

H. W. JACOBS.
COMBUSTION CHAMBER FOR BOILERS.
APPLICATION FILED JULY 28, 1910.

984,429.

Patented Feb. 14, 1911.

4 SHEETS-SHEET 1.

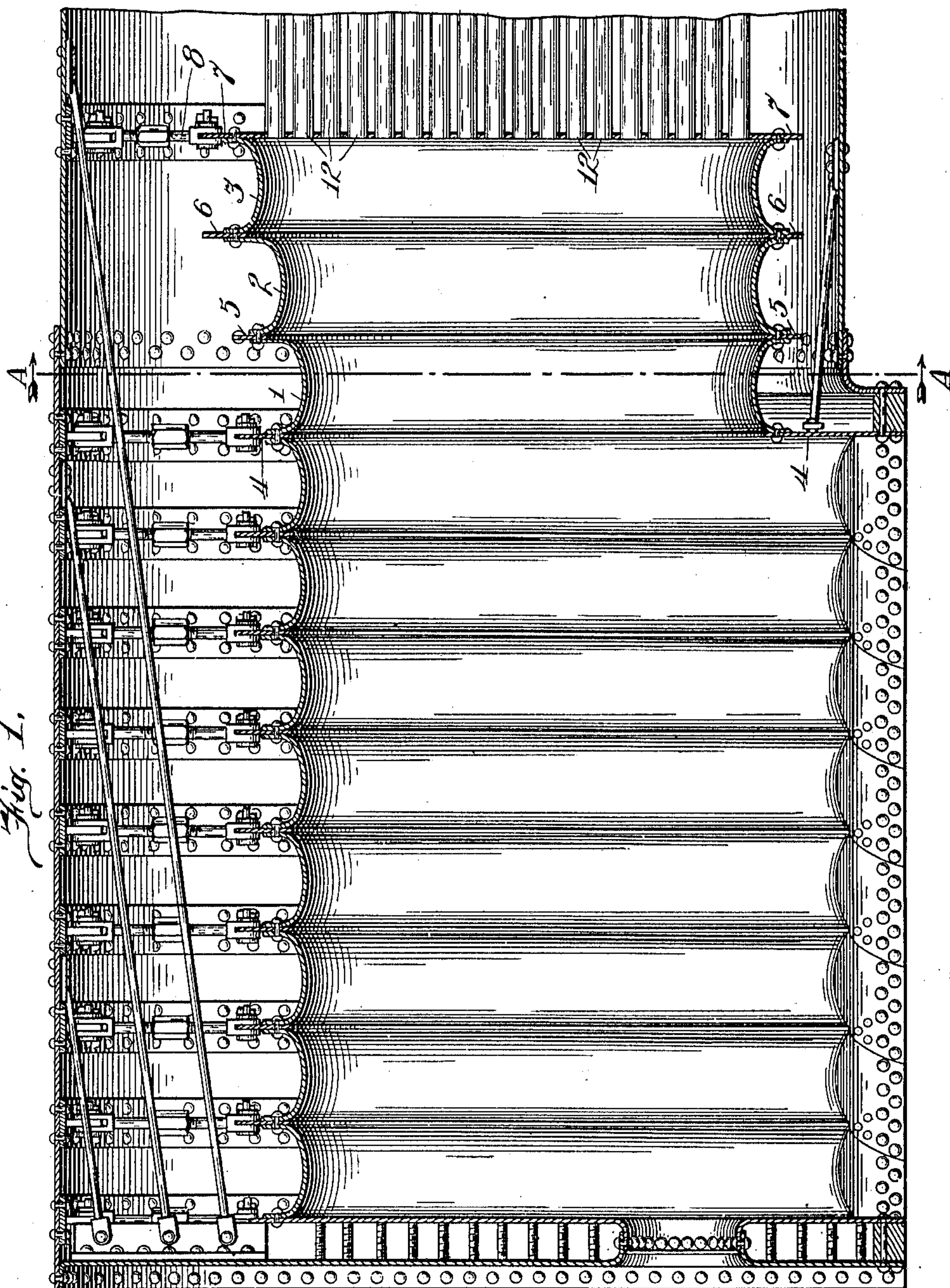


Fig. 1.

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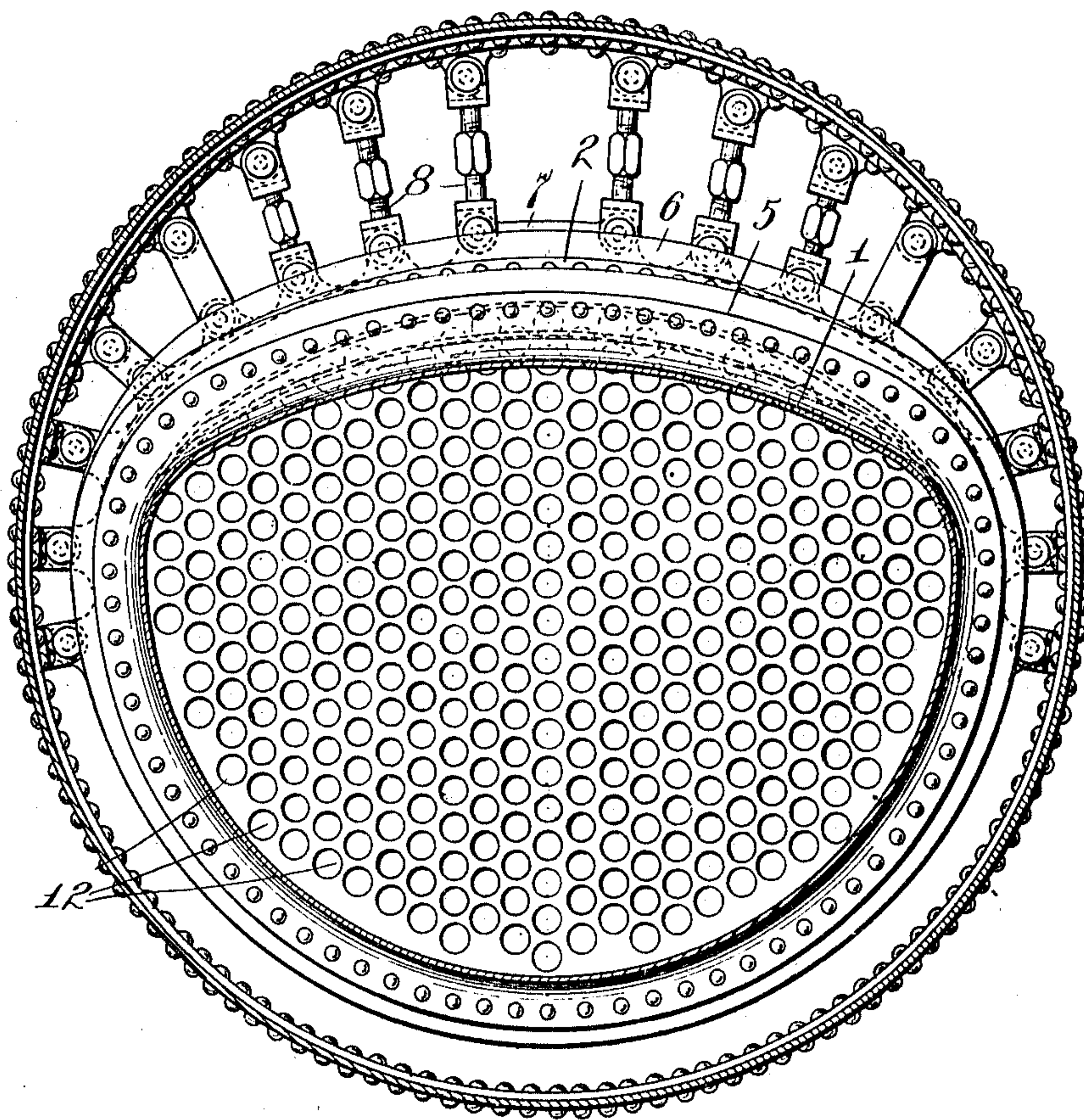
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4 SHEETS—SHEET 2.

Fig. 2.



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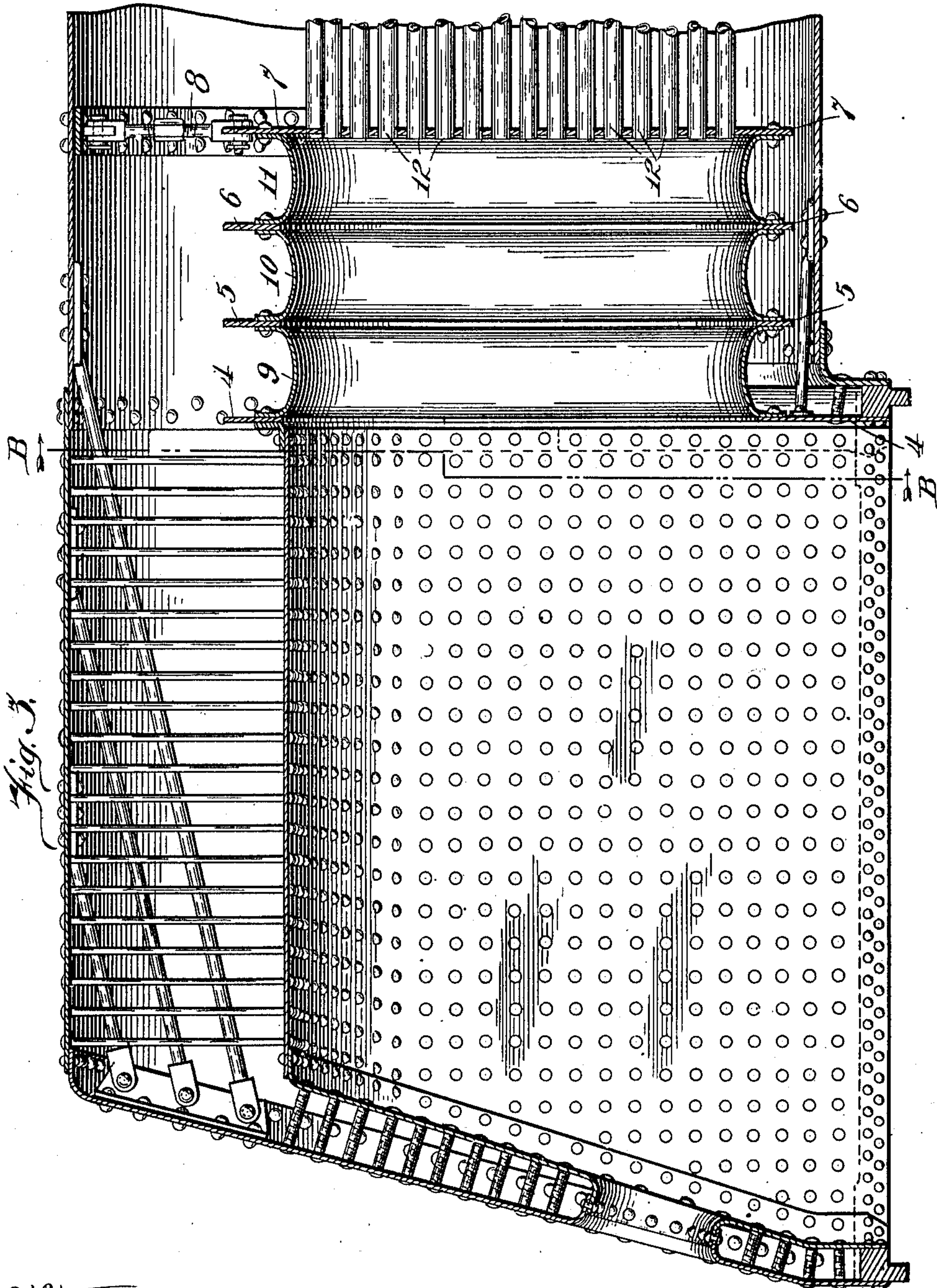


Fig. 3.

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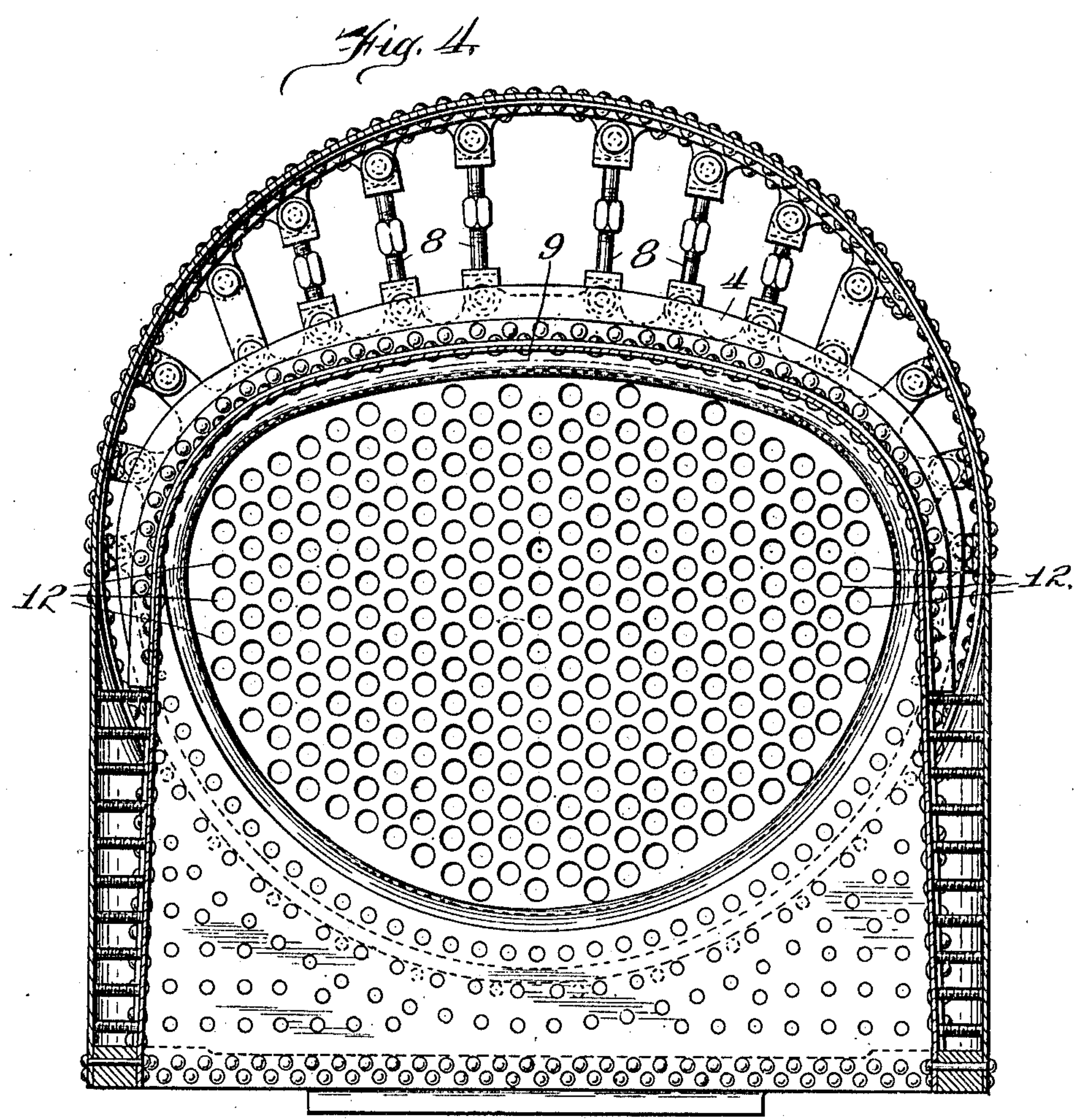
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4 SHEETS—SHEET 4.



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COMBUSTION-CHAMBER FOR BOILERS.

984,429.

Specification of Letters Patent.

Patented Feb. 14, 1911.

Application filed July 28, 1910. Serial No. 574,284.

To all whom it may concern:

Be it known that I, HENRY W. JACOBS, a citizen of the United States, and resident of Topeka, in the county of Shawnee and State of Kansas, have invented certain new and useful Improvements in Combustion-Chambers for Boilers, of which the following is a description, reference being had to the accompanying drawings, which form a part of my specification.

My invention relates to the formation of a combustion chamber more especially intended for a boiler of the locomotive type, and has for its object the provision of a combustion chamber that will not only be self supporting, requiring no supporting stays or other mechanism aside from its support on the fire-box sheet and the flue-sheet, but will also afford flexibility to compensate for the expansion and contraction of the boiler tubes.

A further object of my invention is to provide a combustion chamber with a smooth uninterrupted surface, having no rivets exposed to the flames from the furnace, and possessing other advantages not to be had with the ordinary type of combustion chamber heretofore employed, as will more fully appear from the following detailed description.

In the drawings:—Figure 1 is a longitudinal sectional view through what is known as a sectional fire-box, provided with my improved combustion chamber, fitted to a boiler of the locomotive type. Fig. 2 is a cross section taken on the line A—A of Fig. 1 looking in the direction of the arrows. Fig. 3 is a longitudinal sectional view taken through a fire-box of ordinary construction with my improved combustion chamber fitted to a boiler of the locomotive type. Fig. 4 is a cross sectional view taken on the line B—B of Fig. 3 looking in the direction of the arrows.

My invention comprises a combustion chamber consisting of the portions or members 1, 2, and 3, which are preferably substantially U shaped in cross section, or other equivalent form, as can be seen in Fig. 1. The portions or members 1, 2 and 3 are irregular as shown in Fig. 2, so as to conform with the fire-box section and the flue sheet of the boiler. The members or portions 1, 2 and 3 may be secured together in any suitable manner, but are preferably welded so as to form absolutely tight joints. The rear

member or portion 1 is riveted to the fire-box sheet 4. The joint or connection between the member 1 and the fire-box sheet 4 at the lower part is practically the only joint where the rivet heads are exposed to the flame. This joint may either be riveted, or riveted and welded, but more preferably welded, so that the intense heat of the flames from the furnace may not prematurely destroy the seam.

The different sections or members 1, 2, and 3 are preferably secured together with calking strips or webs 5 and 6 between them, see Fig. 1. With the members or rings composed of channel sections bent into substantially circular form, and the calking strips 5 and 6 reinforcing the sections and forming webs or circumferential flanges, it is unnecessary to provide any further means whereby the shell or combustion chamber is maintained in place, as the nature of the construction itself is sufficient. The section or member 3 is secured to the flue sheet 7 in any desirable manner to form a tight joint. This flue sheet 7 is preferably extended so as to form a web similar to that formed by the calking strips 5 and 6. This extended portion of the flue sheet 7 will also provide anchorage for the stays 8 which support the front end of the combustion chamber and the rear end of the flues 12.

It is apparent from my construction that all the rivet seams are located on the water side, thus leaving a smooth uninterrupted curved surface exposed to the intense heat of the flames, with no projections or rivet-heads protruding on the fire side of the chamber to be burned off by the flames of the furnace; or to engage particles of soot, which afterward catch fire and thus aid in burning off the rivet-heads and prematurely destroying the life of the chamber.

My improved combustion chamber may be fitted to any fire-box of the locomotive type, and I have shown in Figs. 1 and 2 a combustion chamber wherein the sections or members are made of different sizes so that the top of the combustion chamber may be made to gradually rise, see Fig. 1, thereby permitting a greater number of flues to be put in the boiler. The curved or wavy interior surfaces of the combustion chamber will increase the heating capacity thereof, because the inwardly bowed wall of each section or portion will momentarily retain the flames adjacent the wall and causes

them to impinge and eddy about in such manner as to induce greater radiation; the eddying of the flames adjacent the curved walls of the chamber allows the flames to
 5 give up their energy to the sheet metal in a very advantageous manner.

By the use of my improved combustion chamber, formed of channel sections, or equivalently formed portions, suitable flexi-
 10 bility in the walls of the chamber is provided which will absorb or take up the expansion and contraction of the boiler tubes and thus relieve the tube or flue sheets of the excessive strains under which they are
 15 ordinarily placed.

In Figs. 3 and 4 I have illustrated my invention applied to the ordinary type of fire-box; and have also shown the different sections or portions 9, 10 and 11 of the combustion chamber of the same dimensions
 20 throughout. This construction will not allow for the additional flues that are permitted by the construction of combustion chamber shown in Fig. 1.

The advantages of my invention will be readily apparent from the construction shown and described; and the great difficulty heretofore experienced in the ordinary or stayed type of combustion chamber is obviated, to-
 25 wit, the burning off of the stay-bolt heads, thereby causing the chamber to leak badly. Aside from the damage incurred under such conditions, such constructions have caused considerable trouble and great expense in
 30 maintenance, which has resulted in a good device being condemned by many engineers and mechanics. With my improved combustion chamber these difficulties and objections are all eliminated and a construction
 35 is provided that possesses greater efficiency than those heretofore employed. The curved inner surfaces of the combustion chamber tend to more completely break up what may be termed the gas-film which is located be-
 40 tween the flame and the wall of the chamber, thereby greatly increasing the radiation. Furthermore, the fact that the walls of the combustion chamber are substantially self supporting obviates the necessity for the use
 45 of anchor stays to support the chamber, thereby permitting a freer circulation of the water, which was more or less impeded where anchor stays are necessary and the rapid heating of the water interfered with.

I have shown and described what I believe to be the simplest form of my invention and have shown the members formed of channel sections substantially U-shape in cross sec-
 50 tion, but it is apparent that the shape of the channel may be modified, and the number of members altered; and the manner of connecting the different members together, where a number are employed, and to the
 55 fire-box and flue-sheet may be accomplished in a different way without departing from

the spirit of my invention, and I do not wish to be understood as limiting myself to the exact construction shown and described, but

What I claim as my invention and wish to secure by Letters Patent is:—

1. A combustion chamber of the class described located between and secured to the front end of the fire-box and rear flue-sheet of a boiler, and composed of a series of curved sections, each section being substan-
 70 tially U-shape in cross section with the adjacent edges presented outwardly and secured together so as to provide circumferentially extending webs whereby the chamber is held in a suspended condition
 75 within the boiler-shell.

2. A combustion chamber of the class described, secured to the fire-box and rear flue-sheet, composed of channel formed sections, with their adjacent edges presented
 80 outwardly and secured together so as to provide circumferentially extending reinforcing webs.

3. A combustion chamber of the class described, comprising a series of channel sec-
 85 tions, and means whereby said sections are secured together and held suspended within the boiler-shell intermediate of the fire-box and rear flue-sheet.

4. A combustion chamber of the class described composed of a series of graduated curved sections secured together and to the fire-box sheet and rear flue-sheet and inde-
 90 pendent of the boiler-shell.

5. A combustion chamber located between
 95 the front end of the fire-box and the rear flue-sheet of a boiler of the locomotive type, consisting of several graduated channel formed sections whose adjacent edges are presented outwardly and secured together.

6. A combustion chamber of the class described, located between the front end of the fire-box and rear flue-sheet of a loco-
 100 motive, composed of a series of sections so formed and secured together as to provide outside circumferentially extending webs whereby the relative position of the chamber to the fire-box and flue-sheet is main-
 105 tained throughout its length independent of the boiler-shell.

7. A combustion chamber of the class described and of substantially circular form, consisting of a series of curved sections with their edges presented outwardly, said
 110 chamber being intermediate of the fire-box and the rear flue-sheet and secured thereto, and means taking between the adjacent edges whereby circumferential external webs are provided to maintain the chamber
 115 in its suspended position.

8. A combustion chamber of substantially circular form, consisting of a series of curved sections with their adjacent or abut-
 120 ting edges secured together on the outer face of the chamber, the end sections of the

chamber being secured to the front end of the fire-box and rear flue-sheet of the boiler and independent of the boiler-shell.

5 9. A combustion chamber of the class described, located between the front end of the fire-box and rear flue-sheet and secured thereto, consisting of a series of curved sections secured together so as to present their convexed surfaces inwardly, with their adjacent edges forming circumferentially extending webs whereby the chamber is held
10 suspended within the boiler-shell.

10. A combustion chamber of the class de-

scribed, secured to the front end of a fire-box and to the rear flue-sheet of a boiler, 15 consisting of one or more flexible sheet metal sections, substantially U-shape in cross-section and bent into substantially circular form, the flanges or adjacent edges of the sections extending outwardly and secured 20 together so as to form circumferentially extending external webs.

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