

(No Model.)

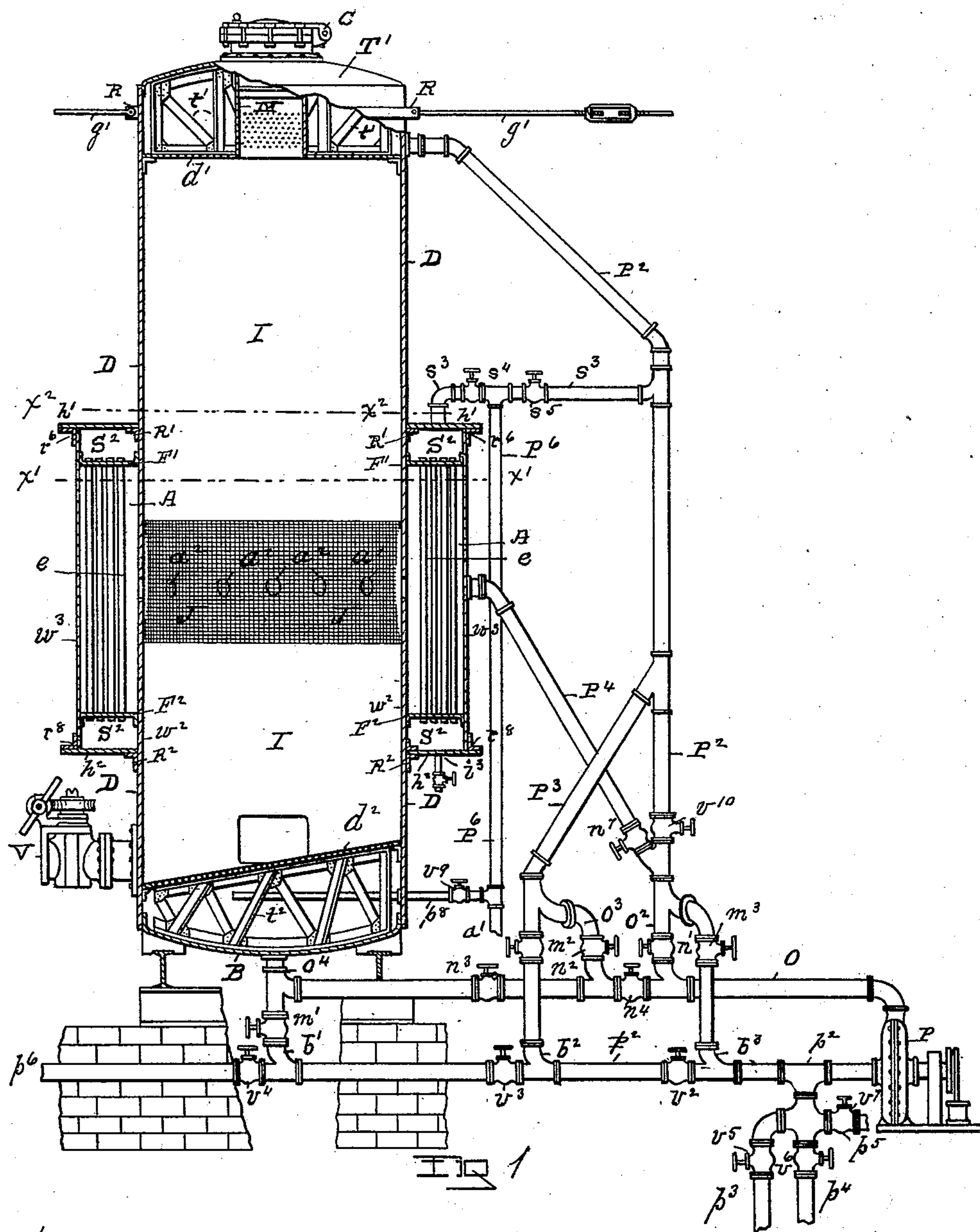
2 Sheets—Sheet 1.

J. MACCORMACK & H. L. VAN ZILE.

DIGESTER FOR TREATING PAPER STOCK.

No. 464,199.

Patented Dec. 1, 1891.



WITNESSES

Charles S. Paintnall

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John Mac Cormack

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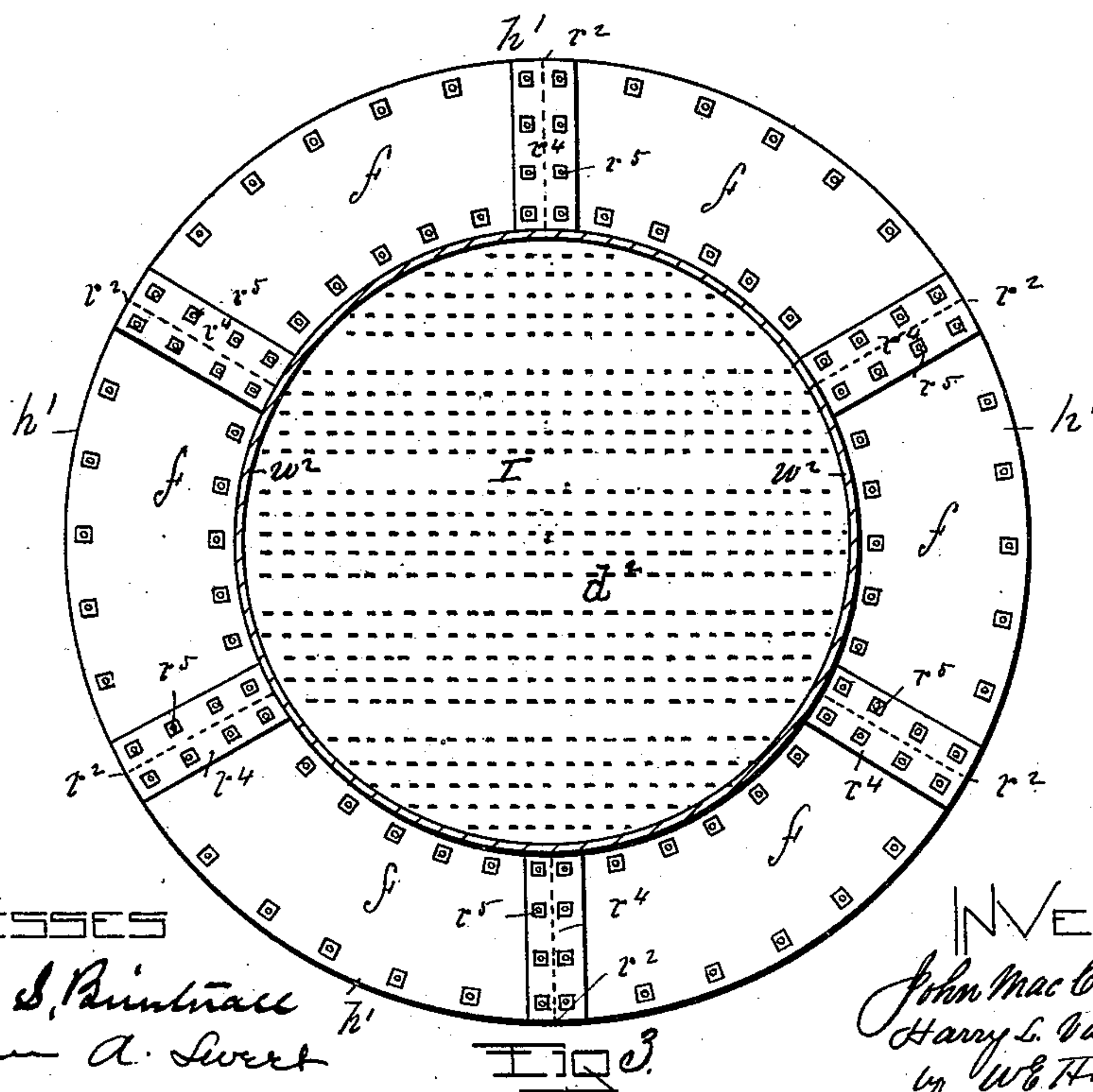
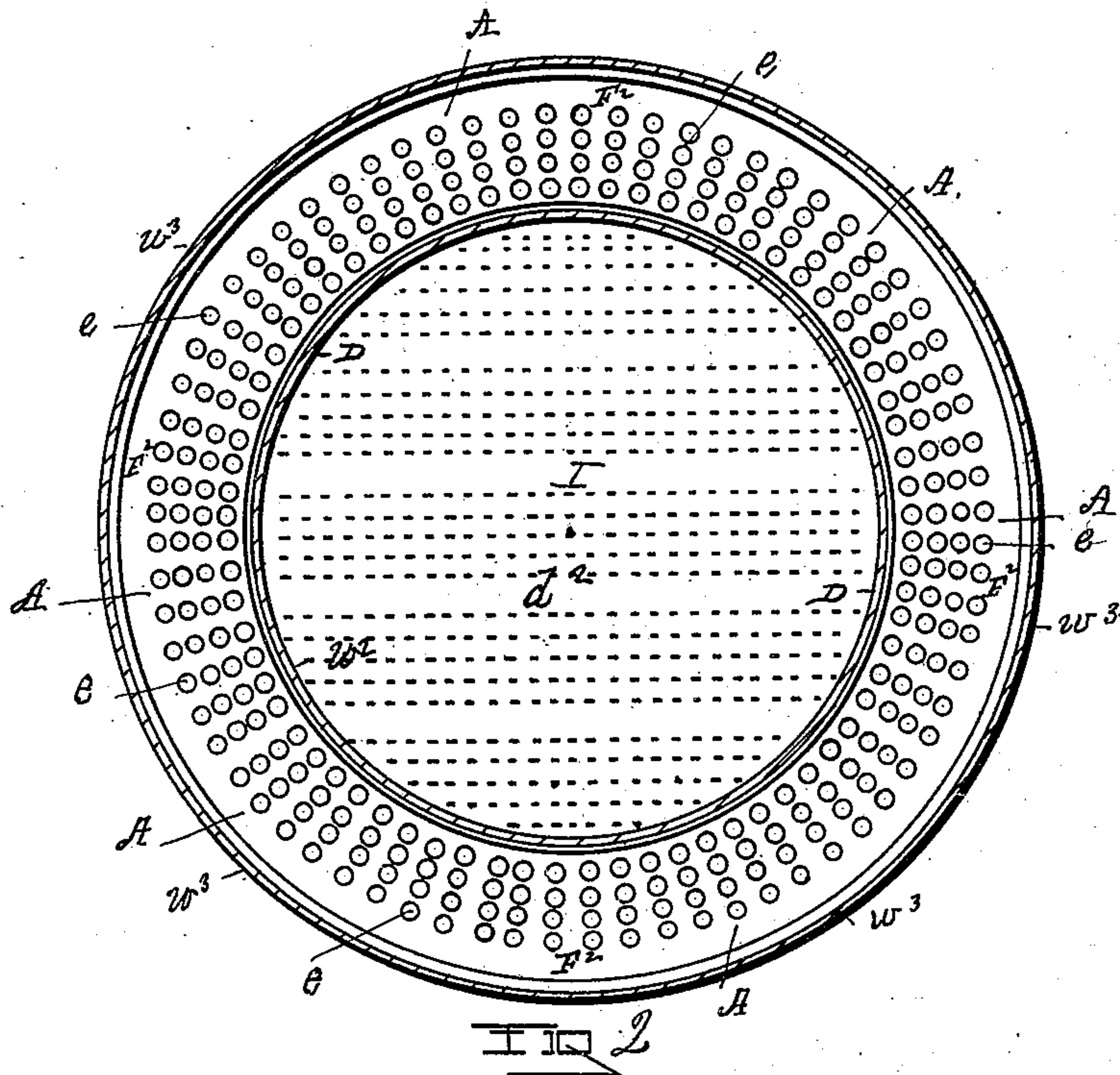
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UNITED STATES PATENT OFFICE.

JOHN MACCORMACK AND HARRY L. VAN ZILE, OF ALBANY, NEW YORK;
SAID JOHN MACCORMACK ASSIGNOR TO WILLIAM W. MACCORMACK,
OF SAME PLACE.

DIGESTER FOR TREATING PAPER-STOCK.

SPECIFICATION forming part of Letters Patent No. 464,199, dated December 1, 1891.

Application filed January 20, 1891. Serial No. 378,450. (No model.)

To all whom it may concern:

Be it known that we, JOHN MACCORMACK and HARRY L. VAN ZILE, both of the city of Albany, county of Albany, and State of New York, have jointly invented new and useful Improvements in Digesters for Treating Paper-Stock, of which the following is a specification.

Our invention relates to improvements upon digester apparatus for treating paper-stock, and more particularly to the construction and arrangement of an annular chamber at the waist of a digester, connecting interiorly with the latter, and adapted to be heated thereat by steam that is not in contact with the stock, the object and purpose of our invention being to provide a means to apply heat to the liquor at the waist of the digester, so as to make better available for use such circulations of the liquor as take it from either the top and bottom of the digester to discharge it into the waist or draw it from the waist to discharge it into the top and bottom of the digester, or from the top and waist to discharge it into the bottom, or from the bottom and waist to discharge it into the top of the digester, or from the bottom to discharge it into the waist and top of the digester.

Accompanying this specification to form a part of it there are two plates of drawings containing two figures illustrating our invention, with the same designation of parts by letter-reference used in all of them.

Of the illustrations, Figure 1 is a central vertical section of a digester having an annular chamber at the waist containing our improvements, with the circulating-pipes, pump, and valves of the apparatus shown in side elevation, with a part of the top and adjacent side thereat also shown in elevation. Fig. 2 is a transverse section taken on the line $x'x'$ of Fig. 1; and Fig. 3 shows a section taken through the digester on the line x^2x^2 of Fig. 1, with the top of the annular chamber shown in plan.

The several parts of the apparatus thus illustrated are designated by letter-reference and the function of the parts is described as follows:

The letter D designates the digester, I its interior, T' its top or head, and B its bottom.

The letter d' designates a perforated diaphragm arranged transversely within the digester near its top or head T'.

M is a perforated tube-form man-hole passage that extends through the upper diaphragm d' , and C indicates the man-hole cap.

The letter t' designates one of a series of trusses arranged between the upper diaphragm d' and the interior surface of the upper head or top T'.

The letter R designates a ring encircling the digester near its top, and g' guy-rods connecting with said ring, with the outer ends of the rods broken off, the function being to run to and connect with a support to keep the digester in position.

The letter d^2 designates the lower diaphragm, which is perforated and arranged within the digester interior on an incline and extending downwardly, so that one end thereof will be below the valve V.

The letters t^2 designate one of a series of truss-supports arranged between the bottom B and the lower diaphragm d^2 , all of which parts of a digester are shown and described in another application for Letters Patent made by the undersigned and filed in the United States Patent Office December 14, 1889, Serial No. 333,692, and is now pending.

The letter P designates a rotary pump for causing a circulation of the liquor within the digester and for supplying fresh liquor when desired. This pump has one main inlet-pipe p^2 , having thereon valves $v^2 v^3 v^4$, and stock-supplying pipes p^3 , having a valve v^5 , pipe p^4 , having a valve v^6 , pipe p^5 , having a valve v^7 , and a pipe p^6 . This main inlet-pipe has a branch b' , having a valve m' , a branch b^2 , having a valve m^2 , and a branch b^3 , having a valve m^3 .

The letter O designates the main discharge-pipe of the pump, and this pipe is provided with a branch o^2 , having a valve n' , a branch o^3 , having a valve n^2 , and another branch o^4 , having a valve n^3 , and is also provided with a valve n^4 , arranged between the branches $o^2 o^3$ on the main outlet-pipe O.

The letter P^2 designates a pipe that at its lower end connects with the branches b^3 and o^2 , said pipe P^2 having a valve v^{10} and at its top connects with the digester interior above the diaphragm d' .

The letter P^3 designates a pipe that at its lower end connects with the branches b^2 and o^3 and at its upper end with the pipe P^2 , and the letter P^4 designates a pipe which at its upper end connects with the annular chamber A and at its lower end with the pipe P^2 and having a valve n^7 .

The letter P^6 designates a steam-supply pipe that connects with the steam-chamber S^2 by means of a branch s^3 at its upper end, and thereat is provided with valves s^4 s^5 and at its outer end connects with the pipe P^2 , and at its lower end this steam-pipe P^6 is provided with a horizontal branch p^8 , having a valve v^9 , which branch enters the digester below the lower diaphragm d^2 . This steam-pipe P^6 is broken off at a' from its connection with a boiler. (Not shown.) The arrangement of pipes and valves thus illustrated and described is for the purpose, in connection with the pump P, for producing different circulations of the liquor from the annular chamber to the top or bottom of the digester, or the reverse, or from the top of the digester to the annular chamber, and are made the subject of the other application for Letters Patent made by us and hereinbefore designated and are disclaimed herein.

The annular chamber A is produced upon the exterior wall w^2 of the digester and connects with the interior of the latter by apertures a^2 , arranged in the digester-wall.

The letter J designates a perforated screen that is arranged upon the inside of the digester-wall, so as to be over the openings a^2 , and the function of this screen is to strain the liquor as it passes from the digester into the annular chamber A. The letters S^2 designate steam-chambers arranged at the top and bottom of said annular chamber A, and $e e e$ steam-pipes connecting at the top and bottom with the steam-chambers S^2 and immediately passing through the annular chamber A, so that when steam enters the steam-chambers S^2 and their connecting-pipes $e e e$ through the pipe P^6 the liquor in the annular chamber is heated by such steam, and heat is also applied to the digester at the waist by the use of steam other than the introduction of the latter within the digester. The letter v^3 designates a drip-cock by which the steam condensing in the steam-chamber may be drawn off. This annular chamber A is produced by the ring-form top h' , made in segments that are placed to abut radially at r^2 on their side edges with top plates r^4 , having a packing beneath them, which packing is not shown, said top plates r^4 being made to overlap the radially-abutting edges of the segments, and where thus overlapping the latter connected with the segments by bolts r^5 . The sides of the annular chamber, as indicated at w^3 , are

secured to the under side of the top h' by a ring of angle-iron r^6 , which is riveted to the under side of the subtending edge of the top h' and to the upper end of the annular-chamber sides, and the lower end of the annular-chamber sides is connected to the upper surface of the bottom h^2 where subtending the sides by means of a ring of angle-iron r^8 , that is riveted to the lower end of the sides and to the upper surface of the bottom h^2 where subtending the sides.

The letter R' designates a ring of angle-iron connecting with the under surface of the inner edge of the top h' and the digester side wall, and the letter R^2 designates another ring of angle-iron which connects with the inner edge of the bottom ring h^2 and with the digester-wall w^2 .

The letter F' designates an annular plate that is arranged transversely to form with the top plate h' the upper steam-chamber S^2 , and the letter F^2 designates another annular plate that is arranged transversely to form with the bottom annular plate h^2 the lower steam-chamber S^2 , and the letter e designates pipes arranged to connect with the bottom ring F^2 and with the top ring F , so as to pass through the annular chamber A.

As thus made and arranged, an annular chamber is formed about the waist of a digester, and this chamber is adapted to contain liquor, with means for it to pass from the chamber into the digester under pump-pressure, or to be drawn from the digester into the annular chamber by the draft force of the pump, and in the use of either of these two currents of the liquor heat may be applied to the latter from steam not discharged into the liquor to reduce its strength Baumé. Another advantage which this manner of construction of an annular chamber gives is that which comes from heating the digester at the waist, where the steam-chambers S^2 S^2 are in contact with the digester above and below the annular chamber. Where an annular chamber is thus constructed by means of circulating-pipes, heat may be applied to the liquor and the latter directed to act locally upon the stock where requiring further treatment without overtreating portions already sufficiently treated.

Having thus described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In an apparatus for treating paper-stock, the combination, with a cylindrical digester, of an annular chamber arranged to encircle the digester at the waist thereof, apertures connecting the digester interior with said annular chamber, a screen arranged on the digester interior where opposite said apertures, and steam-pipes arranged within said annular chamber, constructed and arranged to heat the contents of said annular chamber, substantially in the manner as and for the purposes set forth.

2. The combination, with a digester, of an

annular chamber arranged at the waist of the former to be projected from the sides thereof and having a connection with the digester interior through an intermediate screen, an annular steam-heating chamber at the top and bottom of the annular chamber, and pipes passing through the latter, connecting with said top and bottom steam-chambers, substantially in the manner as and for the purposes set forth.

Signed at Troy, New York, this 24th day of November, 1890, and in the presence of the two witnesses whose names are hereto written.

JOHN MACCORMACK.
HARRY L. VAN ZILE.

Witnesses:

CHARLES S. BRINTNALL,
W. E. HAGAN.