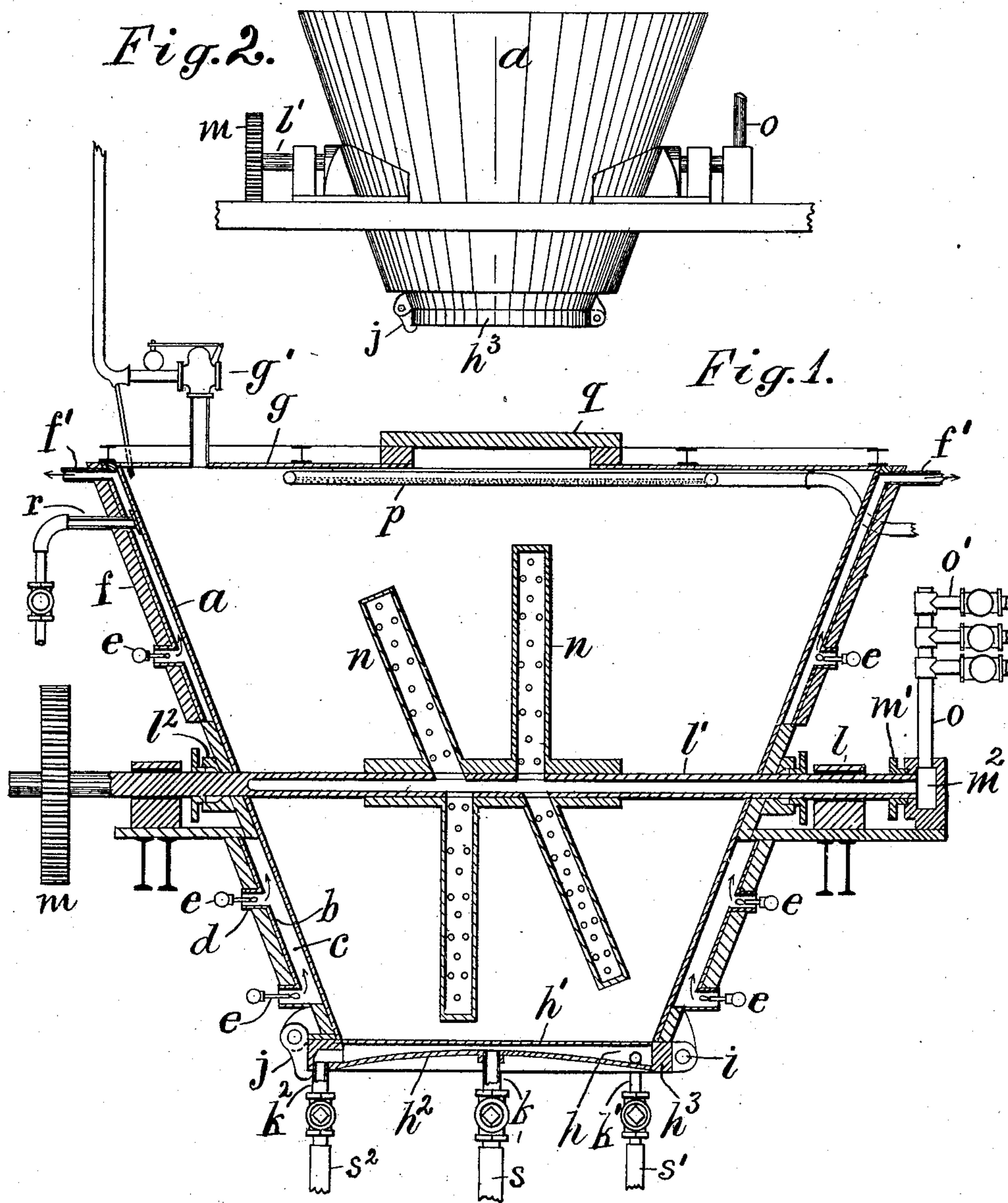


No. 889,241.

PATENTED JUNE 2, 1908.

M. R. KENNEDY.
DIGESTING DISINTEGRATOR.
APPLICATION FILED OCT. 3, 1906.



Witnesses:
L. Lee,
Darius D. Perrington.

Inventor.
Michael R. Kennedy, per
Thomas S. Crane, Atty

UNITED STATES PATENT OFFICE.

MICHAEL R. KENNEDY, OF DANSVILLE, NEW YORK, ASSIGNOR TO THE NATIONAL STRAW PULP COMPANY, OF NEW YORK, N. Y., A CORPORATION OF SOUTH DAKOTA.

DIGESTING-DISINTEGRATOR.

No. 889,241.

Specification of Letters Patent.

Patented June 2, 1908.

Application filed October 3, 1906. Serial No. 337,179.

To all whom it may concern:

Be it known that I, MICHAEL R. KENNEDY, a citizen of the United States, residing at Dansville, county of Livingston, and State of New York, have invented certain new and useful Improvements in Digesting-Disintegrators, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

10 The present invention relates to a digester adapted to the treatment of straw, wood chips, rags, and analogous substances, to extract the fiber from the same for use in making paper, pasteboard, &c., and I have

15 termed the invention a "digesting disintegrator," because I provide in the receptacle for such materials, means for mechanically stirring and agitating the materials so as to disintegrate the tissues by attrition of the

20 particles against one another and against the walls of the digester.

The invention comprises a stationary receptacle with means for heating the walls of the same, means for spraying steam, hot air,

25 or liquor within the top of the receptacle, a double bottom for the receptacle with perforations in its upper side, and outlet and inlet pipes from the space between the bottoms to draw liquor from or supply it thereto;

30 a shaft extended through the receptacle with paddles or stirring arms for agitating the material, the shaft and arms or paddles being preferably hollow, and the paddles perforated so that any fluid may be supplied to the

35 shaft and diffused from the paddles into the contents of the receptacle while stirring the same. The receptacle is preferably jacketed at the sides, and gas jets projected into the jacket with air to furnish combustion, so

40 that the wall of the receptacle may be readily maintained at any desired temperature.

A perforated jet pipe bent in annular form is arranged in the top of the disintegrator and provided with connections by which

45 hot air, steam, water or chemicals may be sprayed upon the contents of the disintegrator, and as the ring-shape of this perforated pipe permits the cut straw to pass through the pipe when poured into the di-

50 gester, such annular jet pipe furnishes a means of moistening the straw as it is fed into the digester, and thus saves much of the time in mixing the straw with the chemicals and diffuses the fluid through the straw in a

most effective manner. A pipe is also inserted through the wall of the digester to supply steam, hot air, or other fluids irrespective of the perforated pipe.

The bottom of the digester is hinged so as to discharge the contents downwardly, and is made with an interior chamber, to which

60 pipe connections are made for supplying fluid to or drawing it from the chamber, the upper side of the chamber being perforated to form a screen and support the contents of

65 the digester while fluids are injected or withdrawn from the same. By means of this construction, the straw may be stirred while any fluid is diffused through its mass by the rotating paddles, and any desired fluid may

70 be introduced upon the surface of the mass, or below the bottom of the same through the screen in the double bottom. While the straw is undergoing chemical treatment by the liquor supplied thereto, it is also under-

75 going a mechanical disintegration by the action of the rotating paddles, and the friction of the material with its own particles and the sides of the digester.

When the chemical treatment is completed,

80 the chemical liquor may be withdrawn through the perforated bottom, and washing water introduced by the same means, to flow upwardly through the mass while agitated by the paddles, so as to effectually wash the

85 liquor from the material. The washing water may then be withdrawn through the screen of the double bottom, and the material discharged for further treatment, with or without the admixture of a chemical,

90 which may readily be mingled with the material by the paddles, if desired, before the material is discharged.

Owing to the double functions of this apparatus, I have in the claims termed it a digest-

95 ing disintegrator, as it operates as a digester through the action of the chemicals and heat which are supplied, and operates as a disintegrator by the mechanical action of the paddles.

In the drawing, Figure 1 is a vertical section of the apparatus, and Fig. 2 is a side elevation of the same upon a smaller scale.

a designates the inner shell or wall of the receptacle, which, for brevity, I will term

105 the "digester." *b* is a jacket surrounding the same with space *c* between the two having various inlets *d* into which gas jets *e* are

projected. The jacket is surrounded by a non-conducting casing *f*, and outlet flues *f'* are extended from the top of the space *c*. A removable cover *g* is shown with safety-valve *g'* thereon, to limit the pressure. The bottom is shown formed with space *h* having a perforated plate or screen *h'* upon the upper side and a solid plate *h²* upon the lower side, all connected with a ring *h³* having a hinge *i* to joint it with the digester. The plate *h²* is arched upwardly in the center, and a pipe *k* connected with such portion, while pipes *k'* and *k²* connect with the margin of the interspace *h* which is lower than the middle portion, so as to drain the liquor therefrom.

Bearings *l* are secured upon the sides of the shell *a*, and a hollow shaft *l'* extended across the body of the receptacle, with stuffing-boxes *l²* upon the shell to prevent leakage. One end of the shaft is plugged, and a gear *m* secured thereon for rotating the shaft by suitable connections, and the opposite or open end of the shaft is extended through a stuffing-box *m'* into a chamber *m²*, which may be supplied with fluid of any kind, as hot air, steam, water or chemicals, through a pipe *o*, which has various branches *o'* connected thereto and supplied with cocks, to connect the pipe *o* with any source of fluid supply. An annular spray-pipe *p* is shown extended beneath the cover *g*, with a manhole *q* in the cover adapted to admit the material through the middle of the annular spray-pipe.

It will be understood that the digester would, for paper manufacture, be made of several tons capacity, and that the material may be fed into the receptacle in any suitable manner.

The pipes *k*, *k'* and *k²*, which connect with the space *h* inside the double bottom, are provided with cocks and have detachable hose connections *s*, *s'*, *s²*, which can be removed, when the bottom is opened upon its hinge *i* to discharge the contents of the digester.

With the detachments described, the apparatus is adapted for use in many processes connected with the extraction of fiber, as digesting, washing, bleaching, &c., the combination of chemical treatment with mechanical agitation producing results which cannot be produced by either alone. For example, in the treatment of a batch of cut straw, a portion of the required chemical is sprayed upon the material from the spray-pipe *p* as the material is fed through the pipe into the digester, the walls of which have been heated by the gas jets *e*. The cover being closed, the mechanical agitation of the material is effected by first rotating the hollow shaft *l'* at a slow speed, injecting steam or hot liquor from the paddles *n* into the material until the temperature is slowly raised to the boiling point; the mechanical agitation is then increased by increasing the speed

of the shaft *l*, thus intimately mixing the liquor and the straw, so that all the parts of the material may be intimately treated or attacked by the solution, the motion also rubbing the particles of the material against one another and against the walls of the vessel. Such treatment renders the silica and other extraneous matters solid, and softens the gum in the knots of the straw, thus disintegrating the portions of the material which are more tractable. At the close of this stage in the treatment, the pipe *k* is opened and the liquor with the dissolved silica is drained off through the false bottom *h'*, steam or air under a low pressure being introduced through a pipe *r* to hasten the process by surface pressure. The pipe *k* being closed, water is introduced through the pipe *k'* and is forced up through the perforated bottom *H'*, thus diffusing it through all of the material, the washing water being used in sufficient quantity to float the entire mass of material and to cleanse it thoroughly. The washing water is withdrawn in the same manner as described for the chemical liquor, and when the washing process is completed, the material is in readiness for treatment at high temperature and pressure in a globular cooker adapted to stand such pressure.

Having thus set forth the nature of the invention what is claimed herein is:

1. A digesting disintegrator having the walls jacketed, and gas jets projected into the jacket to heat the said walls.
2. A digesting disintegrator having the walls jacketed, vent flues extended from the top of the jacket, inlet apertures at different levels upon the jacket, and gas jets projected into such inlets to heat the wall of the jacket.
3. A digesting disintegrator having the walls jacketed, and gas jets projected into the jacket to heat the said walls, and a non-conducting casing applied to the jacket to retain the heat therein.
4. A digesting disintegrator adapted for chemical and mechanical treatment of vegetable tissues, consisting of a receptacle provided with means for supplying chemical liquor to the contents, a hollow shaft extended into the disintegrator with hollow perforated paddles thereon, and means for supplying a fluid, as steam or liquor, to the interior of the shaft, to be diffused from the paddles during the agitation of the material.
5. A digesting disintegrator adapted for chemical and mechanical treatment of vegetable tissues, consisting of a receptacle having a shaft with paddles for agitating the contents, a tightly fitting double bottom with interior space *h* having the screen *h'* upon the upper side and the solid plate *h²* upon the lower side, the plates being connected by a ring *h³* having a hinge *i*, and a joint for such hinge upon the digester.

6. A digesting disintegrator adapted for
chemical and mechanical treatment of vege-
table tissues, consisting of a receptacle having
a shaft with paddles for agitating the contents,
5 a tightly fitting double bottom with interior
space h having the screen h' upon the upper
side and the solid plate h^2 upon the lower
side, a hinge for connecting the hollow bot-
tom to the digester, and inlet and outlet
10 pipes connected to the space h and provided

with detachable fluid connections to be re-
moved when the bottom is opened.

In testimony whereof I have hereunto set
my hand in the presence of two subscribing
witnesses.

MICHAEL R. KENNEDY.

Witnesses:

PARLEY M. HAMMOND,
DAISON D. PURRINGTON.