

June 19, 1923.

1,459,648

J. S. ANDREWS

STEAM BOILER

Original Filed Feb. 12, 1917

3 Sheets-Sheet 1

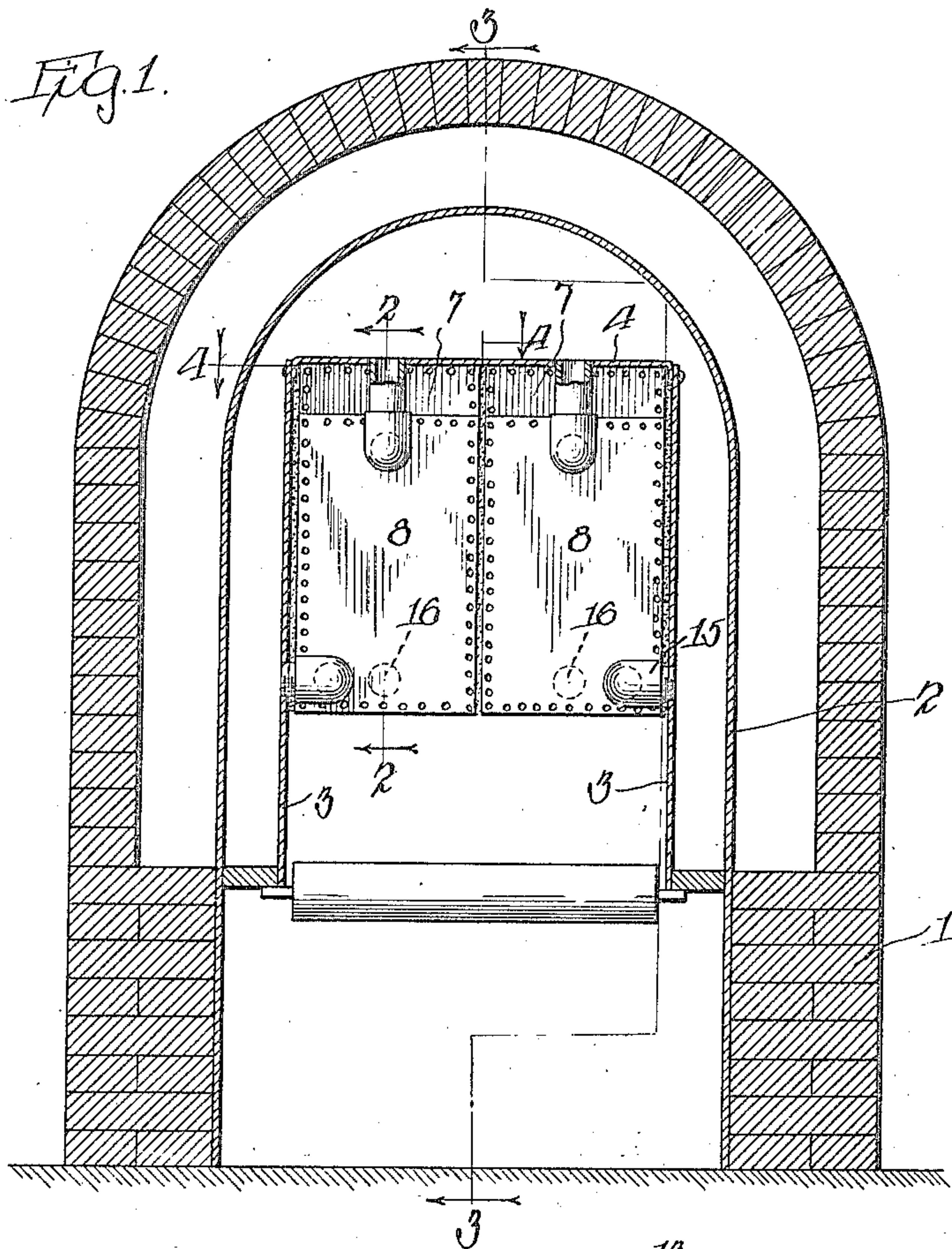
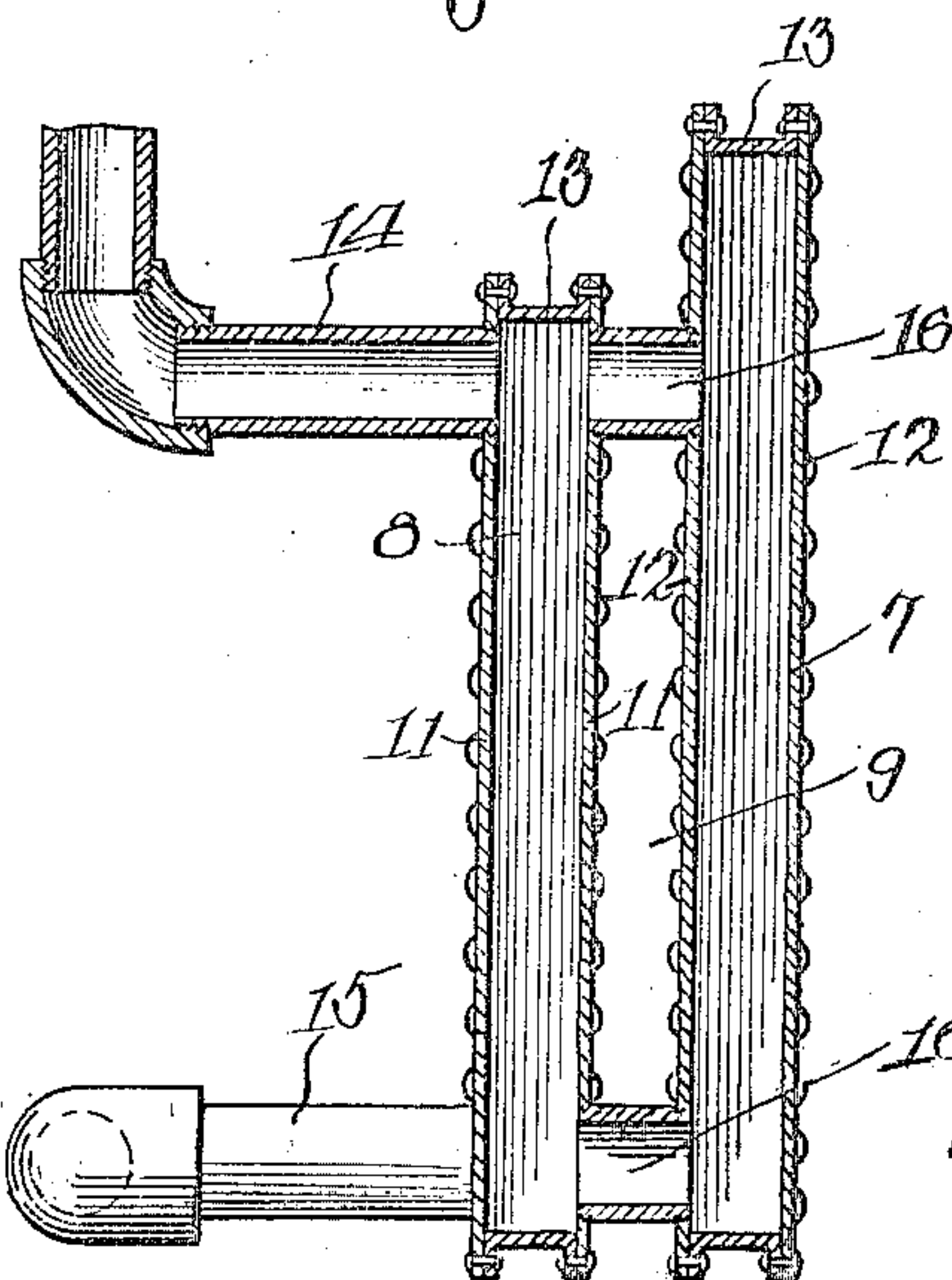


Fig. 2.



*Witness:
Leo. D. Davis.*

*Inventor:
John S. Andrews
by Edmund H. H. H. H.
Att'y.*

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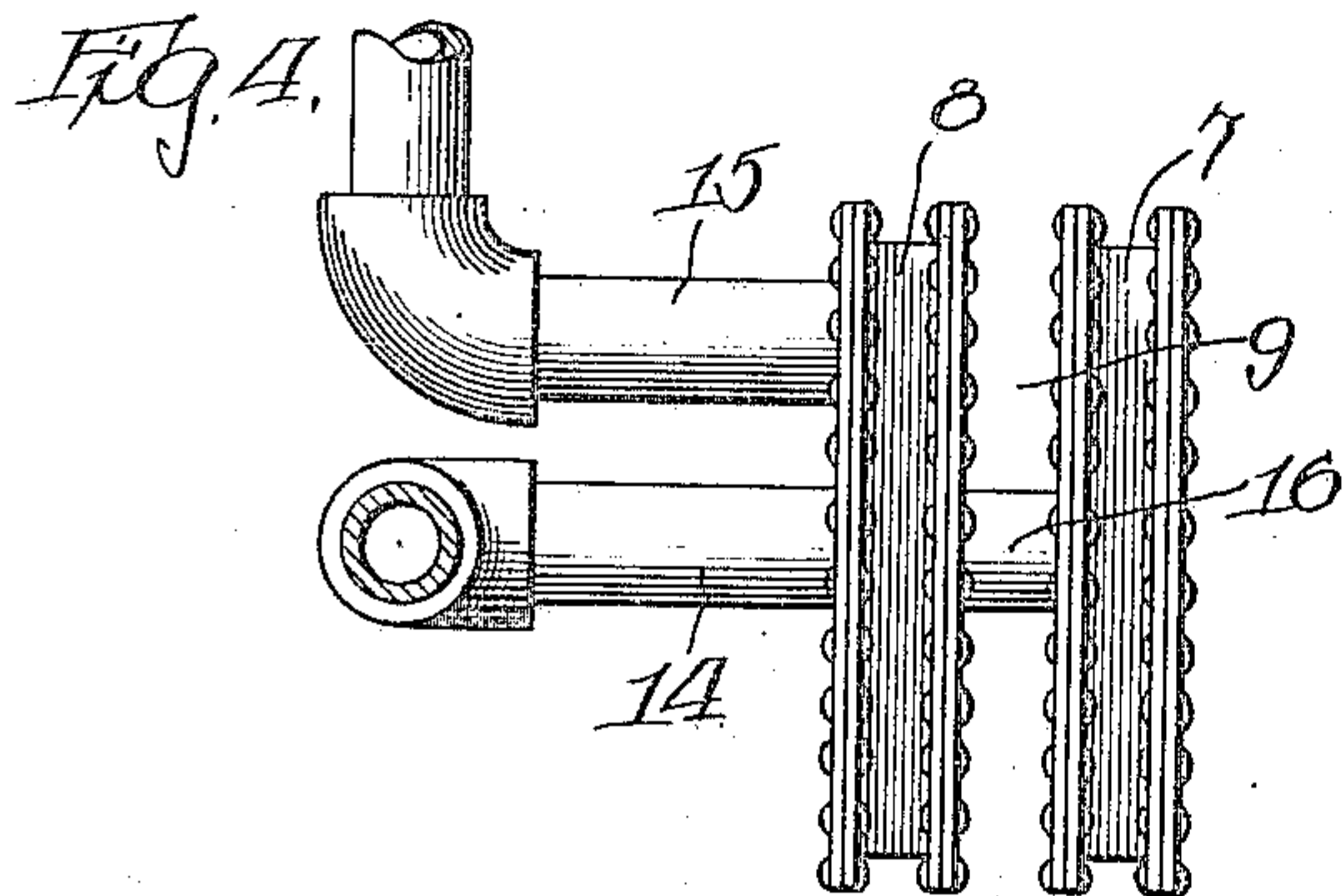
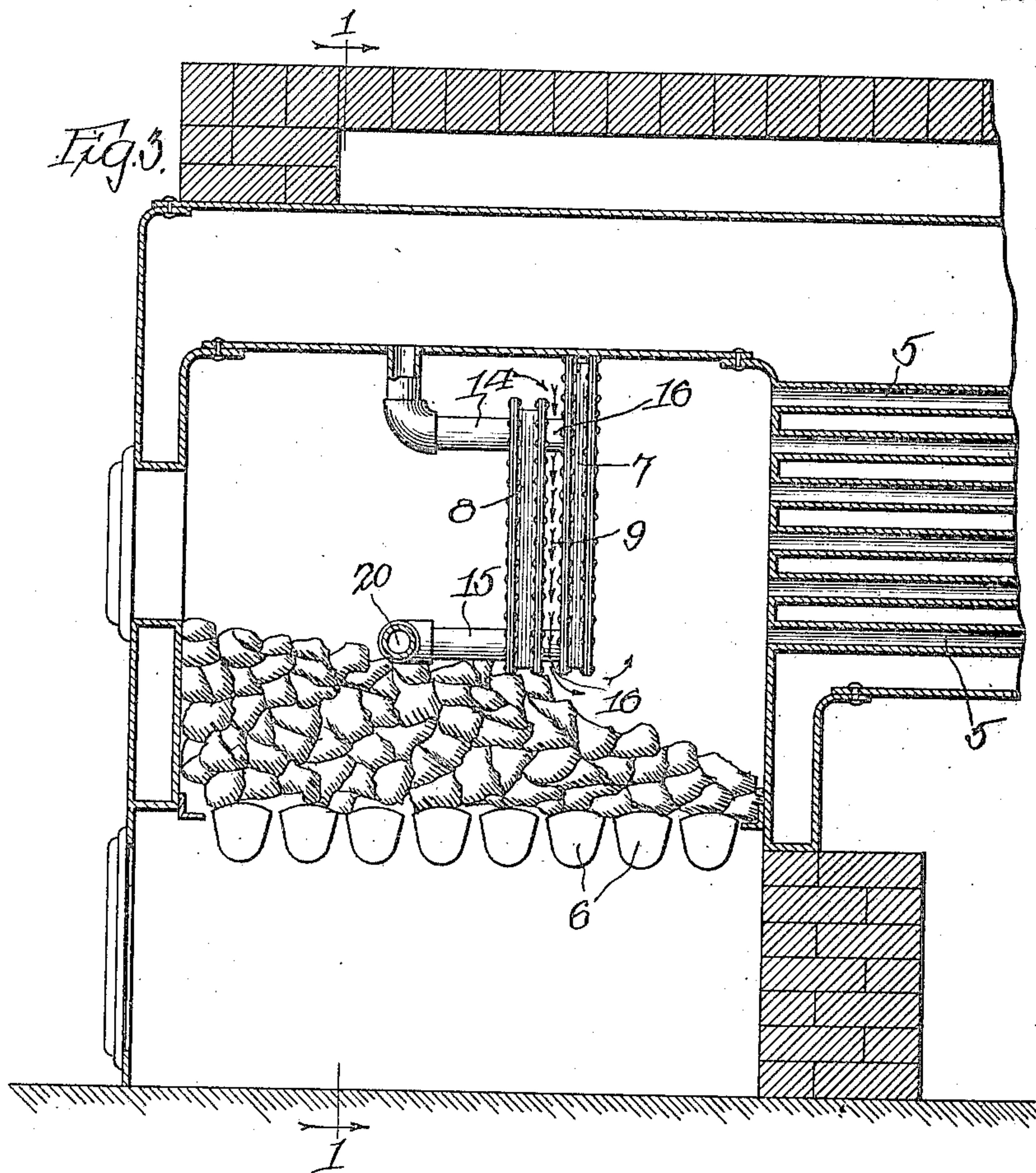
J. S. ANDREWS

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STEAM BOILER

Original Filed Feb. 12, 1917

3 Sheets-Sheet 2



Witness:
Leo. DuMaur.

Inventor:
John S. Andrews
by Wm. C. Chamberlain
Atty.

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J. S. ANDREWS

STEAM BOILER

Original Filed Feb. 12, 1917

3 Sheets-Sheet 3

Fig. 5.

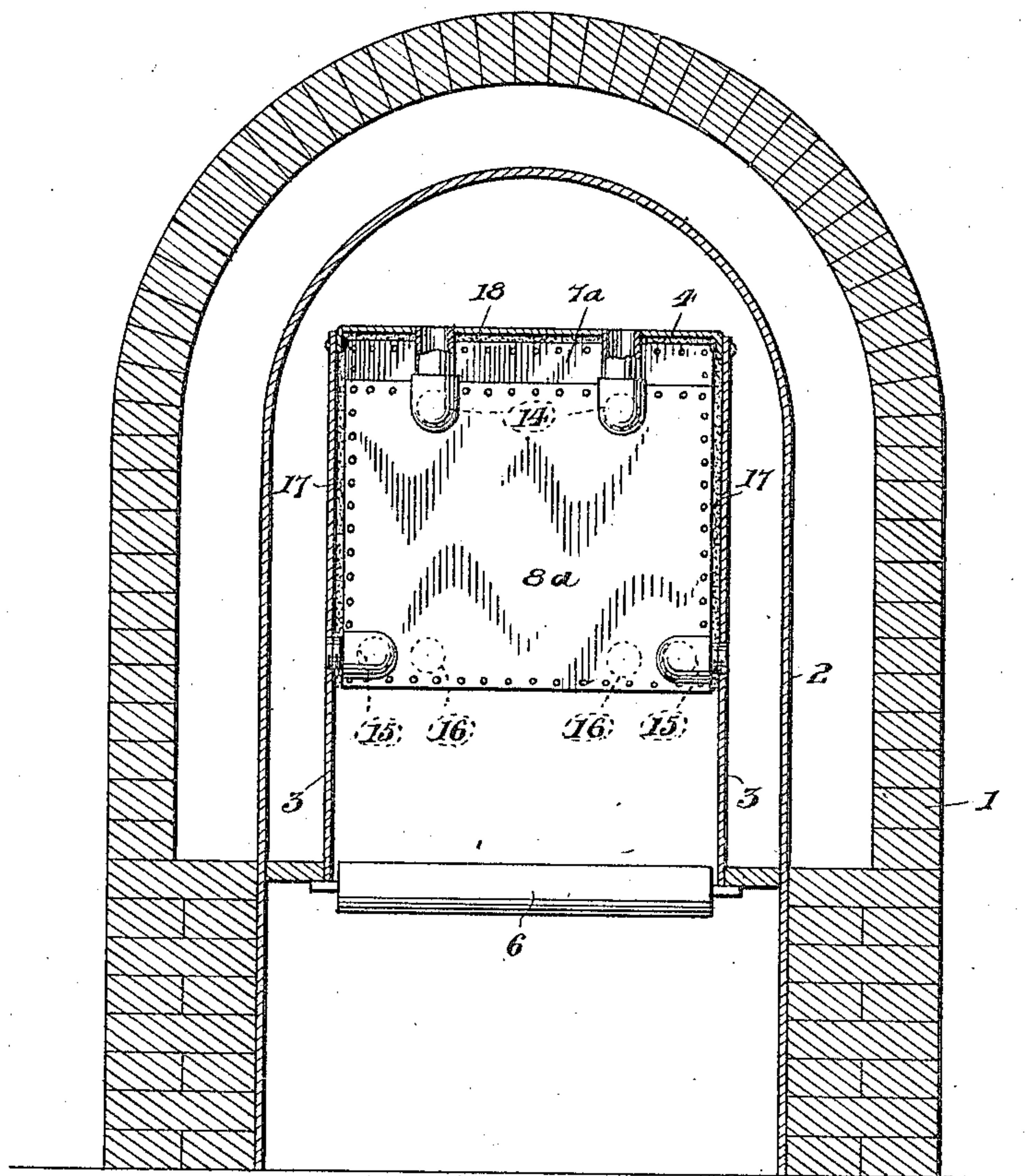
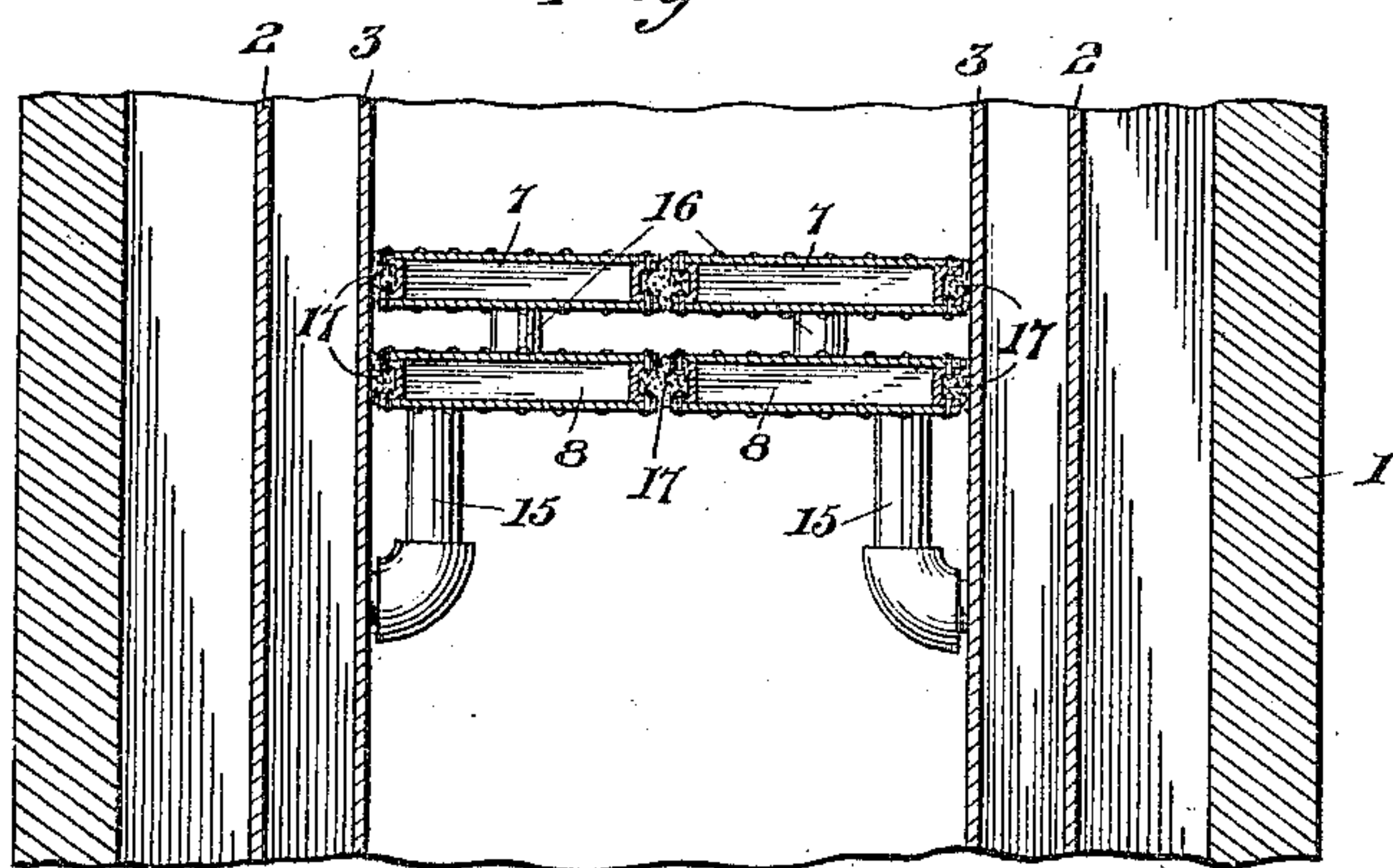


Fig. 6.



Inventor

John S. Andrews
Charles Chamblain
Attorney

By

Patented June 19, 1923.

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UNITED STATES PATENT OFFICE.

JOHN S. ANDREWS, OF GARY, INDIANA.

STEAM BOILER.

Application filed February 12, 1917, Serial No. 147,988. Renewed November 17, 1922.

To all whom it may concern:

Be it known that I, JOHN S. ANDREWS, a citizen of the United States, residing at the city of Gary, in the county of Lake and State of Indiana, have invented certain new and useful Improvements in Steam Boilers, of which the following is a specification.

My invention relates to the construction of boilers which are used for the production of steam for industrial and other purposes. Under ordinary conditions and as usually constructed there is, as is well known, a considerable loss of the heating power of the fuel, and a corresponding production of smoke through loss of unused fuel gases. It is the object of my invention to provide means by which greater economy of fuel values is obtained, by which the production of smoke is eliminated or largely done away with, and by which the steaming capacity of a boiler may be considerably increased as compared with a boiler not provided with my improvements. Such improvements may be used in connection with fire box boilers or with the tubular boilers which are in common use, and may be not only applied to them in the construction, but is adapted to be added to such boilers after construction as a means of increasing their capacity and of economizing fuel and eliminating smoke as stated.

The principles of my invention are illustrated in the drawings, in which the same is shown as applied to a fire box boiler.

Fig. 1 represents a cross section of such boiler on the dotted line 1—1 of Fig. 3;

Fig. 2 is an enlarged vertical section of my improvement on the dotted line 2—2 of Fig. 1;

Fig. 3 is a vertical section on the dotted line 3—3 of Fig. 1;

Fig. 4 is an enlarged top view of a portion of my improvement on the dotted line 4—4 of Fig. 1.

Figure 5 is a front view of my invention in which the front and rear members are of unitary construction; and

Figure 6 shows a horizontal sectional view of the device shown in Figure 1.

Further describing my invention with reference to the drawings in which like characters of reference denote like parts throughout: 1 is a brick wall upon which is supported a boiler having the shell 2, in which is a fire box with the side walls 3, 3, crown sheet 4, and provided with flues 5 leading from the

rear portion of the fire box in the usual manner; 6, 6 being the grate bars by which the fuel is supported. Transversely of the fire box I provide a depending fire wall having a rear member 7^a which may be unitary as shown in Figure 5 or which may comprise a plurality of sections or elements 7 overhanging the grate and so attached that the upper portions thereof are in closed relation to the crown sheet. Said fire wall also has a front member 8^a which may be unitary as shown in Figure 5 or which may comprise elements 8 supported at a distance from the crown sheet to provide an opening for the passage of gases from the front part of the fire box and spaced from the rear member to provide a down flue 9 connecting at its lower end with the rear part of the fire box. The said elements which together make a fire wall depending over the grate, or what might otherwise be described as a baffle, should be hollow and may be formed as shown in Fig. 2, by a plurality of sheets 11, 11 and 12, 12 secured together at the top, bottom and ends by strips 13, having flanges by which they may be riveted to the plates in the usual manner of boiler construction. Any spaces between the ends of members 7 and 8 and the sides of the fire box and the top of 7 and the crown sheet should be filled as at 17 and 18 by fire clay or other refractory material so that no opportunity is afforded for passage of gases thereby except as hereinafter explained. Communication is made between the interior of the said members and the interior of the boiler by means of the tubular connections 14, which are carried to the crown sheet, and similar connections 15 which are carried through the side walls of the fire box. The elements of the front and rear members are connected with each other by pipes 16, so as to give free circulation of water between each other and the boiler. Burning of the plates, of which the depending wall is constructed, is thereby prevented, while a considerably increased steaming capacity is added to the boiler.

In practical use when a fire box is equipped as described with my improvement the fire is built upon the grate bars 6 in the usual manner, so that the fuel forms a bed, the top of which is closely adjacent to the lower edges of the hanging fire wall formed as above described. When additional fuel is added it will cover the space between such wall and the door. As the smoke and the

free gases of combustion are given off, they pass upwardly and between the crown sheet and the top of the front member of the depending fire wall, and thence through the down flue between the two members as indicated by the arrows, thereby coming in contact with the surface of the heated coal body where they are completely consumed. As the combustion proceeds and the fuel is more or less coked, it will fall forwardly into the more highly heated area under and beyond the said hanging wall, which action should be aided in the process of firing, thereby maintaining the bright fire and the high heat of that section of the fire box. Space is thus afforded into which additional quantities of fresh fuel are supplied from time to time as needed, where it is coked and the distilled gases are given off to be passed to the front of the fire box as hereinbefore explained.

I have described my invention with reference to a fire box boiler, and one in which my improvements have been added after the same was fully constructed. For convenience in attachment the front and rear portions of the fire wall are each shown as comprising two separate structures or sections. When used in connection with new construction such portions may be made in unitary form. But, whether made in one or more sections the principle of operation is the same and such constructions are to be held equivalent and so understood throughout the specification and claims. It is also evident that my improvements may be applied to different forms of boilers as well as to new ones in course of construction, so that the form, connections and means of attachment may be greatly varied according to the necessities of the particular case without departing from the essential principles involved.

I claim:

1. A fire wall for boilers including a front and a rear hollow member, tubular means at the upper and lower portions of said members for directly interiorly connecting them together and spacing them from each other to form a down draft flue therebetween, said front member being arranged to allow fuel gases to pass the same at the upper end thereof, said fire wall being provided with devices to interiorly connect the interior thereof with the interior of a boiler.

2. A fire wall for boilers including a front and a rear hollow member, tubular means at the upper and lower portions of said members for directly interiorly connecting them together and spacing them from each other to form a substantially vertical down draft flue therebetween, said front member having its upper end lower than the upper end of said rear member, and one of said members being provided with devices at different vertical points thereof to interiorly

connect the same with the interior of a boiler.

3. A furnace structure having a boiler, fire box, and ash pit, a depending baffle wall structure dividing the fire-box into a front firing chamber and a rear combustion chamber and extending downwardly to the normal top level of the fuel, a grate underneath the fire box, said baffle wall including a hollow rear member extended to the top of and across the fire box, a hollow front member spaced from the rear member and from the top of the fire box to form a down flue therebetween, tubular connections providing direct fluid connection between the interior of said front and rear members, and means providing a fluid connection between one of said members and the interior of the boiler.

4. A furnace structure having a boiler, fire box, and ash pit, a depending baffle wall structure dividing the fire-box into a front firing chamber and a rear combustion chamber and extending downwardly to the normal top level of the fuel, a grate underneath the fire box, said baffle wall including a hollow rear member having its top and ends in closed relation to the fire box, a hollow front member having its ends in closed relation to the fire box and spaced from the rear member and from the top of the fire box to form a down flue between said members, tubular connections providing water communication between said front and rear members, and means connecting the interior of said baffle wall with the interior of the boiler.

5. A furnace structure having a boiler, fire box, and ash pit, a depending baffle wall structure dividing the fire-box into a front firing chamber and a rear combustion chamber and extending downwardly to the normal top level of the fuel, a grate underneath the fire box, said baffle wall including a rear member in closed relation to the top of and extended across the fire box, said rear member comprising a plurality of independent hollow elements, a front member spaced from the rear member and from the top of the fire box to form a down flue between the same and the rear member, said front member comprising a plurality of independent hollow elements, tubular connections providing water communication between said front and rear members, and tubular means connecting the interior of said baffle wall with the interior of the boiler.

6. A furnace structure having a boiler, fire box, and ash pit, a depending baffle wall structure dividing the fire-box into a front firing chamber and a rear combustion chamber and extending downwardly to the normal top level of the fuel, a grate underneath the fire box, said baffle wall having a hollow rear member comprising a plurality of elements in closed relation to the top of the fire box and extended thereacross, a hol-

low front member comprising a plurality of elements spaced from the rear member and from the top of the fire box to form a down flue between said front and rear members, and tubular connections providing a circulatory water communication between all of said elements and the interior of the boiler.

7. A furnace structure having a boiler, fire box, and ash pit, a depending baffle wall structure dividing the fire-box into a front firing chamber and a rear combustion chamber and extending downwardly to the normal top level of the fuel, a grate underneath the fire box, said baffle wall comprising a hollow rear member and a hollow front member connected with and spaced from each other so that the upper edge of the front member is lower than the upper edge of said rear member, means to directly interiorly connect said members, and tubular devices associated with said baffle wall to interiorly connect the same with the interior of the boiler.

8. A furnace structure having a boiler, fire box, and ash pit, a depending baffle wall structure dividing the fire-box into a front firing chamber and a rear combustion chamber and extending downwardly to the normal top level of the fuel, a grate underneath the fire box, said baffle wall including a hollow rear member having a closed upper end in closed relation with the top of the fire box, a hollow front member directly interiorly connected to and spaced from the rear member by tubular connections to form a down draft flue therebetween, said front member being arranged with its upper end lower than the upper end of said rear member, and tubular devices associated with said baffle wall at different levels thereof to interiorly connect the same with the interior of the boiler.

9. A furnace structure having a boiler, fire box, and ash pit, a depending baffle wall structure dividing the fire-box into a front firing chamber and a rear combustion chamber and extending downwardly to the normal top level of the fuel, a grate underneath the fire box, said baffle wall including a hollow rear member having a closed upper end in closed relation with the top of the fire box, a hollow front member spaced from the rear member to form a down draft flue therebetween, means directly interiorly connecting said front and rear members, and devices interiorly connecting one of said members with the interior of the boiler.

10. A furnace structure having a boiler, fire box, and ash pit, a depending baffle wall structure dividing the fire-box into a front firing chamber and a rear combustion chamber and extending downwardly to the normal top level of the fuel, a grate underneath the fire box, said baffle wall including a

front and a rear hollow member, tubular means at the upper and lower portions of said members directly interiorly connecting them to and spacing them from each other to form a down draft flue therebetween, said front member being arranged to allow fuel gases to pass the same at the upper end thereof, and devices interiorly connecting one of said members with the interior of the boiler.

11. A furnace structure having a boiler, fire box, and ash pit, a depending baffle wall structure dividing the fire-box into a front firing chamber and a rear combustion chamber and extending downwardly to the normal top level of the fuel, a grate underneath the fire box, said baffle wall comprising a unitary hollow attachment closed at the ends and having tubular connections attached to the boiler to provide a single circulation of water through the attachment or baffle wall, said baffle wall being positioned in the fire box to provide a down draft passageway for the hot fuel gases in passing from the fire box to the combustion chamber.

12. A furnace structure having a boiler, fire box, and ash pit, a depending baffle wall structure dividing the fire-box into a front firing chamber and a rear combustion chamber and extending downwardly to the normal top level of the fuel, a grate underneath the fire box, said baffle wall including a hollow front member having closed ends and a hollow rear member having closed ends and directly interiorly connected together and spaced from each other to form a down draft passageway therebetween, means connected with the upper part of said fire wall to interiorly connect the same with the upper part of the boiler and means connected with the lower part of said fire wall to interiorly connect the same with a lower part of the boiler.

13. A furnace structure having a boiler, fire box, and ash pit, a depending baffle wall structure dividing the fire-box into a front firing chamber and a rear combustion chamber and extending downwardly to the normal top level of the fuel, a grate underneath the fire box, said baffle wall including a hollow rear member in closed relation to the top of the fire box and extended thereacross, a hollow front member spaced from the rear member and from the top of the fire box to form a down draft flue between said members, and tubular connections providing a circulatory water communication between both of said members and the interior of the boiler.

14. A furnace structure having a boiler, fire box, and ash pit, a depending baffle wall structure dividing the fire-box into a front firing chamber and a rear combination chamber and extending downwardly to the

normal top level of the fuel, a grate under-
neath the fire box, said baffle wall being in
the form of a water circulated fire wall at-
tachment and comprising a hollow unitary
5 structure with a down draft passageway
therethrough, and means detachably opera-
tively connecting the interior of said struc-

ture with the interior of the boiler to es-
tablish a single water circulation through
the structure.

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In witness whereof, I have hereunto sub-
scribed my name this 7th day of February
1917, at Chicago, Cook County, Illinois.

JOHN S. ANDREWS.