

(No Model.)

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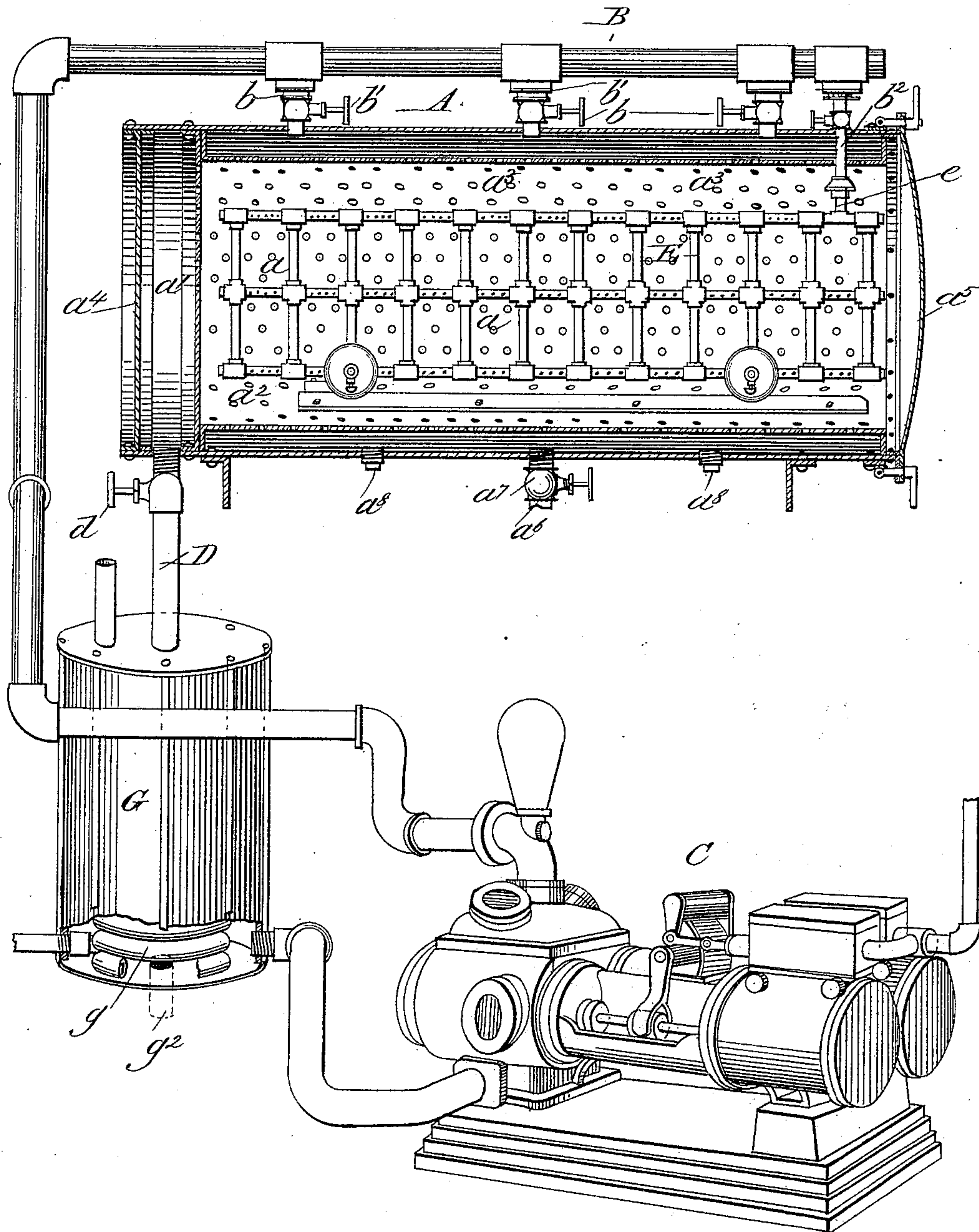
W. T. FORBES.

APPARATUS FOR TREATING FIBROUS PLANTS.

No. 439,032.

Patented Oct. 21, 1890.

Fig. 1.



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Fig. 2.

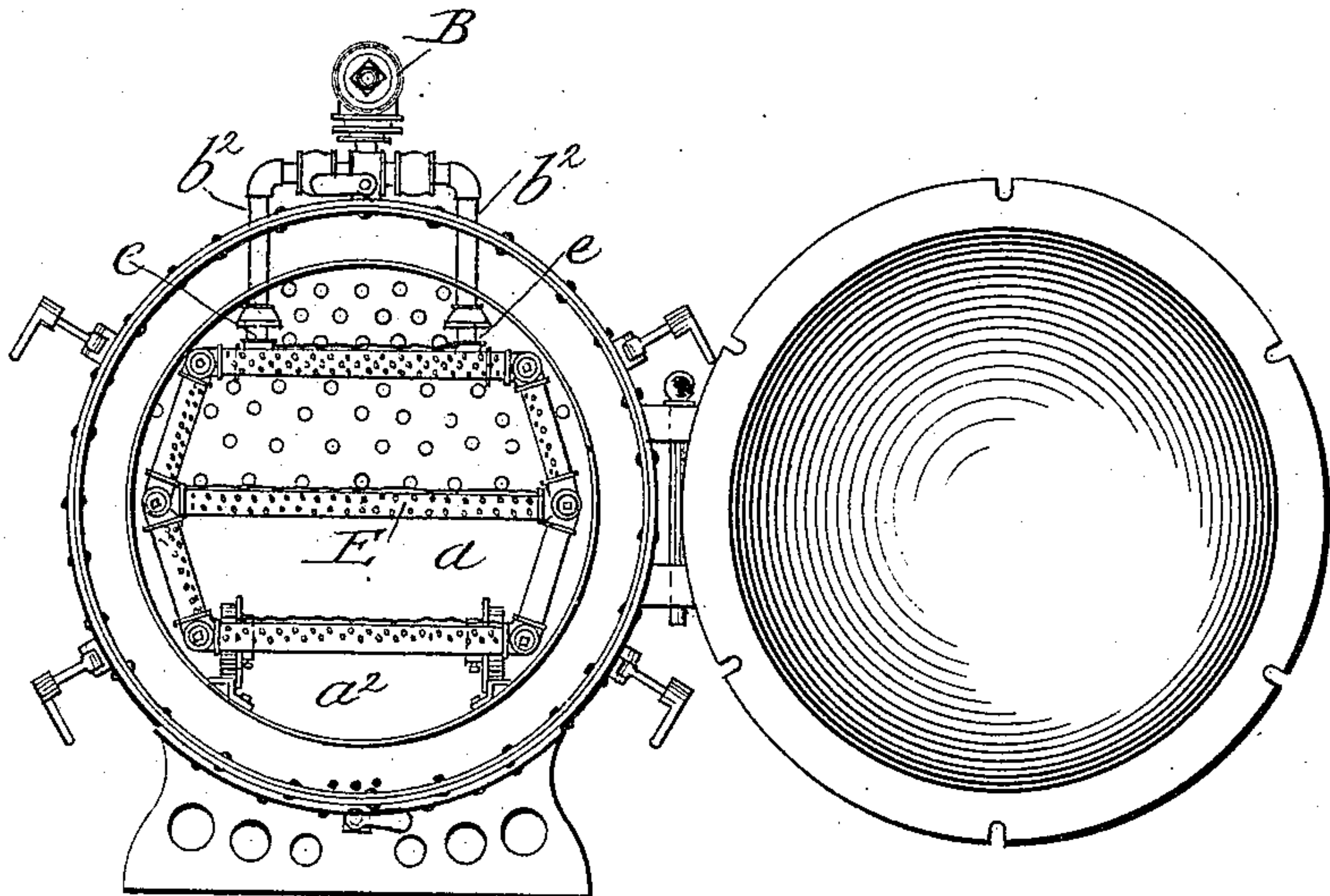
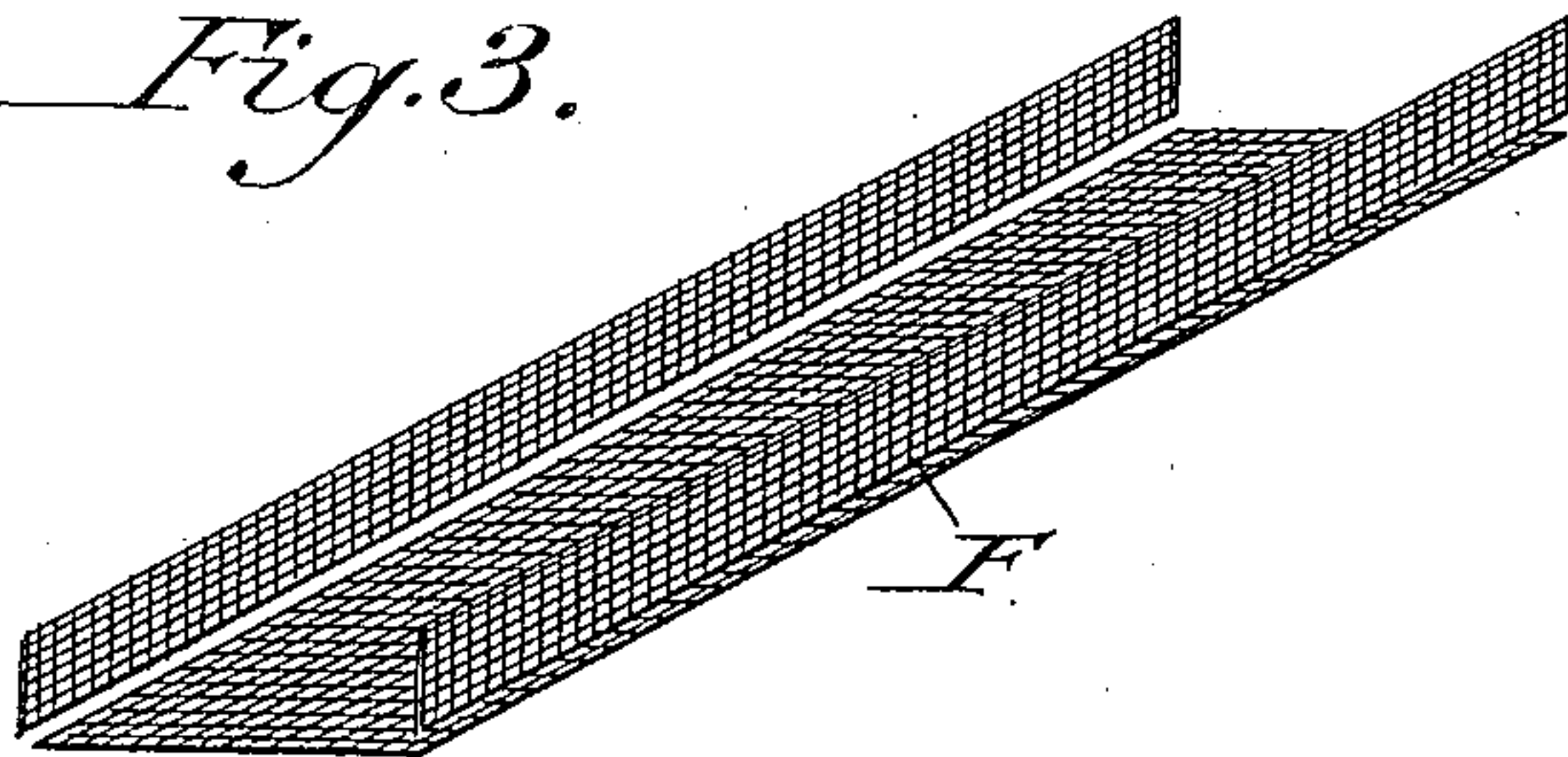


Fig. 3.



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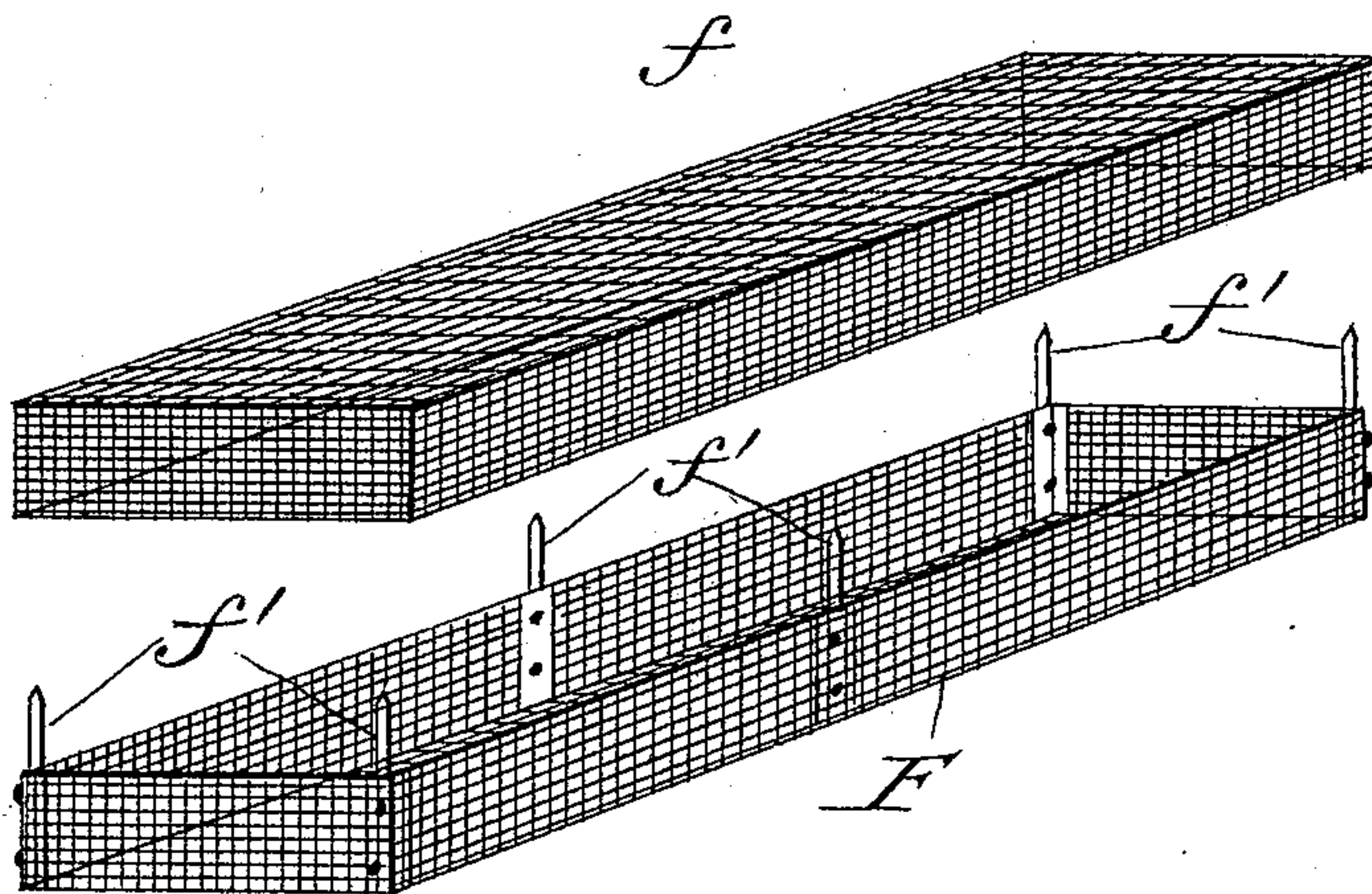
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Fig. 4.



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UNITED STATES PATENT OFFICE.

WALTER T. FORBES, OF ATLANTA, GEORGIA.

APPARATUS FOR TREATING FIBROUS PLANTS.

SPECIFICATION forming part of Letters Patent No. 439,032, dated October 21, 1890.

Application filed March 3, 1890. Serial No. 342,499. (No model.)

To all whom it may concern:

Be it known that I, WALTER T. FORBES, a citizen of the United States, and a resident of Atlanta, in the county of Fulton, State of Georgia, have invented certain new and useful Improvements in Apparatus for Treating Fibrous Plants; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

15 This invention relates to apparatus for treating fibrous plants, and more particularly to that class of devices for that purpose as are adapted to the use of a solvent, the object being primarily to furnish an apparatus or machine which will produce in the best possible manner a long-spinning fiber, and, secondly, to produce a device in which any length of fiber can be produced in as nearly as possible a continuous manner—that is, in which as little time as possible will be lost between a discharge and a recharging of the device with fiber-bearing material.

The invention consists in means for performing the above-mentioned operations, great efficiency being produced by a peculiar and novel means for procuring a complete circulation of and permeation of the plants by the solvent material, and of means for holding the plants when under treatment and the fibers when such are produced, the details of all of which will hereinafter be described, and the parts claimed as new pointed out in the claims.

40 In the accompanying drawings, Figure 1 is a central longitudinal vertical section through the digester and car or movable rack therein contained, showing the various operative parts, and also a heater and pump for heating the liquor employed as a solvent agent and causing a circulation of the same under pressure throughout the device. Fig. 2 is an end view of the digester with the door for charging and discharging of material opened, showing the movable rack or car in the interior, showing an end elevation of the same and its connection with the circulating supply-pipe, and further indicating the perforations between

the outlet and digesting-chamber of the digester. Fig. 3 is a view showing in perspective one of the trays used in the rack when extremely long fibers are being manipulated; and Fig. 4 shows a compression-basket in which plants are treated which bear but ordinarily long-spinning fibers.

I will now proceed to the description of these elements when constructed as shown in said figures, like reference-characters indicating corresponding parts in the several views.

The digester A is made of comparatively thick plate metal and of a size commensurate with the desired capacity of the apparatus, and has one end closed by a flanged plate a^4 and the other end supplied with a door a^5 , hinged to said digester and adapted to be fastened securely when closed, the device shown for the purpose being swivel-screws pivoted in the outer casing and turning into notches in the said door a^5 , having hand-nuts to clamp the door closed with. This casing is divided into two compartments, a being the digesting-chamber, while a' is a suction-chamber, said two chambers being separated by a partition of plate metal a^2 , which is perforated, as shown in Figs. 1 and 2, to about midway of said plate, the upper half being the perforated part. These perforations are comparatively large in diameter, as their function is to prevent the entrance of large substances which might be caused to float in the liquor, and they must be sufficiently large to supply the desired area of outlet-surface, as they constitute in the construction shown the sole outlet for the liquid solvent when the device is in operation. The chamber a has a false casing a^3 , which is perforated, preferably, over its entire surface, and which is situated at a short distance from the outer casing of the digester, leaving an annular chamber sufficient for the circulation of the liquor therein in large enough quantity to supply the total area of the perforations in the false casing a^3 . This false casing a^3 may extend the entire length of the chamber a or it may be cut up into several sections, the object thereof being to obtain a centripetal circulation.

In the chamber a outlet for circulation during the operation is had by way of the

pipe D, having valve d , and connected at the lowest point in the suction-chamber a' and at the other end to the heater G, preferably, or to any intermediate or different device, all of which, however, is fully explained. For discharging the liquor left in the chamber a after the operation by reason of the height of the apertures in the plate a^2 , a pipe a^6 , cut by valve a^7 , is passed out at about the lowest point in the casing, which will efficiently drain the whole digester if it be perfectly level. Otherwise plugs a^8 would be also employed, placed at or near each end of the annular chamber. This thorough draining, however, is only necessary to an extent that will allow of the opening of the door of the digester.

Shown above the digester A in Figs. 1 and 2 is a supply-pipe B, which has several connections b with the chamber a , which connections are each closed by a valve b' . This supply-pipe B is connected to the pump C, which causes a circulation of the liquor, as will be hereinafter described. On the extreme end of the supply-pipe B is connected two pipes b^2 , which pass downwardly and have on each of their ends half of a pipe-union for connection, as will be set forth in a more appropriate place.

Suitably supported in the center of the chamber a of the digester is a rack E, which is of pipe, so as to form throughout the said chamber a support for the trays in which the material is placed to be treated. The pipes forming the frame-work of this rack E are perforated on the sides which are toward the material being treated, or in such a manner as to assist the centripetal currents of liquid solvent. On either or both sides of the structure E is a pipe or pipes e , connecting with the pipes of the structure E of the said racks, and having on each of their upper ends the opposite half of the pipe-union which, as hereinbefore stated, is attached to the pipe b^2 . Thus it will be seen that the liquid solvent is introduced, as it were, into the center of the mass of plants to be treated.

In Fig. 4 is shown a basket F, into which the plants to be treated are placed, care being taken of course to lay them in approximately the position in which it is desired to have the fibers to remain during and after the process. After the plants have been so placed therein the cover f is placed over the said basket F, and being preferably guided by the pins f' and the said basket so covered is then deposited in the rack E in the desired position. It is obvious that during treatment, as the vegetable matter is eliminated from the mass, the cover f will yield to every contraction of the mass and will gently press down and hold together the material under treatment, and the process being completed the fibers will be found in practically the same position in which they were in the plant—that is, in bunches and wholly free from tangles. These baskets may be of any size desired, being either the full

length of the rack E or only as long as will accommodate the plants to be treated side by side, slightly-differing sizes being preferable for the treatment of different fiber-bearing plants—for instance, were the fibers, say, from four to six feet long, as sometimes found, in which case they are generally found very coarse, and hence resilient, a suitable wire-cloth tray, as shown in Fig. 3, might be used; but this tray would not be satisfactory for use in treatment of the ordinary spinning-fibers.

In case the basket shown in Fig. 4 is employed to contain the material under treatment it would be preferable that the rack E be stationary within the chamber a , as said basket could be easily removed; but in case said rack is used with the tray shown in Fig. 3 as a floor, or with the pipes placed sufficiently close together to hold the material, it would be preferable that the construction substantially as shown in Figs. 1 and 2 be employed—that is, said rack having flanged truck-wheels e , and a track e' being laid longitudinally along the bottom of the chamber a , which will allow the removal of the car loaded with the fiber as the result of the process and its refilling with fiber-bearing material and a recharging of the digester therewith, the pipe-unions, hereinbefore described, being disconnected and connected to form means for the transmission of liquid into solvent and the perforated pipes of the said car or rack for circulation therefrom among the material.

The pump C (shown in Fig. 1) may be of any desired form, as may also be the heater G, employed in bringing the liquid solvent to the desired temperature, the pump C shown, however, being a duplex pump, and the heater G being a steam-coiled reservoir, the coil g having connection with a steam-generator and the chamber around said coil being connected in circuit with the pump and digester, and the pipe g^2 , leading to a reservoir, containing the liquid solvent necessary to fill the digester, and from which the supply will be drawn until the said digester is filled, when communication therewith shall be cutoff and the pump caused to circulate the solvent through the digester and heater. A comparatively heavy pressure is to be carried on the digester, and hence these elements just mentioned, together with the said digester, should be strong enough to produce and withstand the same.

The operation of this device is as follows: The rack being charged with material either in basket or on the floor thereof, the digester filled with liquor and all the valves closed, the valve in the admission and outlet-pipes are opened, the pump started, causing a continuous circulation of the liquor through the heater, pump, and digester. In passing through the heater the liquor is raised to about the temperature of the steam passing through the coil, and on entering the digester, steam is produced and pressure caused thereby, and

the pump being speeded to carry said pressure, and the heated liquor will circulate under the pressure, as hereinbefore described, the said pressure and heat increasing as the process
5 continues to such a degree that the vegetable matter incasing the fibers will be dissolved, and by the circulation washed away, the liquor being used for as many operations as practicable and then replaced with new. For different
10 growths or conditions thereof the pressure and heat will be necessarily varied, which is accomplished by a change of steam-pressure within the coil in the heater.

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

1. In an apparatus for treating fibrous plants, the combination of the digester formed of an outer and an inner shell, the latter being
20 perforated and having an annular space between it and the outer shell, the supply-pipe B, the outlet-pipe D, the rack E of perforated pipe, connected with the supply-pipe and mounted within said digester, and the
25 wire trays F, supported by said rack, substantially as and for the purpose specified.

2. In an apparatus for treating fibrous plants, the combination of the digester formed of an outer and an inner shell with an annular space between them and the latter being
30 perforated, the supply-pipe B, the outlet-pipe D, the rack mounted within said digester, the trays supported by said rack, and the compressing-covers fitted to said trays, substantially as and for the purpose specified. 35

3. In an apparatus for treating fibrous plants, the combination of the digester formed of an outer and of an inner perforated shell, the supply and outlet pipes, the rack mounted
40 on wheels within said digester, the trays supported by said rack, the compressing-lids fitted to said trays, and the guide-pins for holding said lids in position, substantially as and for the purpose specified.

In testimony whereof I hereunto affix my
45 signature in presence of two witnesses.

WALTER T. FORBES.

Witnesses:

S. M. WOOD,
A. P. WOOD.