

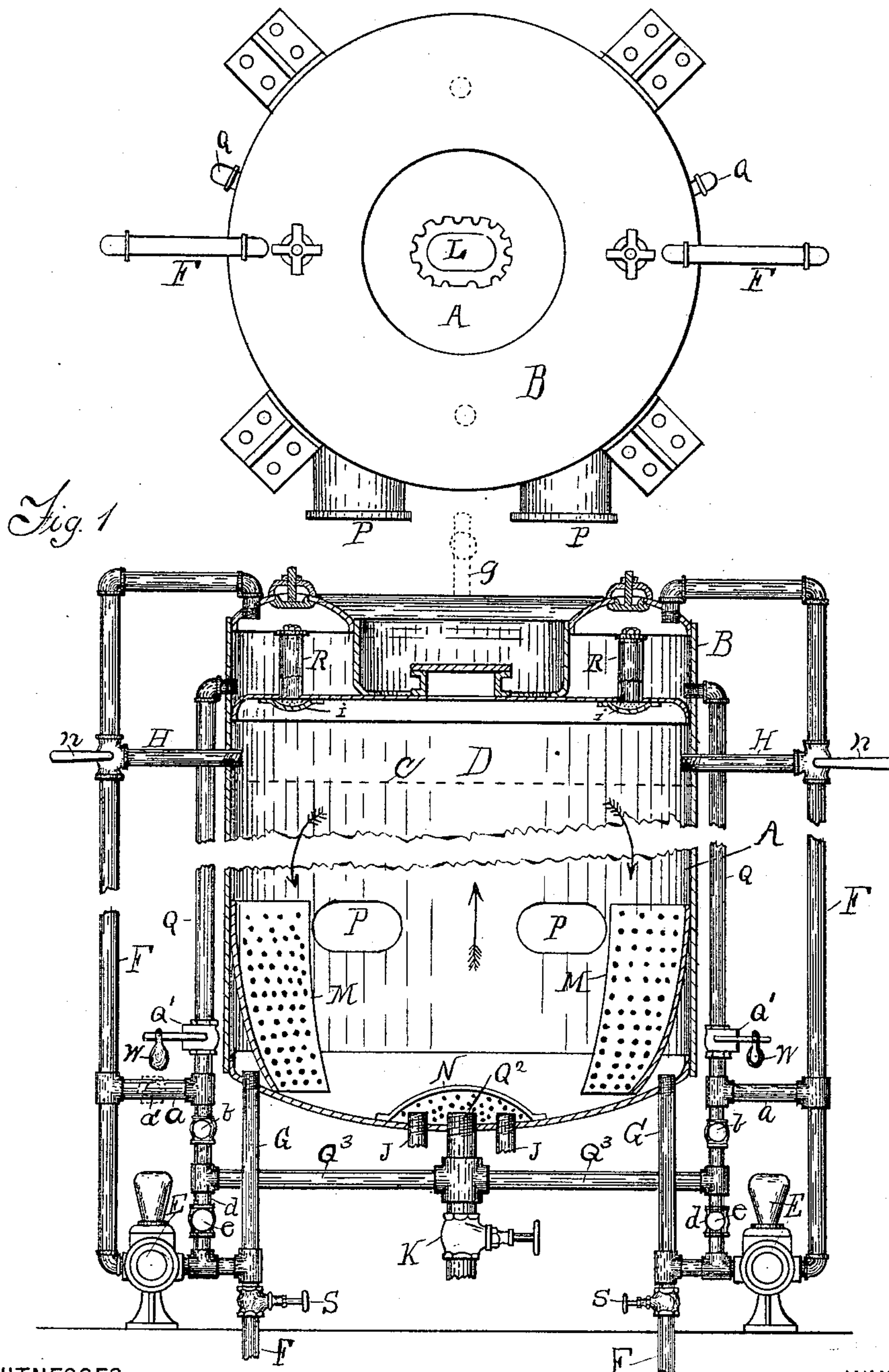
(No Model.)

A. CHAMBERS.

APPARATUS FOR TREATING VEGETABLE SUBSTANCES FOR MAKING
PAPER STOCK.

No. 365,166.

Fig 2 Patented June 21, 1887.



WITNESSES:

Reinhardt Heller.
Stephen Palmer

INVENTOR

Adelbert Chambers
by Geo. Amosher
atty.

UNITED STATES PATENT OFFICE.

ADELBERT CHAMBERS, OF TROY, NEW YORK, ASSIGNOR OF NINE-SIXTEENTHS TO WILLIAM M. PECKHAM, OF SAME PLACE.

APPARATUS FOR TREATING VEGETABLE SUBSTANCES FOR MAKING PAPER-STOCK.

SPECIFICATION forming part of Letters Patent No. 365,166, dated June 21, 1887.

Application filed August 3, 1886. Serial No. 209,851. (No model.)

To all whom it may concern:

Be it known that I, ADELBERT CHAMBERS, a resident of the city of Troy, in the county of Rensselaer and State of New York, have invented certain new and useful Improvements in Apparatus for Treating Vegetable Substances for Making Paper-Stock; and I do hereby declare that the following is a full, clear, and exact description of the invention, that 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 the letters of reference marked thereon, which form a part of this specification.

Similar letters refer to similar parts in both the figures therein.

My invention relates to improvements in apparatus for treating vegetable substances for making paper-stock; and it consists of the novel construction and combination of parts hereinafter described, and pointed out in the claims.

The objects of my invention are fully set forth in connection with the description.

Figure 1 of the drawings is a central vertical section of the digesting and auxiliary reservoirs, and shows the piping, tubing, and various other parts in elevation. Fig. 2 is a top plan view of the apparatus.

A is the digester shell or reservoir, provided with the upper man-hole, L, through which the material to be converted into paper-stock is introduced, and the lower man-holes, P, from which the material can be removed after treatment; also with various inlet and outlet pipes, hereinafter more particularly described.

B is an upper auxiliary reservoir, which may be superimposed upon the digester A, as shown, or located any desired distance above the same.

The two reservoirs are connected by one or more pressure-equalizing tubes, R, provided with check-valves, (indicated by dotted lines,) located, preferably, at their upper ends, to resist downward pressure. Their lower ends may be protected by screens *i*.

As the digester is supplied through man-hole L with the material to be treated, the cooking-liquor is introduced through pipe H into the upper end of the digester by means of a pump, E, in pipe F. The digester is only

partly filled, having an air space or dome, D, for floating foreign substances, (shown above the broken line C.) After the digester has been filled to the proper height, which is to about the relative height shown by broken line C; it is tightly closed and steam at a low pressure is introduced through pipes J in the bottom until the mass is heated to about the boiling-point. The space D affords ample room for the water of condensation. Any excess of pressure in the space D is immediately communicated through tubes R to the auxiliary reservoir; but the check-valves in tubes R prevent the communication through the tubes of any excess of pressure in the auxiliary reservoir to the digester.

When the cooking-liquor has been heated to about the boiling-point, a portion is pumped from the bottom of the digester through pipes F and G by means of a pump, E, into the auxiliary reservoir, valves *e* being closed. The pumping may continue until the reservoir is filled, and the valves in tubes R closing, the pressure is raised to a certain point necessary to open the spring or weight controlled valve Q', when the liquor will be forced down pipe Q and into the digester through the central part of its bottom, at Q², with a force equal to about the difference between the internal pressure of the digester and the resisting pressure of valve Q', which may be adjusted as desired by regulating the tension of the spring, and provided the pump is continuously operated with sufficient force to overcome the resistance of the spring or weight W, the pipe *a* being provided with a closed valve, *a'*. (Shown on one side by dotted lines.) When desired, the pump may be stopped after the auxiliary reservoir is filled, valve Q' being removed or held open, and the contents of the reservoir allowed to flow by force of gravity back into the digester through pipes Q and Q², as before described, after which the pump is again operated to refill the auxiliary reservoir, the contents of which are again allowed to flow by gravity back into the digester, and the operation continued until the material is thoroughly and evenly cooked or digested.

When the pump is operated to fill the digesting-reservoir, the two-way valve is turned

to connect pipe H with pipe F. In filling the auxiliary reservoir the valve is turned to close pipe H and open pipe F to that reservoir.

The contents of the auxiliary reservoir can be forced into the digester in various other ways, as by opening valves Q' and e, closing valves n, b, and t, and operating pump E to draw out the contents through pipes Q, a, and F and force it through pipes d, Q³, and Q², or by admitting live steam of greater pressure into the top of the auxiliary reservoir, as through a pipe, g, (shown by dotted lines,) valves Q' and b being left open and valve e or s being closed.

When desired, the liquor can be drawn by the pumps through pipes G F and forced directly back through pipes F, a, q Q, and Q², valves a' and b being open, and valves s, e, n, and Q' being closed, thus dispensing with the use of the auxiliary reservoir.

The contents of the auxiliary reservoir can be forced into the digester in other ways, as by the pump E, where the pipes F and Q are connected, as by pipes a and d, (shown in dotted lines,) having a closed valve b and open valve e, or by admitting live steam of greater pressure than the internal pressure of the digester into the top of the auxiliary reservoir, as through a pipe, g. (Shown by dotted lines.) The mouths of pipes G, J, and Q² in the bottom of the digester are protected by suitable screens or perforated diaphragms, M N, which may be of any desired size or form.

I have shown two pipes, Q and F, leading from one reservoir to the other; but there may be any desired number, the pipes Q leading from the lower part of the auxiliary reservoir to the lower central part of the other reservoir or digester, and the pipes F leading from the upper part of the auxiliary reservoir to the lower outer portions of the reservoir, as through pipes G.

The valve K' in the pipe K serves to draw off from the digesting-reservoir the liquor when the operation of cooking the material is completed.

The connection of the various pipes and location of pumps and valves may be changed, as desired, to conduct the liquor from one reservoir to another, or from one part of the digesting-reservoir to another part, substantially as described.

The action of the liquor upon the material to be digested or cooked depends in a great measure upon the temperature of the ingredients. It is of the utmost importance, therefore, to maintain as nearly as possible a uniform temperature throughout the mass, lest some portions should be cooked too much, or "burnt," while other portions are cooked too little, or left "raw." Various devices have been employed for agitating the mass and distributing the heat supplied thereto. Dixon and Harding as far back as 1866 procured a patent, No. 54,510, for an apparatus which pumped the liquor from the bottom of the di-

gester and forced it in at the top to produce a current circulation downward through the mass, and more recently an apparatus has been described and a process patented by J. D. Tompkins, No. 340,640, purposing to alternately pump the liquor from the bottom into the top to produce a downward current and from the top into the bottom of the digester to produce an upward current in the liquor; but the liquor in the upper part of the digester contains so much fine fiber and foreign substances which cannot be kept from the pump that the latter soon clogs and becomes inoperative.

In the use of my improved apparatus I do not reverse the currents in the liquor, which are constantly maintained in an upward direction through the inner central portion of the material and a downward direction through the outer or surrounding portions. The steam enters centrally through the bottom, as through pipes J J, which first heats the central portion, and the heated liquor rises, the cooler liquor coming in from the sides to take its place, thus producing the central upward and outer downward current in the direction shown by the arrows. By pumping the liquor for a brief interval from the bottom of the downward current it is secured free from the small light fibers and in its coolest condition. As it is pumped out it is either forced up into the upper reservoir and caused to flow by gravity or otherwise back into the bottom of the digester through pipe Q² between the steam-inlets J, or it is forced directly into the digester through the various pipes, as before explained. In either case it is reheated by the surrounding steam as it enters the digester and again sent up through the central portion of the material. As the only downward current produced is induced by the difference in gravity of portions of the liquor resulting from difference in temperature, the lighter fibers and foreign substances are left to float on the top, upon the surface of the liquor, and are not forced into but gradually out of the mass of the material being treated, the latter being left comparatively clear and free from waste substances. The space D not only provides room for floating the waste material, but affords ample space for the water of condensation of the incoming steam.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with a digesting-reservoir provided with a lower steam-supply pipe or pipes, of an auxiliary reservoir connected with said digesting-reservoir by one or more pipes leading exteriorly from its upper end to the upper interior of the auxiliary reservoir and one or more pipes connecting said reservoirs at or near their lower ends, the latter pipes being severally supplied with a pump and valves, substantially as described, and for the purposes set forth.

2. An apparatus for treating vegetable substances for making paper-pulp, consisting of a

close reservoir provided with an upper float-waste dome, lower central steam-supply pipe, and inlet liquor - pipes, and a lower outlet liquor pipe or pipes connected with the inlet
5 liquor pipe or pipes and supplied with a pump or pumps, substantially as described, and for the purposes set forth.

3. The combination, with a digesting-reservoir provided with a lower steam-supply pipe,
10 of an auxiliary reservoir provided with an upper steam-supply pipe, and connected at its

lower end with the lower end of said digesting-reservoir by pipes, one or more of which are supplied with a pump, substantially as described, and for the purposes set forth. 15

In testimony whereof I have hereunto set my hand this 31st day of July, 1886.

ADELBERT CHAMBERS.

Witnesses:

GEO. A. MOSHER,

W. H. HOLLISTER, Jr.