having an abutment surface, an interlocking tongue projecting from said surface and a groove of corresponding shape formed in said surface, the inner end of said groove terminating at the inner end of said tongue, said groove extending in opposite direction from said tongue, being at least as long as the tongue, and adapted to receive a like tongue upon a complementary brick.

4. The herein described improved refractory arch brick having an abutment surface provided with a projecting tongue and a groove alined therewith, said groove being at least as long as said tongue, adapting the brick to interlock with another brick having an abutment surface of the same formation.

5. A new article of manufacture comprising a refractory arch component brick having an abutment surface, a groove in said surface, said groove extending outwardly from the middle thereof and a tongue of substantially the same dimensions as said groove and reversely disposed upon said surface, extending outwardly from the inner end of said groove.

6. A locomotive boiler firebox arch comprising oppositely inclined refractory bricks having their ends in abutment and each provided with a half-tongue and a half-groove interlocking with the groove and tongue of the other.

7. In a refractory arch for locomotive boiler fireboxes a plurality of pairs of oppositely disposed refractory bricks the ends of each pair being in abutment and each provided with a half-tongue and a half-groove interlocking with the groove and tongue of the other.

8. A locomotive boiler firebox arch comprising a plurality of pairs of refractory brick, the bricks of each pair being arranged

in abutment and each provided with a half-tongue and a half-groove interlocking with the groove and tongue of the other, in combination with refractory panel bricks spacing said pairs apart and supported thereby.

9. A locomotive boiler firebox comprising a plurality of pairs of refractory brick, the bricks of each pair being arranged in abutment and each provided with a half-tongue and a half-groove interlocking with the groove and tongue of the other, in combination with panel bricks spacing said pairs apart, supported thereby and interfitting therewith, substantially as described.

10. The improvement in locomotive boiler firebox arches comprising three or more refractory bricks arranged in end-to-end abutment, each of the abutting surfaces of said bricks being provided with a half-tongue and a half-groove, and the tongue and groove of each surface being disposed reversely to the tongue and groove upon the opposed surface and interlocking therewith.

11. The improvement in locomotive boiler firebox arches comprising relatively long refractory bricks disposed in end-to-end relation in combination with a relatively short or thin spacing brick arranged between the ends of said long bricks and abutting therewith, and all the abutting surfaces of said long bricks being provided with half-tongues and half-grooves which interlock the bricks in series relation, said tongues and grooves being of substantially the same dimensions throughout and the tongue and groove of each surface being the reverse of the tongue and groove of the next.

12. A new article of manufacture comprising a refractory arch component brick having a middle portion which is recessed or pitted and an end of substantially full cross section and said end being provided with a half-tongue and a half-groove of corresponding dimensions and meeting at substantially the middle of said end, adapting the end of the brick to interlock with a complementary arch component brick.

In testimony whereof I have hereunto set my hand this 23rd day of September, 1910, in the presence of two subscribing witnesses, at Washington, D. C.

CHARLES BREARLEY MOORE.

Witnesses:

CHARLES GILBERT HAWLEY,
LUTHER JOHNS.