

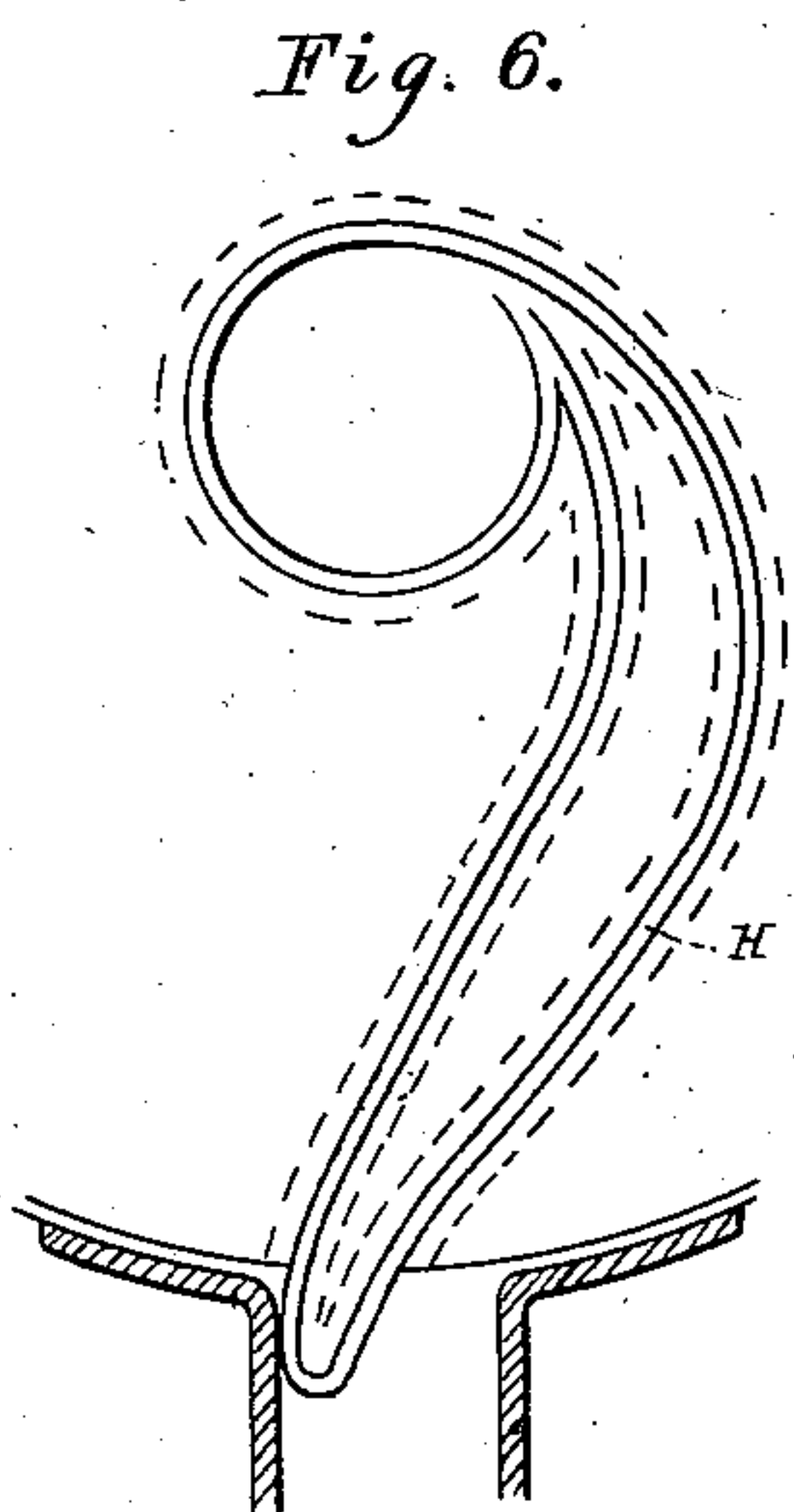
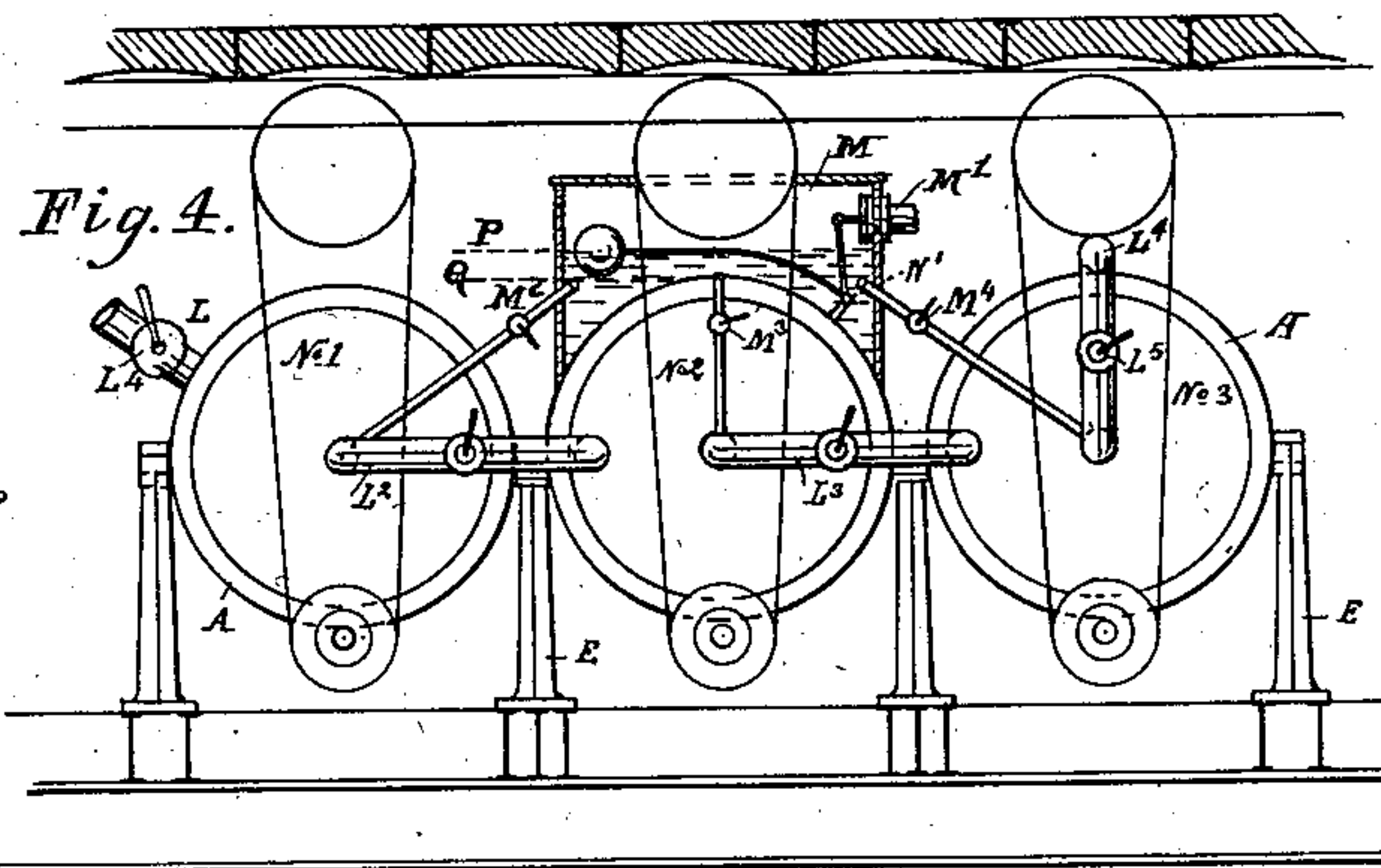
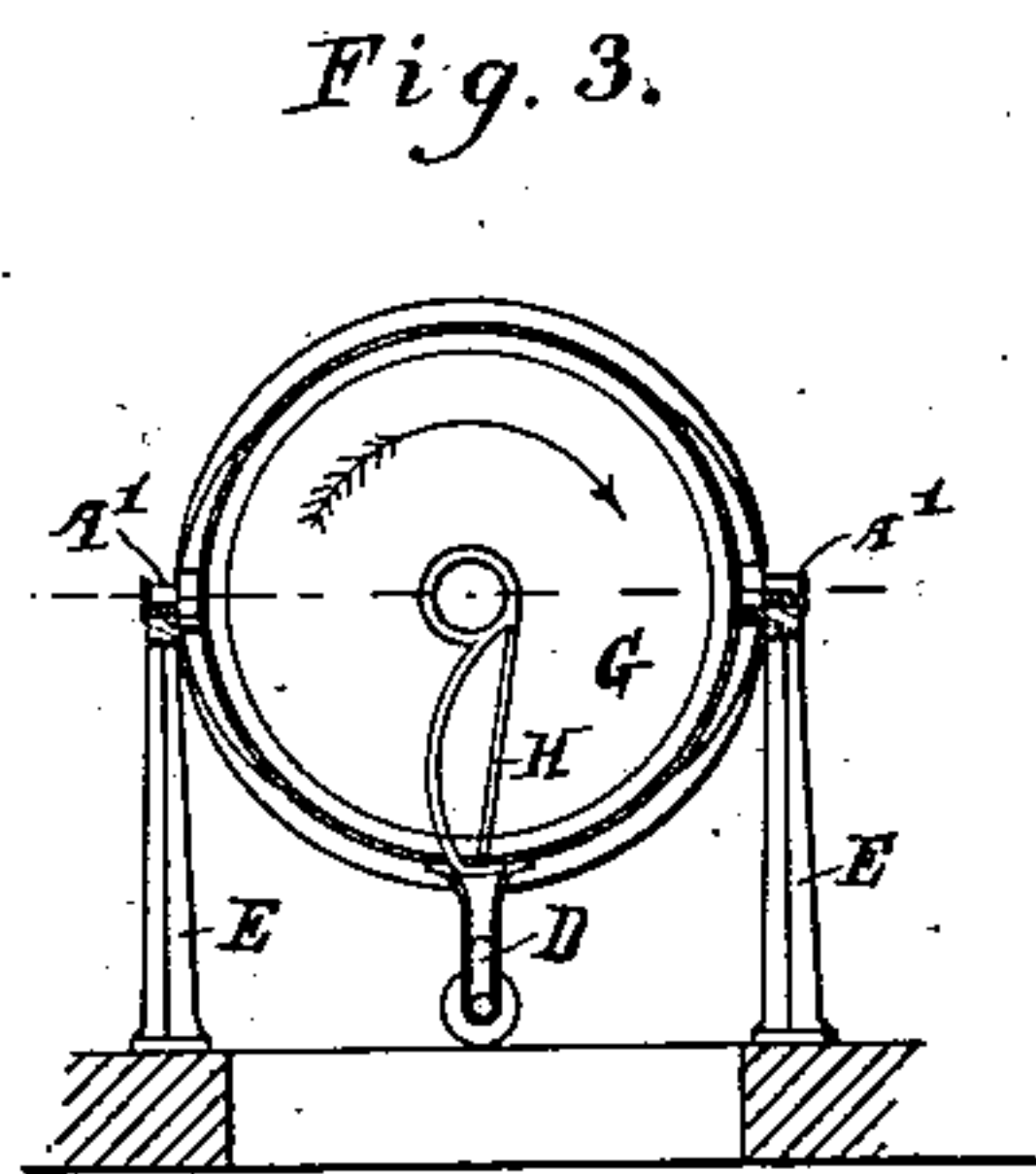
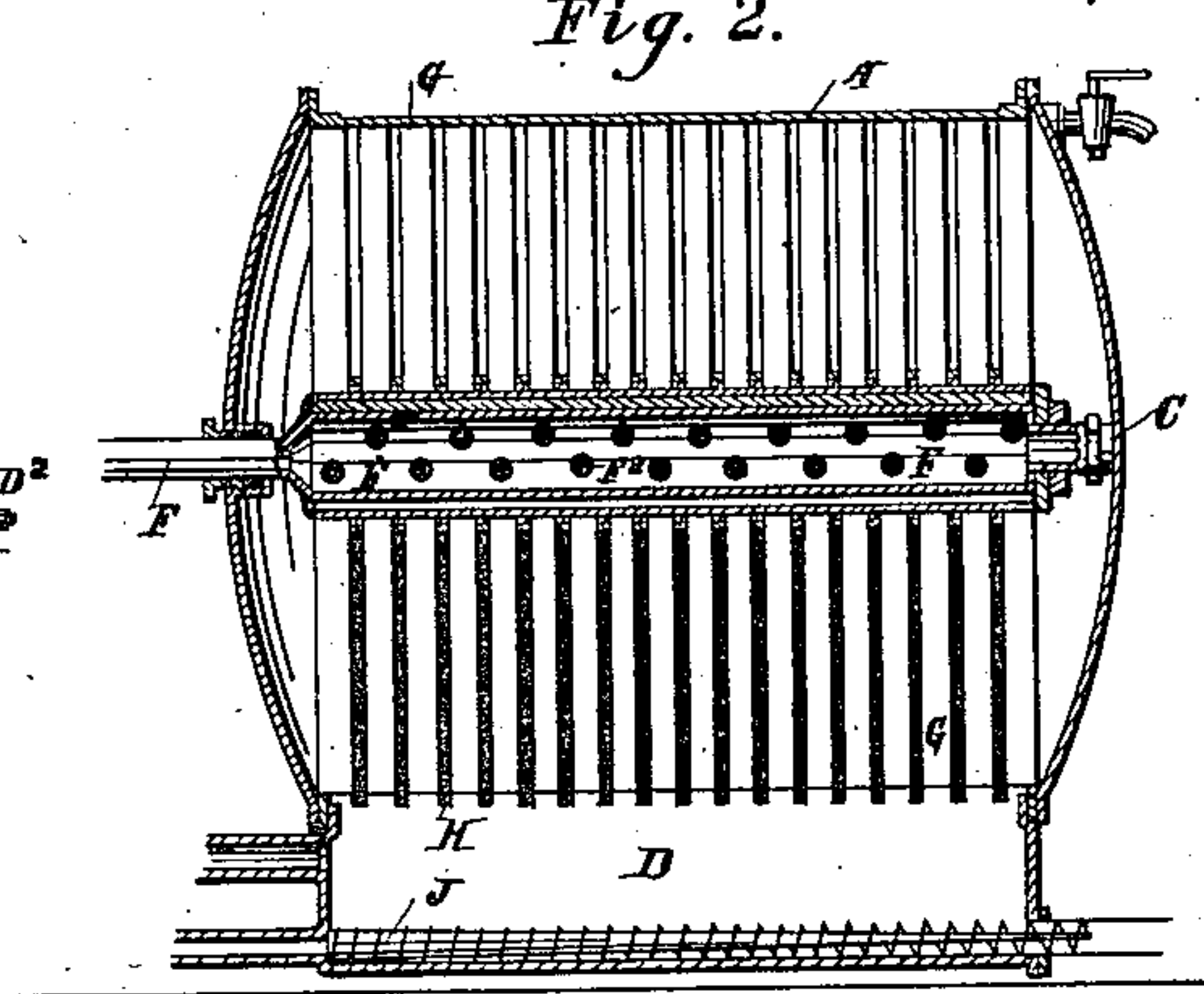
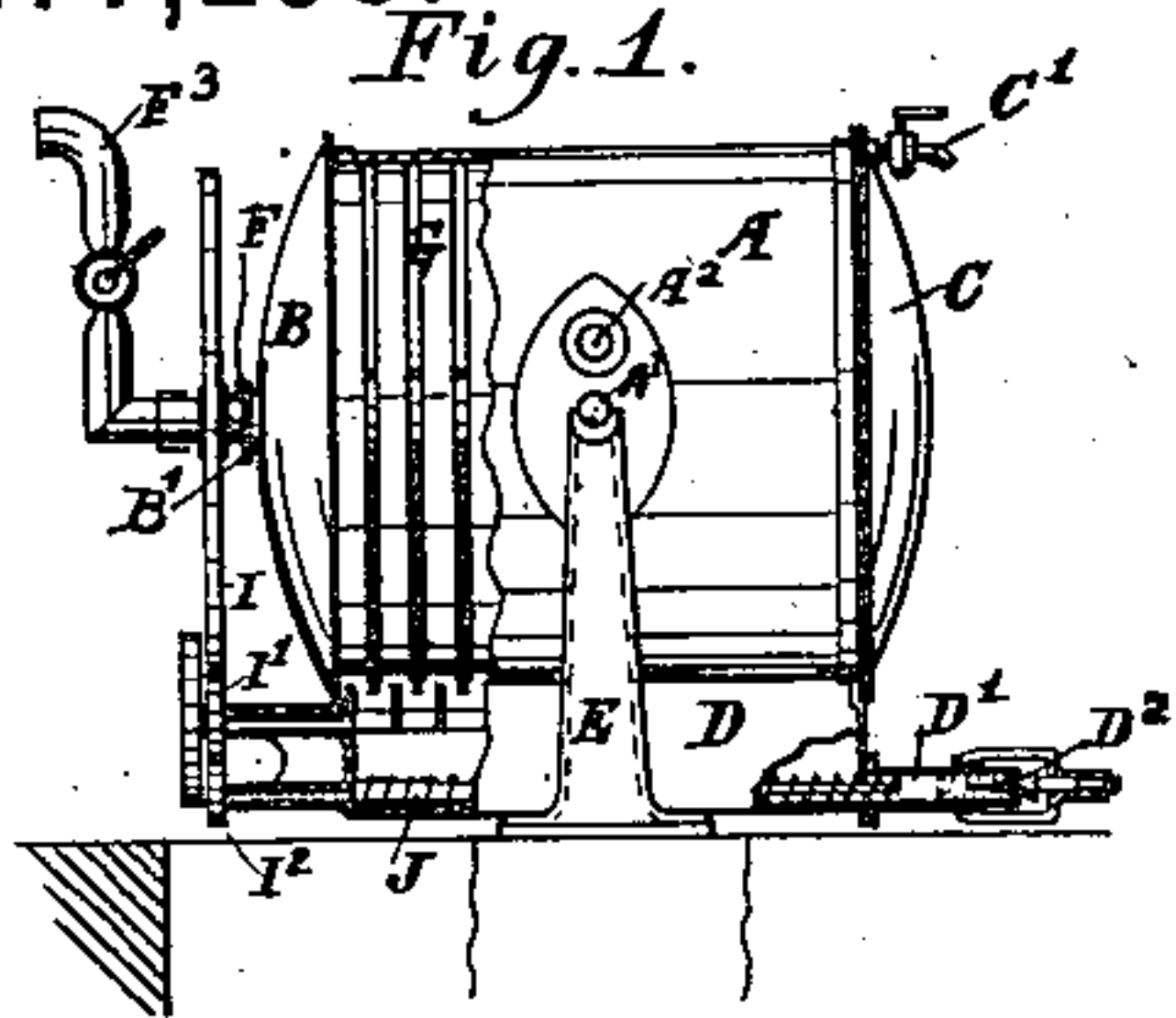
(No Model.)

3 Sheets—Sheet 1.

C. E. WINTERROS.
FILTER.

No. 477,238.

Patented June 21, 1892.



WITNESSES:

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Oliver Bretherton

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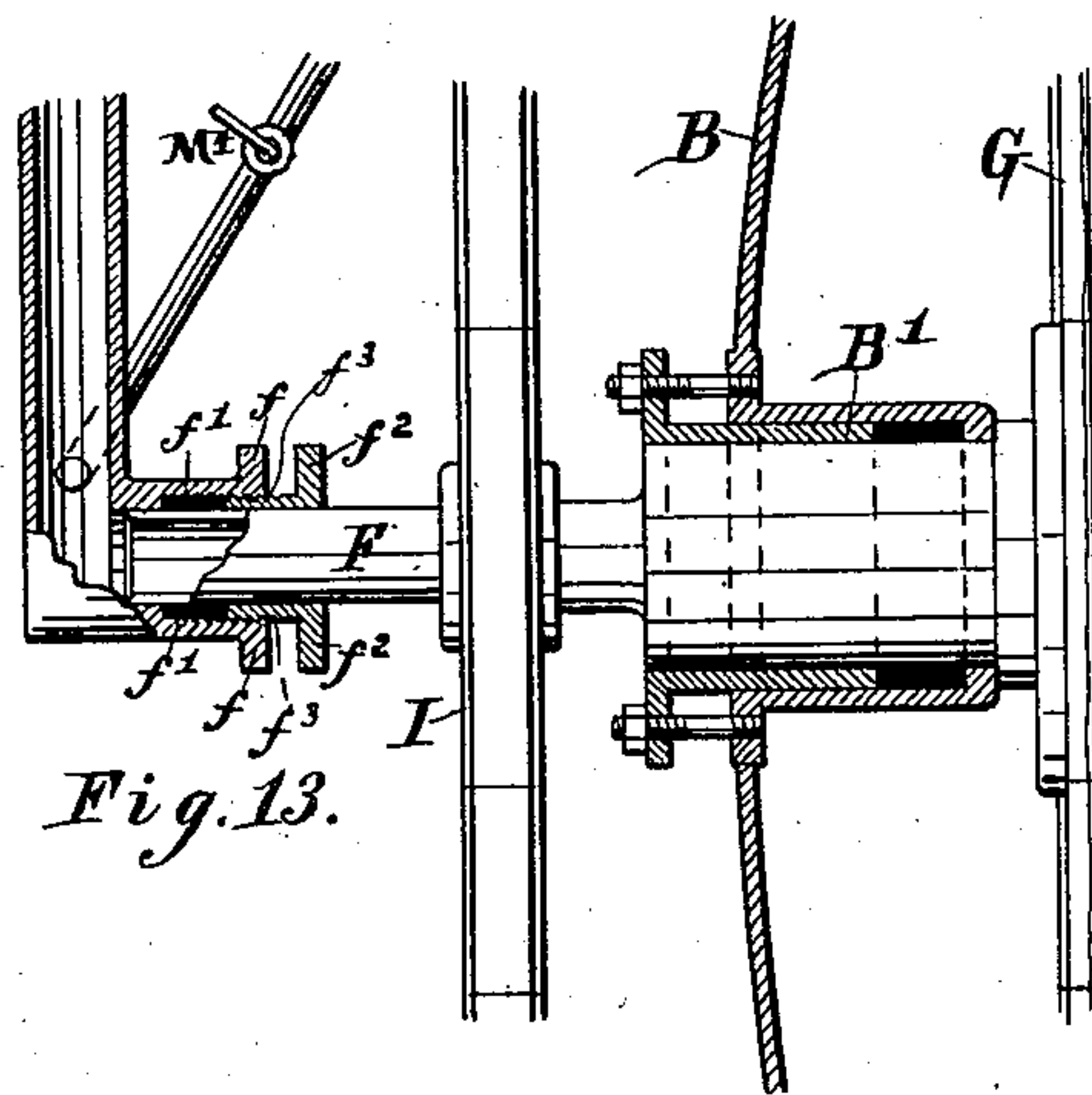
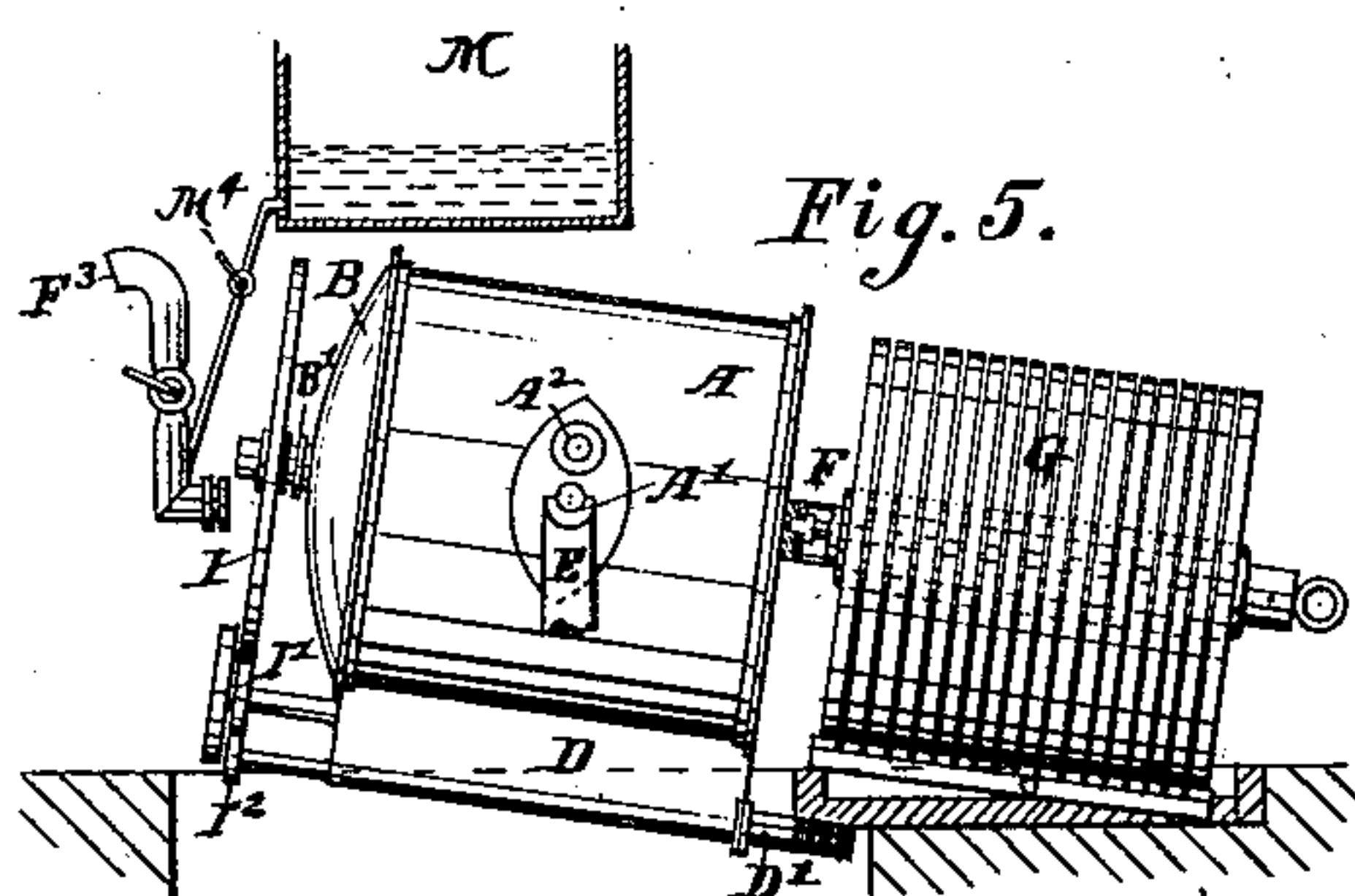
(No Model.)

3 Sheets—Sheet 2.

C. E. WINTERROS.
FILTER.

No. 477,238.

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(No Model.)

3 Sheets—Sheet 3.

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Fig. 7.

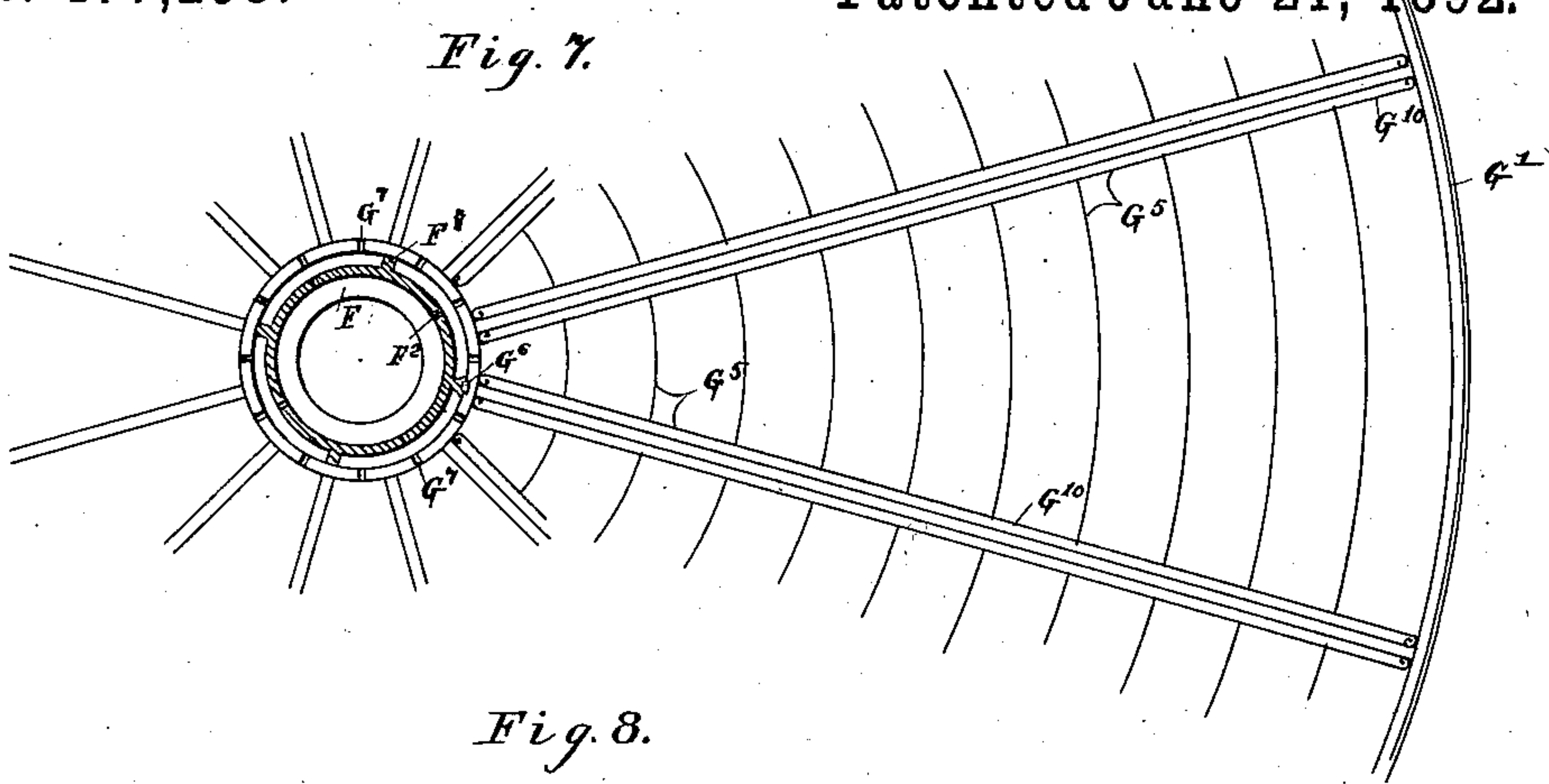


Fig. 8.

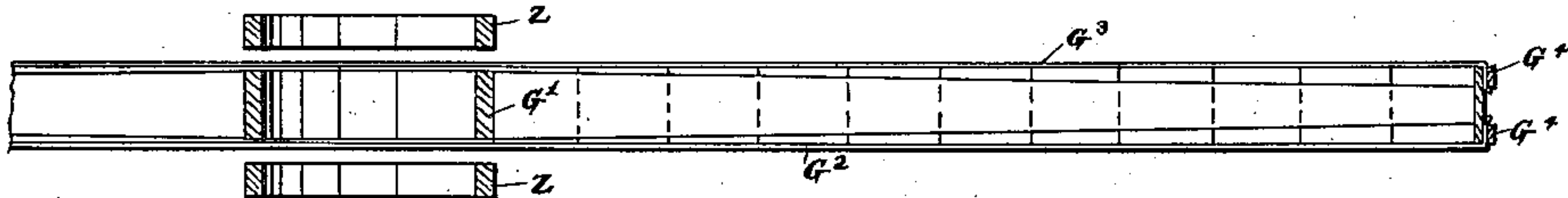


Fig. 9.

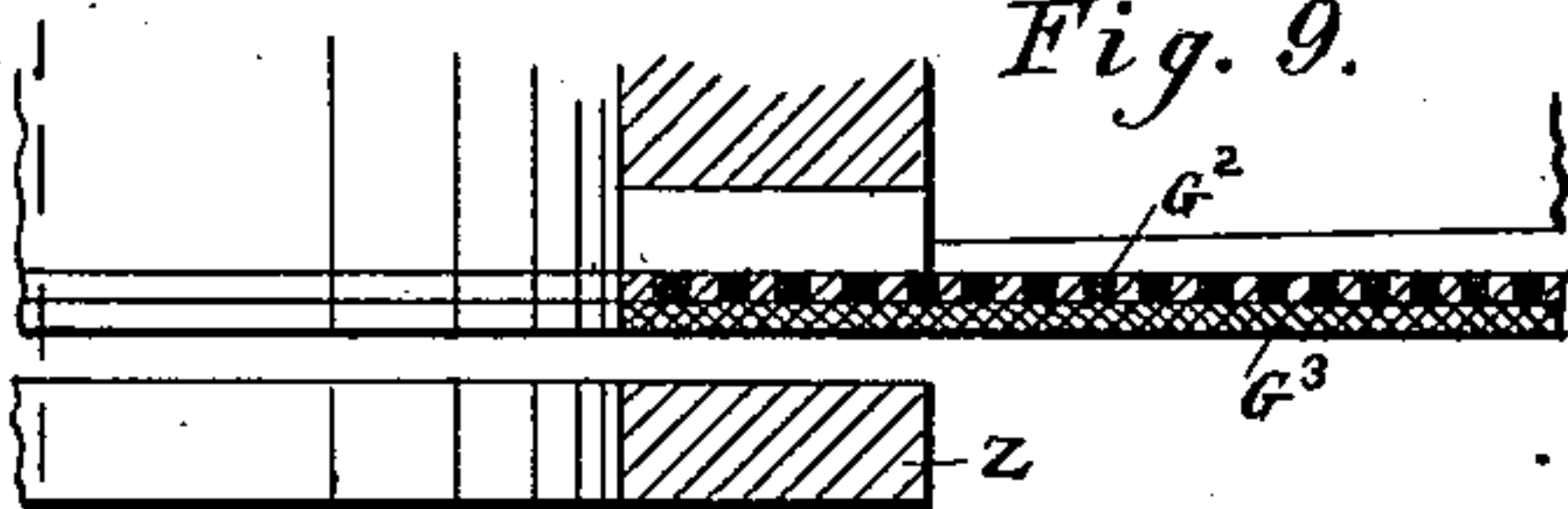


Fig. 10.

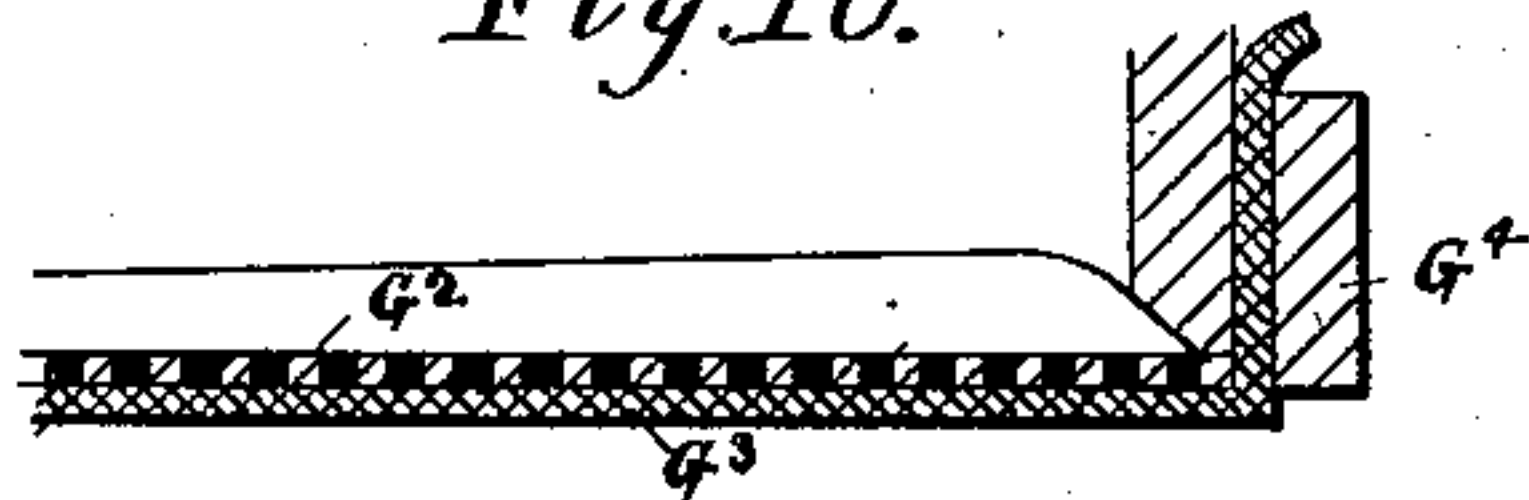


Fig. 11.

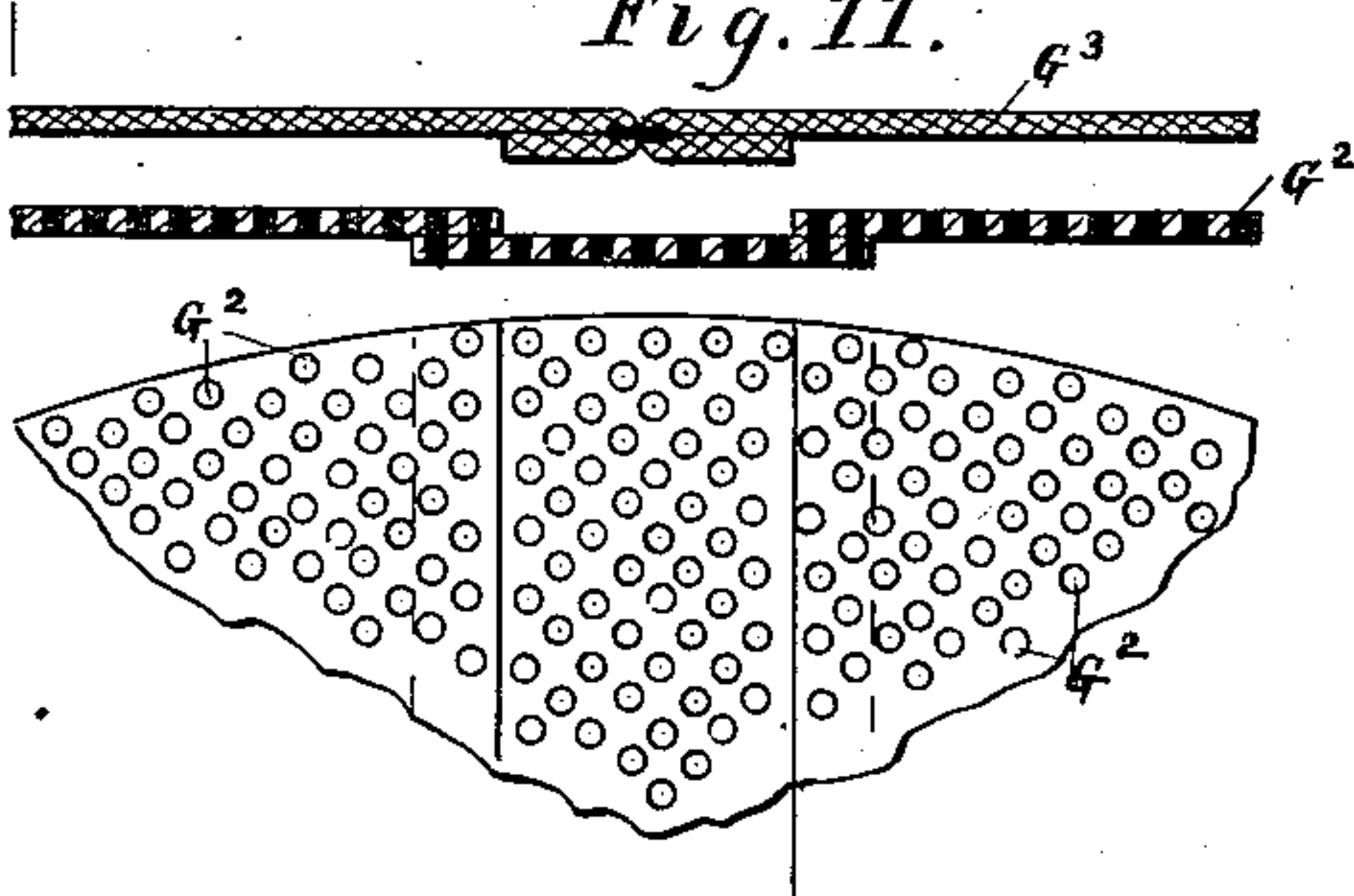
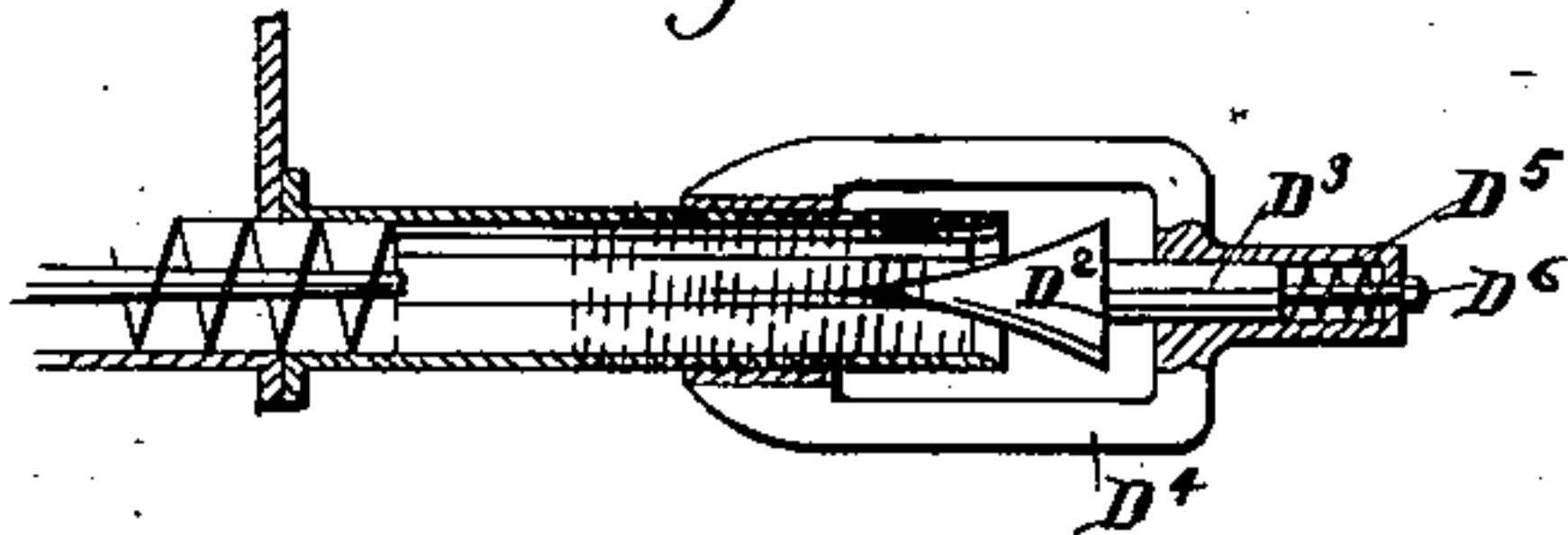


Fig. 12.



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UNITED STATES PATENT OFFICE.

CLAES ERIC WINTERROS, OF BROOKLYN, NEW YORK.

FILTER.

SPECIFICATION forming part of Letters Patent No. 477,238, dated June 21, 1892.

Application filed May 5, 1891. Serial No. 391,617. (No model.)

To all whom it may concern:

Be it known that I, CLAES ERIC WINTERROS, a citizen of the United States, residing at Brooklyn, county of Kings, State of New York, have invented a new and useful Improvement in Filters, of which the following is a full and true description, enabling others skilled in the art to which it pertains to make the same.

My invention relates to filters, and more especially to such filters as are used in sugar-filtering.

It consists in a continuously operating and rotating device, more specifically described and illustrated in the accompanying specification and drawings, in which like letters refer to like parts in each.

Figure 1 is a side view of the filter. Fig. 2 is a section of the same. Fig. 3 is a vertical section showing conveyer-screw. Fig. 4 is a battery of three filters. Fig. 5 is a view showing filter dismounted. Fig. 6 is a view of cleaner, showing in dotted lines the filter-cloth when bulged. Fig. 7 is a front view in section of filter-pan, skeleton, and central tube. Fig. 8 is a cross-section of filter-pan. Fig. 9 is parts of pan, enlarged, in sections. Figs. 10 and 11 are also enlarged sections of parts of filter-pan. Fig. 12 is the outlet refuse-valve, part section. Fig. 13 is a section of the stuffing-boxes on B and F.

A is a cylinder, Figs. 1 and 3, covered on both ends by the covers B and C. This cylinder is on each side provided with a trunnion A'. The under part of A has an opening, and round that opening is fastened a receiver D for the refuse. The apparatus is mounted on the two trunnions A' on two stands E. The cover B has a round opening in its center, through which passes one end of the central tube F, Fig. 1. The other end of that tube is lodged in a circular opening in the cover C. On that central tube is placed a number of filtering-pans G, Figs. 1 and 3, strongly pressed together by nut and washer on the end of central tube, which is lodged in cover C, Fig. 2. Between each pan on central tube is placed a ring, so as to leave a space for a cleaner II to hang loosely between each pan on central tube, Figs. 3 and 6. In cover B is formed a stuffing-box B' round the central tube F. This is best shown in

Fig. 13. In this figure it will be seen that the outer end of the revolving central tube F is lodged in a stuffing-box formed on the discharge-upright F³. The tube, being smaller than F³, passes freely inside of it, and a thimble F², which threads in an enlargement f³ of F³, is screwed against the packing f'. The flange f and the thimble f² come as nearly as possible together and make a tight joint. The pipe M⁴, leading from the tank M, through which the liquor for cleansing the filter-pans passes into the central tube F, is shown in Fig. 5 and also in Fig. 13. Its discharge is located on the upright pipe F³. When the cock on this pipe F³ is closed and the cock M⁴ is open, the liquor passes by gravity through the tube F and into the pans and out through the holes of the metal and through the cloth covers of the filter-pans into the cylinder A, thus reversing the process of filtering in the cleansing process, as described farther on. Near to this stuffing-box on the central tube is placed a toothed wheel I. To that wheel is geared another smaller toothed wheel I', and that one in its turn is geared to a third one I², placed on the end of a conveyer-screw J in the bottom of receiver D, Figs. 1 and 5. These wheels can be turned by means of a belt or otherwise, and the central tube, with its pans G and the conveyer J, consequently turned simultaneously.

Each filter-pan is constructed in the following manner: The interior body is a skeleton in the shape of a wheel G', Fig. 7—a central ring-shaped body or hub from which extends a number of arms ending in its ring-shaped periphery, Figs. 7 and 8. On each side of this frame is placed a perforated disk of sheet metal G², Figs. 8, 9, and 10. This disk is exactly as large in diameter as the frame, and it has an opening in its center as large as the inside diameter of the center of the frame, or, which is the same, as large as the outside diameter of the central tube F. Each of these perforated disks is covered with filter-cloth G³. That cloth has an opening in its center equal to that of the perforated disks; but its outside diameter is somewhat larger, so as to admit of its being folded over the outside periphery of the pan, as shown in Figs. 8 and 10. A hoop G⁴ is now passed over that folded part of the cloth in such a way as to firmly

hold the perforated disk, with its covering, in position. In each opening between the arms of the frame G' and between the two perforated disks is placed a supporting-frame of thin plate G^5 , Fig. 7. That frame consists of two side bars g^{10} , running parallel with arms in the main frame, and between these side bars are placed a number of cross-bars at a distance from each other equal to that at which the perforated plate can support the appropriated pressure. These bars are of the same width as the thickness of the supporting-frame G' in its center and periphery. In Fig. 7 the whole is shown placed on the central tube F . That tube is of a larger diameter in that part on which the filter-pans are placed. At the whole length of that part run ribs F' , Fig. 7. One of these ribs has a thicker edge, which has a longitudinal groove. That groove has for its object to receive a key G^6 , adjusted one in each pan in the center part of G' , Fig. 7. By such means each pan is prevented from turning on the shaft or tube. The rings Z , Figs. 8 and 9, placed between each pan, as before said, on the central tube, has the same inside and outside diameter as the center part of the frame G' . The grooves G^7 on the central part of G' and the holes F^2 in the central tube, Fig. 7, are intended for the passage of the filtered liquid into the central tube from the pans G .

If now liquid to be filtered is let into the cylinder through the opening A^2 , Fig. 1, it will fill the cylinder, submerging the pans G . The pressure of the liquid resulting from difference of level or by being pumped causes it to pass through the filter-cloth and the perforated plates into the pans and, further, as before said, into the central tube F and is let out through the stationary pipe F^3 , Fig. 1. The lower end of that pipe is provided with a stuffing-box, which surrounds the end of central tube F . The upper end of the bent outlet is in level with the highest point of the liquid inside the cylinder. In that way, if the liquid were let in at A^2 without more pressure than just to raise it to the outlet F^3 , which is the same as to fill the apparatus, the inside pressure of the pans and the outside pressure would be balanced in every part of the filter-cloth-covered pans; but nothing would pass the outlet F^3 . That, being in level with the highest point of the liquid in the cylinder, will, as above explained, prevent any difference of pressure to occur on different parts of pans not lying on the same level. The central tube or shaft F and all the pans fastened to it and the conveyer-screw connected with the gearing are now caused to revolve. All the cleaners II , Figs. 3 and 6, being stationary and barely touching the sides of the filter-pans, will not permit more than a very thin layer of refuse to stick to the filter-cloth. The rest continually follows the sides of the cleaner II , partly by gravity and partly by a slight pressure caused by the velocity of the particles loosened from the revolving pans,

and falls down into the receiver D and settles in the bottom of D around the conveyer-screw J , by means of which it is slowly pressed out through the outlet-pipe D' . To regulate that pressure, so as cause the liquid to be squeezed out as much as possible from the refuse and retain the liquid in the apparatus, a conic valve D^2 is provided at the end of the tube D' , Figs. 1 and 12. This valve has a piston D^3 , lodged in the rear part of the frame D^4 , which here forms a cylinder. A spiral spring D^5 is placed behind the piston D^3 , against which it presses, so as to put the valve in motion, until it is checked by the nut D^6 . The farther end of the frame D^4 is shaped to a sleeve, the inside of which is provided with threads which fit to outside threads on the tube D^4 and by means of which the whole frame by turning can be advanced or retired, so as to close or open the valve D^2 . The spring D^5 helps to equalize the pressure against the passing refuse, which is forced out in ring-shaped form.

In order to produce a more complete filtering, the device may be arranged in batteries, and by passing the liquid to be filtered through a number of the filters, each one filtering the liquid more and more, a better result may be obtained. Fig. 4 shows an arrangement for three filters. The liquid is let in at L and passes through filter No. 1, and from No. 1 to No. 2 through the pipe L^2 , and soon until a satisfactory filtering is obtained.

In the event of the filter-cloth becoming stopped up with impurities, so as to prevent the liquid from running through, except under great pressure, a means is provided for cleansing them as follows: The upper part of cylinder No. 2 is provided with a tank M , which is continually filled with liquid. That tank is provided with a float N on one end of a lever. The lever is pivoted at N' . The other end is in connection with an inlet-valve M' , which is regulated by the float, so as to keep the liquid always at the same level. The inlet-valve L^4 and the outlet-valve L^5 are first closed, and the three cocks M^2 , M^3 , and M^4 are opened to allow the liquid to enter the filtering-pans through the central tube F . The three outlet-cocks C' (shown in Fig. 1) are opened, they being on a level with the top of the liquid in the cylinders and with the outlet L^4 —that is to say, with the line Q , Fig. 4. An inside or reverse pressure on the filter-cloth is now produced, which is caused by the different levels Q and P , Fig. 4, the difference in pressure being proportional to the difference in the liquid-levels between that of the tank M and the outlet C' . This pressure will cause the filter-cloth coverings of the perforated disks to bulge from the disks until they meet each other in the space between the pans, and as the pans revolve they will press against each other, except at the points where the cleaner II interposes. These cleaners being stationary, as the revolving filter-cloth passes them it will buckle on the edge of the cleaner, and thus scrape off the dirt from the

cloth with a pressure equal to that of the liquid behind the cloths, caused by the difference in liquid-levels Q and P. As the cloths are stretched, there will always be an opening 5 on both sides of each branch of the cleaner H, which form canals leading down to the receiver D. The edges of these canals are shown in dotted lines in Fig. 6. The peculiarity of this is that it causes the filter-cloth 10 to buckle and form moving curves or waves on each filter-cloth. This causes every foreign particle in the cloth to change position, and thus by the assistance of the pressure from the liquid on the inside forces out the 15 particles in the pores.

If the pans or any part of the filter should need repairing, they can be dismantled in the following manner: The cover C is unscrewed and taken away, as shown in Fig. 5. 20 The nut and washer, Fig. 2, holding the pans on the central tube are removed, leaving the pans free. A tube X, with the same diameter as the outside of ribs F', Fig. 7, on central tube, is strongly fastened to the end of central 25 tube by the long bolt R, which extends through the whole length of the tube X and has a handle R' for turning it. When this is done, the apparatus is put into an inclined position, as in Fig. 5, until the pans slide slowly with 30 their own gravity and stop against the sleeve X', which rests on a supporter S. If S is taken away, all the pans are now resting on the incline plane T, and that is balanced on the trunnions T'. The bolt R is then unscrewed and taken out, a bar is put through 35 the hole X², Fig. 5, so as to hold the pans in position on X, and the balance T, with the pans resting on it, is turned into a horizontal position. The whole system of pans now being 40 in level with the floor can be rolled away for repairing.

The filter, as described and shown, has a special feature about it which gives it a distinction from the one for which an application 45 was filed in September, 1890, by me, Serial No. 366,701. Its axis when working is preferably horizontal, though by means of the trunnions A' it may be put to work in an inclined position on the basis of the above. 50 I give this the name of a "horizontal filter."

I therefore claim—

1. The combination, in a horizontal filter, of a loosely-trunnioned cylindrical main chamber and an auxiliary refuse-chamber, the 55 main chamber having an opening in one end adapted to admit the passage of an axial tube and the auxiliary chamber having an opening on one end adapted to be used as a bearing for a carry-screw and on the other end a 60 valve-chamber with an opening for the discharge of refuse, as herein described and set forth.

2. The combination, in a horizontal filter having a trunnioned main chamber and an 65 under refuse-chamber terminating in a valve-chamber with an opening for the discharge of refuse regulated by a valve, of a central per-

forated axial tube passing through the main chamber and through a stuffing-box located on the end of the chamber, the said central 70 tube having horizontal ribs, upon which is keyed a series of grooved rings with radial arms, as herein described and set forth.

3. In a horizontal filter, the combination of a main chamber with an auxiliary chamber, 75 the auxiliary chamber having an opening on one end adapted to be a bearing for a refuse carry-screw and on the other end a valve-chamber with an opening controlled by a valve for the discharge of the refuse, the 80 main chamber having a ribbed and perforated central tube with a series of grooved annular rings keyed upon it, the rings having radial arms, and a series of concentric rings located between said arms, as herein described and 85 set forth.

4. In a horizontal filter, the combination, with the central tube, of foraminated disks thereon, each having a central opening for the 90 tube and grooves upon the surface, with filter-cloth upon said disks, having folded seams lying in said grooves, and the supporting-frame placed between each pair of said disks, substantially as described.

5. In a horizontal filter, the combination 95 of the central tube having a series of metallic grooved and foraminated disks thereon, with supporting-frames between each pair of said disks, upon which are placed in segments or entire circles filter-cloth the perimeter of 100 which extends beyond and is adapted to fold over the perimeter of the metal disks, and a binding-ring adapted to pass over the folded or extended cloth edge and firmly bind the same to the perimeter of the metal disks, as 105 herein described and set forth.

6. In a horizontal filter, in combination with a main chamber and an auxiliary refuse-chamber, the main chamber having a central 110 tube adapted to revolve, upon which is fixed a series of foraminated metal and cloth-covered disks, with a supporting-frame between each pair of said disks and an annular ring separating each pair of said disks, and a cleaning-fork H, loosely fixed upon it, the end 115 of the fork H extending into the refuse-chamber in which it is engaged and prevented from revolving with the central tube, as herein described and set forth.

7. In a horizontal filter having a main chamber 120 with a central perforated tube, upon which is placed a series of foraminated and cloth-covered metal disks, with an annular ring separating each pair, upon which is loosely hung a cleaning-fork, the combination of a 125 lower or refuse chamber and a carry-screw operating in said chamber, the discharge end of the screw entering into a valve-case containing a valve, the operation of which is controlled by a spring, as herein described and 130 set forth.

8. The combination, in a filter consisting of a main chamber and a refuse-chamber, the main chamber having a central perforated

5 tube, upon which is placed a series of fo-
raminated metal and cloth-covered disks, the
refuse-chamber containing a carry-screw, the
end of which enters into a valve-case con-
taining a valve, the opening of which is con-
trolled by a spring, and a supply-tank the
inlet-valve of which is regulated by a float,
and the outlet-pipe, controlled by a cock, is
connected with the central tube of the main
10 chamber and thence with the pans through
the perforations in the central tube, and
grooves in the center rings of the pans, as
and for the purpose herein shown and de-
scribed.

15 9. A horizontal rotating filter consisting of

a trunnioned cylindrical chamber with inlet
and outlet parts, having a central perforated
tube, upon which is strung a series of forami-
nated metal and cloth-covered filter-pans
which rotate with the central tube, and an 20
auxiliary refuse-chamber, in which is located
a carry-screw, which also rotates and enters
into and discharges in a valve-case contain-
ing a valve regulated in its operations by a
spring, as herein shown and described.

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Witnesses:

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