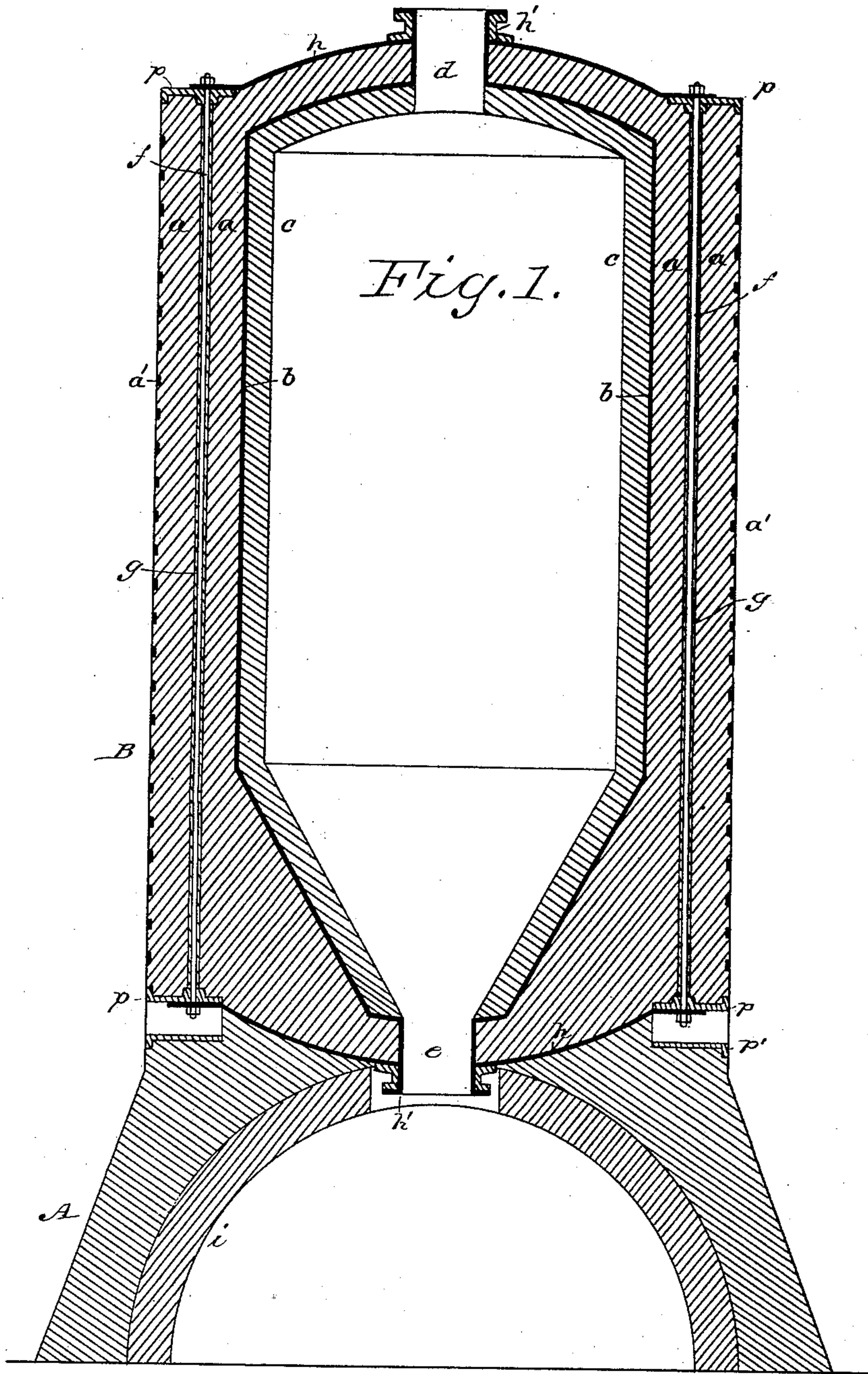


(No Model.)

3 Sheets—Sheet 1.

H. SCHNURMANN & G. CLOSS.
APPARATUS FOR MANUFACTURING SULPHITE CELLULOSE.
No. 360,484. Patented Apr. 5, 1887.



Witnesses

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(No Model.)

3 Sheets—Sheet 2.

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Fig. 2.

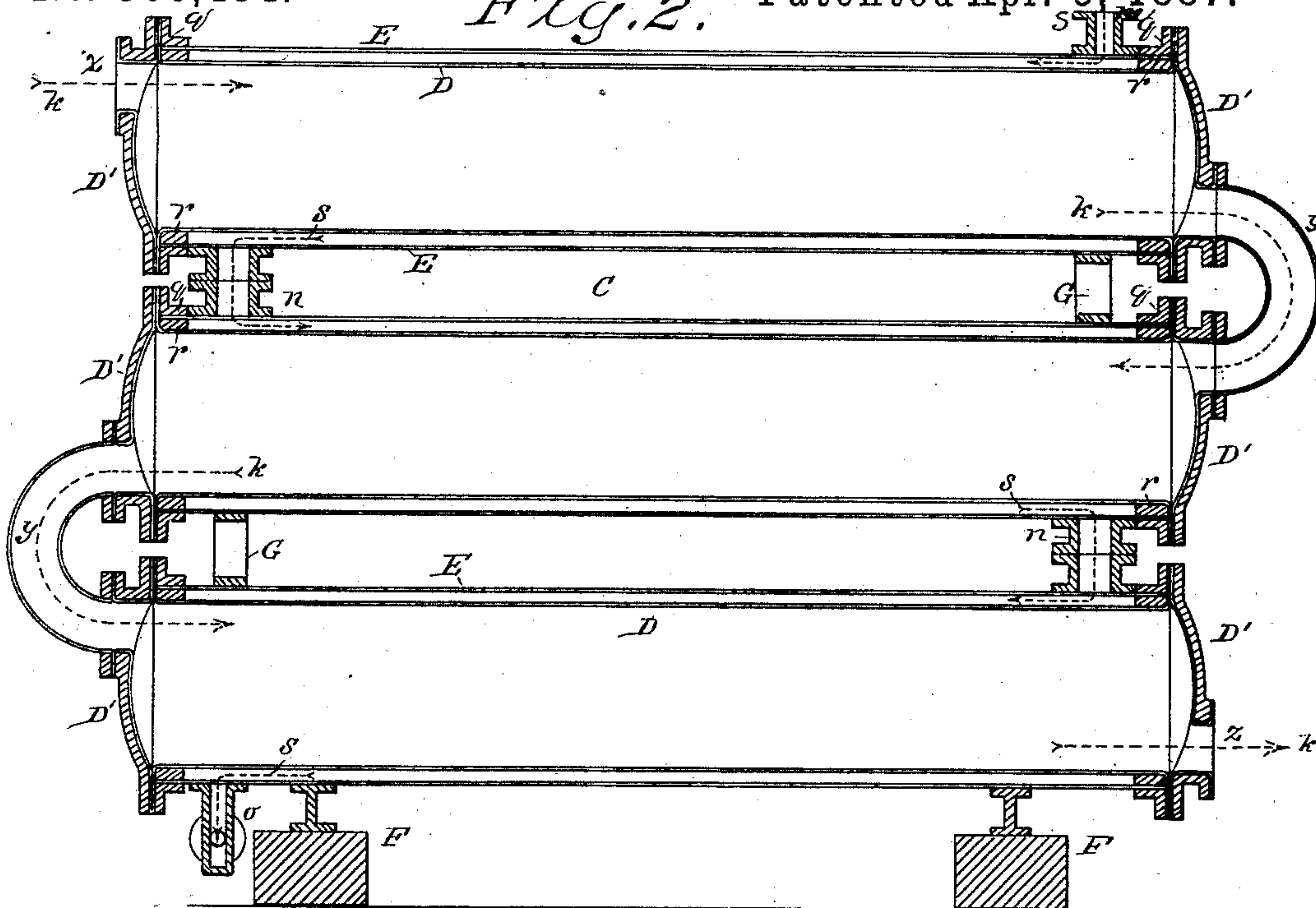


Fig. 3.

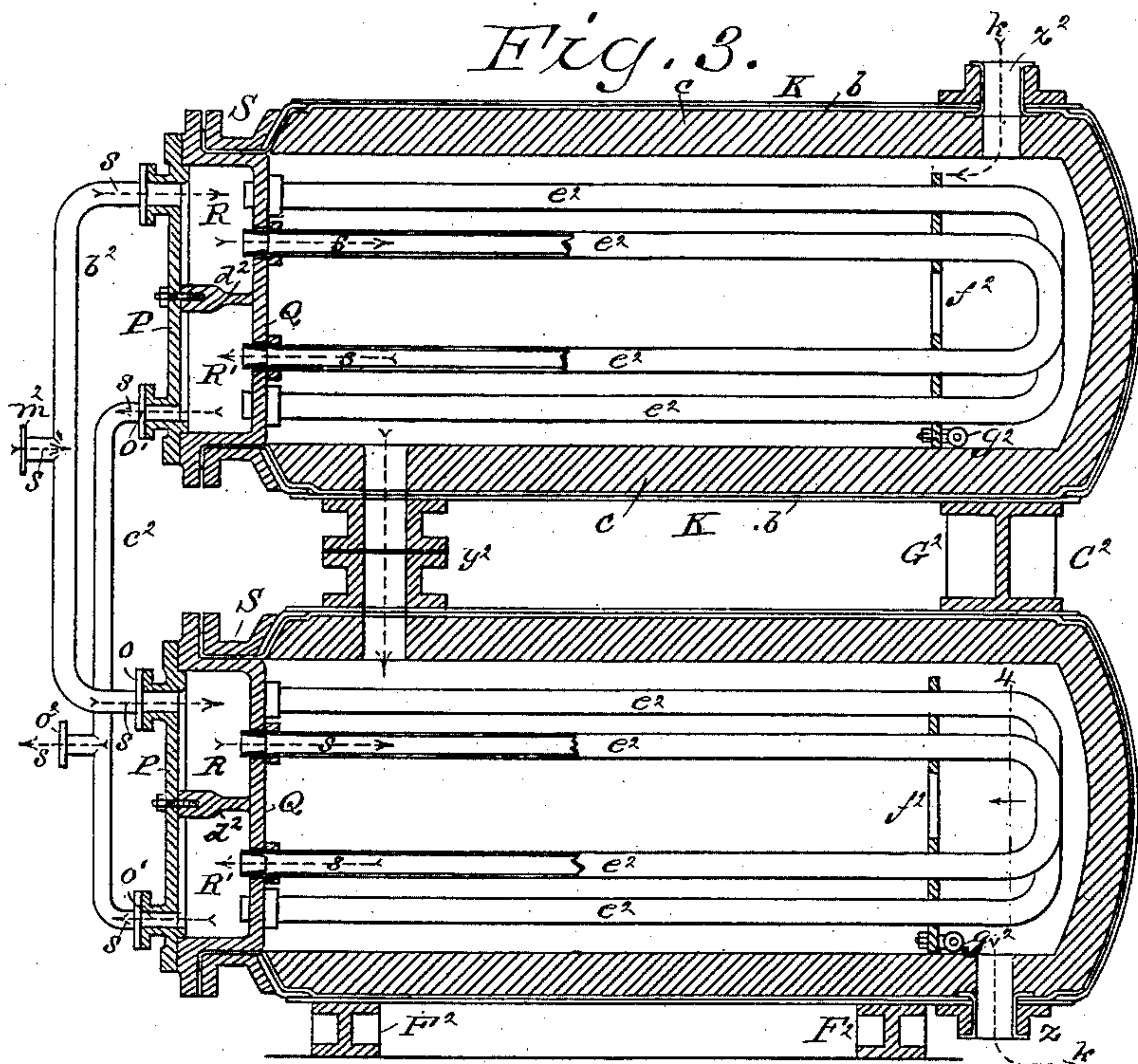


Fig. 5.

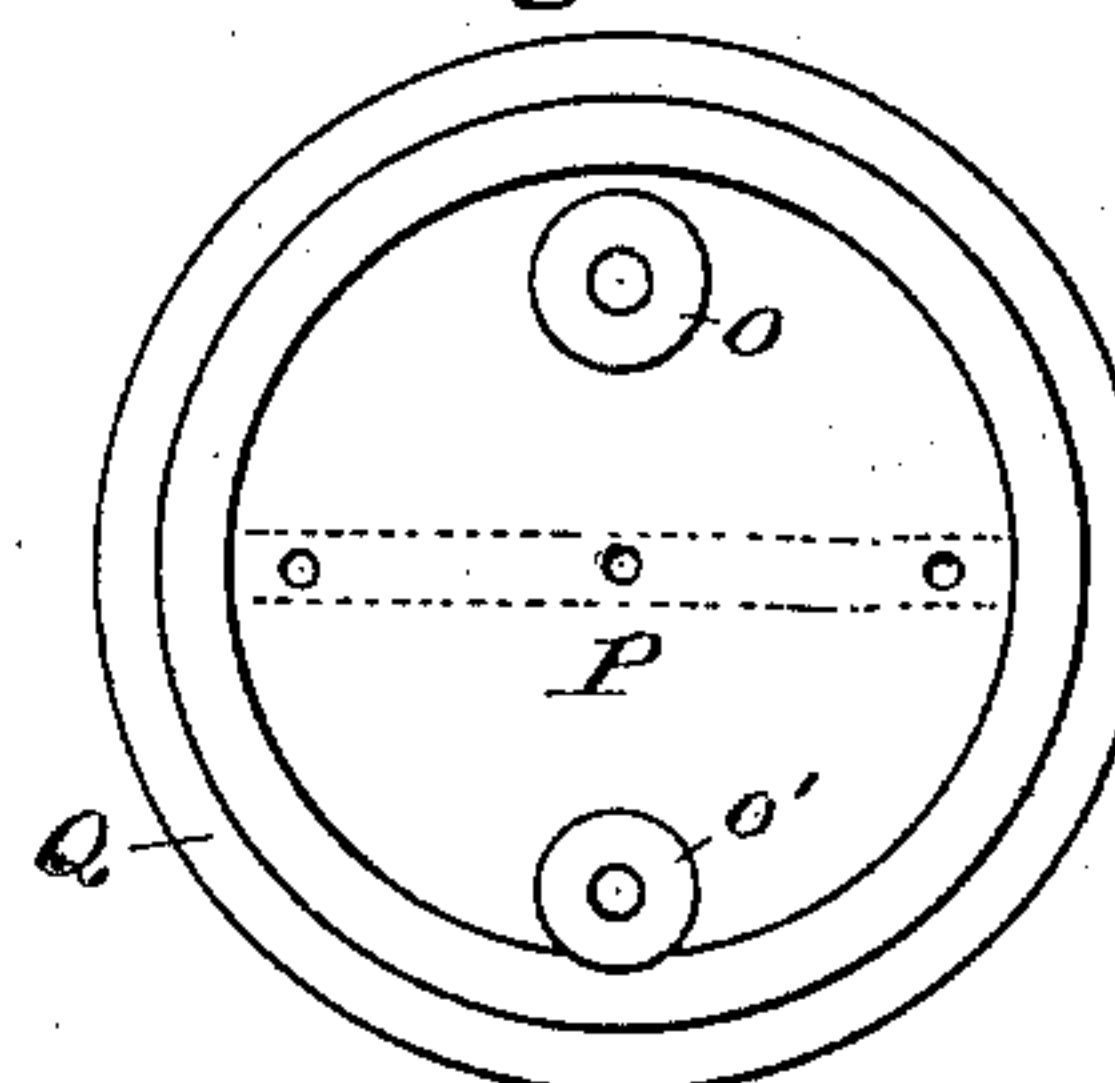
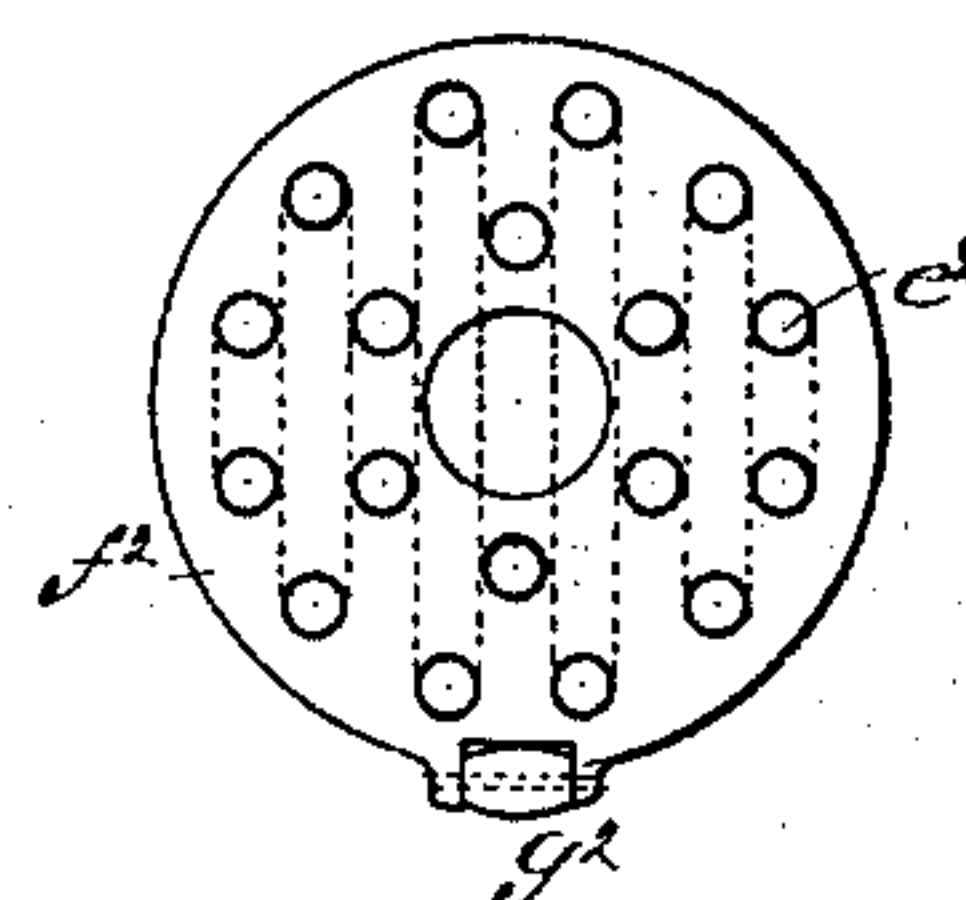


Fig. 4.



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(No Model.)

3 Sheets—Sheet 3.

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Fig. 6.

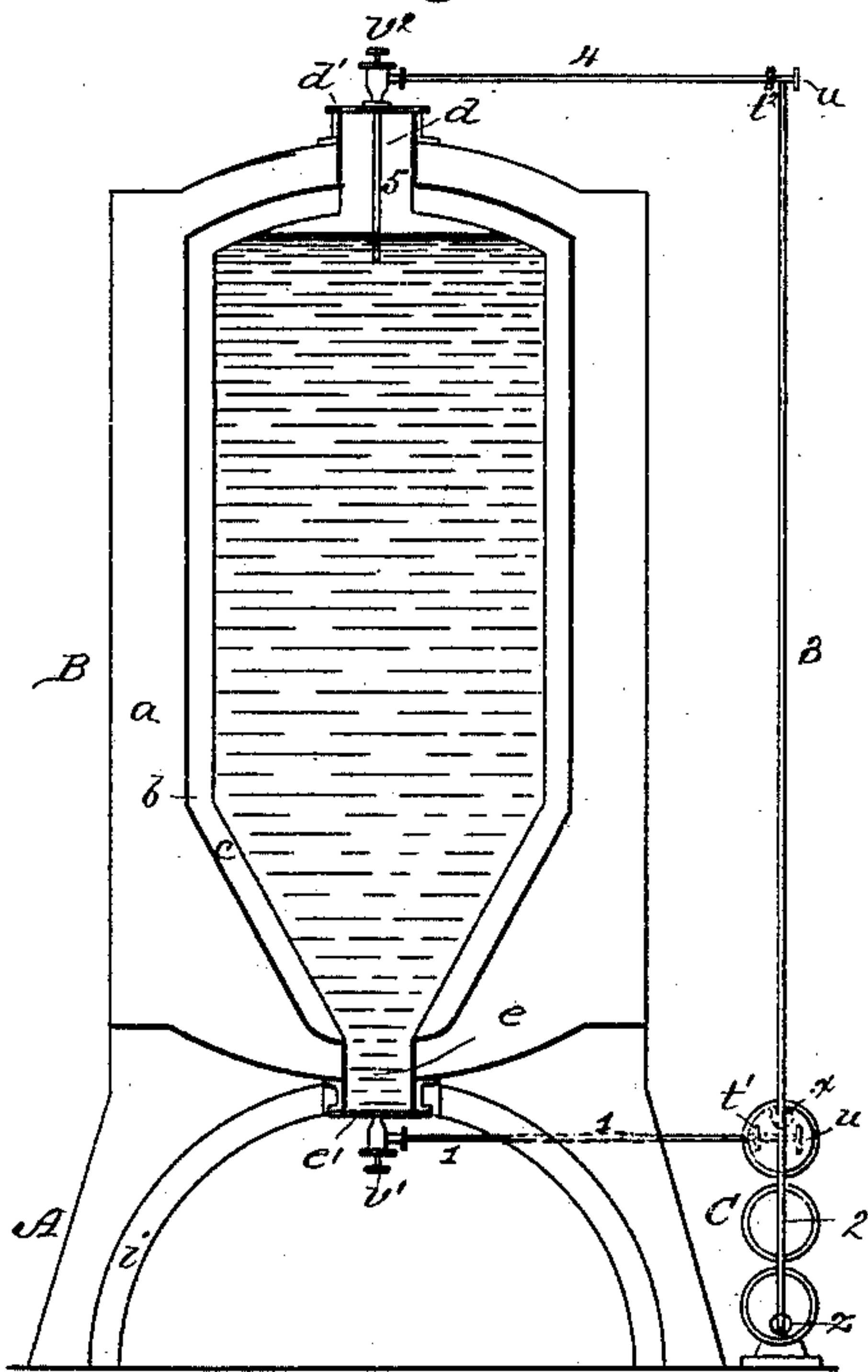


Fig. 8.

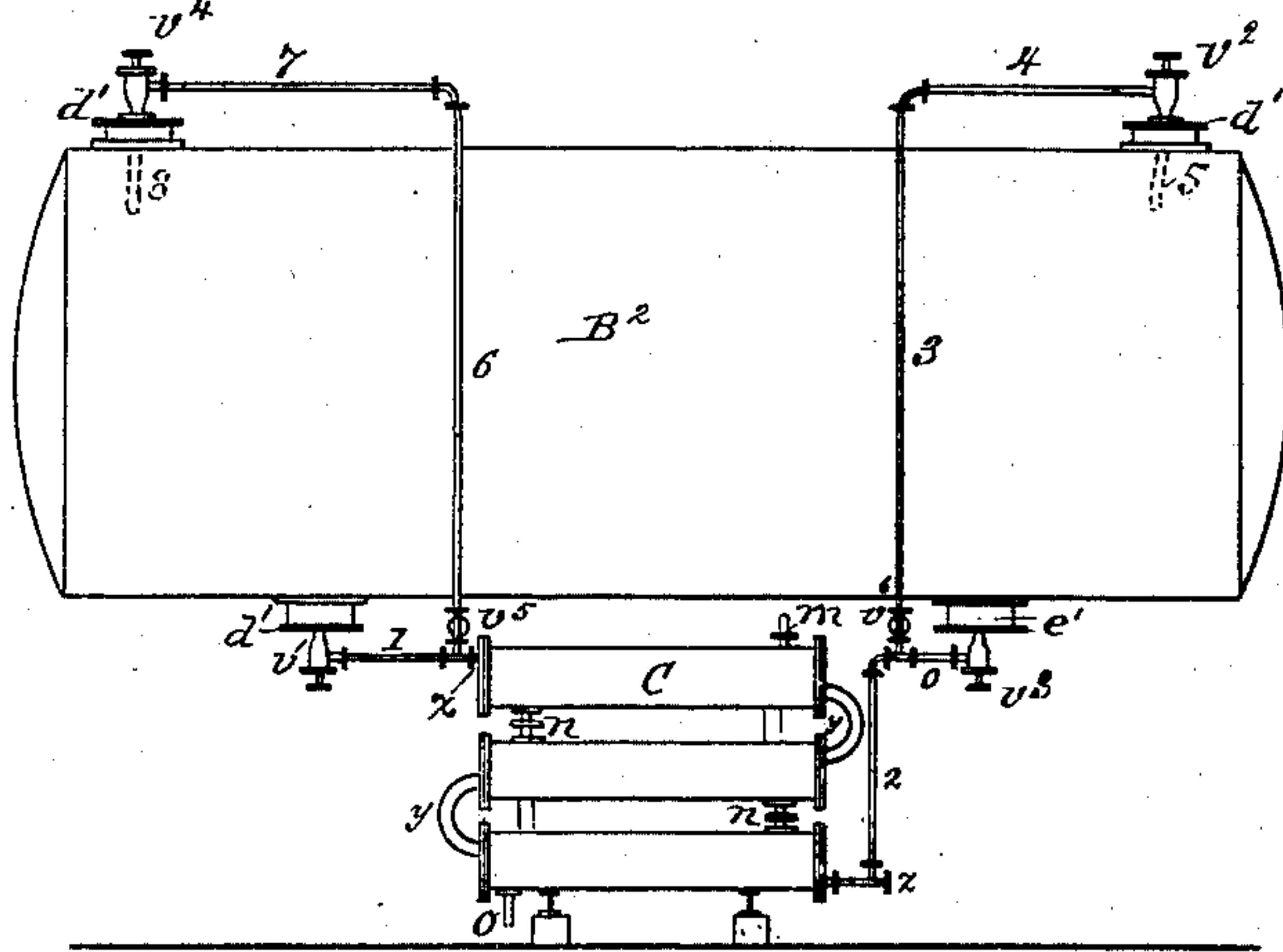


Fig. 9.

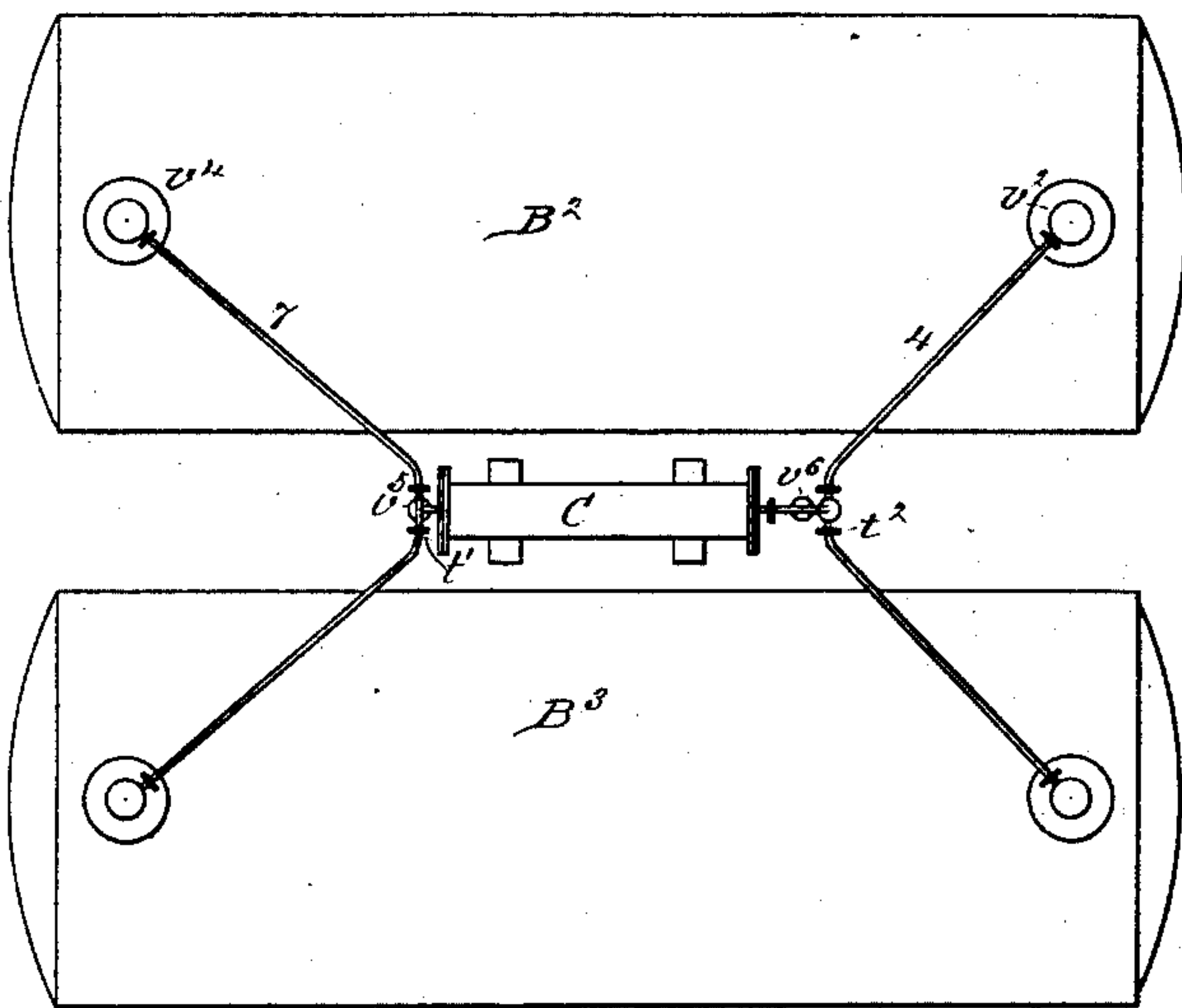
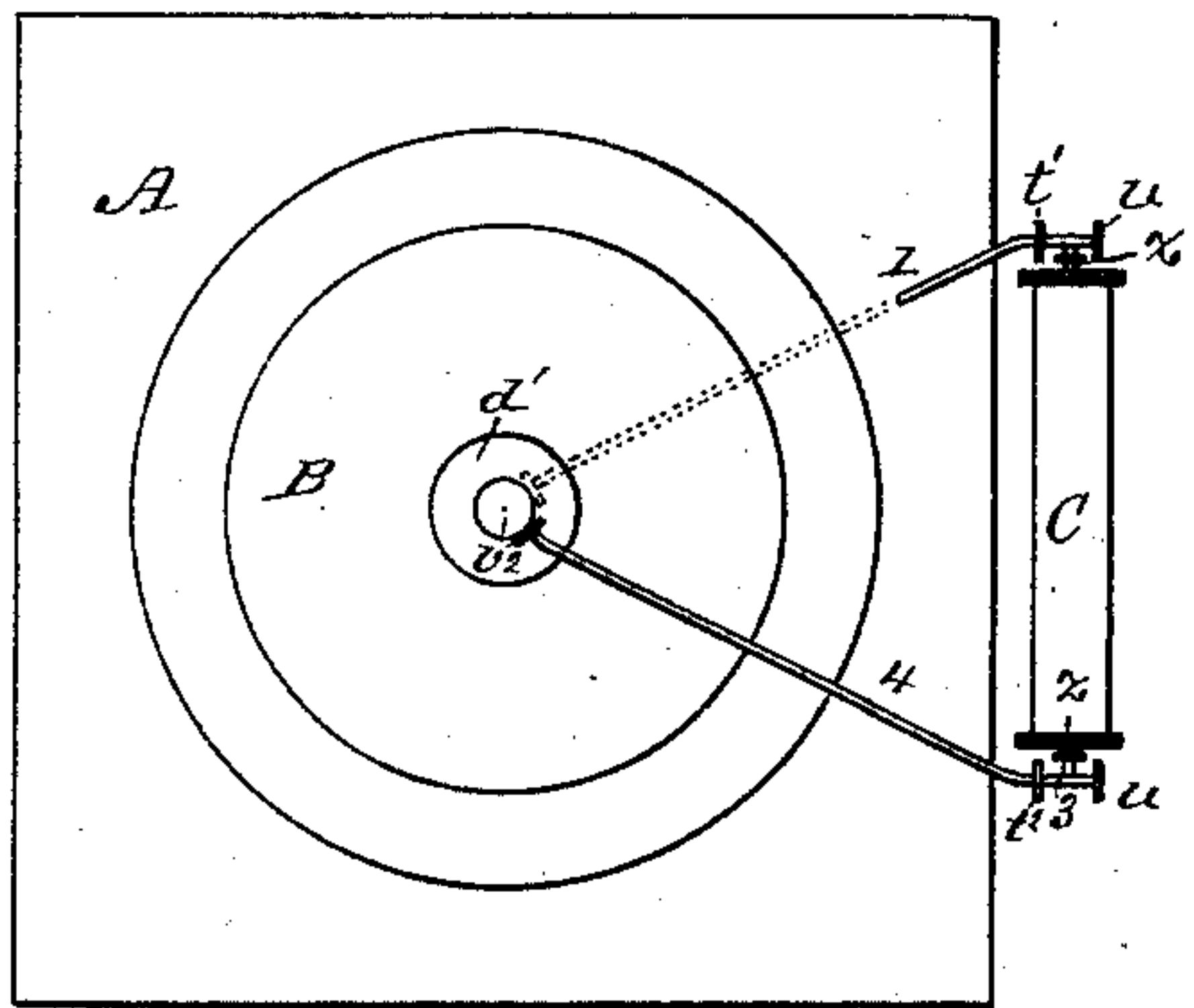


Fig. 7.



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UNITED STATES PATENT OFFICE.

HEINRICH SCHNURMANN AND GOTTHOLD CLOSS, OF UNTER KOCHER, NEAR
AALEN, WÜRTEMBERG, GERMANY.

APPARATUS FOR MANUFACTURING SULPHITE-CELLULOSE.

SPECIFICATION forming part of Letters Patent No. 360,484, dated April 5, 1887.

Application filed July 17, 1886. Serial No. 203,290. (No model.)

To all whom it may concern:

Be it known that we, HEINRICH SCHNURMANN and GOTTHOLD CLOSS, subjects of the German Emperor, residing at Unter Kocher, near Aalen, in Würtemberg, Germany, have invented a new and useful Improvement in Apparatus for Manufacturing Sulphite-Cellulose, of which the following is a specification.

This invention relates to apparatus for disintegrating wood and other fibrous substances, for the separation of cellulose, by means of sulphurous acid.

Our invention consists, primarily, in the combination, with the boiler, of heating and circulating apparatus, external thereto, whereby a given mass may be more quickly and uniformly heated, less repairs are required—especially within the boiler—the removal of incrustation from the heating-surfaces is facilitated by its concentration where access thereto can more readily be had, and, what is more important, this can be effected with more cleanliness, because it does not involve entering the boiler.

Our invention consists, further, in apparatus for so heating the mass by steam-heat, without passing the steam or any portion of it through the liquid, whereby the boiling liquid is protected against dilution, and violent ebullition, which impairs the fiber, may be prevented, as compared with previous steam-heaters.

Our invention consists, further, in a boiler made mainly of beton, protected against bursting, as hereinafter set forth, whereby the same is rendered practically free from the objections to boilers of iron, and can be more quickly and cheaply built than one of wood, and, finally, in a novel combination of parts in the heaters and circulators, whereby the heating-surfaces may be quickly and conveniently exposed for removing incrustation therefrom.

Three sheets of drawings accompany this specification as part thereof.

Figure 1 of the drawings represents a vertical axial section of our boiler. Figs. 2 and 3 represent vertical longitudinal sections of alternative forms of combined heaters and circulators. Fig. 4 represents an end view within one of the latter, with its steam-tubes in cross-section on the line 4, Fig. 3. Fig. 5 repre-

sents a view in the opposite direction of the man-hole cover, to which said tubes are attached. Figs. 6 and 7 are respectively an elevation, partly in section, and a plan view of the boiler and one of said heaters and circulators connected; and Figs. 8 and 9 are respectively an elevation, with one boiler disconnected, and a plan view of the same heater and circulator combined with a set of horizontal boilers.

Like letters of reference indicate corresponding parts in the several figures.

A, Figs. 1, 6, and 7, represents an arched base, and B an upright cylindrical boiler erected thereon, both built mainly of beton. The beton body *a* of said boiler is strengthened laterally against bursting by circumferential hoops *a'*, Fig. 1, of iron, and vertically by a sufficient number of iron tie-rods, *f*, inclosed within tubes *g*, connecting annular top and bottom plates, *p p*, of cast-iron, and end plates, *h h*, of boiler-iron. To give access to the screw-nuts on the lower ends of the tie-rods *f*, recesses are formed below them by a cast-iron ring, *p'*, Fig. 1, at the top of the base A.

To protect the walls of the boiler B internally, it is provided with a double acid-proof lining, being first lined throughout with sheet-lead *b*, and within this with an antacid lining, *c*, of brick laid in cement.

Man-holes *d e* extend outward from the central chamber of the boiler through its brick lining *c*, beton *a*, and end plates, *h*, and the latter are provided externally with cast-iron curbs *h'*, through which the lead lining is extended. Said man-holes *d e* serve, respectively, for filling and emptying the boiler, and it is connected therethrough with a heater and circulator, C or C², Figs. 2 and 3, external thereto, as illustrated by Figs. 6 and 7. A brick arch, *i*, within the base A, forms a convenient delivery-chamber, and the curb *h'* of said man-hole *e* is accommodated by a central opening in this arch. Said man-hole curbs *h'* of the boiler B are provided with tight covers *d' e'*, Figs. 6 and 7, each provided with a central valved coupling. From the coupling *v'* on said man-hole cover *e'* a pipe, *1*, extends to the inlet-neck *x* of the heater and circulator C, for example, and the outlet-neck *z* of the lat-

ter is connected by pipes 2 3 4 with the coupling v^2 on said man-hole cover d' , from which a drop-pipe, 5, depends below the surface of the liquid in the boiler. Two boilers may be worked alternately to advantage in connection with one and the same heater and circulator. The pipes 1 and 3 are consequently provided with T-couplings $t' t^2$, and when but one boiler is used, as shown in Figs. 6 and 7, the unused neck u is tightly capped or plugged. Said heater and circulator C (shown in detail in Fig. 2) is composed of a series of horizontal jacketed cylinders, one above the other, each having diagonally-opposite necks at its respective ends, the first of the series forming said inlet-neck x and the last said outlet-neck z , while those between are coupled in pairs by short curved pipes y , so that the liquid from the boiler B or B^2 or B^3 shall flow freely there-through, as represented by arrows k , Fig. 2. They have also diagonally-opposite vertical necks on each, the first forming an inlet-neck, m , and the last an outlet-neck, o , while the intermediate necks, n , are coupled together, completing a continuous passage through the jacket-spaces of the cylinders, through which steam flows under the control of suitable valves, as represented by arrows s in the figure. The inner walls, D, of each cylinder are of copper, its ends D' D' of cast-iron, lined with lead where the acid could come in contact therewith, and the outer walls, E, of boiler iron, separated from the copper by iron rings $r r$ and bolted to said ends D' by the aid of external collars, q .

F F represent suitable supports beneath the lowermost cylinder, and G G bolsters supporting those ends of the superposed cylinders which are not supported by said necks n . The heater and circulator C^2 , Figs. 3, 4, and 5, is likewise composed of a vertical series of cylinders provided with necks $x^2 y^2 z^2$, through which the circulation of the liquid from the boiler is effected, as illustrated by arrows k , and inlet and outlet necks $m^2 o^2$, for steam, which circulates through the apparatus, as represented by arrows s . The outer walls, K, of the cylinders of this apparatus are of boiler-iron lined internally with lead b , and within this with antacid brick-work c , like the boiler B.

$F^2 F^2$ represent supports, and G^2 a bolster, corresponding with F F G, before described. Said inlet and outlet necks $m^2 o^2$ are formed on pipes $b^2 c^2$, which lead, respectively, to inlet and outlet necks, O O', on the cap-plates P of hollow man-hole covers with which said cylinders of C^2 are provided, at the left-hand end of each, as viewed in Fig. 3. The body of each of these covers contains a central partition, d^2 , which divides its interior into inlet and outlet chambers R R', and these communicate, respectively, with the respective ends of rebent tubes e^2 , attached in sufficient number to said cover so as to project within the liquid-chamber. A bridge-plate, f^2 , supports these tubes near their bends, and is perforated

so as not to obstruct the circulation, and provided at bottom with a roller, g^2 , so as not to obstruct the withdrawal of the tubes, together with said cover, for the removal of incrustation therefrom. Said covers P Q P Q are fitted to large man-hole curbs S S, tightly and securely joined to the metallic shells of the respective cylinders, so as to be steam and acid tight.

Either of the aforesaid heaters and circulators C C^2 may be combined with the upright boiler B or a pair of the same, as aforesaid, as illustrated by Figs. 6 and 7, or with a horizontal boiler, B^2 , or a pair of such boilers, $B^2 B^3$, as illustrated by Figs. 8 and 9. The latter may represent any known boilers adapted to be so used in the manufacture of sulphite-cellulose. In the example a heater and circulator, C, is combined with a pair of horizontal boilers, $B^2 B^3$, each having two inlet man-holes at top and two outlet man-holes at bottom. The cover e' of one of said outlet man-holes of each boiler is connected by a valved coupling, v' , and pipe 1, with the inlet-neck x of C, and the outlet-neck z of the latter is connected by pipes 2 3 4 with a valved coupling, v^2 , and drop-pipe 5 on the cover d' of the diametrically-opposite inlet man-hole, substantially as described with reference to the combination of C with B. The cover e' of the other outlet man-hole of the boiler is likewise connected by valved-coupling v^3 , and pipe O with said pipe 2, and there-through with said neck z of C, and the neck x of the latter is connected by pipes 6 and 7 with a valved coupling, v^4 , and drop-pipe 8 on the cover d' of the other inlet man-hole, valves $v^5 v^6$ being introduced at the junctions of the two systems of pipes. When the liquid is circulated through said couplings v' and v^2 , said valve v^5 is closed and v^6 is open. If, instead, v^3 , v^4 , and v^5 be opened and v and v^6 be closed, the circulation is through the other pair of boiler man-holes, with its direction through C reversed.

One or the other of the boilers is always wholly cut off by means of a cap or plug in its ends of the T-couplings $t' t^2$, as before described, the two boilers being used alternately.

We are aware that the air and fumes of a vulcanizing-chamber have long ago been heated and circulated by a steam-heater external to such chamber; but such apparatus could not be used for making sulphite-cellulose, and does not accomplish the results as a whole which distinguish our combination of a cellulose-boiler and a heater and circulator external thereto, as hereinbefore set forth. We also disclaim, as old, steam-jackets, broadly considered, as used in vulcanizing apparatus, for example, and we do not claim, broadly, as a material free from well-known objections to iron, from which to build cellulose-boilers.

Having thus described our said improvement in apparatus for manufacturing sulphite-cellulose, we claim as our invention, and desire to patent under this specification—

1. In an apparatus for the manufacture of sulphite-cellulose, the combination of a boiler or boilers having man-holes in top and bottom, covers applied to said man-holes and provided with pipe-couplings and drop-pipes, a heater and circulator external to the boilers, and pipes connecting said heater and circulator with said pipe-couplings on the man-hole covers, substantially as hereinbefore specified, for the purposes set forth.

2. In an apparatus for the manufacture of sulphite-cellulose, the combination, with a boiler or boilers and connecting-pipes, of a heater and circulator external to the boilers, having liquid and steam spaces isolated from each other, and diagonally-opposite inlets and outlets for its liquid-spaces, together with suitable steam inlets and outlets, substantially as hereinbefore specified, for the purposes set forth.

3. In an apparatus for the manufacture of sulphite-cellulose, an upright cylindrical boiler having a beton body strengthened against bursting by circumferential hoops and

vertical tie-rods, the latter inclosed within tubes in the beton body, and further provided with annular top and bottom plates of cast-iron and end plates of boiler-iron, which are connected by said tie-rods, and with man-hole curbs attached to said end plates, substantially as hereinbefore specified, for the purposes set forth.

4. In an apparatus for the manufacture of sulphite-cellulose, a heater and circulator external to the boiler, in the form of horizontal cylinders, each having a large man-hole in one end and provided with a hollow man-hole cover having inlet and outlet necks and chambers for steam, and rebent steam-tubes attached to said cover with their respective ends in connection with said chambers, respectively, substantially as hereinbefore specified.

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