

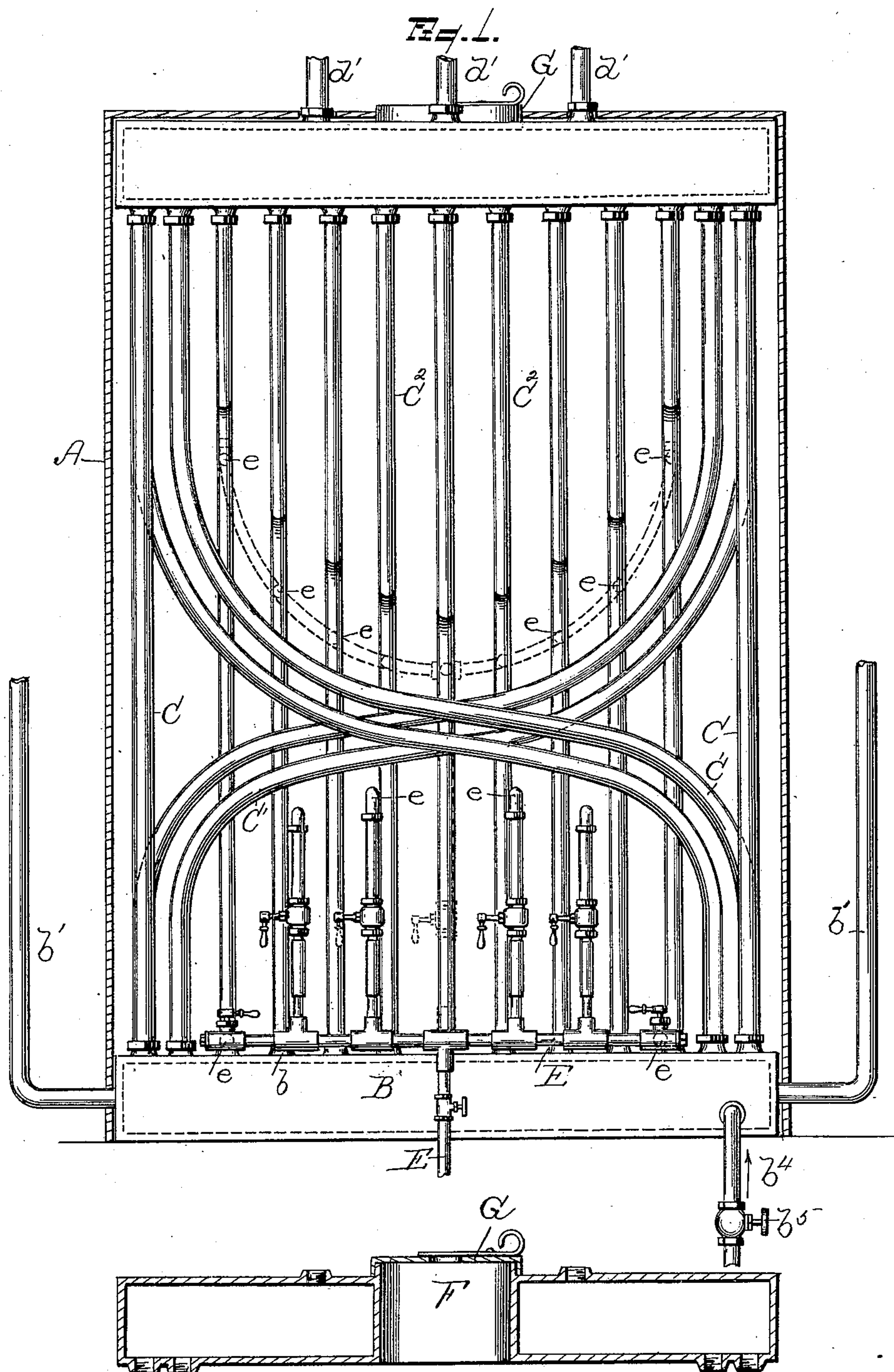
(No Model.)

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M. E. IRVING.
BOILER.

No. 404,912.

Patented June 11, 1889.



WITNESSES

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Samuel C. Thomas
W. N. Chamberlin

Fig. 4

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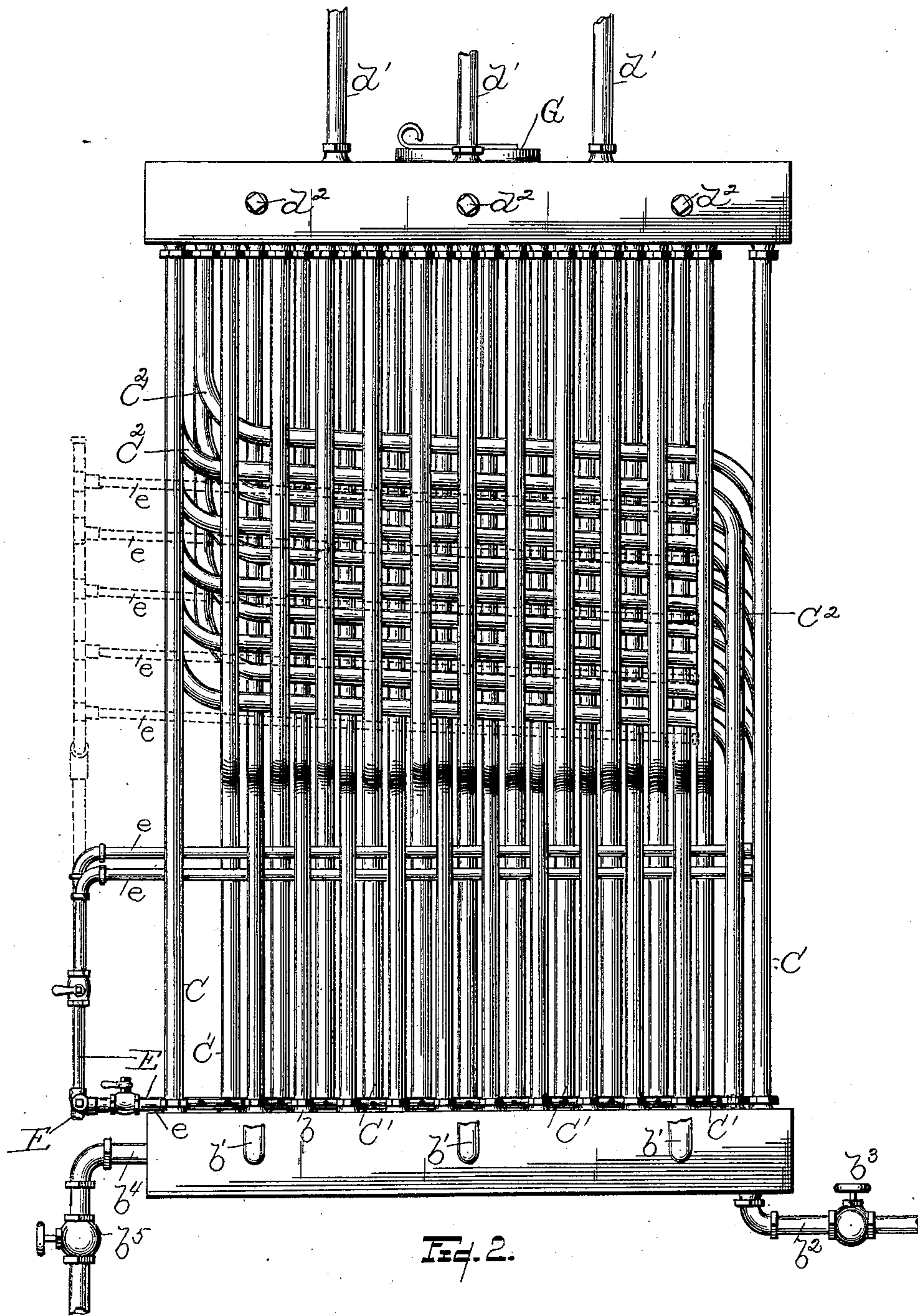
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(No Model.)

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Fig. 5.

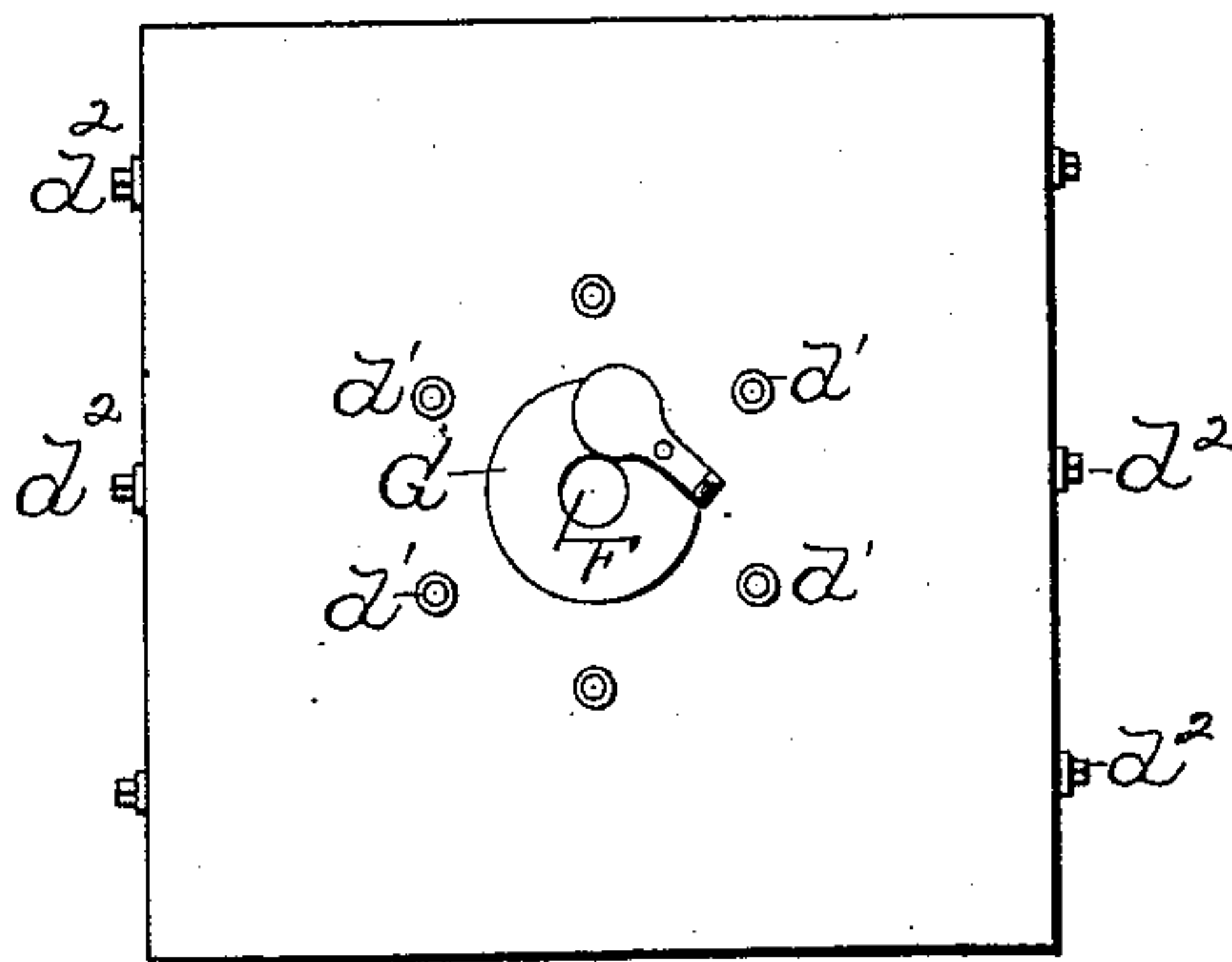
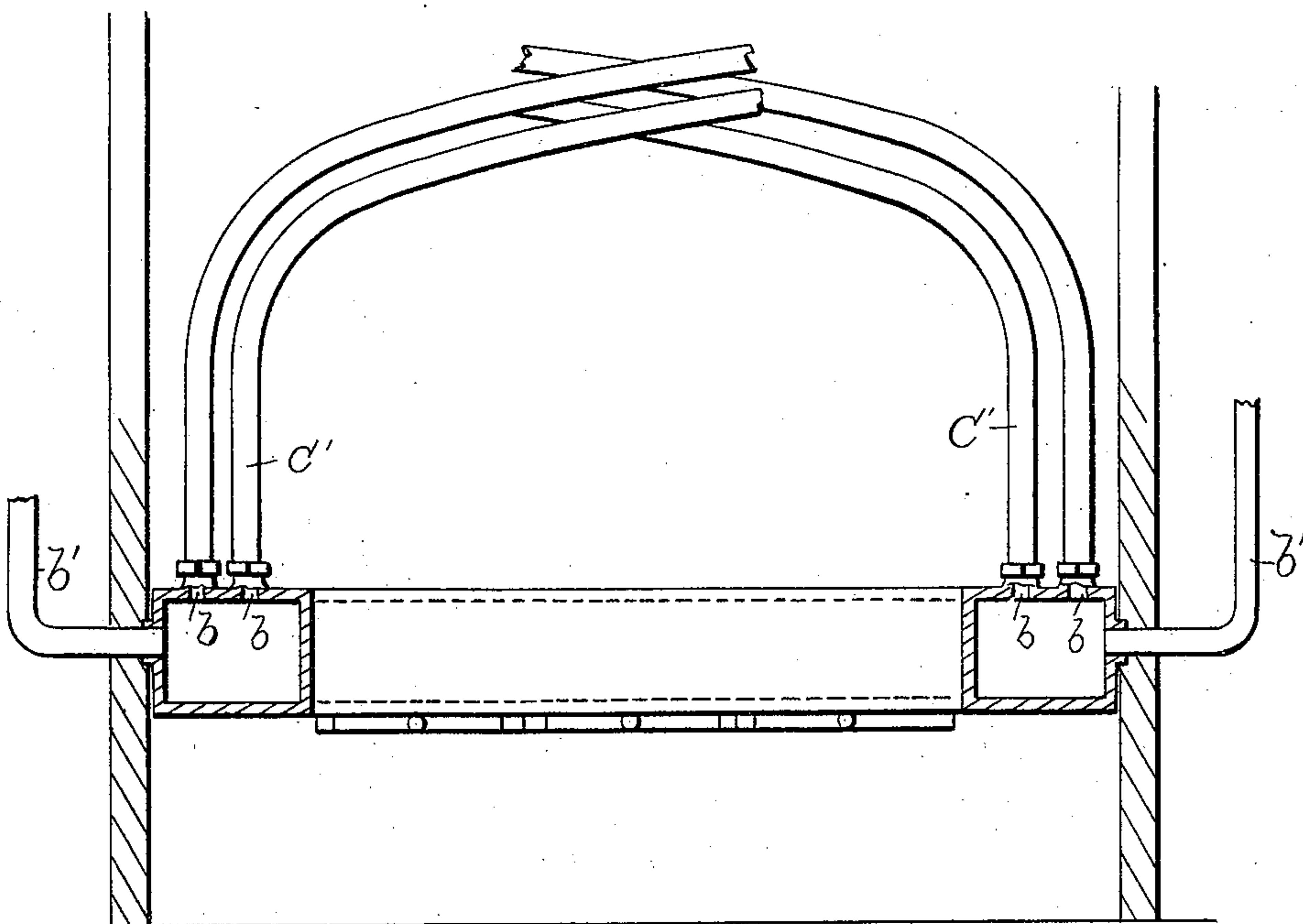


Fig. 3.

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UNITED STATES PATENT OFFICE.

MARK E. IRVING, OF DETROIT, MICHIGAN, ASSIGNOR OF TWO-THIRDS TO
CORNELIUS S. DYER AND JOHN HEFFRON, OF SAME PLACE.

BOILER.

SPECIFICATION forming part of Letters Patent No. 404,912, dated June 11, 1889.

Application filed September 8, 1888. Serial No. 284,931. (No model.)

To all whom it may concern:

Be it known that I, MARK E. IRVING, a citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Boilers; and I declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification, and in which—

Figure 1 represents a front elevation of my improved hot-water tubular boiler with the jacket in section. Fig. 2 is a side elevation of the same. Fig. 3 is a plan view. Fig. 4 is a cross-section of the upper shell. Fig. 5 is a sectional view showing a variation of the mode of heating the apparatus.

My invention relates to that class of boilers used in heating apparatus known as "hot-water-circulating boilers," in which water heated to a high temperature is circulated through pipes and radiators for the purpose of heating rooms and buildings.

The invention has for its object the production of a boiler that, while it presents a large amount of surface for the heating of the water, is simple and durable, may be readily cleaned, and is easily repaired.

My invention is designed more particularly for the use of gas as the source of heat; but either coal or wood or any other fuel is equally applicable.

In the drawings, A represents the jacket which incloses the boiler. This may be constructed of either cast or sheet iron or any equivalent material adapted to retain the heat. B is the base or lower shell, made in a rectangular-shaped hollow ring of cast-iron or equivalent, and preferably in a single piece, and provided with orifices *b*, into which the ends of the tubular conduits C C' C² may be fitted.

D is the upper shell, cast hollow and preferably in a single piece, also provided with orifices *d*, into which the upper ends of the tubular conduits C C' C² may be fitted. These conduits C C' C² are adapted to conduct the water from shell to shell, during which it becomes thoroughly heated, as shown in the drawings. While some of the conduits C are

vertical, the majority are so shaped that they will present a large surface to be heated, the conduits C' starting from the upper shell at the sides and descending in curved lines to the opposite sides of the lower shell, and the conduits C² starting from the front of the upper shell and descending in curved lines to the back of the lower shell. The conduits C' will thus form a natural fire-chamber below the place where they intersect, and the conduits C² will form another chamber above the conduits C', into which the heat may pass. At no point, however, are these conduits shaped in such a manner that water or sediment can lodge in them, they describing a continual downward course from the upper to the lower shell and having no angles whatever in them.

The upper shell D is provided with outlet-pipes *d'*, leading to the radiators, and the lower shell B is provided with inlet-pipes *b'*, leading from the radiators.

It will be readily seen that the peculiar shape of the conduits C C' C² is an important advantage, since by providing the lower shell B with an outlet-pipe *b*² and cock *b*³ the water may be drained from the whole system at will, and should repairs become necessary each conduit can be removed and replaced independently of the others. The system may be filled by connecting the lower shell B by means of the pipe *b*⁴ with the water-main or other source of water-supply, and after the system has been filled cut off the supply by means of the cock *b*⁵. Thus the system may be emptied and cleaned or repaired and filled again in a short space of time and with very little trouble or expense.

Any fuel desired may be used for heating the system. In Figs. 1 and 2 apparatus for burning gas is represented, E being the supply-pipe, which may be tapped at any desired point or points, and horizontal conduits *e* may be extended therefrom adjacent to the conduits C C' C². These conduits *e* may be provided with orifices through which the gas may issue and be consumed.

In Fig. 5 the heater is provided with a fire-pot adjacent to the lower shell, and coal, wood, or other fuel may be used therein for heating the exposed surfaces, the heat rising through

the lower shell and surrounding the outer surface of the conduits C C' C².

5 The upper shell D may be provided with an opening F for the exit of smoke and gases where coal, wood, or other fuel is used in the fire-pot; or, when gas is used, the opening F may be covered by a cap G, which may be provided with suitable ventilating-orifices.

10 The shell D may be provided with suitable plugged openings d², whereby the shell may be cleaned at will.

What I claim is—

15 1. A hot-water-circulating boiler consisting of top and bottom shells united by water-tubes C', which curve in alternate directions across the intervening space from side to side, and

in connection therewith water-tubes extending in like manner from the front of the upper shell downward and backward to the rear end of the lower shell, substantially as described. 20

2. A hot-water-circulating boiler consisting of horizontal top and bottom shells united by lateral tubes C' and longitudinal tubes C², both completely crossing the space between the shells, substantially as described. 25

In testimony whereof I sign this specification in the presence of two witnesses.

MARK E. IRVING.

Witnesses:

ISRAEL T. COWLES,

W. H. CHAMBERLIN.