

(No Model.)

2 Sheets—Sheet 1.

E. J. MOORE.
VERTICAL BOILER.

No. 426,838.

Patented Apr. 29, 1890.

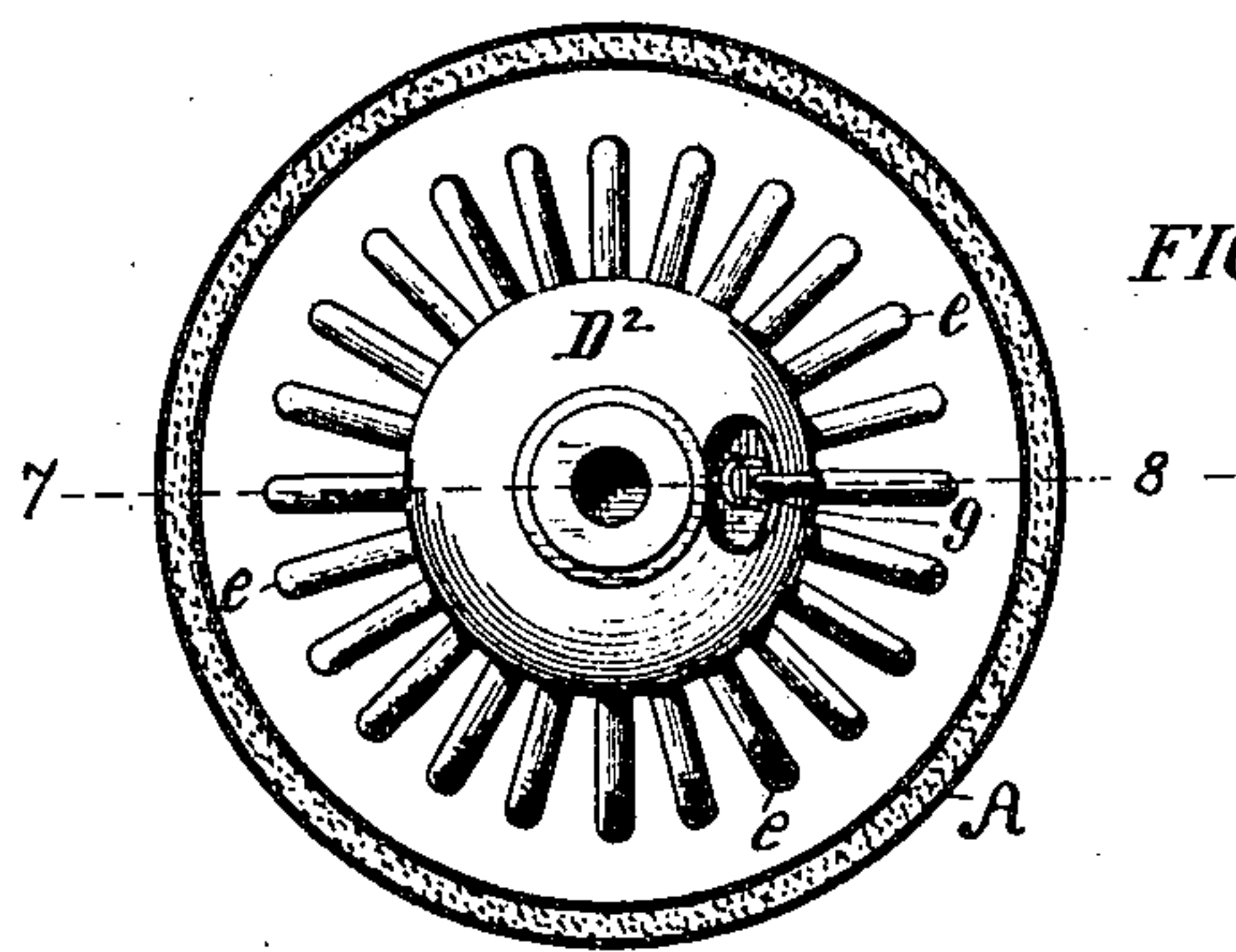


FIG. 4.

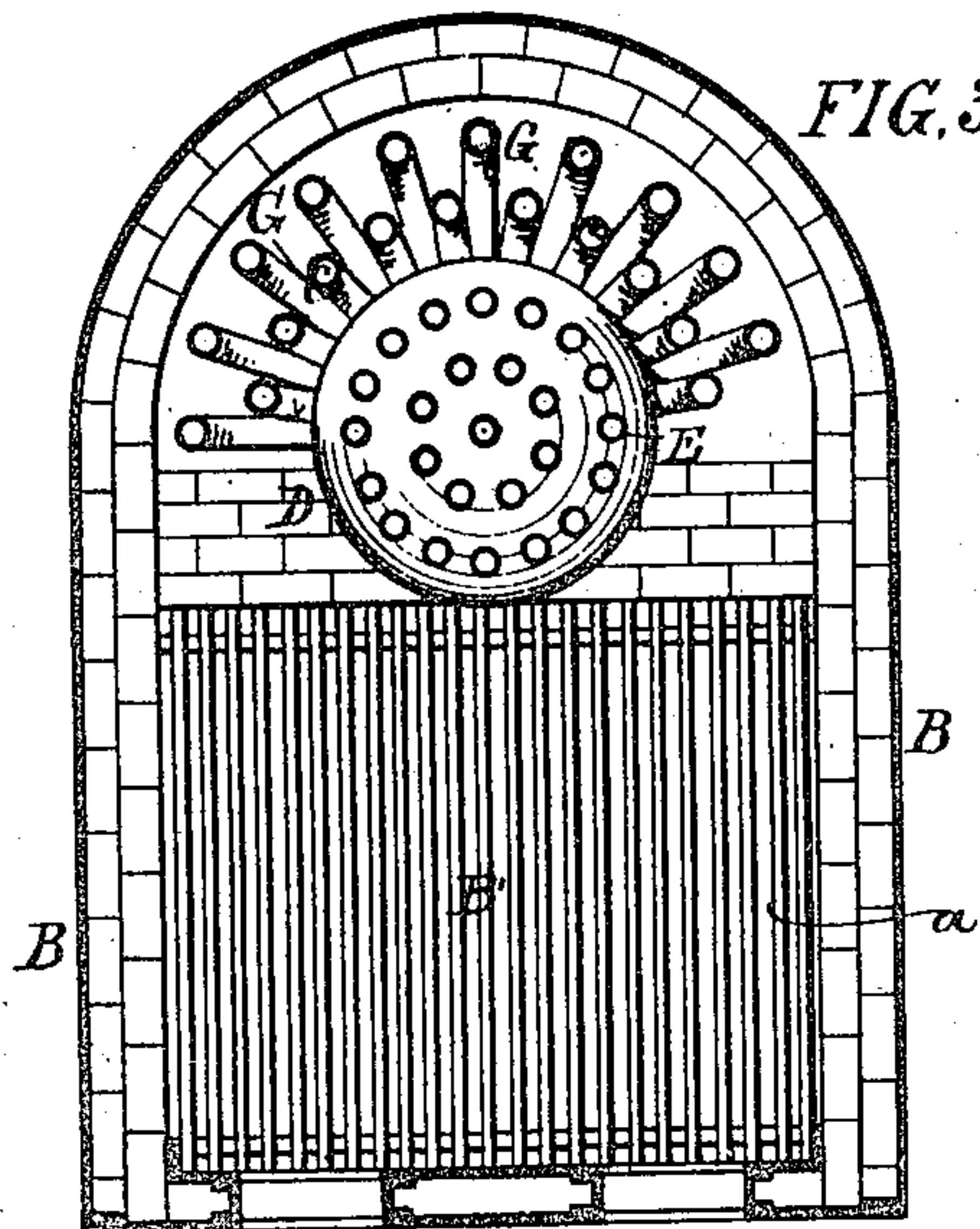


FIG. 3.

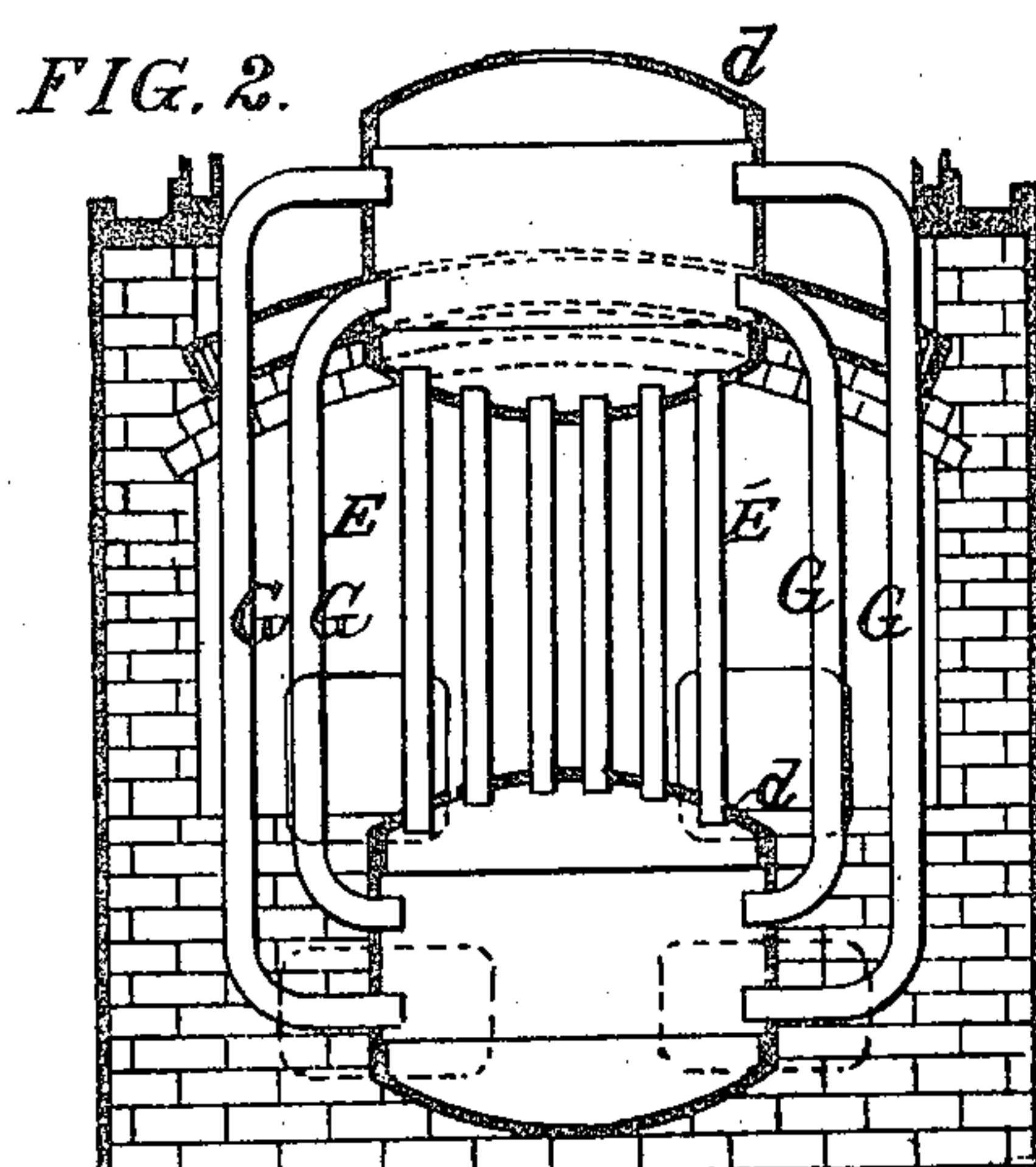


FIG. 2.

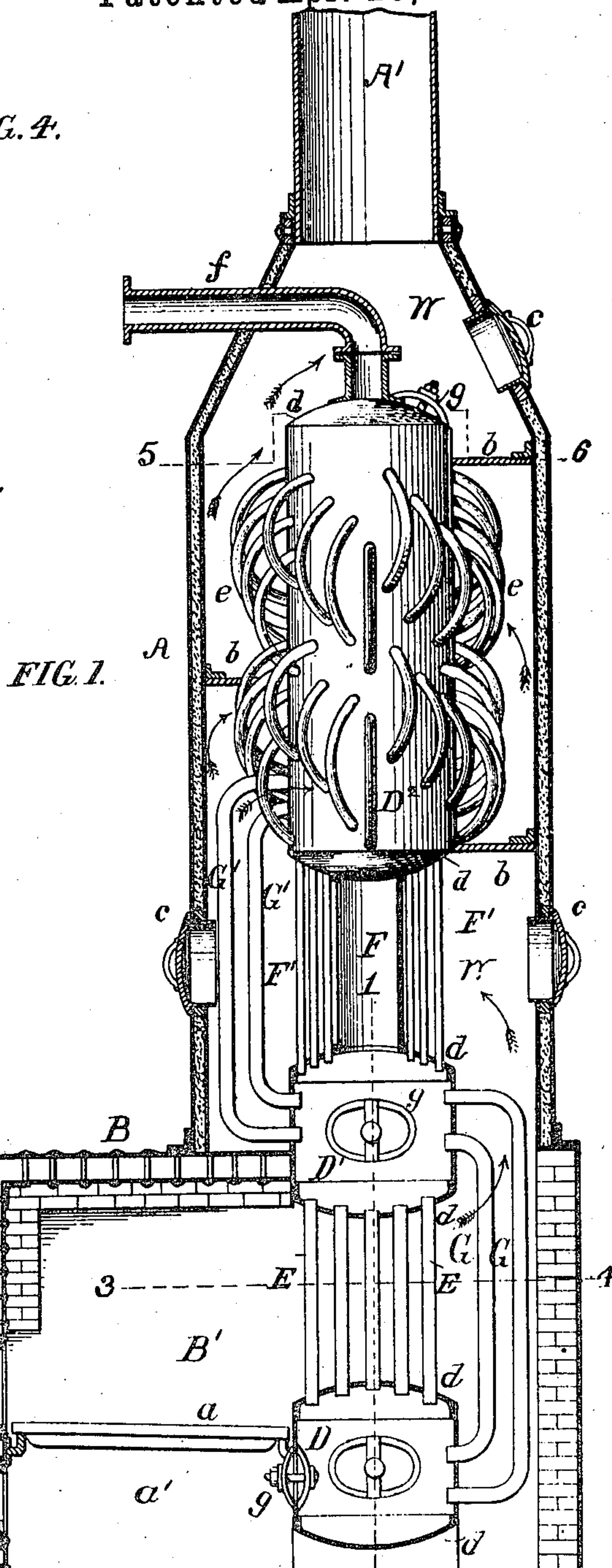


FIG. 1.

Witnesses:
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FIG. 8.

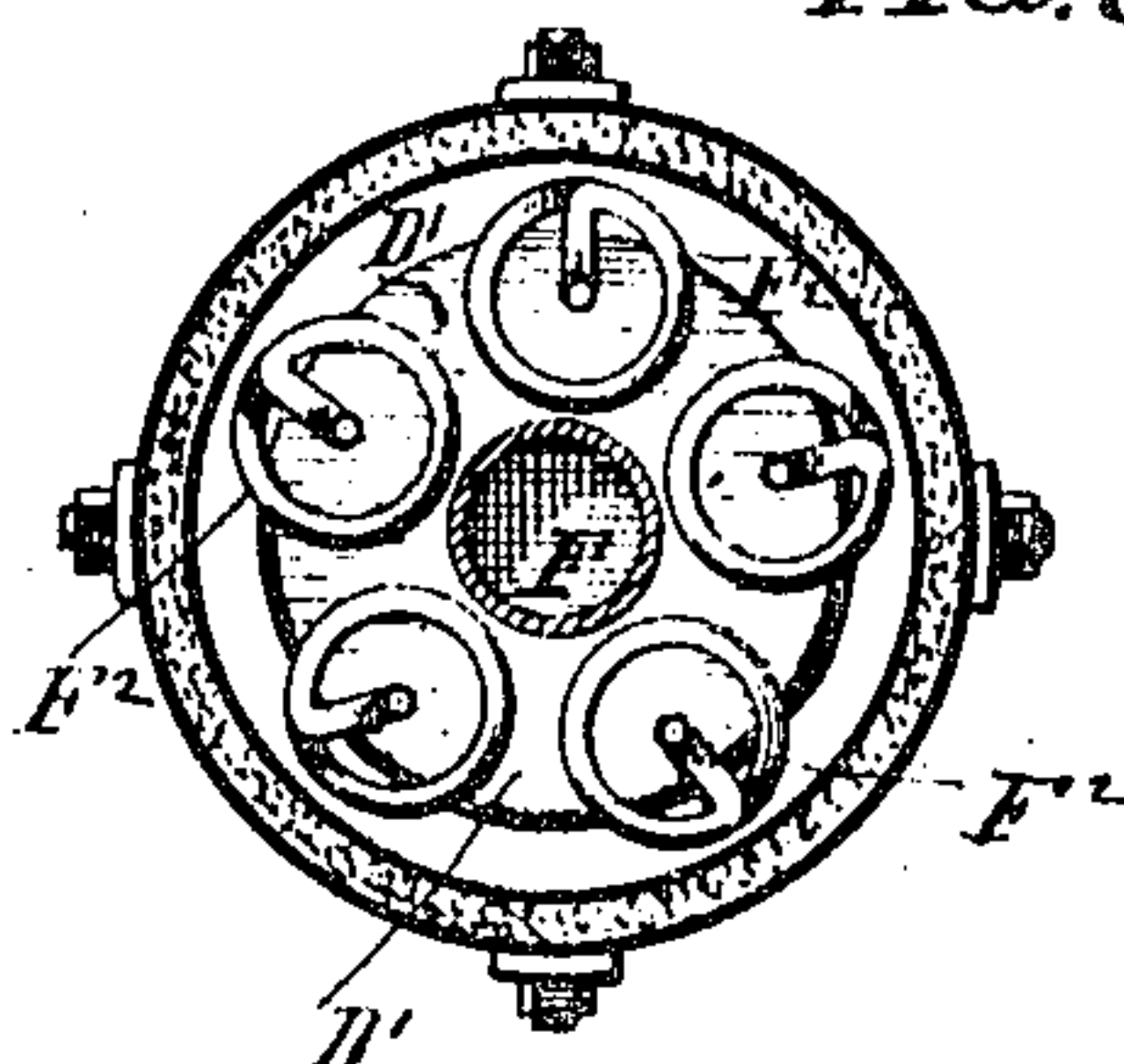


FIG. 7.



FIG. 5.

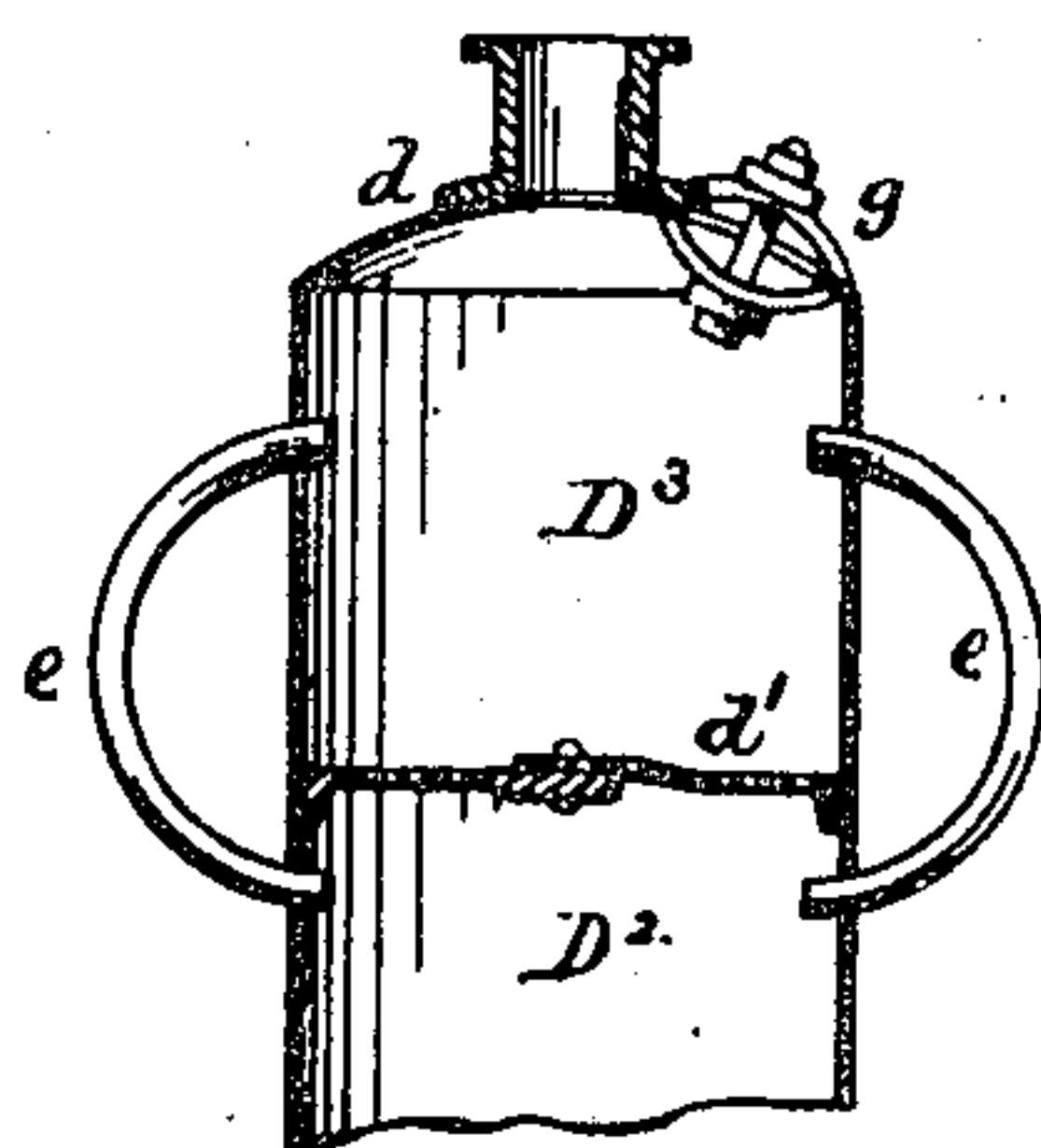
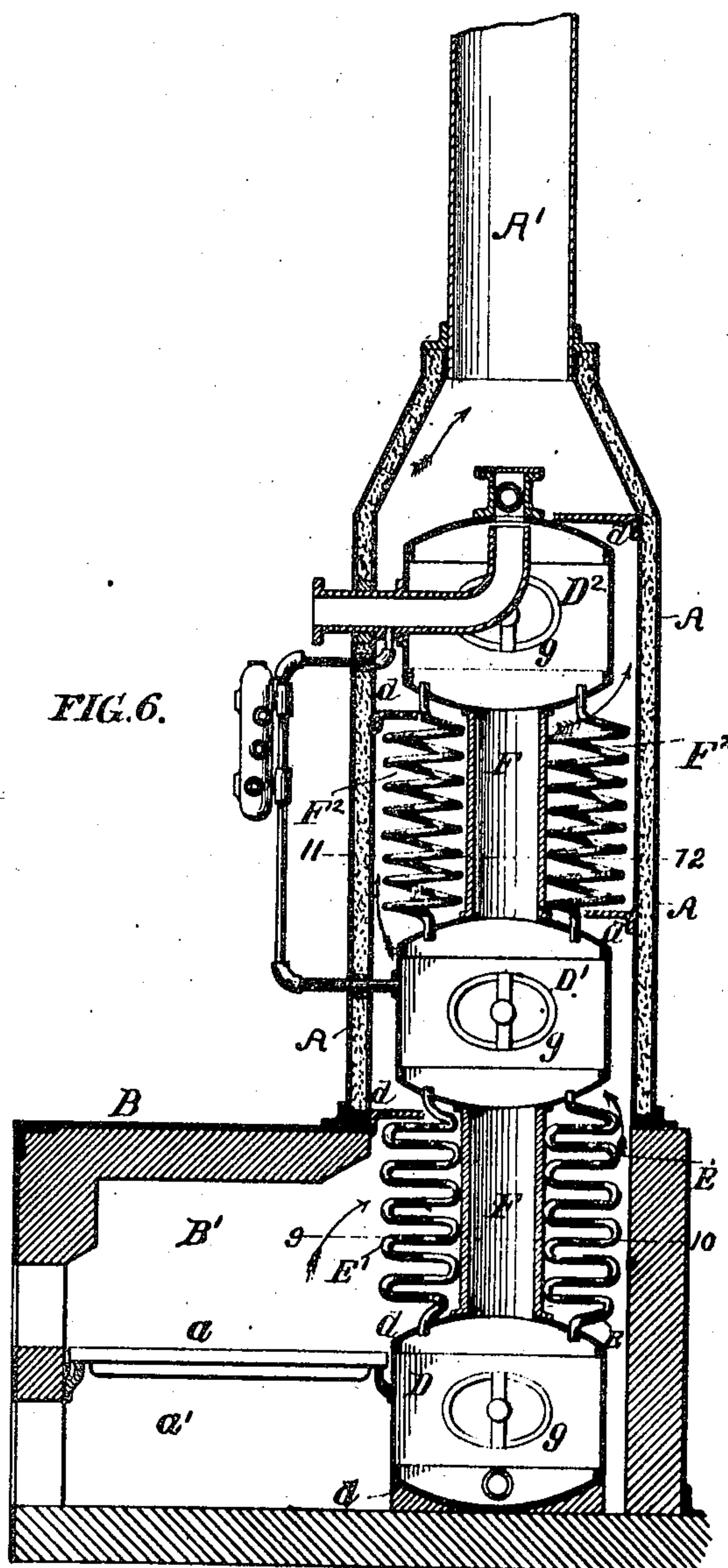


FIG. 6.



Inventor:

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UNITED STATES PATENT OFFICE.

EDWARD J. MOORE, OF PHILADELPHIA, PENNSYLVANIA.

VERTICAL BOILER.

SPECIFICATION forming part of Letters Patent No. 426,838, dated April 29, 1890.

Application filed May 9, 1889. Serial No. 310,102. (No model.)

To all whom it may concern:

Be it known that I, EDWARD J. MOORE, a citizen of the United States, and a resident of Philadelphia, Pennsylvania, have invented certain Improvements in Vertical Boilers, of which the following is a specification.

The object of my invention is to so construct a vertical tubular boiler having a large grate-surface and an extended heating-surface.

The main features of my invention are the special construction of boiler by which a large heating-surface is obtained in a comparatively small space, the location of the combustion-chamber and grate beyond the vertical structure of the boiler, and the construction of the boiler of a series of enlarged chambers connected together by tubes, thus dispensing with the stays usually employed in this class of boilers.

Referring to the drawings, Figure 1 is a sectional elevation of my improved boiler. Fig. 2 is a section on the line 1 2, Fig. 1. Fig. 3 is a section on the line 3 4, Fig. 1. Fig. 4 is a section on the line 5 6, Fig. 1. Fig. 5 is a section on the line 7 8, Fig. 4. Fig. 6 is a vertical section of my improved boiler slightly modified. Fig. 7 is a section on the line 9 10, Fig. 6; and Fig. 8 is a section on the line 11 12, Fig. 6.

A is the outer casing of the vertical-boiler flue, which is mounted on the casing of the fire-box B, said fire-box projecting at one side, so as to provide an extended grate-surface, and the fire-box being provided with the usual combustion-chamber B', grate *a*, and ash-pit *a'*. The boiler is in the present instance composed of three compartments or chambers D D' D², having their top and bottom plates *d* *d'* rounded, as shown, so as to act as stays for the side plates, and thus dispense with the usual stays in the boiler. The chambers are connected together, and the lower chamber rests in the bridge-wall of the fire-box. It will thus be seen that the casing structure is L-shaped, the horizontal portion containing the fire-box and the vertical portion containing the boiler structure. At the rear of the bridge-wall and boiler is a second combustion-chamber communicating with the vertical flue portion of the boiler-casing. The chambers D D' are connected together by a series of vertical tubes E, which are expanded into the

chambers D D'. The chambers D' D² are connected by a central flue F, and also by smaller tubes F', expanded into the top plate of the chamber D' and into the bottom plate of the chamber D². The chambers D D' are also connected by side tubes G, as shown in Figs. 1 and 2, and the chambers D' D² are connected together by side tubes G'.

Deflecting-plates *b b* extend from the boiler-casing to the center of the flue W, first from one side and then from the other side, so as to direct the products of combustion in a zig-zag course around the boiler, thus utilizing as much of the heat as possible.

The chamber D² is divided by a plate *d'*, forming in its upper part a steam-dome D³, as shown in Fig. 5. This steam-dome is connected to the remaining portion of the chamber D² by the upper of a series of pipes *e e*, rounded, as shown, so as to leave no flat surface on which water may lodge at any time, the pipes being, in fact, segments of circles. These pipes extend, as shown in Fig. 1, in spiral courses around the entire periphery of the chamber D², so that the products of combustion gain access to all portions of the pipes, thus increasing the heating capacity of the boiler.

Man-holes *g g* are provided in the shells of each chamber D D' D², so that access can be had to the interior of the chambers in case of any alterations or repairs being required. Man-holes *c c* are also provided in the casing A of the flue *a* for the same purpose. Communicating with the steam-dome D³ is a steam-outlet pipe *f*, and a smoke-stack A' communicates with the upper end of the flue A.

The grate-surface may be enlarged, and two or more doors may be used for firing, as shown in cross-section, Fig. 2.

By having the top and bottom plates of the chambers rounded the tubes E or F' at the center are necessarily shorter than the tubes at the outer edge, so that the tubes are readily removed from the structure in making repairs.

In Fig. 6 I have shown the chambers D D' D² connected together by the central flues F, and the chambers D D' are also connected together by a series of zigzag tubes E', the chambers D D² being connected by a series of helical tubes F². The chambers D D' D²

may also be provided with projecting segmental tubes *e*, as circumstances suggest.

I claim as my invention—

1. The combination, in a vertical boiler, of the base-section and fire-box with a vertical casing mounted thereon, chambers *D D' D²*, vertically arranged within said casing and base, with connecting and circulating tubes uniting the several chambers, substantially as specified.

2. The combination, in a vertical boiler, of the base and laterally-extending fire-box section with a vertical casing, with chambers *D D'*, vertically-arranged tubes connecting said chambers, said chamber *D* being set in the bridge-wall, while the chamber *D'* forms a continuation of the roof of the combustion-chamber, substantially as specified.

3. The combination, in a vertical boiler, of the base-section and laterally-extending fire-box with a casing mounted thereon, chambers *D D' D²*, arranged in a vertical line with tubes connecting the chambers, and deflecting-plates in the flue formed by the casing, whereby the products of combustion are deflected from a straight path, substantially as specified.

4. The combination, in a vertical boiler, of the laterally-extended fire-box, with the cham-

bers *D D'* at the rear of the grate of said fire-box, the chamber *D* situated in the line of the bridge-wall, and the chamber *D'* situated in a vertical line above the chamber *D*, with straight tubes *E*, adapted to the heads of said chambers, with the tubes *G* arranged circumferentially around the rear portion of the combustion-chamber and connected at their lower ends to the chamber *D* and at their upper ends to the chamber *D'*, substantially as specified.

5. The combination, in a vertical boiler, of the fire-box section, the vertically-arranged chambers *D D' D²*, tubes connecting the several chambers together, with a casing mounted on the fire-box section and forming a continuation of the combustion-chamber, with tubes *e*, projecting from the chamber *D²* into the combustion-chamber, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EDWARD J. MOORE.

Witnesses:

HARRY SMITH,

HENRY HOWSON.