

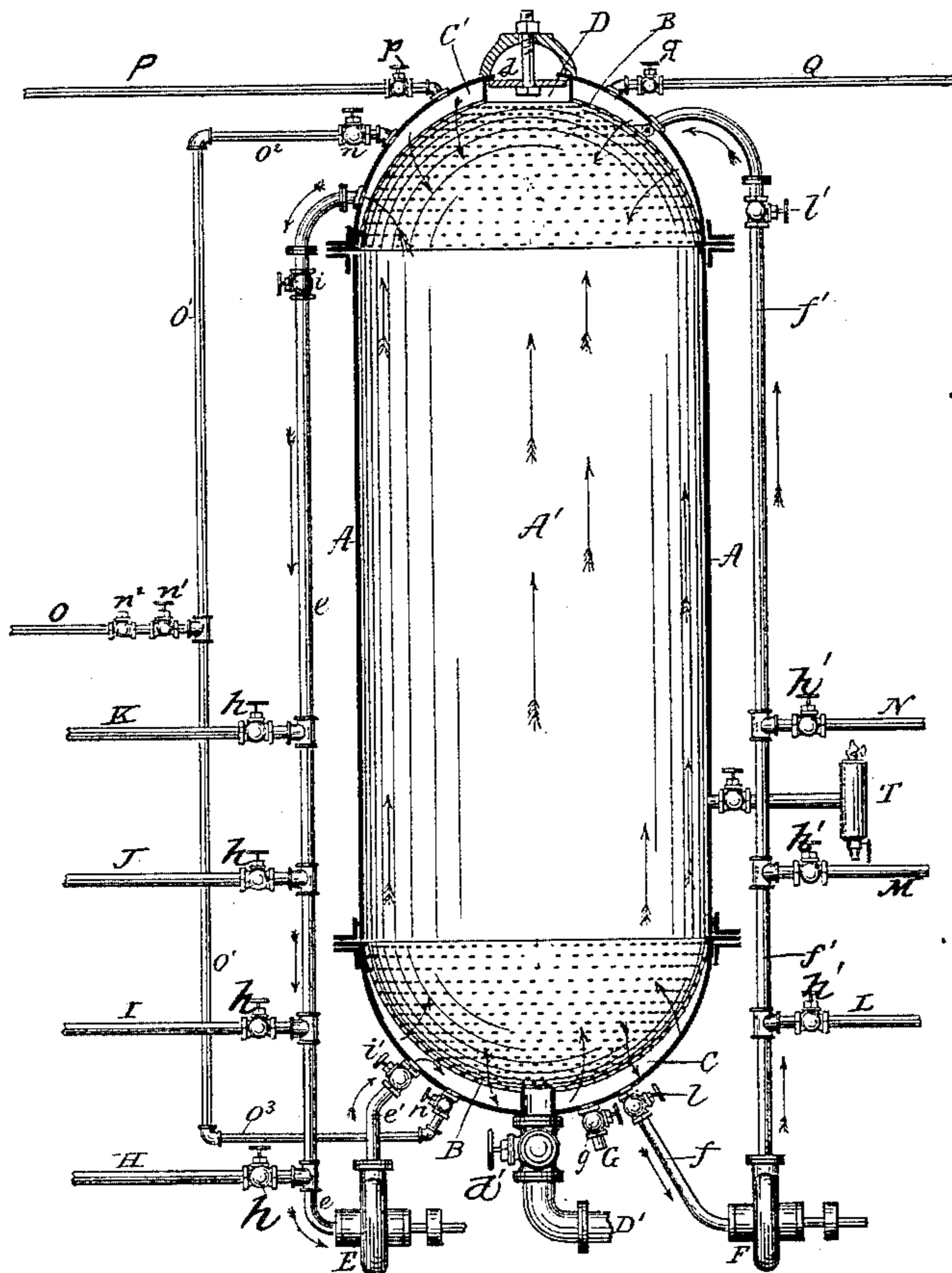
(No Model.)

J. D. TOMPKINS.

APPARATUS FOR MAKING PAPER STOCK.

No. 394,031.

Patented Dec. 4, 1888.



Witnesses:

Charles Beckwith
Arthur M. Bugden

John D. Tompkins,

Inventor.
by his Attorney
Alex. McKim.

UNITED STATES PATENT OFFICE.

JOHN D. TOMPKINS, OF NASSAU, NEW YORK.

APPARATUS FOR MAKING PAPER-STOCK.

SPECIFICATION forming part of Letters Patent No. 394,031, dated December 4, 1888.

Application filed February 9, 1886. Serial No. 191,487. (No model.)

To all whom it may concern:

Be it known that I, JOHN D. TOMPKINS, a citizen of the United States, residing at Nassau, in the county of Rensselaer and State of New York, have invented certain new and useful Improvements in Apparatus for Making Paper-Stock, of which the following is a specification.

My invention relates to improvements in apparatus for making paper-stock of wood, straw, grasses, and other vegetable substances; and it consists of the devices and parts and combinations of devices, and parts and elements hereinafter particularly described, and specifically set forth in the claims.

The object of my invention is to provide means by which I am enabled to carry into practice a new process of treating vegetable substances—such as wood, straw, grasses, &c.—for their conversion into paper stock or pulp, which process is fully described in United States Letters Patent No. 370,640, granted to me April 27, 1886. I attain this object by the mechanism illustrated in the accompanying drawing, forming a part of this specification.

In the drawing, A is the shell of the digester, which shell can be made of any suitable material. This shell incloses the digesting-chamber A' and the upper and lower liquor-chambers, C C'. These latter chambers are separated from the digesting-chamber by the concavo-convex perforated walls or diaphragms B B'. This shell A, with the said chambers A' and C C', with the perforated walls or diaphragms B B, constitute the digester. With this digester I use two systems of liquor-circulating pipes and pumps. Of these pipes, *e e'* connect the lower liquor-chamber, C, with the upper chamber, C', and a pump, E, in the course of these pipes *e e'*, operates to draw the liquors from the upper chamber, C', and discharge the same into the lower chamber, C. The other pipes, *f f'*, also connect the said two chambers C C', and a pump, F, in the course of these pipes *f f'*, operates to draw the liquors from the lower chamber, C, and discharge the same into the upper chamber, C'.

With pipe *e* are connected the series of pipes H, I, J, and K, each leading from a suitable tank, (not shown,)—as, for instance, pipe

H from a hot-water tank, pipe I from a cold-water tank, pipe J from an alkali or chemical-liquor tank, and pipe K from a bleaching-liquor tank. Each of these pipes are provided with a suitable valve, *h*, for cutting off or making communication at will of the respective pipes with pipes *e e'* as will be required from time to time.

Connecting with pipe *f'* are pipes L, M, and N, one of which, as pipe L, leads to a hot-water tank. (Not shown.) Another, as pipe M, leads to the spent alkali or chemical liquor tank, (not shown,) and the other pipe, N, to spent chlorine or bleaching-liquor tank. (Not shown.) These pipes L, M, and N are each provided with a suitable valve, *h'*, between pipe *f'* and the respective tanks these pipes connect with.

Pipes *e e'* are provided with valves *i* and *i'*, and pipes *f f'* are provided with valves *l l'* for use, as will be hereinafter described.

In the upper end of this digester is provided a man-hole, D, for introduction of material into the digesting-chamber A'. This hole is closed by the plate *d* and crow's-foot and bolt in the usual manner. The lower end of the digester is provided with discharge-pipe D', having a suitable valve, *d'*, for the discharge of the finished product from the digesting-chamber.

G is a waste-liquor discharge-pipe provided with a suitable valve, *g*, by which waste liquors can be readily drawn from lower liquor-chamber, C, at will.

O is a steam-pipe leading from any suitable steam-generator to pipe O', and pipe O' connects above with pipe O², which communicates with the upper liquor-chamber, C', and below with pipe O³, which connects with lower chamber, C. Pipes O² and O³ are each provided with a suitable valve, *n*, for controlling the introduction of live steam into the chambers C C', respectively, as occasion may require, and pipe O is also provided with valve *n'* and check-valve *n*².

Q is a pipe leading from the upper side of the upper chamber, C, to any suitable vessel (not shown) for receiving the bleaching-gas after it has sufficiently acted on the material. This pipe is provided with valve *q*.

P is a waste-steam pipe leading from the

upper end of upper chamber, C, to any vessel to be heated, and it may be made to communicate by means of suitable branch pipes (not shown) with any vessels containing liquors for use in treating the material operated with for heating the same. This pipe P is provided with valve *p*.

T is a tester connected with the digester by means of a suitable pipe, and is provided with suitable valves for operating with the same as practiced by the trade.

This digester is also provided with a safety-valve and steam-gage. (Not shown.)

The method of using my improved apparatus when employed to carry the process to which I have referred into operation is as follows: The hand-plate *d* having been removed, the material to be treated is gradually introduced through the man-hole, at the same time the pump E is started, drawing the cooking liquid from the tank within which it is stored and injecting it into the lower chamber against the falling mass of material. After a certain amount of liquid has been introduced the pump F is started, drawing the cooking liquid from the lower chamber and delivering it into the upper chamber, from whence it is sprayed downward upon the material in the digesting-chamber. After the required charge of material and sufficient cooking liquid have been introduced the pump F is stopped, the pump E continued in operation, drawing the cooking liquid from the upper chamber and delivering it into the lower chamber and through the perforations therein in an upwardly-directed spray or series of fine streams against the material in the digesting-chamber, so as in effect to keep the material in suspension and prevent it from packing upon the perforated bottom of the chamber. A suitable pressure of steam is introduced through the pipes O O' O² O³ for the purpose of raising the temperature of the cooking liquid, whatever it may be, whether water, alkali, or other chemical liquid, as will be most suitable to be applied to the material to be treated. After circulating the liquor for a suitable length of time in the above-described direction pump E will be stopped and pump F will be operated and cause the liquor to be drawn downwardly through the digesting-chamber into chamber C, and thence through pipes *f* and *f'* be discharged into the upper chamber, C', to return to the digesting-chamber. These pumps E and F will be operated alternately at will to produce the reversed directions of circulations of the treating-liquors, as above described, through the mass of material within the digesting-chamber; and these alternate operations of these pumps will be had until the operations of the liquors with the material has been completed. The reversal of the direction of the flow of the treating-liquid also serves to free the perforated ends of the digesting-chamber from

any light material which may accumulate against it. When the cooking of the material is completed, the pump E will be stopped and pump F will be operated, and valves *h'* and *l'* will be closed, excepting the valve *h'* of the pipe L or M of the hot-water or spent cooking-liquor tank, (not shown,) when the liquor will be drawn off from the digester and introduced into its appropriate receiving-tank. When valve *g* is opened, the liquor in the digester will run off by gravity and escape through a suitable pipe or sewer. (Not shown.) Washing-water will be introduced and circulated alternately in reversed directions through the pumps E and F and their respective coacting pipes by the alternate operations of said pumps, as above described. The bleaching-liquor will also be introduced through pipes K *e e'* and pump E and be circulated in alternating reversed directions by operating pumps E and F alternately, as above described. When the material has been bleached, valve *g* will be opened and a slight pressure of steam will be introduced into the digesting-chamber from its lower end, when the gas from the bleaching-liquor will escape through pipe Q into the tank of liquor provided for its reception, after which the bleaching-liquor will be drawn from the digester, through the operation of pump F and its coacting pipes *f, f'*, and N, and discharged into the tank for receiving the same. Waste steam will be permitted to escape through pipe P.

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

1. In a machine for making paper-stock, the combination of a digesting-chamber, the upper and lower fluid-chambers communicating therewith, two pipes exteriorly connecting said fluid-chambers, and a pump in each of said pipes, respectively, substantially as and for the purpose set forth.

2. In a machine for making paper-stock, the combination of a digesting-chamber, the upper and lower fluid-chambers communicating therewith, two pipes exteriorly connecting said fluid-chambers, a pump in each of said pipes, respectively, and a pipe connecting with the bottom of said digesting-chamber, substantially as and for the purpose set forth.

3. In a machine for making paper-stock, the combination of a digesting-chamber, upper and lower fluid-chambers communicating therewith, two pipes exteriorly connecting said fluid-chambers, a pump in each of said pipes, respectively, and an inlet and outlet pipe connecting, respectively, with said communicating pipes, substantially as and for the purpose set forth.

J. D. TOMPKINS.

Witnesses:

ALEX. SELKIRK,
CHARLES WETHERWORX.