

No. 702,855.

Patented June 17, 1902.

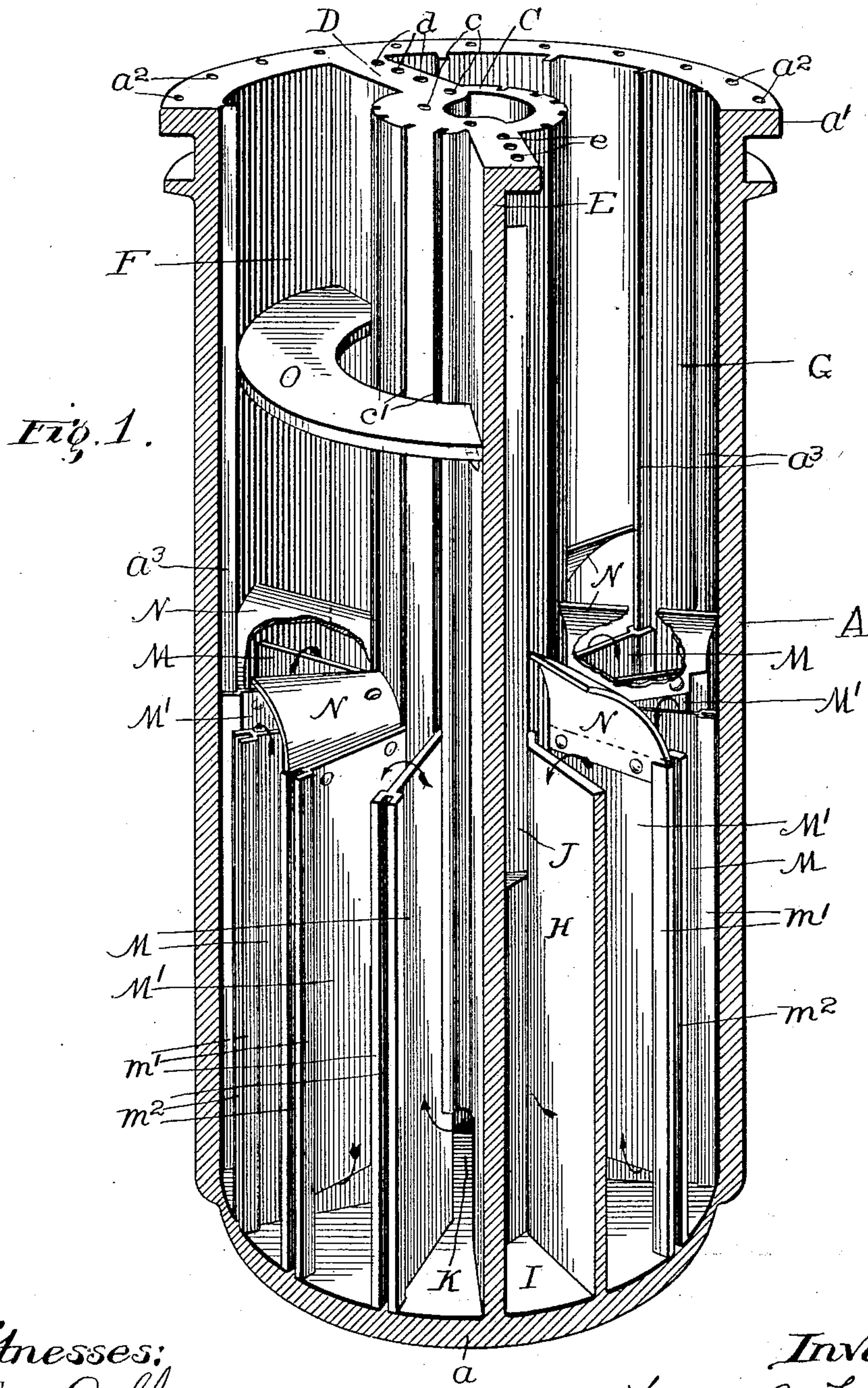
F. B. FELT.

RETORT FOR GENERATING OXYGEN.

(Application filed Nov. 6, 1901.)

(No Model.)

4 Sheets—Sheet 1.



Witnesses:
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Inventor:
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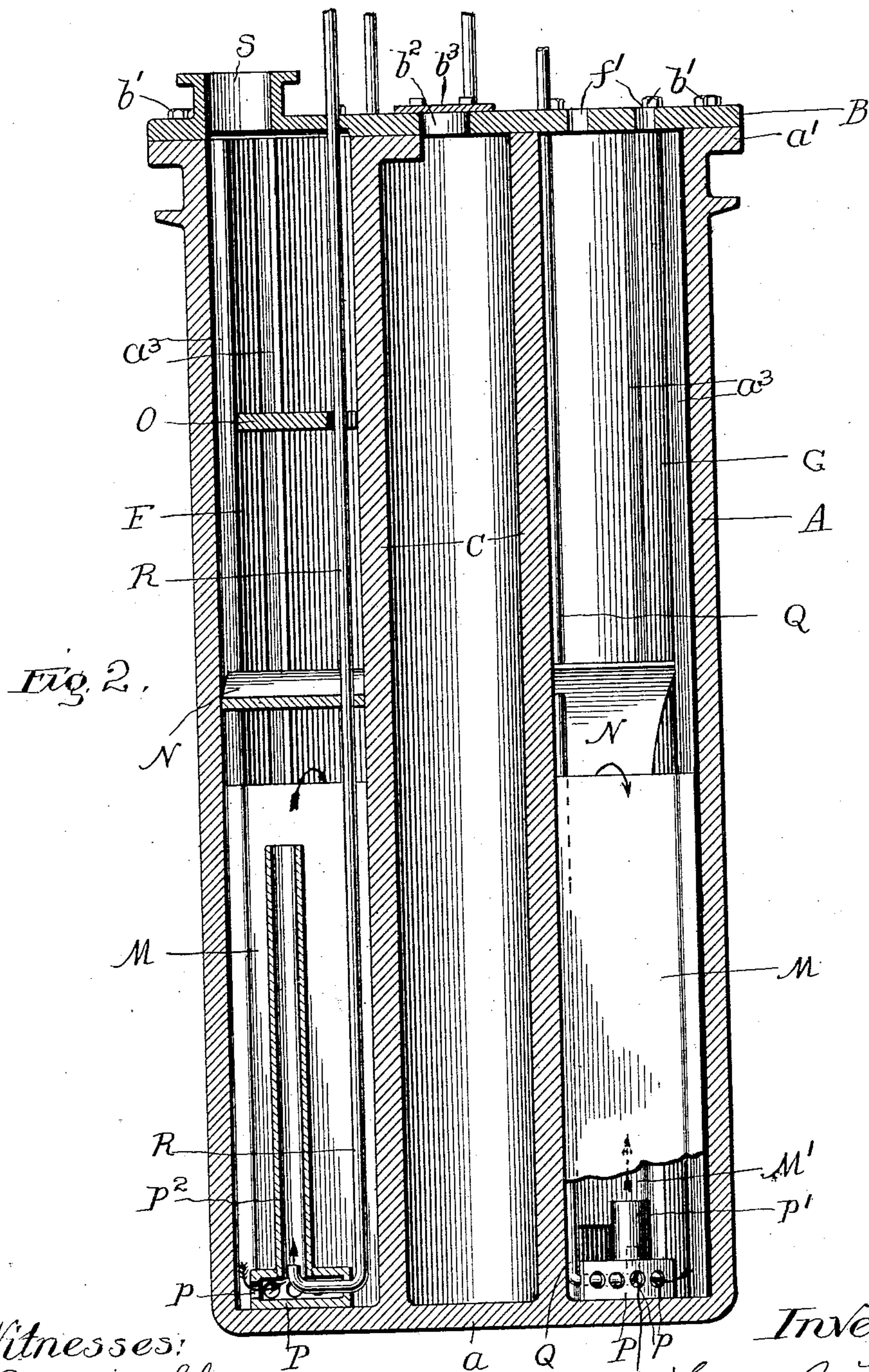
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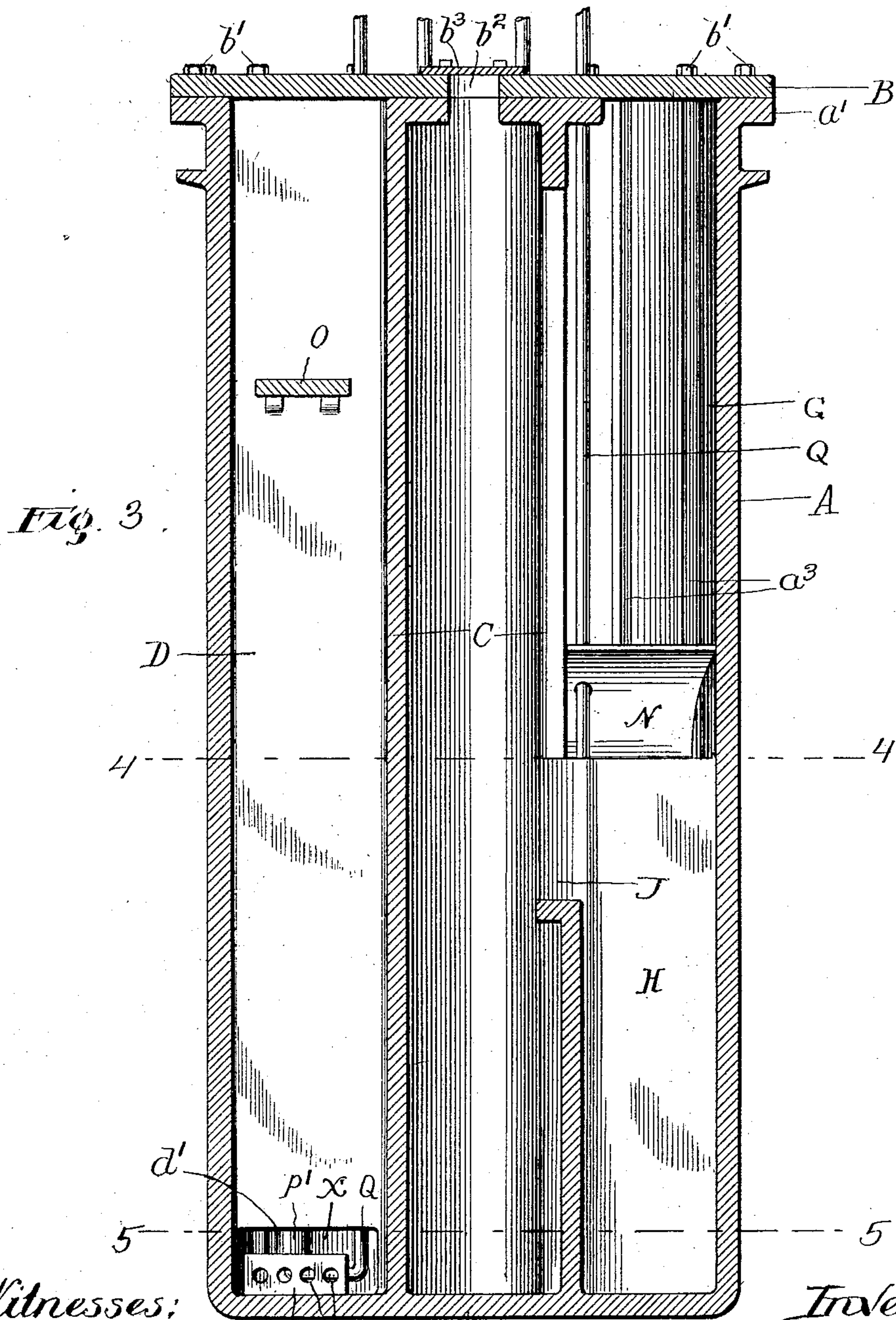
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4 Sheets—Sheet 3.



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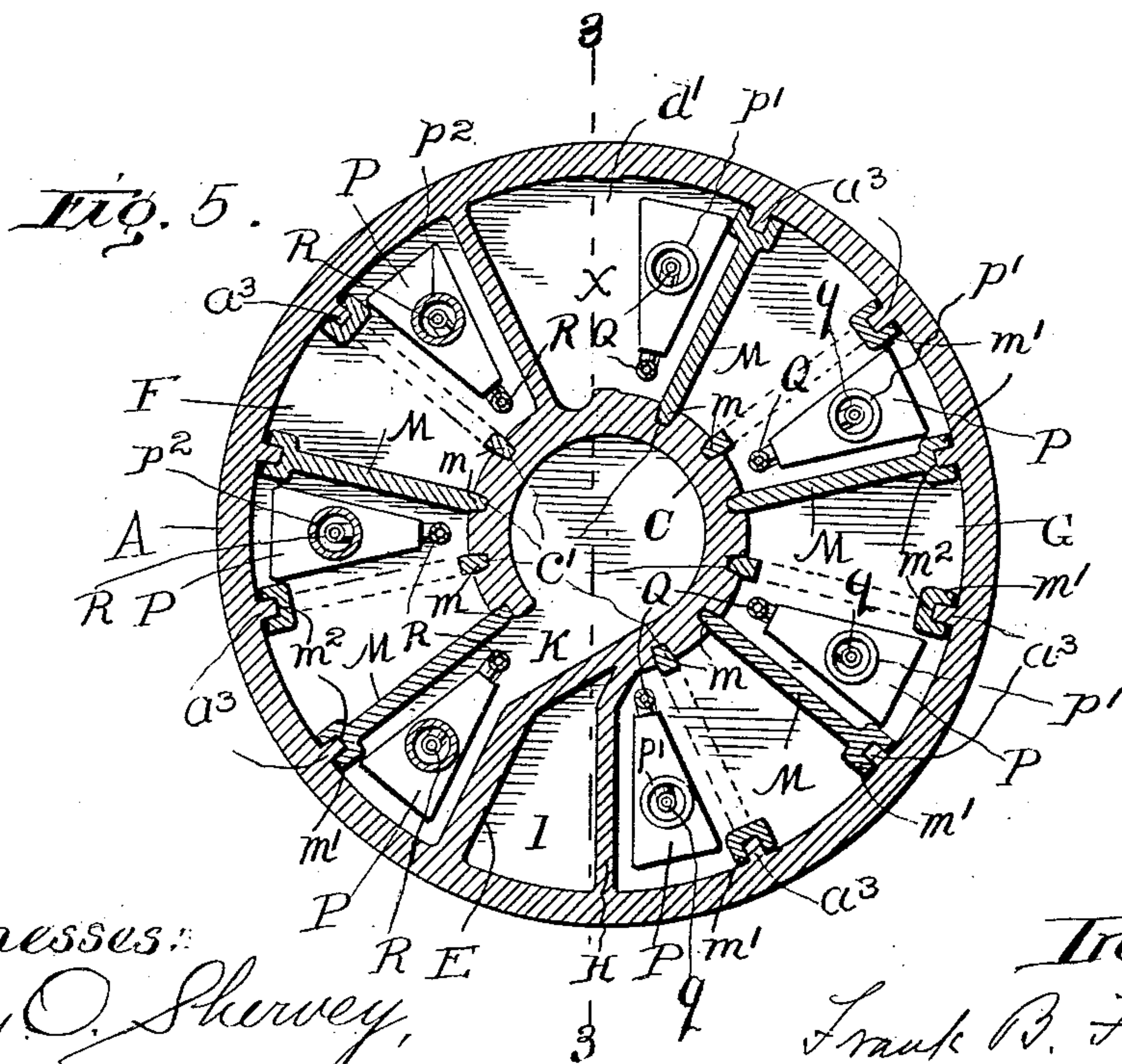
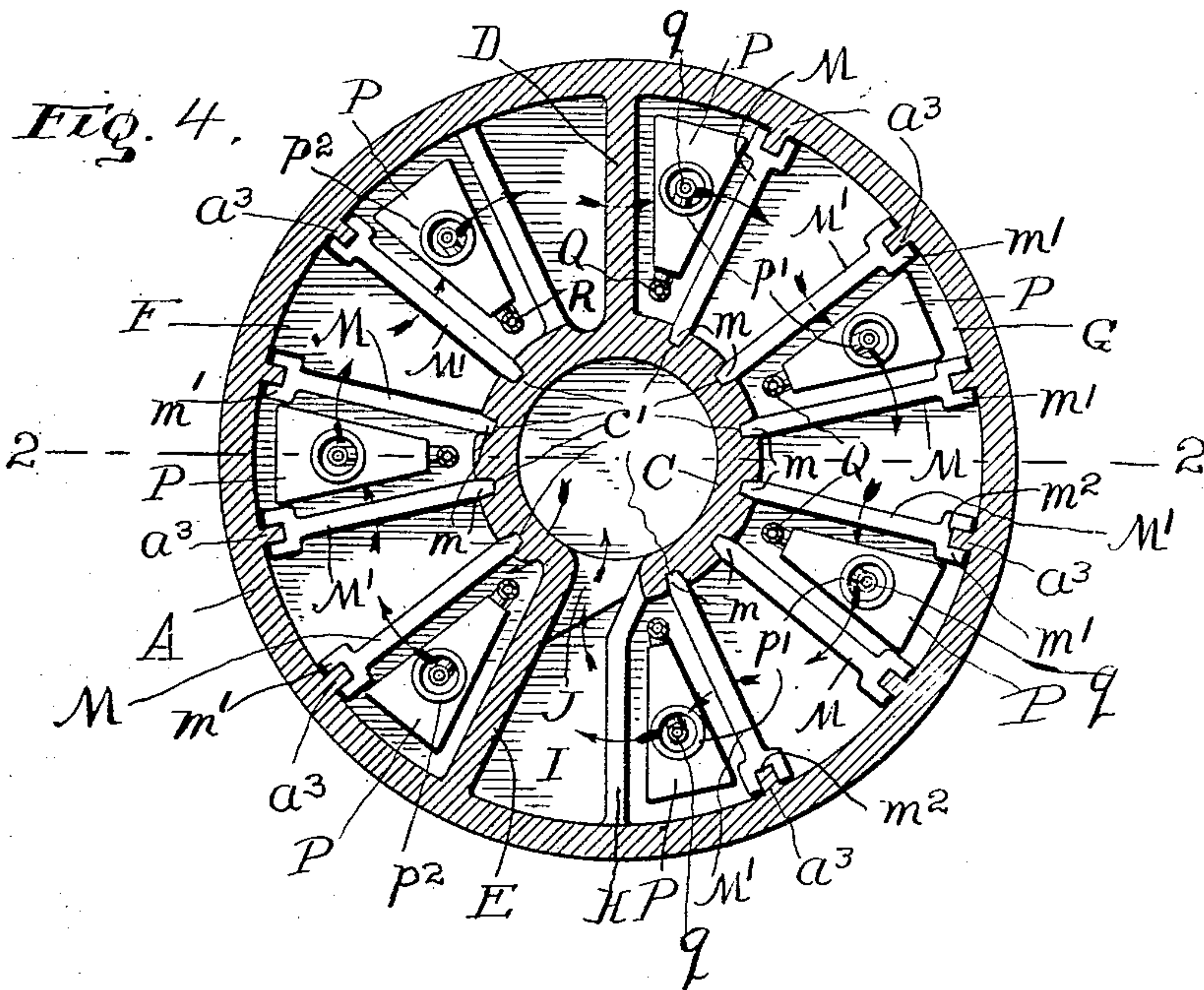
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4 Sheets—Sheet 4.



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UNITED STATES PATENT OFFICE.

FRANK B. FELT, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO
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RETORT FOR GENERATING OXYGEN.

SPECIFICATION forming part of Letters Patent No. 702,855, dated June 17, 1902.

Application filed November 6, 1901. Serial No. 81,281. (No model.)

To all whom it may concern:

Be it known that I, FRANK B. FELT, a citizen of the United States of America, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Gas-Generating Retorts, of which the following is a specification.

My invention relates to certain improvements in gas-generating retorts primarily designed for the production of oxygen from air and steam by means of a suitable liquid successively and continuously oxidized by means of the air and deoxidized by means of the steam, so that the same liquid is used over and over again and without intermission.

The purpose of the invention is to provide a retort of convenient form, construction, and arrangement, so that it may be readily adapted to the various requirements of the uses to which it is to be put and may at the same time be cheap and durable, so as to be well adapted to commercial use.

It is also my purpose to provide in the retort means for handling the liquid in such a way as to obtain better results therefrom both as to capacity and as to the purity of the product.

To these and other minor ends the invention consists in certain novel characteristics possessed by the preferred form of apparatus, which will be hereinafter described, said characteristics being clearly defined in the claims appended hereto.

The preferred construction is illustrated in the drawings, of which—

Figure 1 is a sectional perspective showing the interior of the retort and certain of the various chambers and partitions therein. Fig. 2 is a vertical diametrical section in plane 2 2 of Fig. 4. Fig. 3 is a similar section in plane 3 3 of Fig. 5. Fig. 4 is a horizontal section looking downward, taken in the plane 4 4 of Fig. 3; and Fig. 5 is a horizontal section taken in the plane 5 5 of Fig. 3.

Referring to these drawings, A represents a cylindrical vessel provided with a bottom a and a horizontal flange a' at the top, perforated at a^2 to provide means for bolting a cover thereupon. Said cover is shown in Fig. 2 at B and the bolts by means of which it is secured at b' . The retort, as shown, is pro-

vided with permanent partitions C D E, the partition C being preferably cylindrical in form and centrally disposed in the retort and the partitions D E extending from the central cylindrical partition upon opposite sides to the sides of the retort. These various partitions are provided with perforations $c d e$, to which the cover may also be bolted to inclose tightly the chamber F, in which the gas which is to be generated is produced. A number of openings f' above the opposite chamber G provide free access between the same and the atmosphere, so as to permit of the escape of nitrogen liberated in this chamber, as will be seen hereinafter. An opening b^2 into the central chamber provided with a cap b^3 affords means of access to said central chamber and is used principally to add from time to time such quantities of the liquid as may be needed.

A short preferably permanent partition H separates a portion I of the chamber G from the remainder, which portion is connected with the central chamber by an opening J, extending somewhat below the top of the partition H and of sufficient length to provide free communication between the upper portion of the central chamber and the chamber G. Said central chamber is also connected at the bottom by means of an opening K near the partition E with the chamber F, and the lower part of the partition D is omitted, as seen at d' , Figs. 3 and 5, so as to provide at this point an opening X directly from the chamber F to the chamber G.

The inner side of the cylindrical wall A is provided with a series of perpendicular ribs a^3 , preferably at substantially equal distances from each other, and the opposite outer wall of the partition C is provided with a corresponding series of grooves c' . A series of removable partitions M M' have one edge m fitted to the groove c' and the opposite edge m' , which is preferably widened for the purpose, provided with a groove m^2 , fitted to the ribs a^3 . These partitions are of two kinds, the partitions M being continuous from top to bottom and the bottom portions of the partitions M' being omitted, so as to afford access between the compartments upon opposite sides of said partitions. The partitions

M' are also preferably provided at the top with deflectors N, curved toward the adjacent partitions, so as to guide the liquid in its passage from one to the other.

5 In the chamber F, intermediate between the tops of the partitions M M' and the top of the retort, is a preferably flat horizontal plate O, the outer portion of the chamber to check the upward flow of the liquid when the same is subjected to violent agitation. In the bot-
10 tom of each alternate compartment of the outer chambers is a box P, the edges of which contain perforations p and in the top of which is fitted a pipe p' p^2 , the pipes p^2 being
15 preferably longer than the pipes p' for the purpose referred to later. Extending downward through the cover and entering each one of these boxes in the chamber G is a smaller air-pipe Q, the end of which is turned
20 upward at q , so as to discharge upwardly into the pipe p' . Similar pipes R for the admission of steam extend downward through the cover, enter the boxes in the chamber F, and terminate in an upward direction in the pipe
25 p^2 . A boss S in the cover is intended for the connection of a pipe through which the generated gas may be carried wherever desired.

In the operation of the apparatus above described the lower portion of the retort is
30 filled with a suitable liquid, as manganate of soda, to a height less than that of the partitions M M' and greater than that of the bottom of the opening J. In practice there is more or less opening around the edges of the
35 partitions M M', so that the manganate tends to maintain the same height throughout the entire retort. If the joints between the partitions and the retort should be too close to permit of the desired equalization, openings
40 may be provided through the partitions to admit of the limited flow from one compartment to another. After the manganate occupies the various compartments to the desired height air is turned into the air-
45 pipes and steam into the steam-pipes, preferably with sufficient pressure to cause a more or less violent agitation of the liquid. Both air and steam pipes act on the principle of injectors, sucking the liquid into the boxes
50 P through the openings in the sides thereof and ejecting it forcibly from the upper ends of the tubes p' p^2 . The agitation of the liquid in the compartments of the chamber G by means of the various air-currents passing
55 upward through the same thoroughly oxidizes the manganate and at the same time advances it from chamber to chamber over the intervening partitions, so that it is repeatedly subjected to the air-currents and agitated thereby. The deflectors N on the tops
60 of the partitions direct the rising liquid forward from each compartment to the next succeeding compartment. After the manganate has passed through all of the active compart-
65 ments in the chamber G it reaches the compartment I and from said compartment overflows through the opening J into the central

chamber. The compartment I acts as a settling-chamber and the central chamber as a reservoir adapted to contain a sufficient quantity
70 of manganate to insure a continual supply for the deoxidizing operation. Said chamber also gives an opportunity for all of the air held in suspension by the manganate to rise and escape therefrom prior to the com-
75 mencement of the deoxidation. By the combination of the settling-chamber I and the central reservoir-chamber the manganate is completely freed of all sediment or impurities which settle in the compartment I and
80 also of all air, which if carried forward into the deoxidizing-chamber would render the product of the apparatus impure. The manganate passes from the central chamber through the opening K into the first com-
85 partment of the deoxidizing-chamber and is sucked in by the steam and thrown violently upward in the tube p^2 . The thorough mingling of the steam and manganate deoxidizes the latter, and as the liquid is ejected from
90 the top of the tube the free oxygen escapes upward into the chamber F, while the manganate passes onward to the next compartment to undergo a repetition of the operation, and so on until the last compartment of
95 the chamber F is reached, when the deoxidation is supposed to be complete and the manganate passes through the opening X into the chamber G to undergo a repetition of the oxidizing process.
100

While I recognize the possibility of great variation in the exact construction of the retort described, yet I consider the form here shown as greatly preferable and as possessing many advantages over others known to
105 me at the present time.

I claim as new and desire to secure by Letters Patent—

1. In a retort of the class described, the combination with the outer wall, of parti-
110 tions forming oxidizing and deoxidizing chambers, a series of compartments in each chamber opening alternately near top and bottom, into the next succeeding compartments, a settling-compartment into which the
115 last oxidizing-compartment opens at the top, a supply-chamber having an overflow-opening from the settling-chamber and opening near the bottom into the first deoxidizing-compartment, an opening near the bottom of
120 the last deoxidizing-compartment into the first oxidizing-compartment, a series of air-pipes in the oxidizing-chamber, a series of steam-pipes in the deoxidizing-chamber, said pipes terminating in an upward direction in
125 the lower portions of the compartments which open near the top into the next succeeding compartments, and the oxidizing and deoxidizing chambers being provided respectively with means for the escape of the nitrogen and
130 the withdrawal of the oxygen; substantially as described.

2. In a retort of the class described, the combination with the outer walls, of a cen-

tral hollow partition and partitions extending therefrom to the outer walls, suitable guides on the hollow partition and the outer walls, removable sliding partitions fitted to
5 said guides, and suitable oxidizing and deoxidizing apparatus located in the respective chambers between the said partition and the outer walls; substantially as described.

3. In a retort of the class described, the
10 combination with a hollow cylindrical partition and partitions radiating therefrom to divide the retort into oxidizing and deoxidizing chambers, said cylindrical partition being provided with openings above and below,
15 opening respectively into the oxidizing and deoxidizing chambers, of a series of radial partitions extending from the cylindrical partition to the outer wall, the alternate radial partitions terminating respectively short
20 of the top and bottom of the retort, and suitable oxidizing and deoxidizing apparatus located in the respective chambers and adapted to maintain a continuous circulation around the retort, substantially as described.

25 4. The combination with the cylindrical vessel, A, adapted for the purpose described, of the partitions, C, D, E, dividing the retort into an oxidizing and deoxidizing and a supply chamber, the latter of which opens above
30 the bottom into the oxidizing-chamber and near the bottom into the deoxidizing-chamber, the partitions, M, terminating above and the partitions, M', open below the liquid-level, the deflectors, N, secured to the partitions, M', and suitable apparatus in the alternate compartments, formed by the partitions, M, M', adapted to effect the alternate
35 oxidation and deoxidation of a suitable liquid and also to keep the same in continual circulation through the various compartments; substantially as described.

5. In a retort of the class described, the combination with the cylindrical vessel, A, and the partitions, C, D, E, therein, of the
45 short permanent partition, H, the partition, C, having the opening, J, between the partitions, E, H, and terminating below the top of the latter, the radial partitions, M, M', open alternately at the bottom, and means
50 for successively oxidizing and deoxidizing a suitable liquid and at the same time passing it continuously around the retort; substantially as described.

6. In a retort of the class described, the
55 combination with an outer wall, of a cylindrical partition forming a cylindrical central

supply-chamber, radial partitions extending from said cylindrical partition to the outer walls of the retort, and dividing the remainder of the retort into an oxidizing and a de- 60 oxidizing chamber, said oxidizing and deoxidizing chambers being crossed by various partitions extending part way up, said partitions being so arranged that the chambers formed by them open, one into another, alter- 65 nately at the top and bottom, the alternate chambers being provided with injectors, those in the oxidizing-chamber being air-injectors, and those in the deoxidizing-chamber being steam-injectors, the alternate ones of said 70 short partitions being provided with deflectors so arranged that the liquid which is turned upward by the injector will be turned into the next compartment, suitable means of communication from the oxidizing-cham- 75 ber to the central supply-chamber, from the central supply-chamber to the deoxidizing-chamber, and from the deoxidizing-chamber to the oxidizing-chamber; substantially as described. 80

7. In a retort of the class described, the combination with an outer wall, of a cylindrical partition forming a central supply-chamber, with radial partitions extending from said cylindrical partition to the walls 85 of the retort and dividing the remainder of the retort into an oxidizing and a deoxidizing chamber, said oxidizing and deoxidizing chambers being crossed by various partitions extending part way up, said partitions being 90 so arranged that the chambers formed by them open, one into another, alternately at the top and bottom, the last chamber of the oxidizing series opening at the top into the central supply-chamber, also at the top into 95 the next oxidizing-chamber, said last chamber being adapted to serve as a settling-chamber for the liquid, suitable means of communication from the central supply-chamber to the lower part of the deoxidizing-chamber 100 and from the last chamber of the deoxidizing series to the first chamber of the oxidizing series; substantially as described.

In witness whereof I have hereunto set my hand, at Chicago, in the county of Cook and 105 State of Illinois, this 12th day of October, A. D. 1901.

FRANK B. FELT.

Witnesses:

CHAS. O. SHERVEY,
S. BLISS.