

No. 618,501.

Patented Jan. 31, 1899.

**S. FRASER.
STEAM BOILER.**

(Application filed Apr. 8, 1898.)

(No Model.)

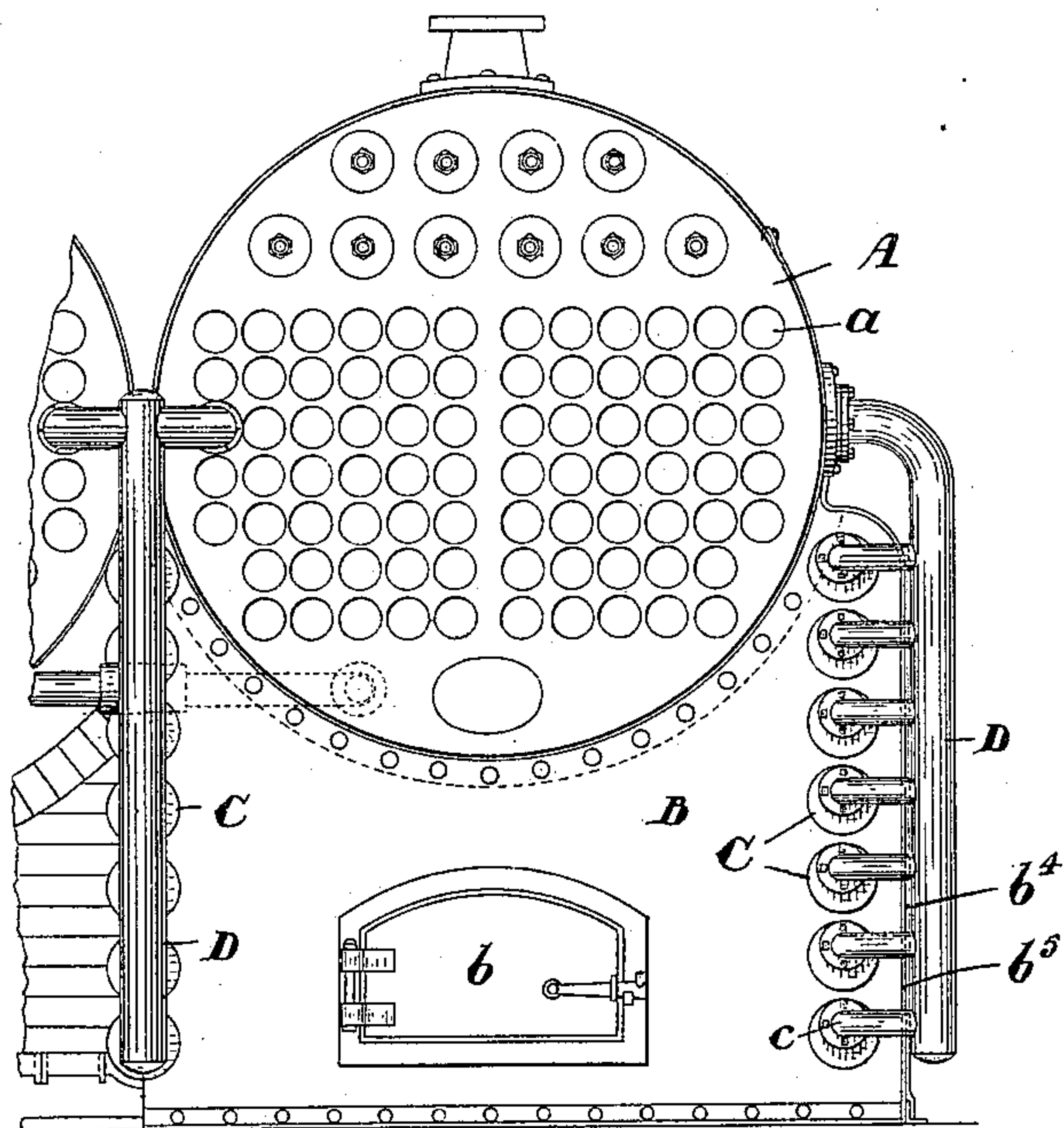


Fig. 1.

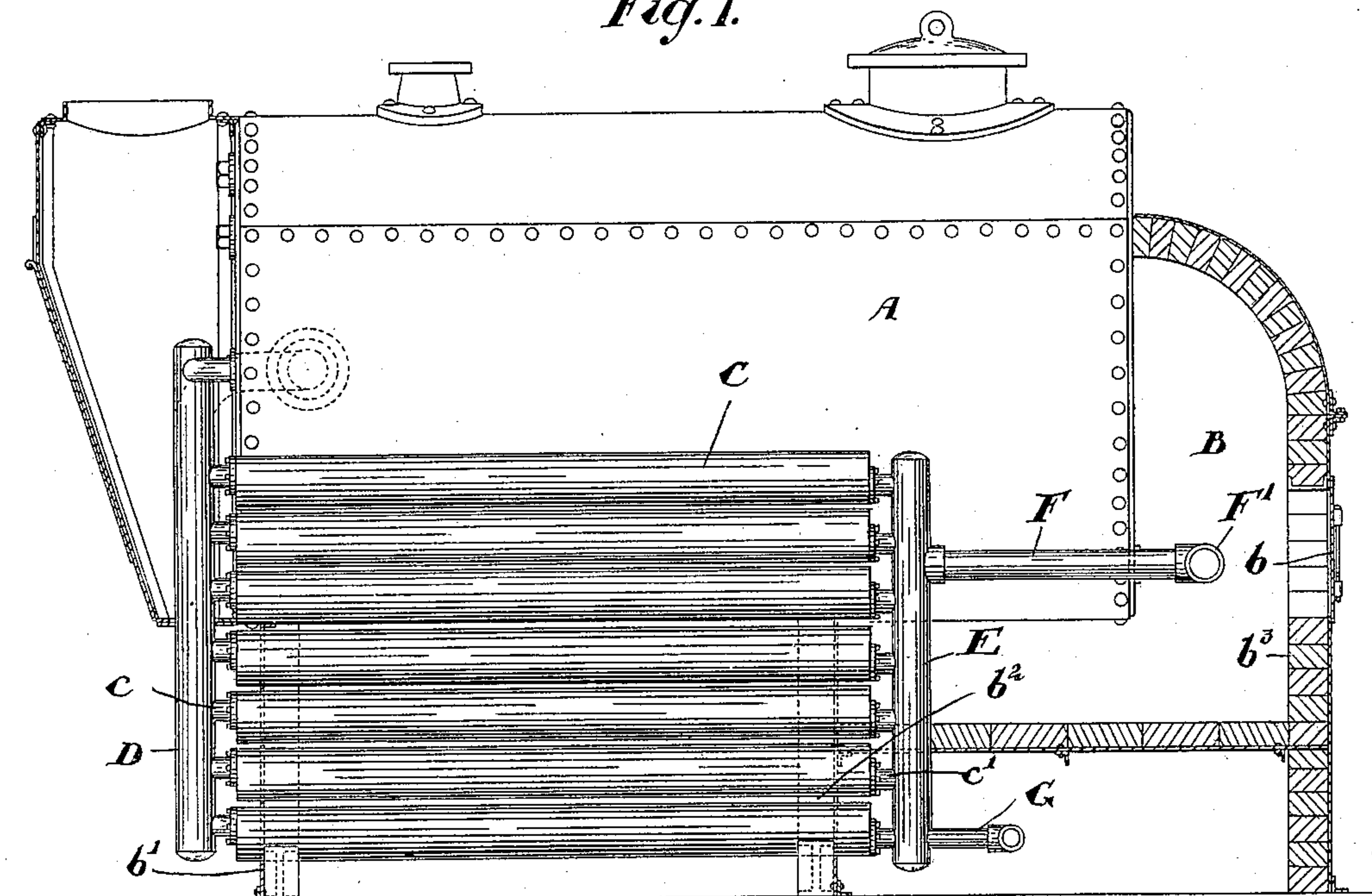


Fig. 2.

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UNITED STATES PATENT OFFICE.

SAMUEL FRASER, OF TORONTO, CANADA.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 618,501, dated January 31, 1899.

Application filed April 8, 1898. Serial No. 676,923. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL FRASER, of the city of Toronto, in the county of York, in the Province of Ontario, Canada, have invented
5 certain new and useful Improvements in Steam-Boilers, of which the following is a specification.

My invention relates to improvements in steam-boilers and steam-boiler furnaces; and
10 the object of the invention is to improve the construction of the boiler and furnace, whereby a maximum amount of heating-surface may be provided, and consequently the steam generated more quickly, a rapid more complete cir-
15 culation of water and consequent economy in fuel, and at the same time prevent the radiation of the heat from the walls of the furnace; and it consists, essentially, of a boiler having a furnace the sides or walls of which
20 are made of suitable metal tubes placed one above the other, the front of the tubes being connected to the boiler just below the water-line and near the center line of the boiler and the back of the tubes being connected to the
25 boiler near the bottom thereof, where the water is colder, the pipes and connections to the boiler being otherwise arranged and constructed in detail as hereinafter more particularly explained.

30 Figure 1 is an elevation of a boiler constructed in accordance with my invention. Fig. 2 is a side elevation of Fig. 1, partially in section.

35 In the drawings like letters of reference indicate corresponding parts in each figure.

In the drawings I have shown one-half of a double boiler, plus the central tubular partition.

40 A is the boiler proper, consisting of the usual flue-tubes *a*.

B is the furnace, which is provided with the usual front door *b*, front *b'*, bridge *b²*, and back *b³*, all lined with the usual fire-brick lining.

45 *b⁴* are the sides, which are provided with a lining *b⁵* of asbestos or fire-clay to prevent radiation and to protect the outside plate from the intense heat of the furnace.

50 C are a series of tubes located on each side and forming, substantially, the wall of the furnace. The tubes C are located at a slight distance apart, one above the other. These

tubes are so spaced that there will be a clear space between them and the heat or flames will entirely surround the tubes. The front
55 plate *b'* and bridge-plate *b²* I provide with suitable holes for the pipes to pass through. The ends of the tubes project through the plates *b'* and *b²*, whereby the connections are not exposed to the intense heat of the fire. 60

Although in the drawings I only show the tubes extending just through the bridge-wall, it will be understood that they may be carried to the full length of the boiler should it be
65 deemed necessary.

The tubes are connected at the front end by the pipe-joints *c* to the stand-pipe D, which is closed at the bottom and is connected at the top to the boiler below the water-line, near the center line of the boiler. It will be no-
70 ticed that the joints *c* are connected to the tubes C near the upper portion of the ends. The joints *c'* at the opposite end, however, are connected to the ends of the tubes C near the lower portion of the ends and are suitably con-
75 nected to or form part of the stand-pipe E, which is connected by the pipe F to the branch pipe F', which extends into the bottom of the boiler.

The advantage of the connection of the
80 joints *c* and *c'* to the tubes C as described is that the circulation is facilitated. The stand-pipe D is connected, as hereinbefore described, to the center of the boiler, just below the water-line, in order to introduce the steam from the
85 tubes C most advantageously into the boiler; and the pipe F is connected to the lower portion of the boiler, where the water is colder than at or near the steam-line, thereby creating a free circulation of the water. I also
90 provide a drain-pipe G for the tubes. This construction can be adapted to any multitubular boiler and increases the capacity of such boiler to a great extent.

The advantages of this class of boiler over
95 ordinary boilers are numerous. There are no walls to absorb the heat and afterward throw it off into the boiler-room, but the heat is taken up by the tubes, which, being exposed to the intense heat of the fire, cause steam to
100 be generated here more quickly than at any portion of the boiler. The construction also creates a rapid and complete circulation of the water, thereby further economizing in fuel.

The advantages of this type over the locomotive type of boiler are great. There are no flat surfaces. The tubes, being cylindrical, take up the particles of heat more rapidly than vertical flat surfaces in the proportion of about two to one. Again, in the same height of fire-box there is a greater amount of surface exposed to heat—in fact, nearly three times more, as the tubes are surrounded by heat. Again—water-legs of the locomotive type of boiler frequently get choked up with mud and become a source of danger. Besides, the first cost of these boilers is enormous in comparison with the plain cylindrical type.

The boiler is simple and cheap and of great strength, and there is excellent circulation and equal expansion and contraction and a greater heating-surface than any boiler at present in use of which I am aware.

What I claim as my invention is—

In a steam-boiler, the combination with the main boiler proper and furnace-chamber, of

the horizontal side tubes forming the side walls of the fire-box, the stand-pipes at each end of the tubes connected by suitable branches to the ends of the tubes, the stand-pipe at the back of the boiler being located in the furnace-chamber and the branches thereof connected to the side tubes at the lower portion of the ends of the tube and the stand-pipe at the front end of the boiler entirely outside the wall and connected to this end of the side tubes at the upper portion of the ends, a suitable inlet-pipe connected to the rear end of the boiler near the bottom thereof and to the stand-pipe and a suitable branch or extension of the outer front stand-pipe extending into the boiler immediately below the water-line thereof, substantially as described.

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Witnesses:

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