

No. 827,554.

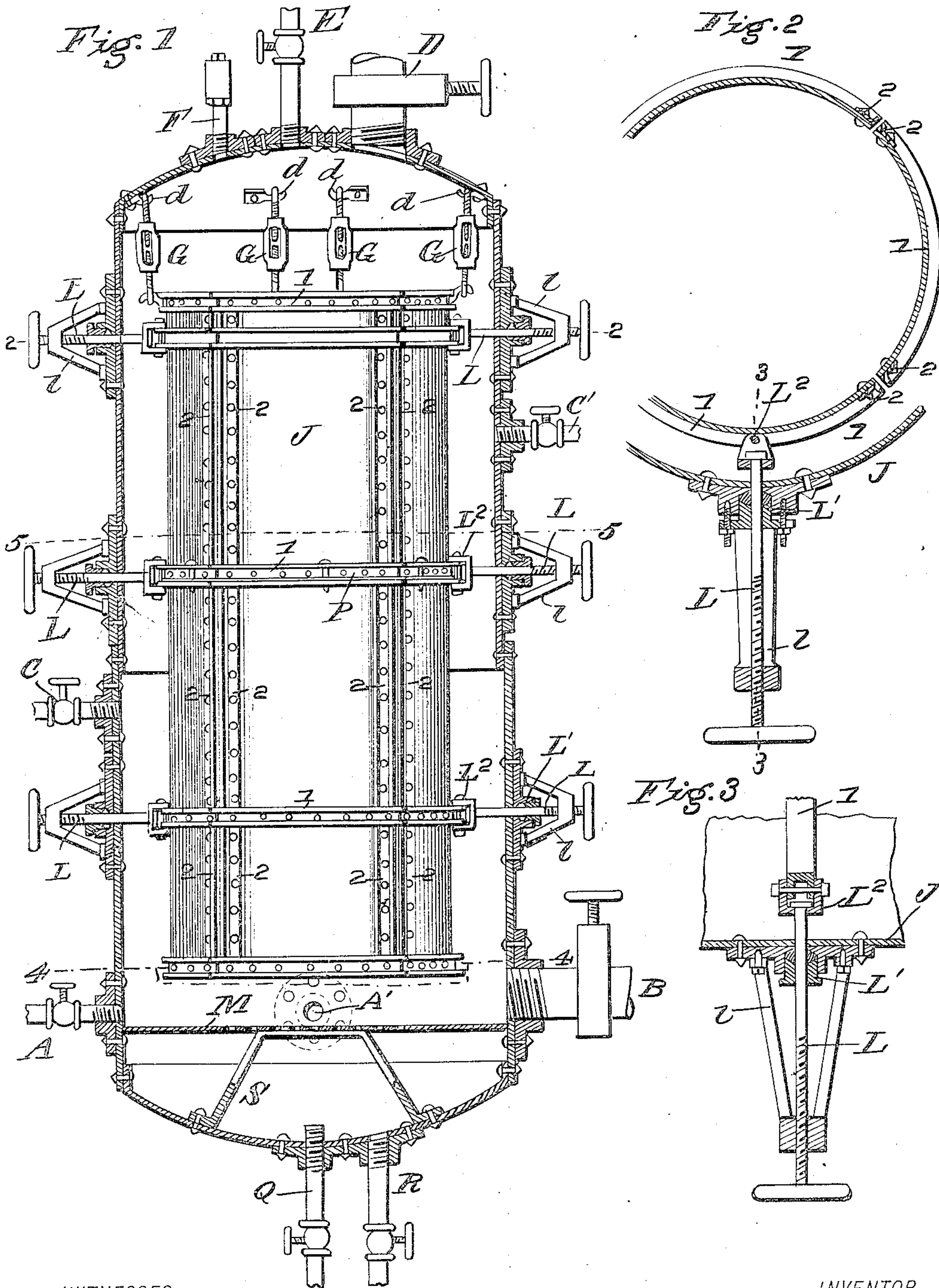
PATENTED JULY 31, 1906.

F. D. McMILLAN.

DIGESTER FOR EXTRACTING SPIRITS OF TURPENTINE.

APPLICATION FILED MAR. 24, 1906.

2 SHEETS—SHEET 1.



WITNESSES

E. Chaffey
Edw. W. Byrne

INVENTOR

FERDINAND D. McMILLAN

BY *Munn & Co.*

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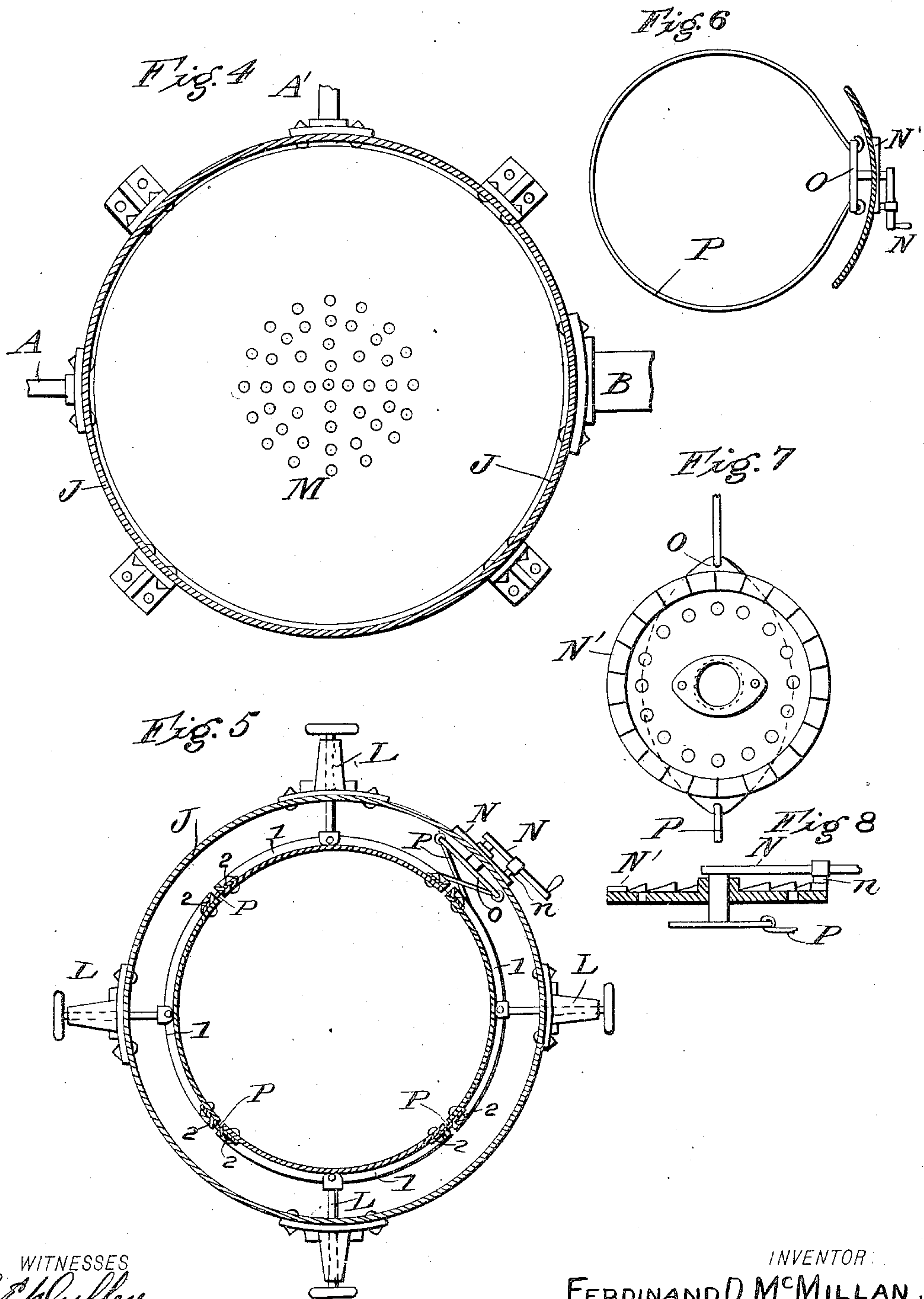
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UNITED STATES PATENT OFFICE.

FERDINAND D. McMILLAN, OF ATLANTA, GEORGIA.

DIGESTER FOR EXTRACTING SPIRITS OF TURPENTINE.

No. 827,554.

Specification of Letters Patent.

Patented July 31, 1906.

Application filed March 24, 1906. Serial No. 307,826.

To all whom it may concern:

Be it known that I, FERDINAND D. McMILLAN, a citizen of the United States, residing at Atlanta, in the county of Fulton and State of Georgia, have invented a new and useful Improvement in Digesters for Extracting Spirits of Turpentine, of which the following is a specification.

My invention is in the nature of a digester for the purpose of extracting spirits of turpentine or other volatile products from wood in the form of blocks, chips, sawdust, or granulations.

It relates to the form of digester which employs a vertical or upright cylinder. In this form of digester difficulty has been found in discharging the woody residuum, owing to the fact that under the influence of heat the woody material becomes compacted and conglomerated or glued together and so tightly held by swelling as to be difficult of discharge, requiring several hours to discharge a single charge of residuum.

My invention is designed to devise a simple and practical means for promoting the discharge of this conglomerate mass remaining as residuum and to do so rapidly and in a convenient manner.

The invention consists in the novel construction and arrangement of parts of a sectional retort for holding the wood and relieving its adhesion thereto, so that it may be fed down by gravity and be blown out by a blast of air or steam.

Figure 1 is a vertical section of the upright digester. Fig. 2 is a partial horizontal section thereof on about line 2 2 of Fig. 1. Fig. 3 is a detail sectional view of the means for adjusting the sections of the retort, taken on line 3 3 of Fig. 2. Fig. 4 is a horizontal section taken on line 4 4 of Fig. 1, showing the perforated bottom. Fig. 5 is a horizontal section taken on line 5 5 of Fig. 1. Fig. 6 is a detail of the encompassing girdle or constricting-band for the sectional retort, and Figs. 7 and 8 are enlarged details of the means for applying or relaxing the tension of said band.

Referring to Fig. 1, J is an upright cylinder having near its bottom a large outlet B, provided with a gate-valve through which the woody residuum is blown out. D is a large inlet-opening at the top through which the wood is charged into the cylinder. E is an outlet-pipe from which the volatile vapors resulting from the distillation of the wood are allowed to pass off into the con-

denser. F is a safety-valve. Q is an inlet-pipe for the steam. R is a discharge-pipe for the tar and heavier oils. A and A' are blowout-pipes located in the horizontal plane of the outlet B for the purpose of introducing the blast of air or steam to discharge the woody residuum from the cylinder. C and C' are inlet-blowpipes through which steam or air is introduced to loosen and discharge material remaining between the cylinder and the retort.

In central position in the upright cylinder is suspended a vertical sectional retort open at top and bottom and consisting of a series of longitudinal sections of a cylinder, each section having horizontal curved ribs 1, connected by vertical bars 2, of which sections there are four, more or less, (see Figs. 2 and 5,) which form a complete sectional retort of cylindrical form, each section of the retort being constructed independently and capable of independent adjustment to and from the center. These sections are independently suspended by means of turnbuckles G, having right and left screw-threads and supported on hooks d, attached to the top of the cylinder. The bottom of the retort as formed of these sections is suspended within fourteen inches of a false bottom M, mounted upon a support S on the bottom of the cylinder. This false bottom is perforated throughout the central portion, as shown in Fig. 4, and occupies a plane just below the level of the discharging-pipe B and blowout-pipes A and A'. Each section of the retort is rendered independently adjustable to or from the center by means of three (more or less) screws L, which are tapped through brackets l, fastened to plates bolted to the cylinder. Each screw passes through a stuffing-box L' and is provided inside of the cylinder with a head swiveling within a yoke-frame L², connected to the ribs 1 of the sections of the retort, so that by turning the screws L in one direction or the other the several sections of the retort are adjusted to or from the center. When adjusted to their inner position, the several sections of the retort form a complete circle, as shown in Figs. 2 and 5, but each section may be independently withdrawn by means of screws L to enlarge the circle of the retort.

The sectional retort constitutes the receptacle which holds the mass of comminuted wood. The steam admitted through the pipe Q serves to distil the volatile vapors of

the woods contained within the retort, which volatile vapors pass up through the pipe E into any condenser. The mass of more or less conglomerated wood remaining in the retort is allowed to feed down by gravity by retracting the adjusting-screws L so that the several sections of the retort will recede from the charge of conglomerated wood and will thus loosen its adhesion to the retort, so that it passes down to the level of the false bottom M and is easily blown out in a comminuted form through the outlet-discharge B by means of a steam or air blast introduced through pipes A A'. Any portion of the woody residuum remaining in the annular space between the retort and the outer cylinder J is loosened and discharged by means of a blast of steam or air introduced through pipes C and C'. The large charging-inlet D and the large discharge-outlet B are provided with suitable tight covers or gate-valves, and the several steam and distillate pipes are suitably provided with valves.

When the retort is first charged with wood and its sections have been adjusted to their inner position by means of screws L, these sections of the retort are firmly held to position by one or more encompassing bands or girdles P, (shown in Fig. 6,) which band is extended around the retort, as shown in Fig. 5, and the ends of this band or girdle are tightened or relaxed, as may be required, by means of adjusting devices. (Shown in Figs. 7 and 8.) These consist of a disk or plate O, to which the ends of the constricting-girdle P are attached. On the opposite side of the disk is fastened a short shaft, which passes through a stuffing-box in the cylinder and is rigidly connected with a crank-arm N. The crank-arm N is provided with a detent *n*, adapted to engage the ratchet-teeth on the external plate N', bolted to the exterior of the cylinder. By rotating the crank-arm N it will be seen that the disk O is turned and the ends of the girdle are tightened about the sections of the retort and are held in this position by means of a detent *n*, engaging the ratchet-teeth on the plate N'. When the sections of the retort are to be expanded by means of the screws L, the detent *n* of the arm N is released from the ratchet-teeth N', and the disk O is turned to relax the encompassing girdle P.

The operation of my digester is as follows: The sections of the suspended retort are first adjusted to their inner position by means of screws L and are retained in this position by tightening the encompassing girdle. The discharge-gate at B is closed and the wood is charged into the retort through the inlet D in the form of blocks of suitable size or chips, sawdust, or granulations or any combination of these as may be desired. The charging-inlet D is then closed, as is also the vapor-escape pipe E and the blowout-valves in

pipes A, A', and R. Steam at about fifty pounds pressure is then turned on through the pipe Q, and when a sufficient pressure has been attained the valve in the vapor-pipe E is opened, which allows the vapors from the wood to pass to the condenser until a sufficient amount thereof has been extracted. The digester is then discharged as follows: The steam is cut off at the pipe Q and the volatile vapors at pipe E, the flexible girdle or band P is relaxed, and the sections of the retort are then drawn back by means of the screws L, which loosens the charge within the retort and which allows the charge to automatically feed down and rest upon the perforated bottom M. Steam or air through the pipes C C' is then admitted into the space in the digester between the retort and the outer shell to loosen any material which has accumulated there, and as soon as this has been accomplished the valves in the pipes C and C' are closed. Then the discharge-gate in the outlet B is opened and steam or air is admitted from the pipes A A' onto the charge of residuum resting on the false bottom M, which charge of woody residuum is blown out in a more or less comminuted condition through the pipe B. The turnbuckles G with right and left screws permit a slight vertical adjustment of the sections of the retort to cause the weight of the retort and its charge to be borne upon the turnbuckles, and thus relieve the adjusting-screws L from such weight, so that the screws may be conveniently operated without excessive friction and without lateral wear and leakage at the stuffing-boxes.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A digester of upright form having arranged within it a sectional retort with means for enlarging its cross-section.

2. A digester of upright form having a horizontal bottom near its lower end, inlet and outlet blowpipes arranged above the level of the said bottom, and a vertically-suspended and laterally-expansible retort with open top and bottom arranged above said bottom.

3. An upright digester having a sectional retort within the same, combined with adjusting-screws extending through stuffing-boxes in the side of the digester and attached to the adjustable sections of the retort to increase or diminish the cross-section of the same.

4. In a digester of the kind described, the combination with a sectional retort; of means for adjusting said sections, and an encompassing band or girdle for said sectional retort and tightening and loosening devices for adjusting said band.

5. In a digester of the kind described, the combination of outlet and inlet pipes, an in-

ner retort made in sections, an encompassing band or girdle, and a tightening device for the same consisting of a disk or plate attached to the ends of the girdle, a shaft attached to said disk and extending through the wall of the digester and carrying a crank-arm and detent, and a stationary toothed plate secured to the exterior walls of the digester.

10 6. The combination with a digester having a blowout-pipe near its bottom, and a horizontal perforated false bottom at the level of said blowout-pipe; of a suspended retort open at top and bottom and terminating at
15 its lower end slightly above the false bottom and formed of laterally-expansible sections.

7. A digester comprising an outer upright

cylindrical shell, an inner sectional retort, adjusting-screws extending through the sides of the outer shell and connecting with the sections of the retort and independent suspending devices for each section of the retort.

8. A digester comprising an outer upright shell, an inner sectional retort, adjusting-screws extending through the sides of the outer shell and connecting with the sections of the retort and turnbuckles adjustably connecting the tops of the section of the retort to the outer shell.

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Witnesses:

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W. W. CLARKE.