

(No Model.)

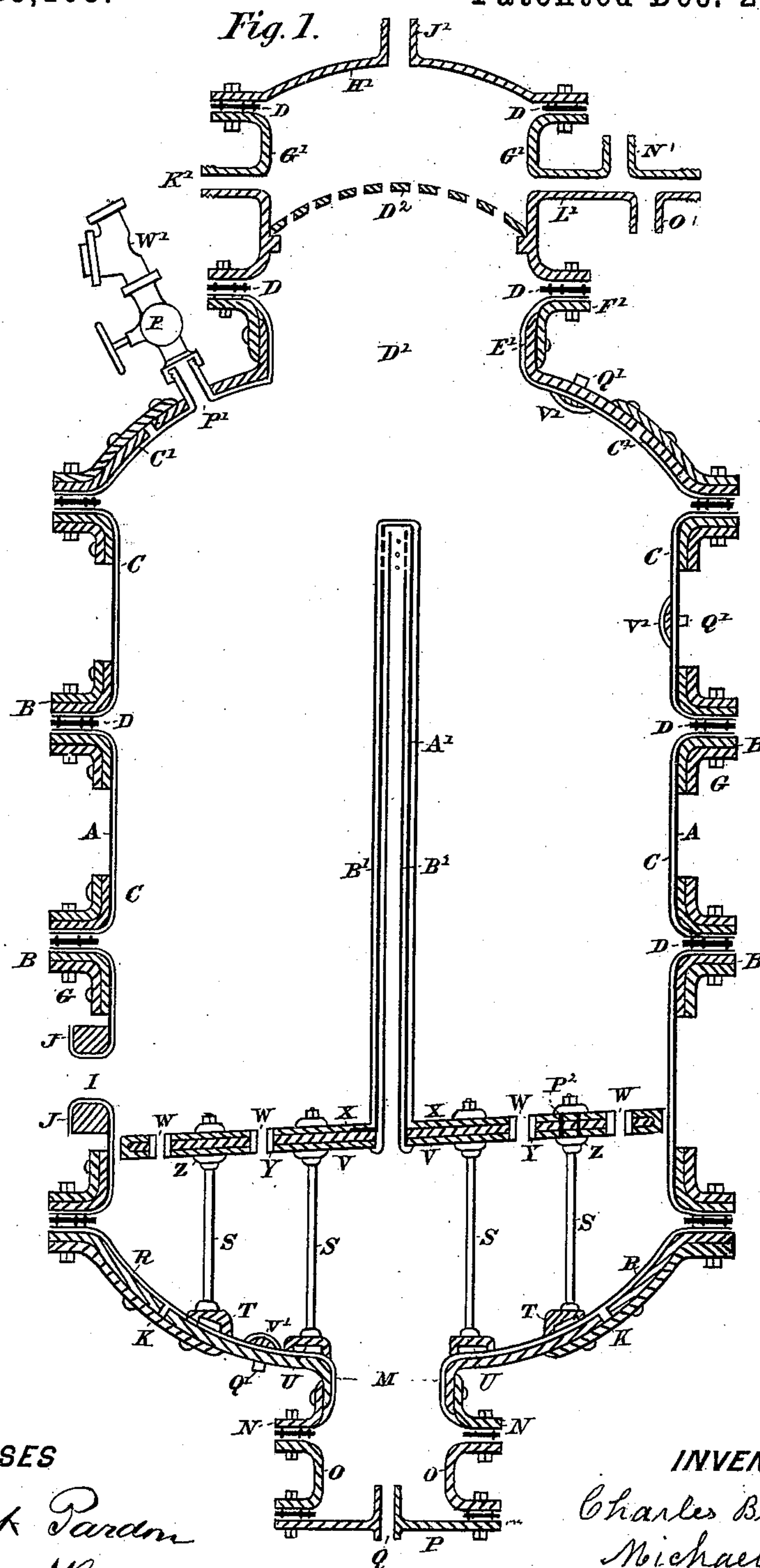
3 Sheets—Sheet 1.

C. BREMAKER & M. ZIER, Sr.

PAPER PULP DIGESTER.

No. 333,105.

Patented Dec. 29, 1885.



WITNESSES

Frank Pardon  
George Hammer

INVENTOR.

Charles Bremaier  
Michael Zier Sr.,  
by J. G. Herriott  
Attorney

(No Model.)

3 Sheets—Sheet 2.

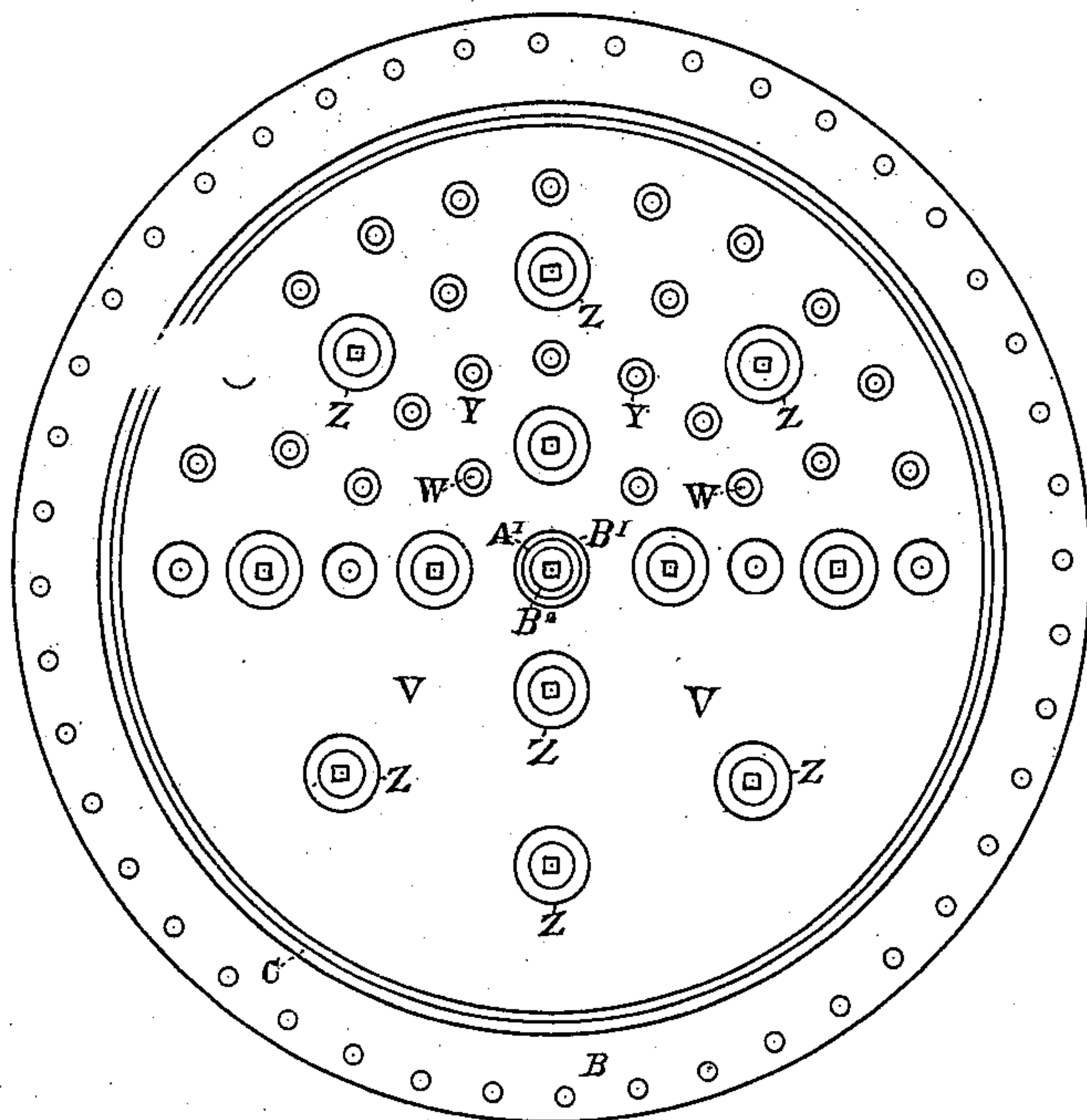
C. BREMAKER & M. ZIER, Sr.

PAPER PULP DIGESTER.

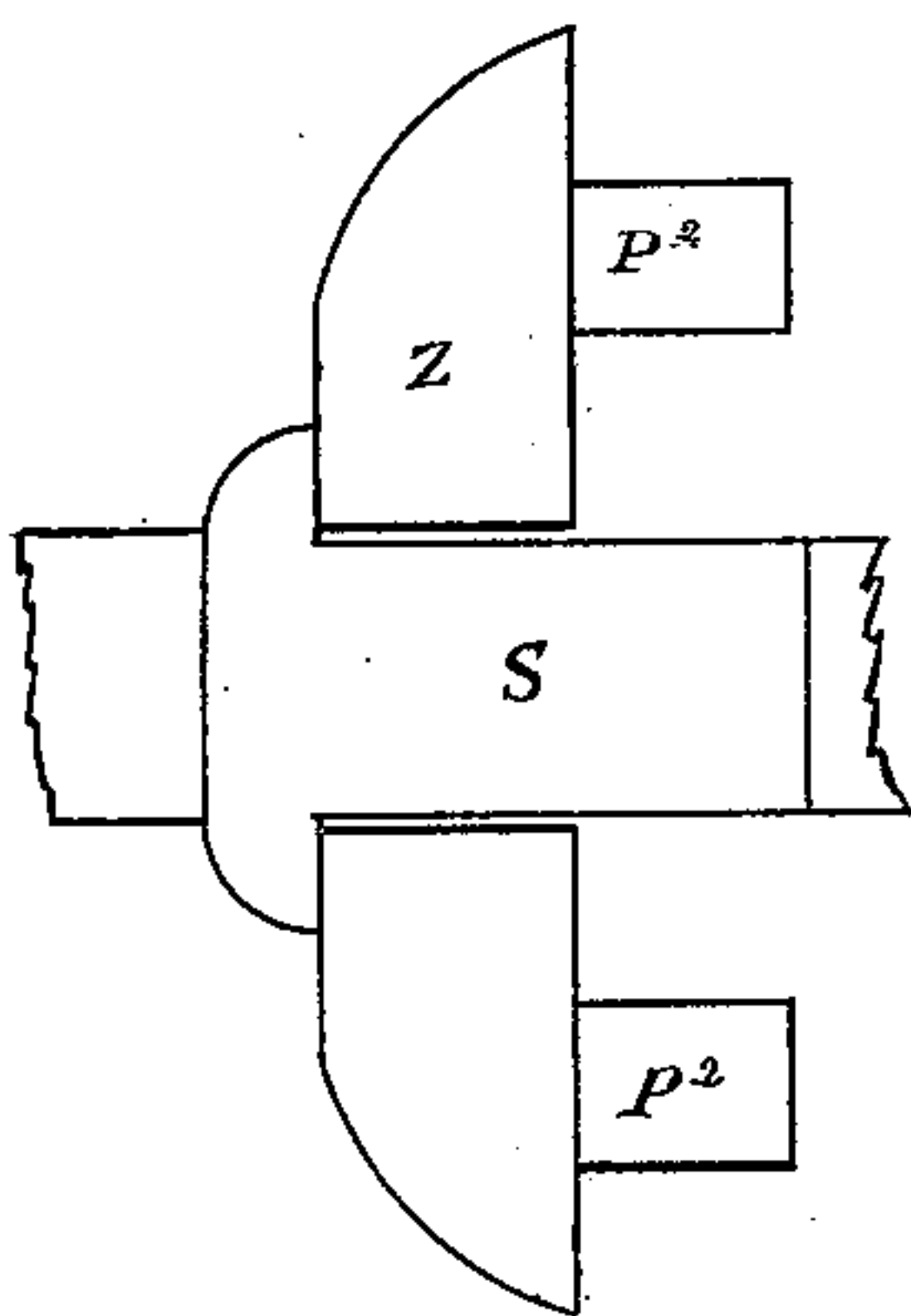
No. 333,105.

Patented Dec. 29, 1885.

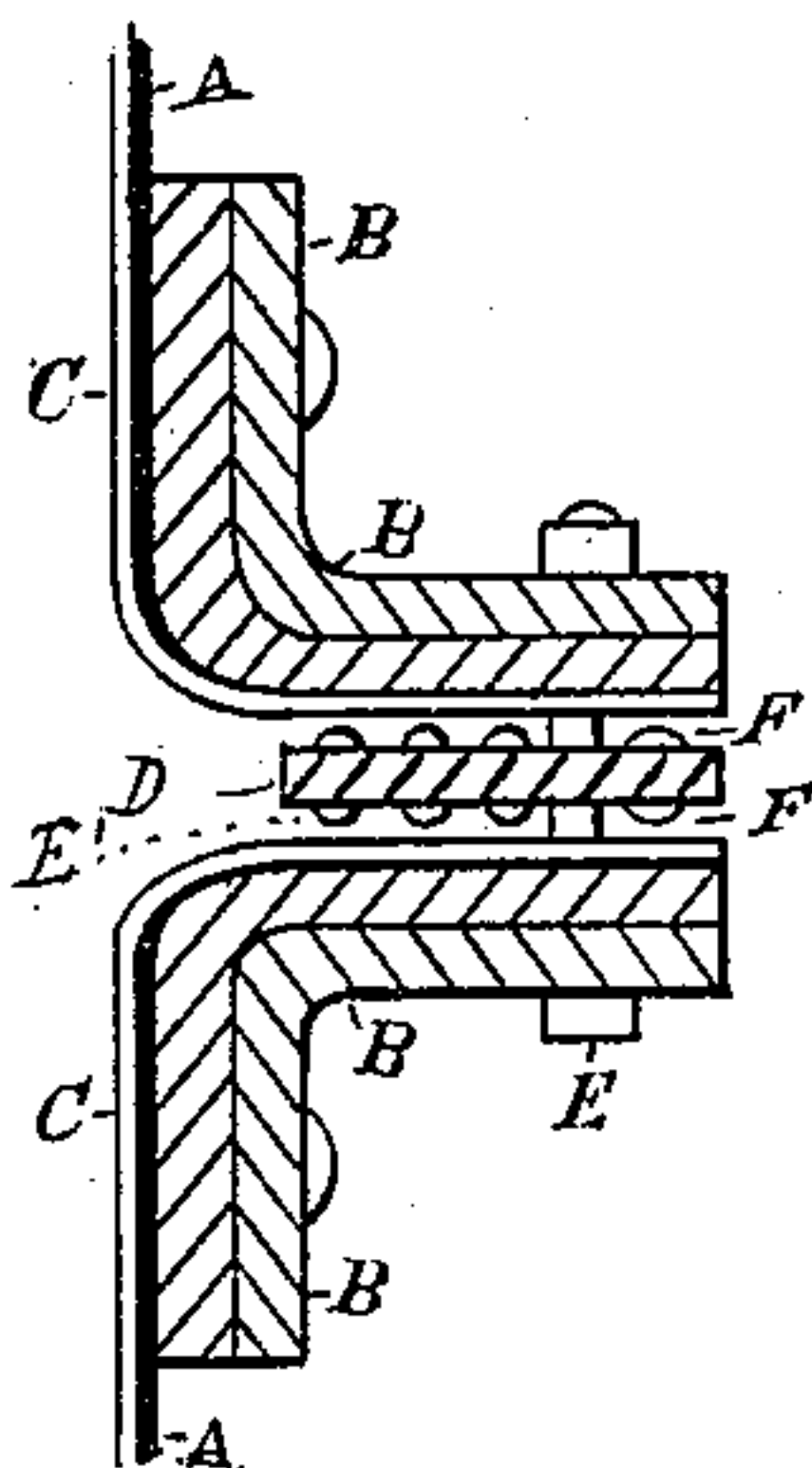
*Fig. 2.*



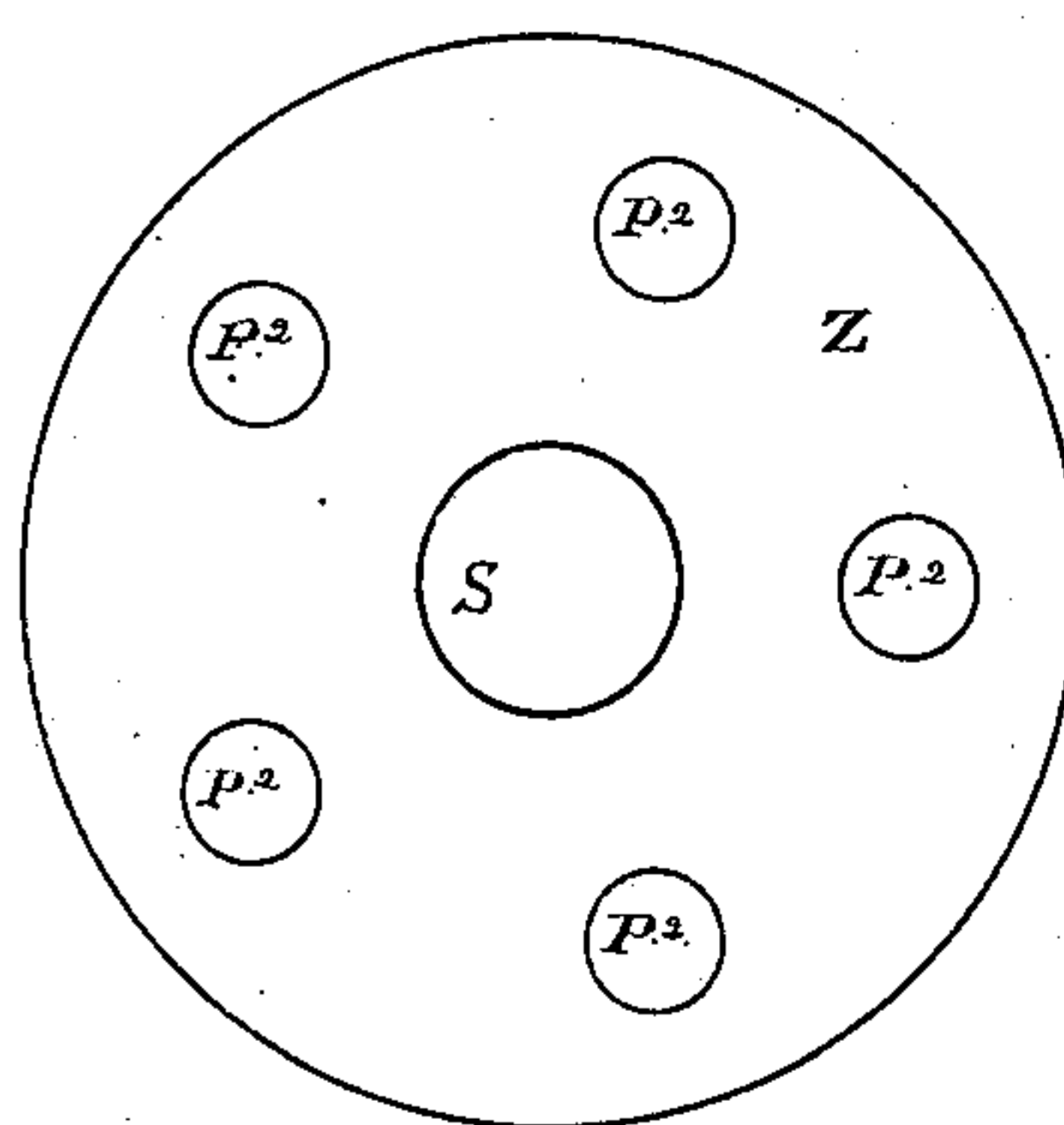
*Fig. 4.*



*Fig. 3.*



*Fig. 5.*



WITNESSES.

*Frank Pardon*  
*George Hammer*

INVENTOR.

*Charles Bremaeker*  
*Michael Zier Sr*  
*by J. E. Herriott*  
*attorney*

(No Model.)

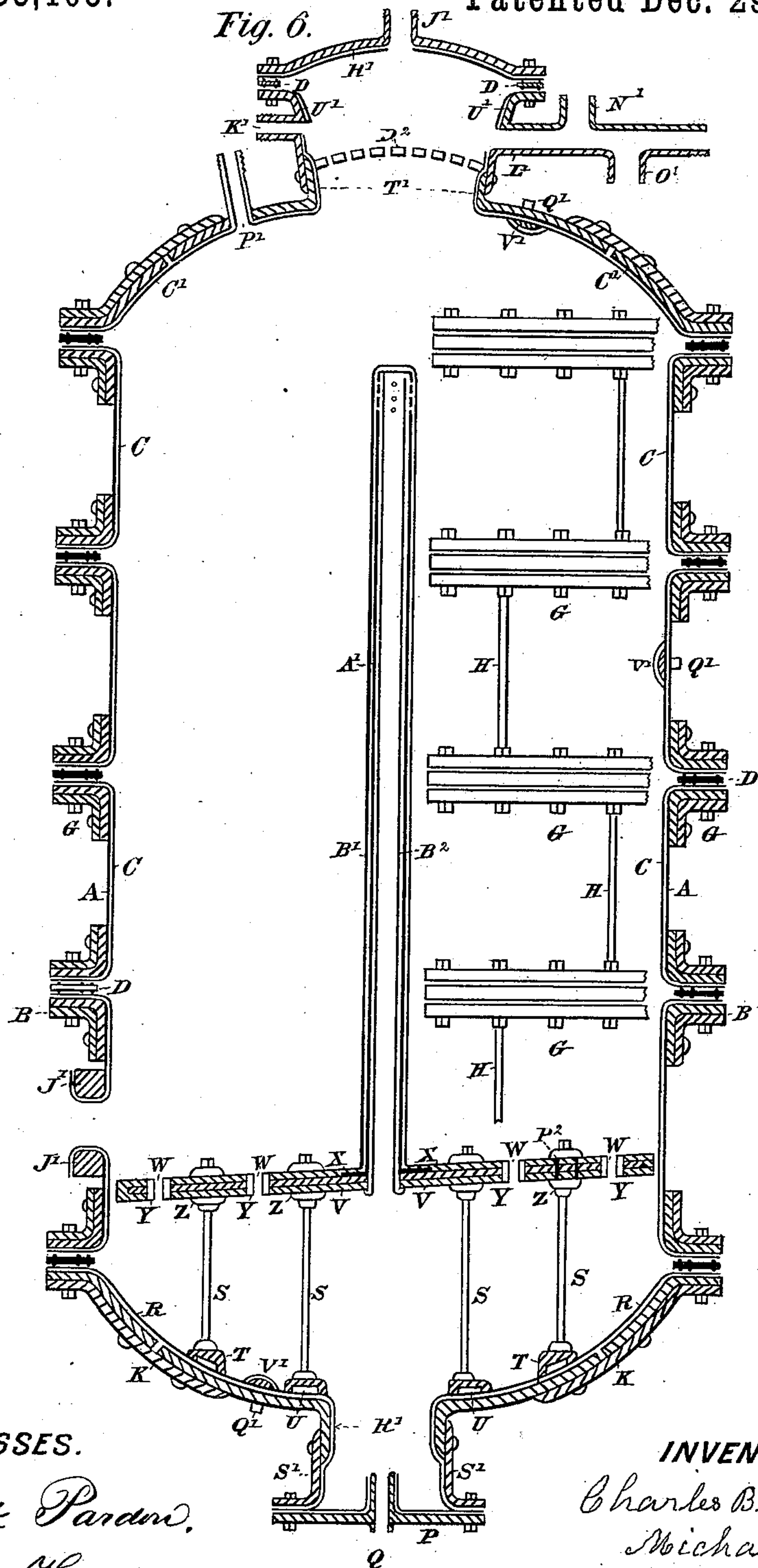
3 Sheets—Sheet 3.

C. BREMAKER & M. ZIER, Sr.

PAPER PULP DIGESTER.

No. 333,105.

Patented Dec. 29, 1885.



WITNESSES.

Frank Pardon.  
George Hammer.

INVENTOR.

Charles Bremaker.  
Michael Zier Sr.,  
by J. S. Hewitt.  
Attorney



# UNITED STATES PATENT OFFICE.

CHARLES BREMAKER, OF LOUISVILLE, KENTUCKY, AND MICHAEL ZIER, SR.,  
OF NEW ALBANY, INDIANA.

## PAPER-PULP DIGESTER.

SPECIFICATION forming part of Letters Patent No. 333,105, dated December 29, 1885.

Application filed March 30, 1885. Serial No. 160,710. (No model.)

*To all whom it may concern:*

Be it known that we, CHARLES BREMAKER, of Louisville, in the county of Jefferson and State of Kentucky, and MICHAEL ZIER, Sr., of New Albany, in the county of Floyd and State of Indiana, citizens of the United States, have invented a certain new and useful Improvement in Paper-Pulp Digesters; and we do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the accompanying drawings, forming part of this specification.

This our invention relates to certain new and useful improvements in paper-pulp digesters, consisting in a digester or boiler about seven feet in diameter, and about twenty-six feet (more or less) in height, made in sections or rings sufficient in number to make the height, and bolted together by means of strong double flanges, with lead rings or gaskets between the flanges, in order to render the joints steam-tight, with the whole inside surface covered with sheet-lead, while the bottom and top heads are made convex in form, and secured to the end rings by means of bolts through the flanges, and are also covered with lead on the inside, with an opening in the center of the top for charging it with stock, and also one in the bottom for removing the refuse liquor therefrom, and through which steam is introduced into the boiler. The lower part of the digester is provided with a false bottom in the inside, made the full diameter of the digester, covered with sheet-lead, and made to rest upon stands or supporting-bolts screwed into the bottom head of the digester, with a pipe in the center extending up within about two feet (more or less) of the top, the upper end of which is perforated with small holes near the top, and also another pipe in the bottom cap, through which the steam is introduced into the digester in its operation.

The object of this our invention is to provide a suitable digester or boiler for preparing paper-pulp, made in sections or rings, with strong double or single flanges on the end of each section, by means of which they are securely bolted together, with a lead ring or gasket between the parts, in order to render

the joints steam-tight, and sufficiently strong to resist a high pressure of steam in so large a vessel, the entire inside of which is covered with sheet-lead, to prevent the liquor used on the stock from injuring the iron or steel of which the digester is constructed.

We attain the above object by the mechanism illustrated in the drawings, in which Figure 1 is a sectional view of the digester, showing the double flanges of the rings with gaskets between them, and the false bottom in the interior, with the supporting stands or bolts under it, and the general construction of the detachable chamber-rings on the top and bottom heads, when made of composition metal requiring no lead lining. Fig. 2 is a flat or top view of the false bottom, showing the small holes, and also the supporting-bolt, washers and nuts, and flanges of the digester-rings and lead lining thereof. Fig. 3 is a sectional view of the flanges, on a larger scale, showing the lead ring or gasket between them extending outside of the bolts. Fig. 4 is a sectional view of the washers on the upper end of the supporting stands or bolts above and below the bottom, with nuts on the top and pins in the plate between the washers. Fig. 5 is a flat view of the supporting-bolt washers, showing the pins of the plate upon which the washers rest. Fig. 6 is a sectional view of the digester, showing the ring-flanges with gaskets, and false bottom in the interior, with the stands upon which it rests, and the general arrangement of the bolts by which the digester is bolted together, and also the peculiar construction of the bottom and top chamber-rings, when made of iron or steel, requiring to be lead-lined.

Similar letters refer to similar parts throughout the several views.

In the drawings, A A represent the digester or boiler rings, which are made of iron or steel, about half an inch (more or less) in thickness, and in form as shown in the drawings, any suitable number of which may be used to make the required length.

B B are the double flanges, which are riveted to the end of the digester-rings, which are made of rolled plate iron or steel, about six inches (more or less) on the face, with rounded



corners, as shown in the drawings, with one shrunk over the other, in order to increase the strength, it being almost impossible to make them sufficiently strong from a single sheet of metal without much trouble and expense.

C C is the lead lining of the digester-rings, which extends out through the flanges, to prevent the liquor from injuring the iron face of the flanges.

D is a lead ring or gasket between the flanges, to render the joint steam-tight when screwed down upon it. The faces of this lead ring D, which are made flat, extend outside of the bolts G, and are each provided with small raised rings F around the bolts, with two raised rings (more or less) between the bolts and inner edge, on a line with the ring, to prevent the liquor from leaking through to the bolts G, which are inserted in the flanges B B, somewhat as shown in Fig. 6 of the drawings, with about every fifth bolt H (more or less) made to extend up through the flanges of the lower head, and through both flanges of the lower ring, and also up through the lower flange of the next ring or section, with screw-nuts above and below each pair of flanges as they come together, so that each end of the long bolts H assists the intermediate short bolts, G, in drawing the flanges together steam-tight, besides another advantage hereinafter named. After the first series of long bolts are put in around the digester the lower ends of the second series of long bolts pass through the same flanges of the digester, the upper ends of the long bolts in the first series and lower ends of second series of long bolts are placed between the upper ends of the bolts in the first series, with short bolts placed in each pair of flanges between the long ones in each ring or section added, and so on in like manner until the full series of long bolts are put in and made to pass through both the top and bottom head-flanges of the digester, as shown, the object of which, and the great advantage we claim by this method of bolting, is that it secures the digester from end to end, and adds greatly to its strength and security, that cannot be otherwise obtained.

I is an opening in the side above the false bottom, about eight inches (more or less) in diameter, and J is a raised ring riveted to the digester around the opening, to answer as a flange, to which a blow-off valve is bolted, but not shown, for the purpose of discharging the contents of the digester.

K is the bottom head of the digester, the inner parts of which are made in two pieces, about five-eighths or three-fourths of an inch in thickness, and convex in form, with the edges butted together about midway from the center of the digester, in order to make a smooth surface on the inside for the lead lining, while the verge parts, constituting the flanges by which it is bolted to the digester, is provided with an additional thickness of the same material, riveted at the edge of the flanges,

and extending in so as to overlap the butted joint of the head, to which it is firmly riveted on each side of the joint, as shown, and thereby answers as a means of connecting the parts constituting heads, and for giving strength and rigidity to the projecting flange, by which it is bolted to the digester, as shown.

The central part of the bottom K is made of a single sheet of iron or steel about three-fourths of an inch in thickness and riveted to the edges of the outer circular parts of the bottom head, with an opening, M, in the center about sixteen inches (more or less) in diameter, and of any suitable form, with an angle-flange turned on the sheet within the opening, to which a flanged ring, N, is riveted, to form a flange to which the chamber O is bolted, which chamber O is made of any suitable metal, and in form as shown in the drawings, and covered with a removable cap, P, of suitable metal, without lead lining, and through which the steam-pipe Q enters the digester, as a means of supplying the steam to operate it, and when the cap is removed it is intended for the purpose of discharging any remaining liquor in the bottom, the whole inner surface of which is lined with lead, R, except the chamber O and removable cap P, which are made of bronze or other suitable metal.

S S are the stands or bolts which support the false bottom of the digester, which are screwed into the bottom of the digester, with suitable washers, T, under the collars to level up the angle of the head-bottom. These washers are recessed on the under side, in which a gum washer, U, is placed, to prevent the liquor from leaking through to the iron head below. All of these bolts and washers are made of bronze, or other suitable metal that will stand the acid without lead covering.

V is the false bottom, which is made of iron or steel about five-eighths of an inch in thickness, filling the entire diameter of the digester loosely, with the whole surface perforated with small holes W W, as shown in part in Fig. 2 of the drawings, and covered with sheet-lead, X, about one-fourth of an inch (more or less) in thickness on both sides and edges, and in order to lead-line the iron plate V within the holes, which extend through the lead lining also, a small piece of lead pipe, Y, is inserted in each hole and made to adhere to the lead surface-lining by means of soldering or burning on both sides of the bottom, which process may be employed exclusively in lead covering the edges of the plate V within the holes. This false bottom or plate V rests upon and is secured to the supporting-bolts S S, which are provided with collars and washers Z Z for the plate to rest upon, and is secured thereto by means of screw-nuts on the ends of the bolts S S, which are screwed down upon washers, Z Z, which rest upon the lead surface, and in order to prevent crushing the lead, small pins P<sup>2</sup> are inserted under the washers, extending through the plate V from each side, and there-



by rest upon each other, as shown in the drawings.

A' is a pipe, made of iron or other suitable metal, about four inches (more or less) in diameter inserted in the center of the false bottom V, and secured thereto by a flange near the lower end, which extends through the plate V, while the other end extends up within about two feet (more or less) of the top of the digester, with both inside and outside covered with lead B'. This pipe A' is intended for the purpose of regulating the pressure at each end of the digester, and also for circulating the liquor in the inclosed vessel under pressure, and is not attached to any pipe outside the digester.

C' is the upper head of the digester, which is made of the same material, and in all other respects similar to the bottom, with an opening, D', in the center, about twenty inches (more or less) in diameter, or of any suitable form for charging the digester with stock, with a flange, E', turned on the inner head-sheet, to which a flanged ring, F', is riveted, and to which the flanged chamber G' is bolted, and rendered steam-tight by means of lead rings or gaskets D, similar to the ones used between the rings of the boiler-flanges. This flanged chamber G' is made of any suitable metal that will resist the action of the acid without lead lining, and is made in form as shown in the drawings, and covered with a removable cap, H', made of the same or other suitable material, and in form as shown.

J' is a branch pipe in the cap H' for blowing off the steam to reduce the pressure preparatory to discharging the contents of the digester.

K' is a branch on the side of chamber G', which may be used instead of the one in the cap.

L' is also a branch on the side of chamber G', which is made in form as shown, with additional branches, N' and O', to which a safety-valve and vacuum-valve are attached, but not shown.

P' is a branch pipe in the digester-head, to which a stop-valve, P<sup>3</sup>, and vacuum-valve W' are attached, as shown.

Q' are small bolts screwed into a washer-formed nut, V', on the inside of the digester-rings, to prevent the lead lining from collapsing when the steam is blown off, any number of which may be used.

The opening D' in the top of the digester is provided with a plate or cover, D<sup>2</sup>, perforated with small holes, and made to rest upon lugs on the sides of the chamber, to prevent the stock from rising up and obstructing the branch openings. R' is the opening and S' is the chamber-ring on the bottom, and T' is the opening and U' is the chamber-ring on the top, as shown in Fig. 6, showing their general construction when made of iron or steel, requiring lead lining.

G G are a series of small bolts inserted in

the ring-flanges B at intervals, as before stated.

By adopting the use of the several branches, as shown, on the sides of the chambers G' and U' the necessity of breaking the pipe-connections every time the digester is to be charged with stock is avoided, and thereby much time and labor are saved. Therefore,

We do not claim anything as our invention in paper-pulp digesters made of iron, having forged-iron rings riveted to the shell of the boiler and bolted together with bolts, or a perforated false bottom made of iron, uncovered with lead, such as are used in what is known as the "alkali process," which does not require a lead-lined digester; but

What we do claim as our invention, and desire to secure by Letters Patent, is—

1. In a paper-pulp digester, the bottom head, K, and top head, C', consisting of two parts each, convex in form, with the edges securely riveted to an additional thickness of the same material extending in from the flanges, to which it is riveted, sufficient to overlap the butted seam, and thereby answer as a means of connecting the heads and giving strength and rigidity to the projecting flanges, substantially as herein described, and for the purpose set forth.

2. In a paper-pulp digester, the flanges B B, made of rolled plate metal in two parts, one placed over the other, substantially as described, and for the purpose set forth.

3. In a pulp-digester, the combination of the chamber G', in the form shown, with its cap H' and branch J' on the top, and branches K' and L' on the sides, and branch N', to which a safety-valve may be attached, substantially as described, and for the purpose set forth.

4. In a paper-pulp digester, the branch pipe P', vacuum-valve W', and steam-valve P<sup>3</sup>, connected with the top of the digester, substantially as described, and for the purpose set forth.

5. In a pulp-digester having a perforated false bottom, V, the surface lead lining X X and small lead pipes Y Y, by means of which the holes are lined, substantially as described, and for the purpose set forth.

6. In a pulp-digester, the small composition pins P<sup>2</sup> P<sup>2</sup>, screwed into the false bottom V, against which the composition washers Z and T rest, substantially as described, and for the purpose set forth.

7. In a pulp-digester, the supporting stand-bolts S S, upon which the false bottom V rests, with the composition washers Z and T on the ends and under the collars, substantially as described, and for the purpose set forth.

8. In a paper-pulp digester, the metal pipe A' in the center of the false bottom V, and lead lining B', substantially as described, and for the purpose set forth.

9. In a pulp-digester, the composition anchor-plates or washer-formed nuts V', and bolts Q', for holding the lead lining C C to the



inner surface of the digester, substantially as described, and for the purpose set forth.

10. In a paper-pulp digester, the manner of arranging the long and short bolts in bolt-  
5 ing the rings together, commencing with the bottom flanges, by inserting a long bolt, H, in about every fifth hole, which bolt is long enough to pass through the bottom flange and up through the flanges of the first and second  
10 rings, thereby constituting the first one of a series of similar long bolts, H, inserted side by side to the right and left in each set of flanges, extending up in like manner through the upper head, with screw-nuts on each end  
15 above and below each set of flanges, with the spaces between the long bolts H at the bottom filled with three short bolts G, but the other flanges above have only two short bolts G between each until the top head-flanges are

reached, which will require three, thereby se- 20 curing the digester from end to end, substantially as described, and for the purpose set forth.

11. In a pulp-digester, the combination of the flanged chamber O, cap-plate P, and pipe- 25 connection Q, substantially as described, and for the purpose set forth.

12. In a pulp-digester, the lead gasket or ring D, having small convex raised rings F around the bolt-holes and two raised rings, E' 30 E', on the faces inside of the bolts, on a line with the ring, substantially as described, and for the purpose set forth.

CHARLES BREMAKER.  
MICHAEL ZIER, SR.

Witnesses:

FRANK PARDON,  
GEORGE HAMMER.