

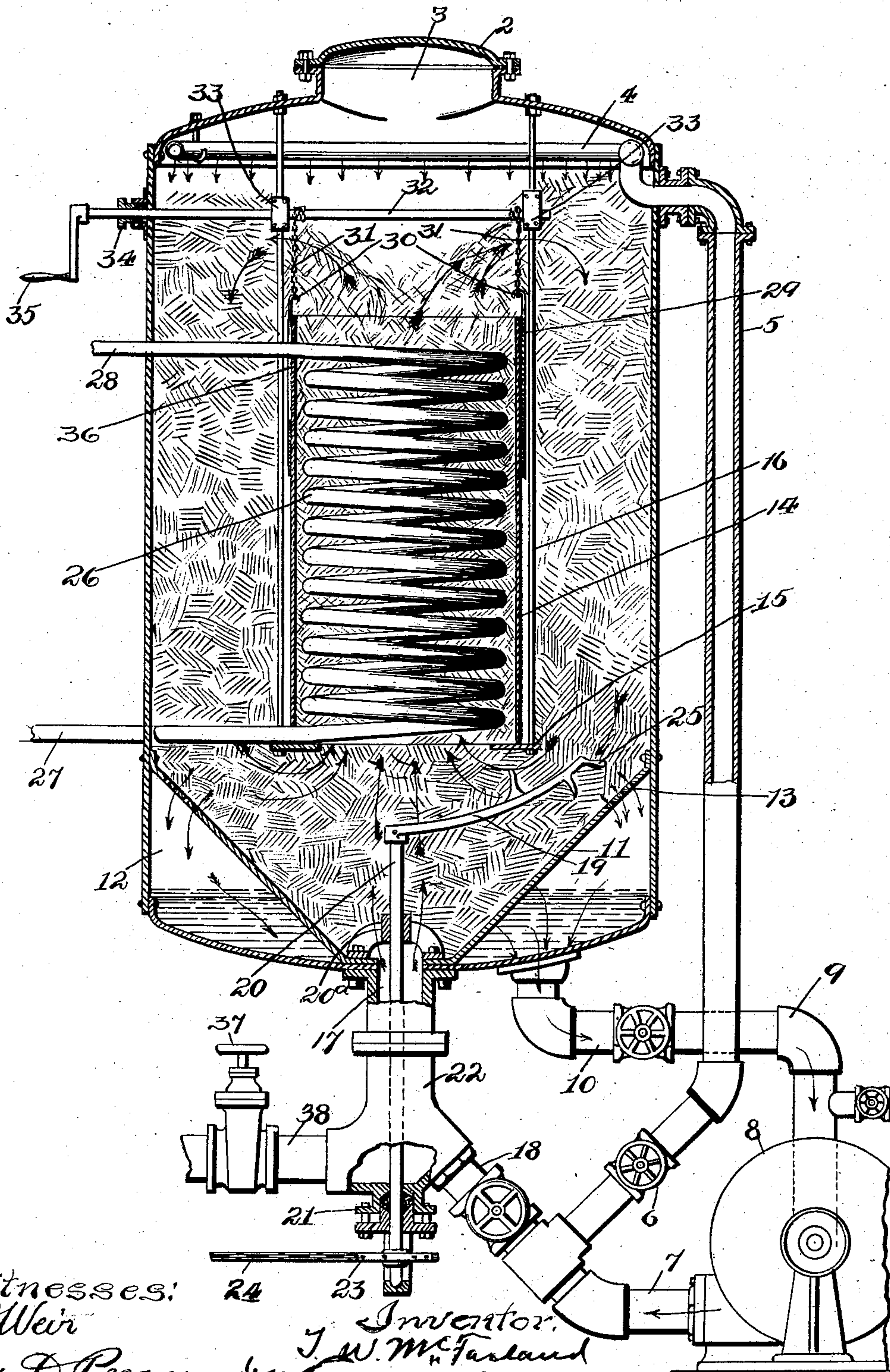
No. 741,530.

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T. W. McFARLAND.
DIGESTER.

APPLICATION FILED FEB. 3, 1902.

NO MODEL.



Witnesses:

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UNITED STATES PATENT OFFICE.

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DIGESTER.

SPECIFICATION forming part of Letters Patent No. 741,530, dated October 13, 1903.

Application filed February 3, 1902. Serial No. 92,262. (No model.)

To all whom it may concern:

Be it known that I, THOMAS W. MCFARLAND, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Digesters, of which the following is a full, clear, and exact specification.

My invention relates to that class of digesters employed for digesting or cooking fibrous substances—such as cotton-seed hulls, flax-stalks, hemp, wood, and other matter—from which to produce paper-pulp; and my invention has for its primary object to provide improved means whereby an energetic and positive defined circulation of the cooking liquor and fiber being treated may be maintained during the cooking operation, whereby all particles of the fiber will be successively brought into intimate association with the cooking liquor at the hottest part of the digester and all clogging or matting of the material prevented.

With these ends in view my invention consists in certain features of novelty in the construction, combination, and arrangement of parts by which the said objects and certain other objects hereinafter appearing are attained, all as fully described with reference to the accompanying drawing, and more particularly pointed out in the claims.

The said drawing illustrates a vertical sectional view of my improved digester.

1 is a shell which may be of cylindrical or any other suitable form, but preferably vertically elongated and provided at its upper end with a cover 2, closing a charging-aperture 3, through which the fiber to be treated may be introduced, and while being introduced it is sprinkled, and thus intermittently commingled with the cooking liquor, by a spray from an annular spray-pipe 4, arranged at the upper end of the shell and supplied when desired from a pipe 5, having valve 6 and connected to a discharge-pipe 7, leading from a pump 8, whose induction-pipe 9 is connected by valve-pipe 10 with the bottom of the digester-shell, whereby the liquor sprinkled through the pipe 4 and falling to the bottom of the shell will be again raised to the pipe 4 and a continuous circulation of the liquor thus maintained during the charging operation or as long as desired.

The bottom of the shell 1 is provided with a cone 11, which is secured to the sides and bottom of the shell and forms therewith an annular chamber 12, into which the cooking liquor finds its way through strainers constituted by perforations 13 at suitable intervals in the cone 11, thus permitting the liquor to pass on to the pump without danger of clogging the pump with the fiber.

Suspended in the center of the shell 1 is a flue 14, composed of an open-ended cylinder or other suitable device, which is maintained in position by a ring 15, supported from the top of the shell by a number of suspension-rods 16, and which flue constitutes a passage for the upward current of the cooking liquor and particles of fiber or material being treated floating therein. This flue 14 is arranged directly over and preferably concentrically with a bottom inlet 17, which opens into the cone 11 and is connected by valve-pipe 18 with the discharge-pipe 7 of the pump 8, so that when desired the pump may be utilized for forcing a continuous circulation upwardly through the flue 14 and downwardly around the outer sides thereof, the liquor being strained through the strainers 13 and passing to the induction of the pump, and thence upwardly again through the inlet 17, while the fiber will be thrown up over the end of the flue 14 to again fall into the path of the ascending current when it strikes the sloping sides of the cone 11, it being observed that the space between the lower end of the flue 14 and the cone is unobstructed, so as to reduce to the minimum any possibility of the fiber or material bridging at this point. In order, however, that this passage may be kept absolutely open and free from clotted material, it is continuously swept by an agitator-arm 19, secured to the upper end of a vertical shaft 20, journaled at its upper end in spider 20^a and whose lower end passes through suitable stuffing-box 21 in the lower end of Y 22 and is driven by sprocket 23 and chain 24 or other suitable means. This agitator-arm 19 may, if desired, be provided with spurs or fingers 25, suitably projected for reaching substantially all points of the passage between the cone and the flue.

The requisite heat for cooking the contents of the shell is supplied by a steam-coil 26,

open at its upper and lower ends and arranged concentrically within the flue 14, the terminals 27 28 of the coil being carried through the sides of the shell and flue. It will therefore be seen that the heat of the coil itself will be sufficient to induce an energetic upward current through the flue 14 even in the absence of pump 8, the force of the ascending current produced by the greater heat within the flue being sufficient to throw the fiber and cooking liquor upwardly over the end of the flue, whence it descends around the outer sides of the flue, where the liquor is cooler, and is caught by the contracted sides of the cone, and thus carried directly under the lower end of the flue, where it is again carried upwardly by the ascending current therethrough. Whether the heat of the ascending current within the flue or the dynamic force of the current supplied by the pump through the bottom inlet 17 will be sufficient to throw the liquor and material over the upper end of the flue and cause the described circulation will of course depend upon the relative height of the flue and depth of the cooking liquor, and as this depth varies as the cooking operation proceeds it is important that the height of the flue be also capable of corresponding variation. The upper end of the flue, therefore, is provided with a telescopic section 29, which may be adjustably held in position by any suitable means. In the example of the invention shown in the drawing the upper end of this section 29 is provided with a pair of hooks 30, which are connected by chains 31 to a windlass 32, journaled in suitable bearings 33, secured to the suspension-rods 16, the windlass passing through stuffing-box 34 in the side of the shell and having a crank 35, whereby it may be manipulated for raising or lowering the telescopic section as the exigencies of the case may require. In order that the telescopic section 29 may rise and fall without interference from the coil-pipe 28, it is slotted on one side, as shown at 36.

When it is desired to discharge the contents of the digester, a gate-valve 37 in a pipe 38, leading from one branch of the Y 22, may be opened.

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

1. In an apparatus for the purpose described, the combination of a shell, a perforated cone dividing the bottom of said shell into chamber 12, a flue suspended in said shell over the center of said cone, the space between the lower end of said flue and said

cone being unobstructed and constituting a free passage for the material being treated in the shell, means for causing a circulation upwardly through said flue and downwardly between the flue and the shell and the flue and the cone, and a pump connected with said chamber 12 and with the shell within said cone, substantially as set forth.

2. In an apparatus for the purpose described, the combination of a shell, the flue suspended in said shell, a perforated cone at the bottom of said shell under said flue, a revolving agitator below said flue and over the perforated cone for agitating the material between the lower end of the flue and the sides of the shell and the cone, and means for causing a circulation of the material upwardly through the flue and downwardly around the outer sides thereof, substantially as set forth.

3. In an apparatus for the purpose described, the combination of a shell, a flue suspended therein, said shell having an outlet and an inlet in the bottom thereof, a spider bridging said inlet, a shaft passing downwardly through said inlet and journaled in said spider, means for revolving said shaft, and a laterally-projecting agitator-arm secured on the upper end of said shaft and sweeping the space between the lower end of said flue and the shell, substantially as set forth.

4. In an apparatus for the purpose described, the combination of a shell, a flue suspended therein and having a telescopic section, and means for causing a circulation upwardly through said flue, substantially as set forth.

5. In an apparatus for the purpose described, the combination of a shell, a flue suspended therein and having a telescopic section, exterior operating means connected with said telescopic section for adjusting it vertically, and means for causing an upward current through said flue, substantially as set forth.

6. In an apparatus for the purpose described, the combination of a shell, a flue in said shell, the suspension-rod 16 for suspending said flue, a telescopic section on the upper end of said flue, the windlass 32 connected with said section for raising it, the bearings 33 for said windlass on said rods, exterior operating means for said windlass and means for causing a circulation through said flue, substantially as set forth.

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Witnesses:

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