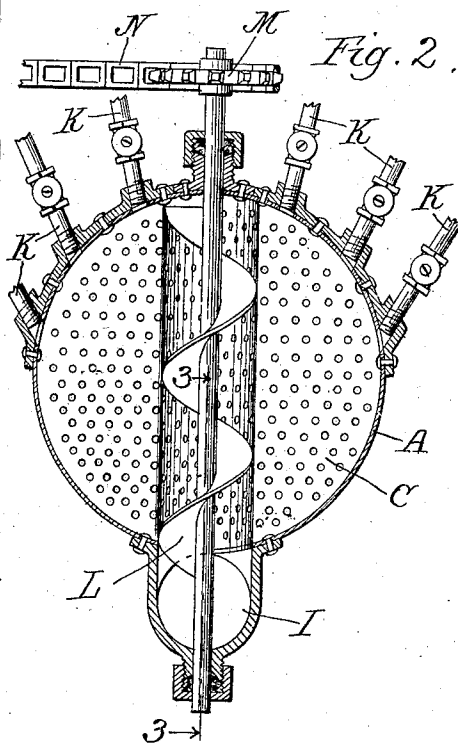
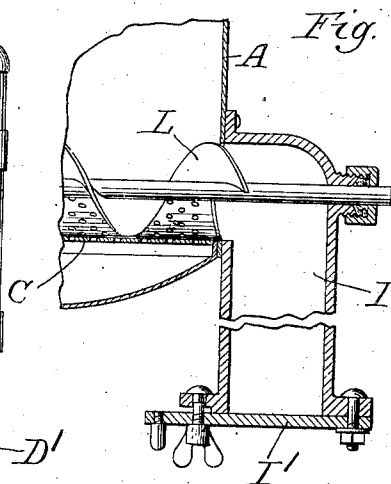
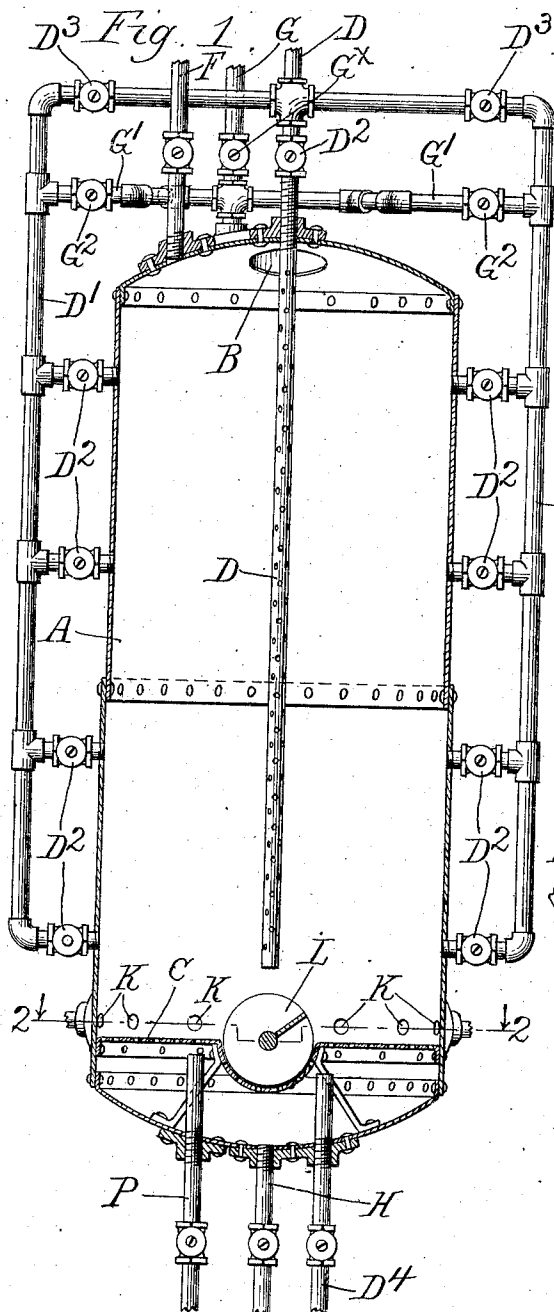


No. 850,384.

PATENTED APR. 16, 1907.

G. H. MALLAM.
DIGESTER FOR WOOD FIBER.
APPLICATION FILED NOV. 1, 1906.

2 SHEETS—SHEET 1.



Witnesses.
Edward T. Wray.
J. S. Abbott

Inventor.
Guy H. Mallam.
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his Atty.s.

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2 SHEETS—SHEET 2.

Fig. 4.

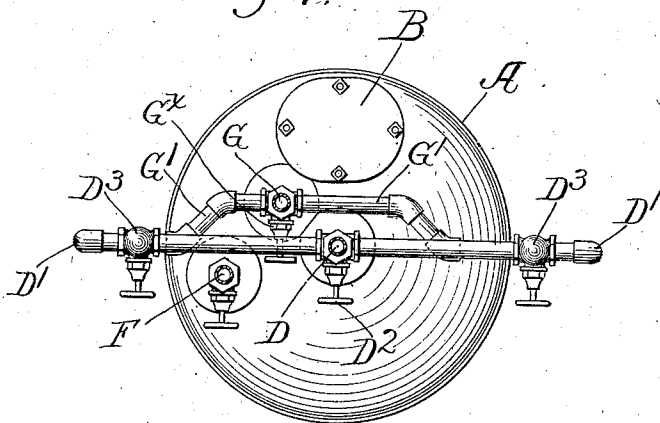
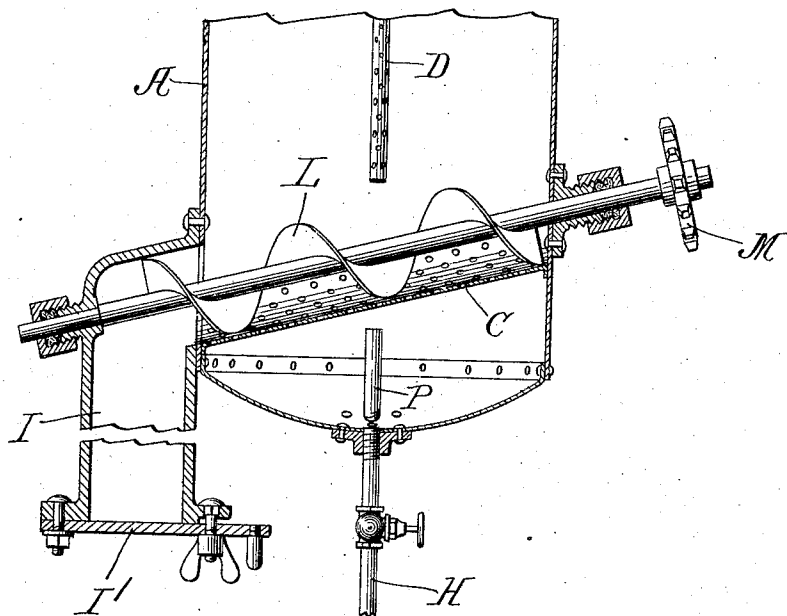


Fig. 5.



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UNITED STATES PATENT OFFICE.

GUY H. MALLAM, OF KANSAS CITY, MISSOURI.

DIGESTER FOR WOOD FIBER.

No. 850,384.

Specification of Letters Patent.

Patented April 16, 1907.

Application filed November 1, 1906. Serial No. 341,520.

To all whom it may concern:

Be it known that I, GUY H. MALLAM, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented new and useful Improvements in Digesters for Wood Fiber, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

This application is designed as an improvement upon steam-digesters hitherto employed for treating wood fiber for the purpose of extracting therefrom the vaporizable and soluble oils and other chemical constituents, so as to leave the fiber free of said elements and for further treatment and to retain for removal separately the liquid and soluble constituents.

It consists of the features of construction especially adapted for discharging therefrom the mass of fiber after the treatment for separating the soluble elements is completed.

In the drawings, Figure 1 is a vertical axial section of a digester embodying this invention. Fig. 2 is a section at the line 2 2 on Fig. 1. Fig. 3 is a section at the line 3 3 on Fig. 2. Fig. 4 is a top plan view. Fig. 5 is a detail section in plane at right angles to that of Fig. 1, showing a modification consisting of inclining the grating or fiber-support for discharge.

This digester comprises an upright cylinder A, into which the wood fragments or shredded, chipped, or otherwise mechanically-reduced wood to be treated are introduced through a manhole B at the upper end, provided with suitable removable cover, which may be applied and tightly secured when the digester is filled. The material thus introduced is supported upon a grating or wire-mesh diaphragm C near the bottom.

D is a steam-pipe, through which steam may be introduced at the upper end, such pipe preferably extending longitudinally through the center of the cylinder and being perforated for discharge of the steam at a multiplicity of points in its length. In order to introduce steam at different points in the length of the cylinder at the outer side of the mass of wood fiber therein, as well as at the center through the central pipe D, branch steam-pipes D' D' are extended longitudinally of the cylinder outside the same and connected at a plurality of points, as many as desired, with the cylinder for discharging

steam thereinto. Valves D² are provided in the pipe D and at the several connections of the pipe D' with the cylinder for controlling the discharge of steam at as many points as may be found desirable in each case.

F is a pipe leading from the top for carrying off vapors of the vaporizable elements to proper condenser or distilling apparatus (not shown) for suitably condensing, separating, or further treating such vapors to recover the values therefrom.

G is a pipe leading into the top for the introduction of water for a purpose hereinafter specified. Branch pipes G' G' extend from the main water-pipe G beyond the valve G^x in said water-pipe to the branch steam-pipes D' D', being connected to the latter beyond valves D³ D³, which are provided in said branch pipes D' D' to cut them off from the main steam-pipe D at will. A valve G² in the branch pipe G' controls the admission of water from the pipe G to the pipes D and D' for admitting water to the cylinder at all or any desired points in the length thereof at which a provision is made for admitting steam, as described.

H is a pipe leading off liquid containing the soluble elements which are not vaporized by the temperature employed.

I is a discharge connection leading from one side near the lower end and preferably being an elbow, as shown, closed by an exterior shut-off gate or valve I'.

The soluble constituents of the wood, which are not vaporizable at the temperature employed for treatment, pass through the grating or wire-mesh support and diaphragm C into the space beneath the same, where they accumulate ready to be drawn off through the pipe H.

D⁴ is a steam-pipe leading into the bottom of the cylinder below the diaphragm or grating C for the purpose of vaporizing all or any portions of the liquid derived from the soluble elements of the wood fiber. A pipe P may be provided extending up through the bottom, opening immediately under the grating or diaphragm C for carrying off the vapors thus developed to proper apparatus (not shown) for subsequent treatment.

When the digester is fully charged with the fibrous material and the steam is let into it, the expansion of the fiber caused by the increase of temperature and its absorption of moisture causes it to be very compactly

massed in the digester, and this condition tends to prevent its ready discharge therefrom when the treatment is completed. For the purpose of starting the mass out through the discharge-opening there are provided at the lower end a little above the grating or wire-mesh diaphragm C a number of steam-pipes K K K K for discharging steam-jets substantially horizontally above said grating in directions converging toward the discharge-opening, and these by their mechanical force attacking the lower part of the fiber force it out and leave space into which the fiber above falls, with the effect usually of gradually loosening the entire mass, so that it passes out readily, but in any event with the effect of forcing it out as it settles into the range of the steam-jets. In order to supplement and facilitate this action and more expeditiously discharge the contents, I provide a spiral conveyer L, extending at the lower part of the space occupied by the fiber above the grating or wire-mesh diaphragm C substantially diametrically toward the discharge-opening from the opposite side. To accommodate and facilitate the action of this spiral conveyer, the grating or wire-mesh diaphragm C may be formed with a diametrically-located depression or trough, in which the spiral conveyer is seated and operates for feeding the fiber toward the discharge connection I. The shaft of the conveyer extends out through stuffing-boxes at both ends, and at either end it may be provided with means for rotating it, as a sprocket-wheel M, to receive a driving-chain.

In any case in which the fiber is of such nature or is so compactly massed in the digester that it does not yield to the means already described for discharging it the discharge may be assisted by flooding the digester with water completely enveloping the fiber, the water being supplied through the pipe G under pressure maintained after the discharge gate or valve is opened and, if desired, while the other means—the steam-jets and the spiral conveyer—are in operation for assisting in the movement of the fiber. The valve G^x in the pipe G being opened, the mass of water enveloping the fiber is caused to move onward bodily by the pressure behind, and in so moving carries the fiber with it into the space made vacant, partially cleared by the operation of the jets and the spiral conveyer at the bottom, the water behind or above the fiber operating substantially as a piston to force the mass of water-enveloped fiber before it. The introduction of water at ordinary temperature operating to cool the fiber mass may have sufficient effect to loosen it in the cylinder and permit it to pass out readily, and the introduction of water under considerable pressure at the sides of the cylinder may sometimes operate to compress it somewhat before the center is fully occupied with

the water mass, with the like effect of loosening it to permit its easy egress, and for this reason, as well as to facilitate the filling of the cylinder with water in order that the fiber may be moved out under pressure against the continuous body of liquid containing the fiber, as above described, the connection from the water-pipe G to the steam-pipes D and D' is made as above described, and when it is desired to use the water-pressure in this manner the valve D³ being closed, the valve G² may be opened to admit the water, not only through the pipe G, but also through the pipe G' and their connections with the cylinder. In order to further facilitate the discharge of the fiber, it may be found preferable to incline the grating C upward from the lower side of the discharge-opening, so that gravity may assist the lateral movement as well as the descending movement of the fiber for discharge. Such modification is illustrated in Fig. 5.

I claim—

1. A digester for wood fiber consisting of a chamber having the space for the fiber free from transverse obstruction; a grating for supporting the fiber at a little distance above the bottom of the digester, the chamber having a lateral opening adapted for discharge of the fiber immediately above the level of the grating, and a multiplicity of steam-jets converging toward said discharge-opening.

2. A digester for wood fiber comprising an upright cylinder provided with steam-supply connections and having a fiber-supporting grating near the bottom, the fiber-space above the grating being free from transverse obstruction, such cylinder having a lateral discharge-opening immediately above the grating, and a spiral conveyer operating immediately above the grating for feeding the fiber transversely toward the discharge-opening.

3. A wood-fiber digester comprising an upright cylinder having a lateral discharge-opening near the bottom; a grating to support the fiber below the discharge-opening; mechanical means for feeding the fiber transversely toward the discharge-opening; and connections into the cylinder for maintaining a supply of water under pressure to said cylinder.

4. A wood-fiber digester consisting of an upright cylinder having a lateral discharge-opening at the bottom; a grating for supporting the fiber extending below the discharge-opening; a multiplicity of steam-jets discharging transversely into the cylinder and converging toward the discharge-opening, and a valved water-supply connection into the cylinder for maintaining a supply of water under pressure thereto during discharge.

5. A wood-fiber digester comprising an upright cylinder having a lateral discharge-opening near the lower end; a grating for

supporting the fiber below such opening; a spiral conveyer extending transversely above the grate for feeding toward the lateral discharge-opening; a multiplicity of steam-jets projecting transversely into the cylinder immediately above the grating and converging toward the discharge-opening, and a valved water-supply connection into the cylinder for maintaining a supply of water under pressure thereto during discharge.

6. A wood-fiber digester consisting of an upright cylinder having near the bottom a grating or transverse reticulated diaphragm for supporting the fiber; a lateral fiber-discharge opening immediately above such diaphragm; a steam-pipe extending longitudinally within the cylinder and perforated within the same for discharge of steam at a multiplicity of points throughout the length thereof; a drainage connection for the liquids leading from the lower end of the cylinder below the diaphragm, and vapor-pipe connections leading to the upper end of the cylinder.

7. A digester for wood fiber consisting of an upright cylinder having a lateral fiber-discharge opening at the bottom; a grating to support the fiber; steam-pipe connections for admitting steam to the space above the grating for digesting the fiber; a steam connection into the space below the grating for vaporizing the liquid derived from the solu-

ble elements of the wood, and a vapor-discharge-pipe connection at the upper part.

8. A digester for wood fiber consisting of a chamber having space for the fiber and a grating for supporting the latter at a little distance above the bottom of the digester, the chamber having a lateral discharge-opening above the grating, said grating being inclined upward from the lower side of the discharge-opening, in combination with a multiplicity of fluid-discharge jets projecting into the cylinder above the grating and converging toward the discharge-opening.

9. A digester for wood fiber consisting of a chamber having space for the fiber and a grate for supporting the latter a little distance above the bottom of the digester, such chamber having a lateral discharge-opening above the grating, such grating being inclined upward from the lower side of the discharge-opening, in combination with a conveyer operating along the incline above the grating toward the discharge-opening.

In testimony whereof I have hereunto set my hand, at Kansas City, Missouri, this 15th day of October, A. D. 1906.

GUY H. MALLAM.

Witnesses:

E. H. BALLA,
WM. A. SINGLE.