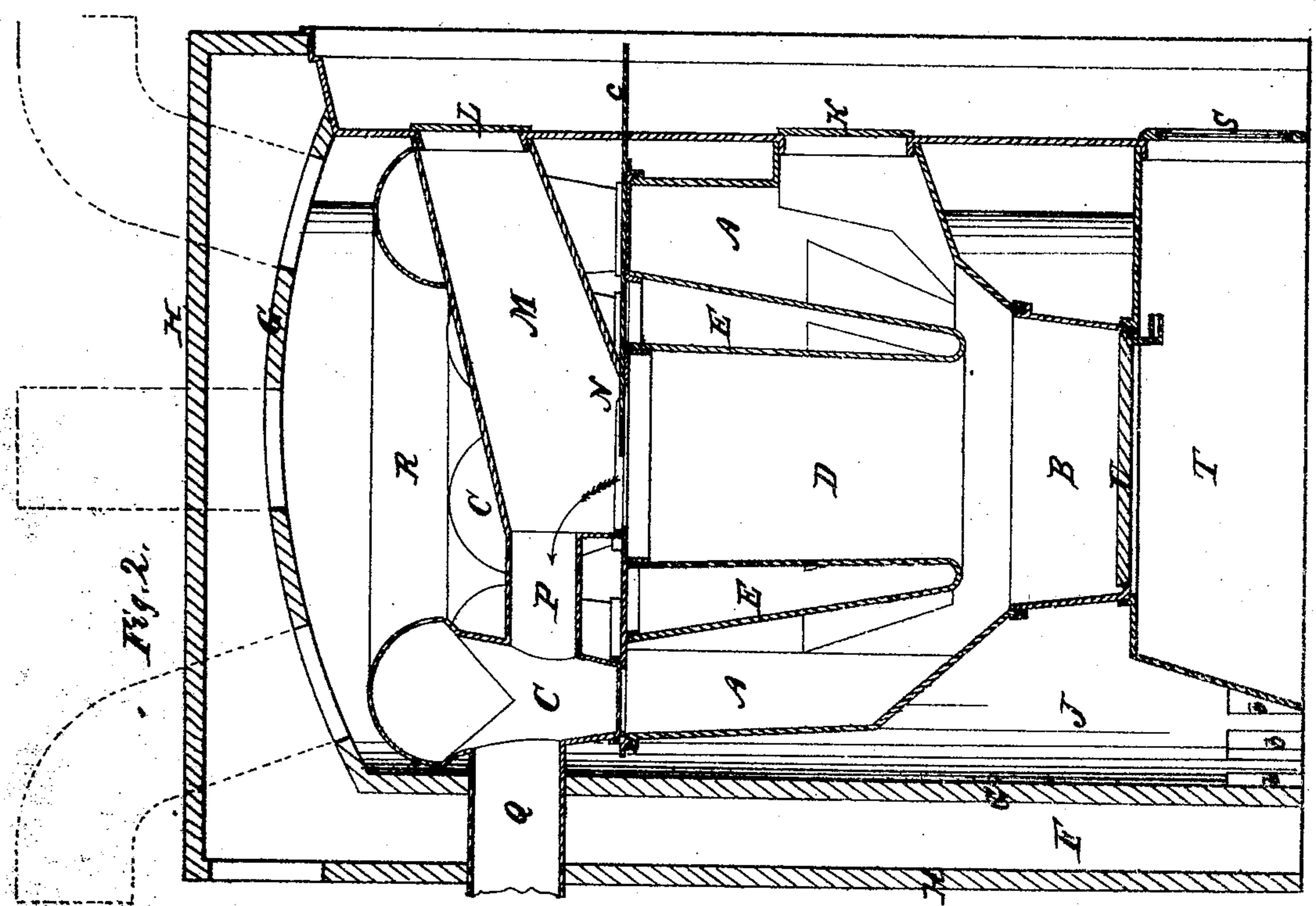
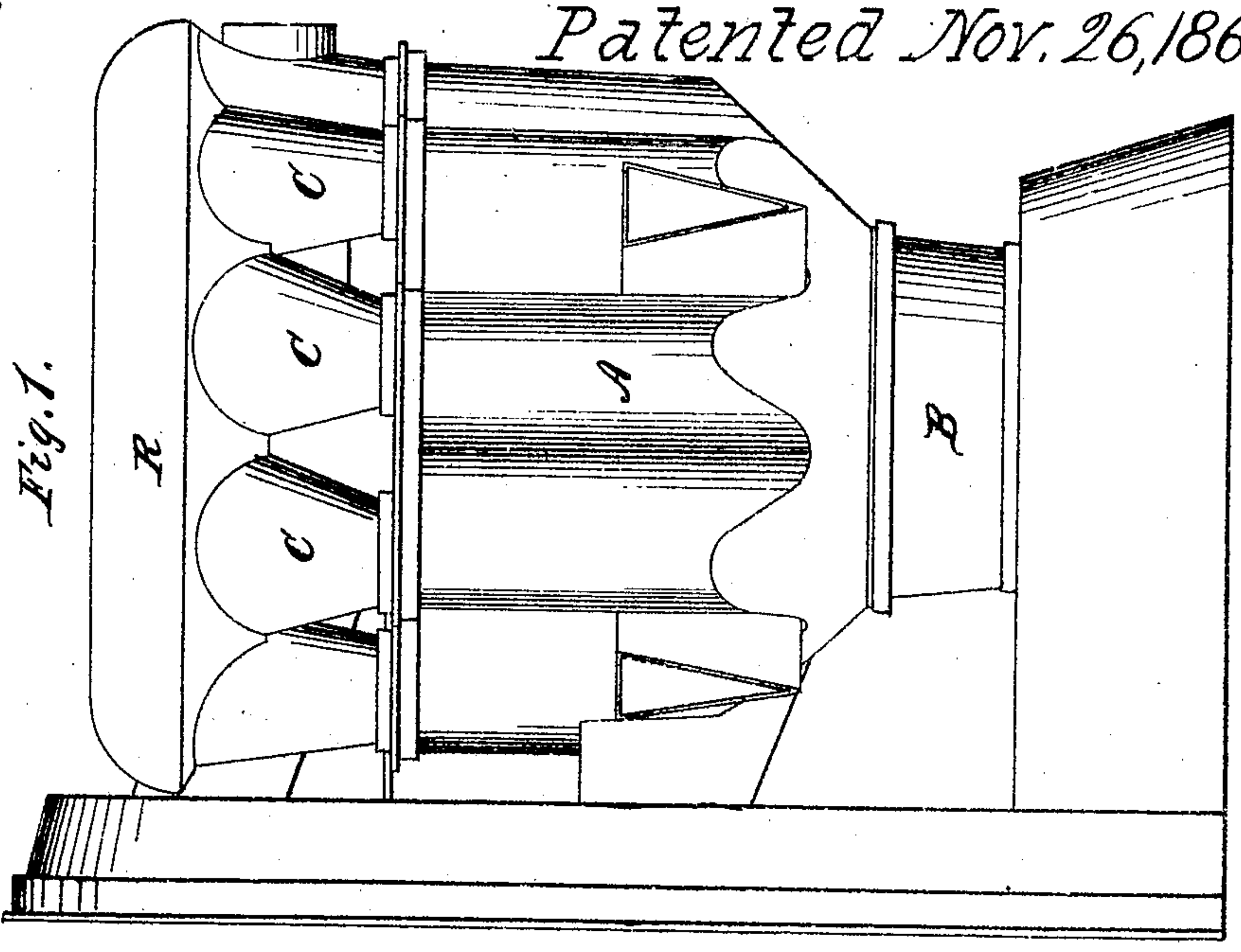


R. Z. Liddle.

Hot Air Furnace.

No 71517

Patented Nov. 26, 1867.



Witnesses.
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Fig. 4.

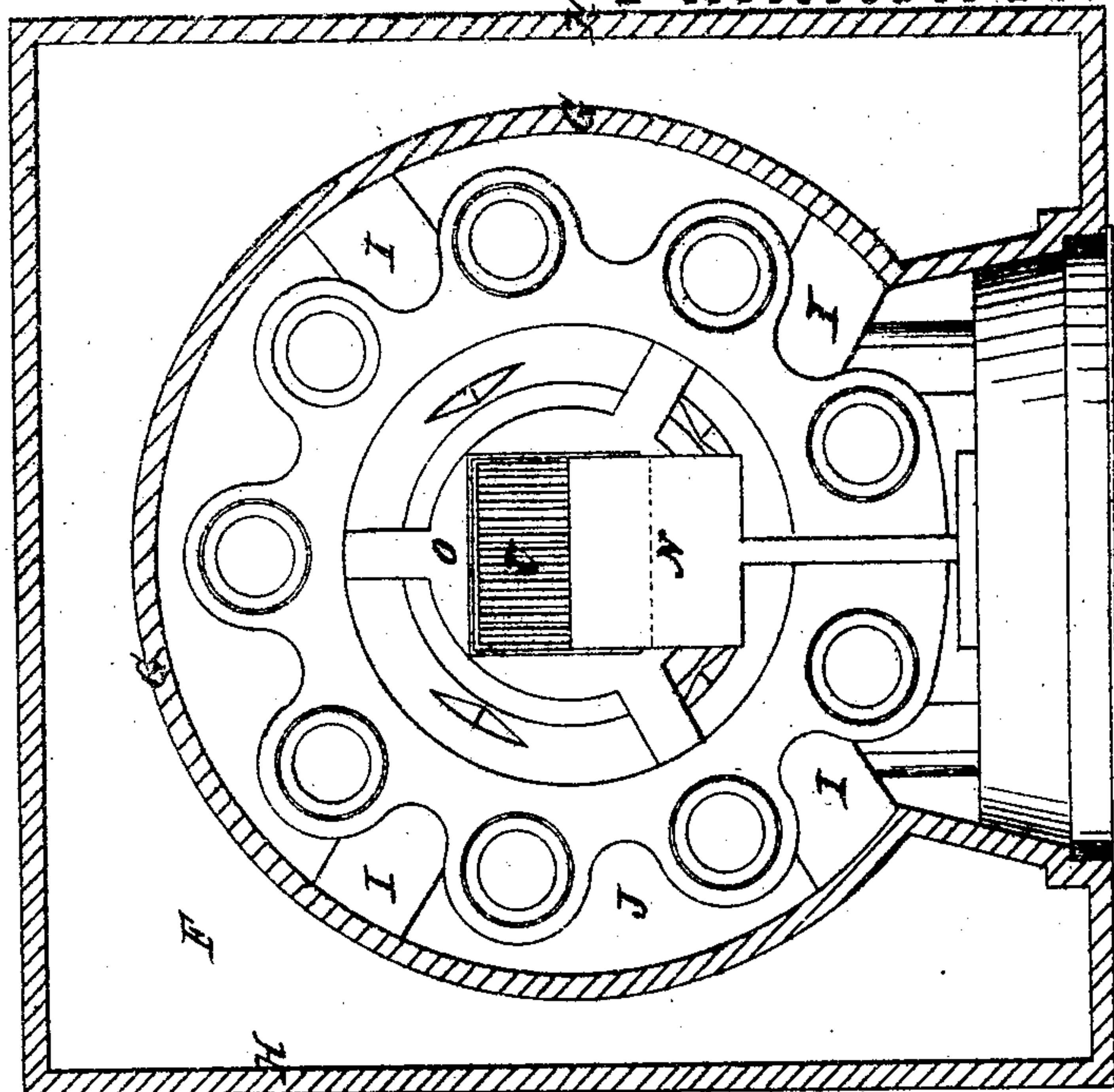
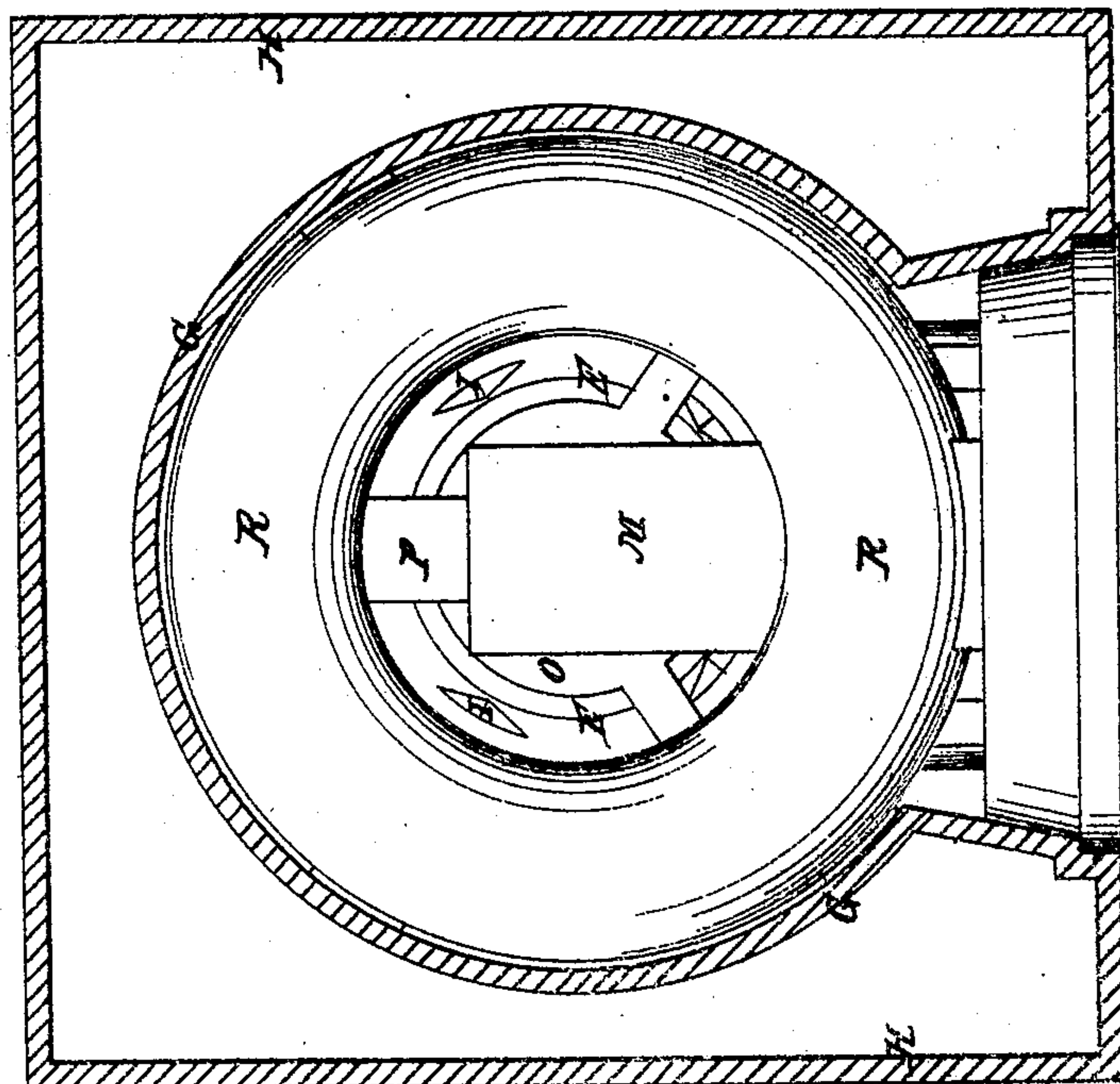


Fig. 3.



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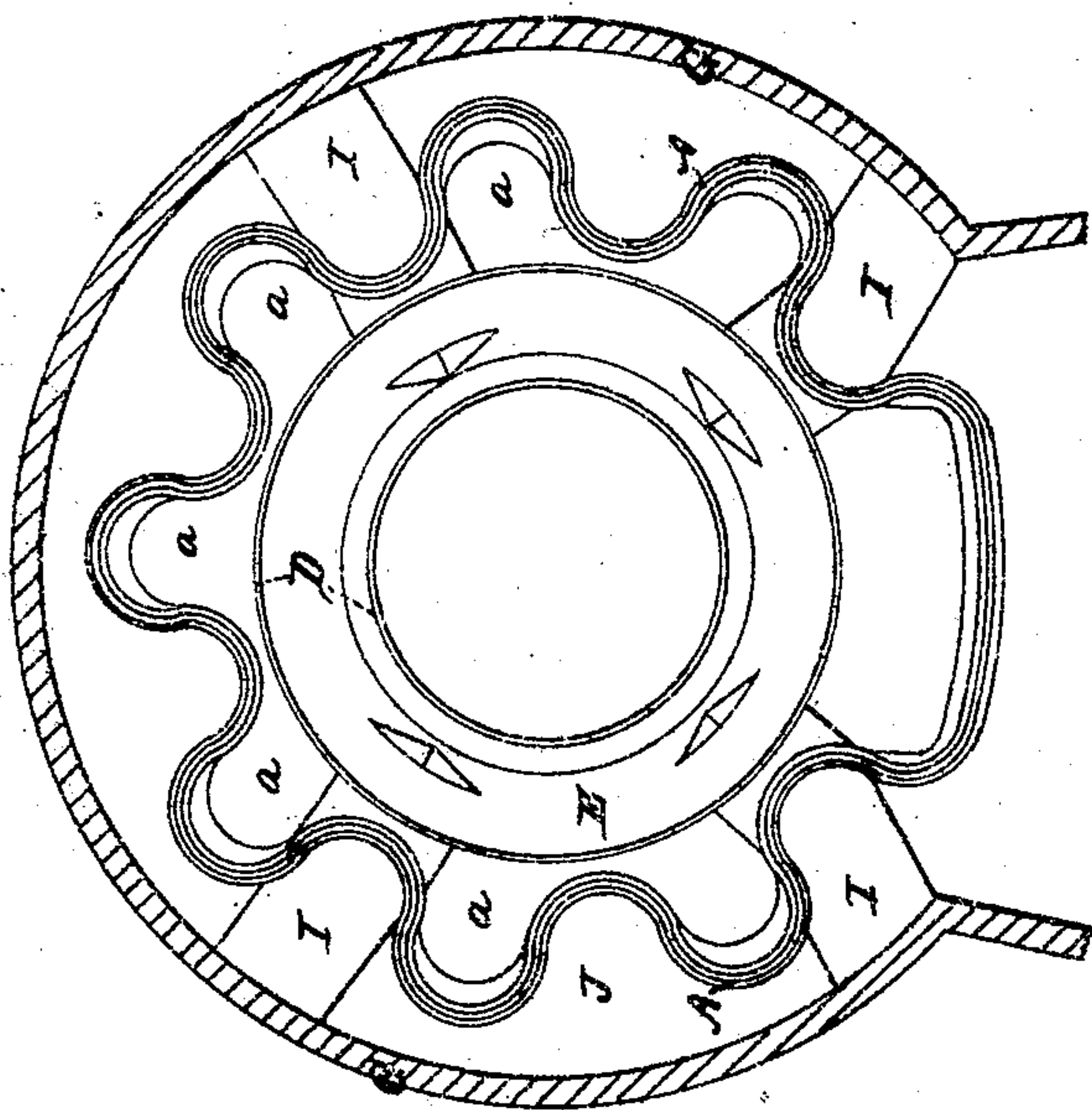
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Fig. 5.



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ROBERT Z. LIDDLE, OF BROOKLYN, NEW YORK.

Letters Patent No. 71,517, dated November 26, 1867.

HOT-AIR FURNACE.

The Schedule referred to in these Letters Patent and making part of the same.

Specification of certain Improvements in Furnaces for Heating Dwellings, &c., invented by ROBERT Z. LIDDLE, of Brooklyn, in the county of Kings, and State of New York.

My invention relates to that class of furnaces which is used for the purpose of heating air to be supplied to dwellings through suitable conducting-pipes; and it consists in—

First, the combination with the main body of the furnace, which is deeply fluted or sinuated longitudinally so as to provide suitable flues for the passage upward of the products of combustion without the disadvantages attendant on vertical joints, of a double or single suspended feeder or reservoir for supplying fuel to the fire-pot. Said reservoir or feeder may be made double, with two walls, for the purpose of providing extra heating-surfaces between or on the adjacent sides of said walls, or it may be made single, as preferred.

Second, the combination with the said suspended feeder or reservoir, when made double, of suitable air-channels for supplying the heating-surfaces of the said feeder or reservoir with air from the cold-air chamber, instead of from the hot-air chamber; and

Third, the combination with a single or double feeder, constructed substantially as hereinafter described, and the fire-pot of a furnace, of a door opening directly into said fire-pot, by which access may be obtained directly to said fire-pot for the purpose of lighting fires, &c.

In the accompanying drawings—

Figure 1 is a side elevation of the furnace removed from the brick-work setting.

Figure 2 is a vertical central section of the furnace complete on a plane passing from front to rear.

Figure 3 is a plan of the same, the top of the brick-work having been removed.

Figure 4 is a plan of the same, the upper smoke-flues being removed in addition to the top of the brick-work.

Figure 5 is a plan of the same parts shown in fig. 4, except that the frame or connecting-rings which connect the upper smoke-flues to the main body, the cover of the feeder, and the outer wall of brick-work, are removed.

A is the main body of the furnace. It is deeply sinuous or indented longitudinally, as clearly shown in fig. 5, whereby flues, *a a a*, for the passage of smoke from the fire-pot B to the upper smoke-flues C C C, are formed between said main body A and the outside of the feeder D. It is evident that these smoke-flues *a a a* will not leak gas since there are no vertical joints in them to connect them to the air-chamber or passages. This form of the main body allows the said feeder to be brought up close to the inner curve of the sinuosities of the main body, so that a more effectual action is obtained as the heat is brought more closely in contact with the surfaces to be heated, and the surface on which the heat acts is increased. As a consequence of this arrangement, the same amount of heat will produce a greater effect. Another advantage connected with these sinuosities is the increase in the amount of heating surface for heating the air on the outside of the main body A. The feeder D, as shown in the drawings, is double, cast in sections, and encloses between its two walls a hot-air chamber, E, which is supplied with air to be heated from the cold-air chamber F, between the brick walls G and H through the pipes or channels I I I. Another hot-air chamber, J, is enclosed between the wall G and the outside of the main body A. This hot-air chamber is supplied with cold air to be heated from the cold-air chamber F, through openings *b b b* at the bottom of the wall G. A door, K, which communicates directly with the fire-pot B, is set in the front of the furnace. By means of this door, ready and direct access may be obtained to the fire-pot B for the purpose of lighting fires, &c. L is a door, which opens into the feeder D through the box or conductor M. The coal to supply the fire is shovelled into this box or conductor M, whence it slides down into the feeder D. A damper or cut-off, N, is made to slide over the opening in the cover O of the feeder D. It is operated by a handle projecting through the front of the furnace, as at *c*, fig. 2. While lighting a fire, or for the purpose of increasing combustion, the cut-off N is drawn out, as shown, by which the draught is permitted to pass directly from the grate to the chimney, up through the coal in the feeder D, thence through the connecting-pipes P and Q. After the fire has become sufficiently started or has attained sufficient strength, the damper N is closed and the fire then burns only below the feeder D, the products of combustion passing up between the main body and the feeder through the flues *a a a*, into and through the upper smoke-flues C C C, and into the ring R; they thence pass into the connecting-pipe Q, which carries them to the chimney. The fire-pot is supplied with air to support combustion through the door S, which permits the air to pass into the ash-pit T, whence it finds its way to the fire through the grate U. The air to supply the cold-air chamber may be

introduced in the usual manner by a suitable conducting-pipe or conveyer extending to the outside of the building.

The object of extending the pipes I I I through the wall or casing G, and into the cold-air space F, is two-fold: first, it supplies the said feeder with colder air than it would if the said pipes terminated in and were supplied from the space within the casing or wall G, because the air in the last-mentioned space is considerably heated in passing up around and in contact with the fire-pot, which is the hottest part of the furnace, and also in contact with the other parts of the furnace, and by thus supplying the feeder with colder air, the said feeder is more effectually prevented from becoming overheated, and danger of warping or fracturing the parts of the heater through the unequal expansion of said parts is thereby much more effectually prevented; second, the air for supplying the feeder being taken from the cold-air space, a greater amount of air can be heated, without overheating any part of the furnace, and the air is not deteriorated by coming in contact with the overheated parts.

The principal advantages which my invention possesses over others of its class are, first, the increased heating-surface which is obtained by combining with a deeply sinuated body, A, the feeder D which may be made either single or double, though I consider the double feeder the best; second, the increase in the amount of air heated which is obtained by supplying the feeder D with cold air through the pipes or channels I I I, instead of with hot air; and third, the ready and direct access which I obtain to the interior of the fire-pot by means of the door K, whereby I am enabled to adjust the materials for lighting the fire, and also to ascertain by inspection the condition of the said fire while in process of ignition and at other times.

First. I do not claim in a base-burning stove or furnace having a supply-cylinder, an escape-passage through the feed-chute so that the supply-cylinder may be filled with coal without obstructing said passage.

Second. Nor do I claim the combination with the chute M of the damper N.

Third. Nor do I claim the combination with a base-burning furnace of the chute M, by which coal may be passed into the cylinder D at a point below the top G of the furnace.

Fourth. Nor do I claim in a base-burning furnace a door opening directly into the fire-pot, by which direct access may be obtained to the fire.

I am aware that furnaces with deeply-corrugated sides have been used before; these I do not claim, but I claim—

1. The combination, with the main body of a furnace, constructed substantially as described, of a single or double feeder, substantially as and for the purpose set forth.

2. Extending the conducting-pipes or channels I I I, or their equivalents, for supplying the double feeder with air through the walls or casing which encloses the furnace and into the cold-air space beyond said wall or casing, so as to supply said feeder with cold air, substantially as hereinabove set forth.

3. The combination, in an air-heating furnace containing a single or double feeder, of the annular flue or ring R, with short pipes or connections C, connecting the smoke-chamber with said ring, said short pipes or connections and ring being surrounded by air-passages, substantially as described.

4. The combination, in an air-heating furnace containing a single or double feeder, of the sliding damper N with the annular flue or ring R, and short pipes or connections C, substantially as described.

5. Closing or reducing the size of the openings through one or more of the short pipes or connections C in an air-heating furnace containing a single or double feeder to equalize the draught from the combustion-chamber, and to shut off direct communication from the combustion-chamber to the exit-pipe, substantially as described.

ROBERT Z. LIDDLE.

Witnesses:

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JAMES S. LAURENCE,