

W. H. JUDSON.
PULP MACHINE.

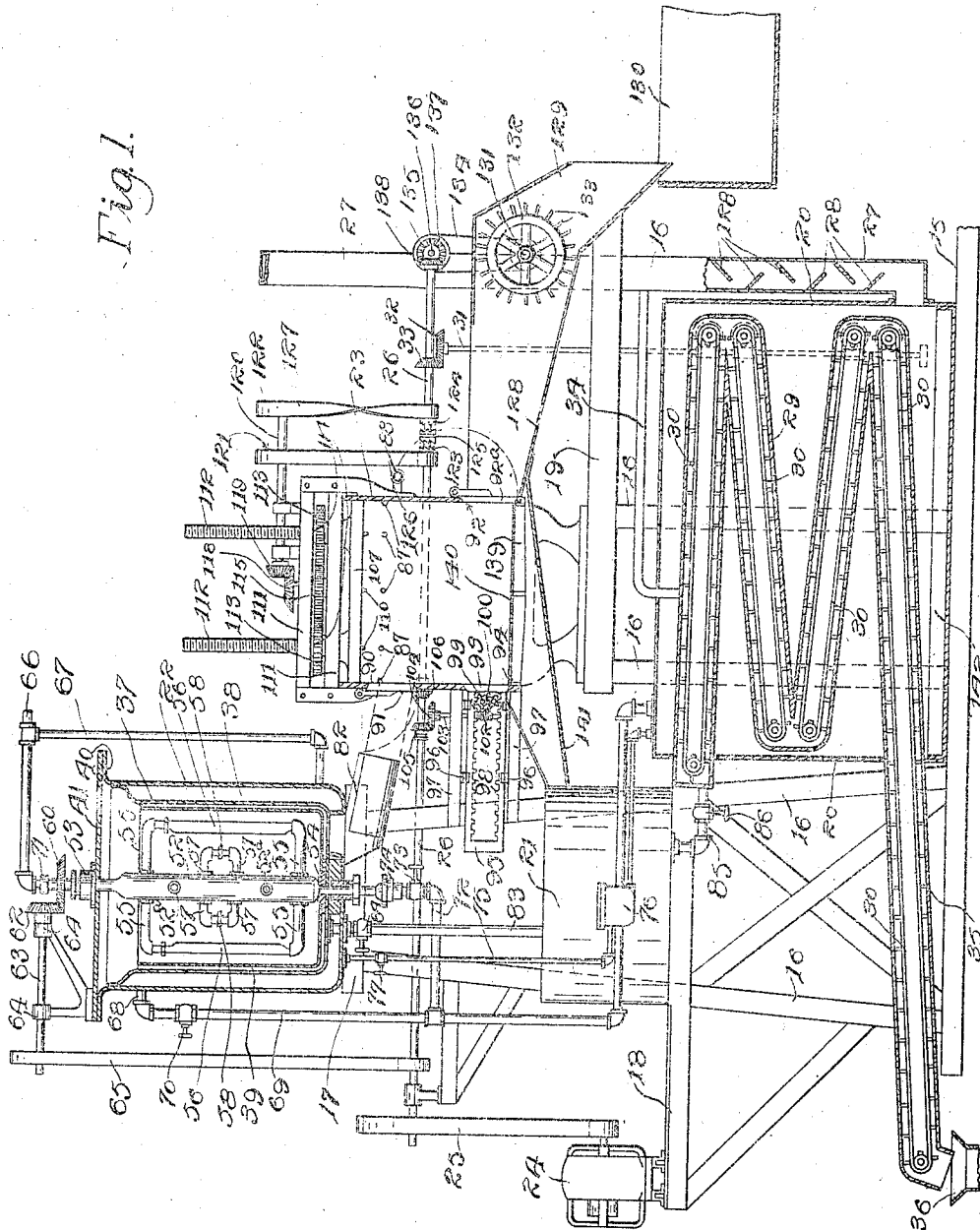
APPLICATION FILED APR. 13, 1911.

1,015,803.

Patented Jan. 30, 1912.

5 SHEETS—SHEET 1.

Fig. 1.



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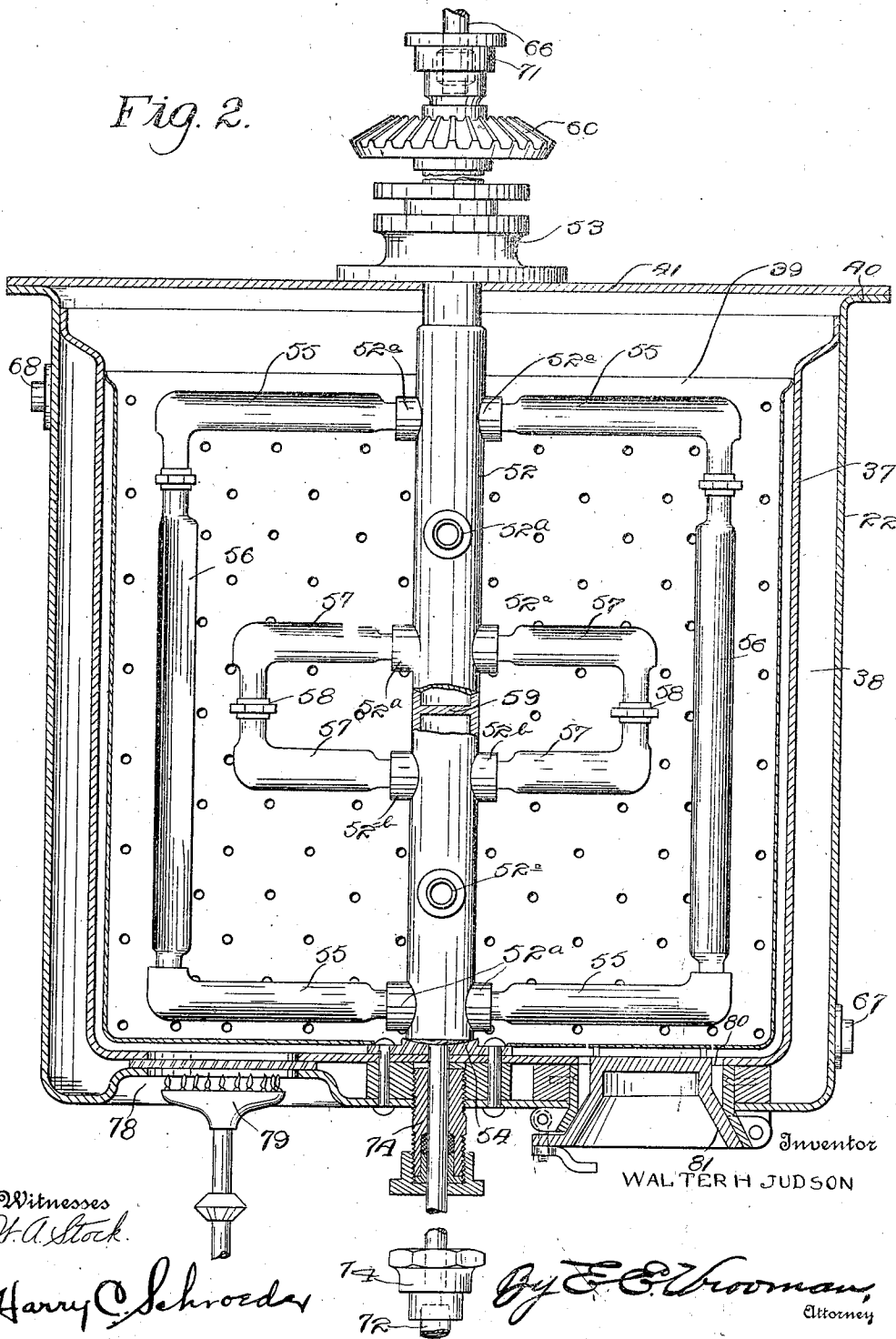
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5 SHEETS—SHEET 2.

Fig. 2.



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5 SHEETS—SHEET 3.

Fig. 3.

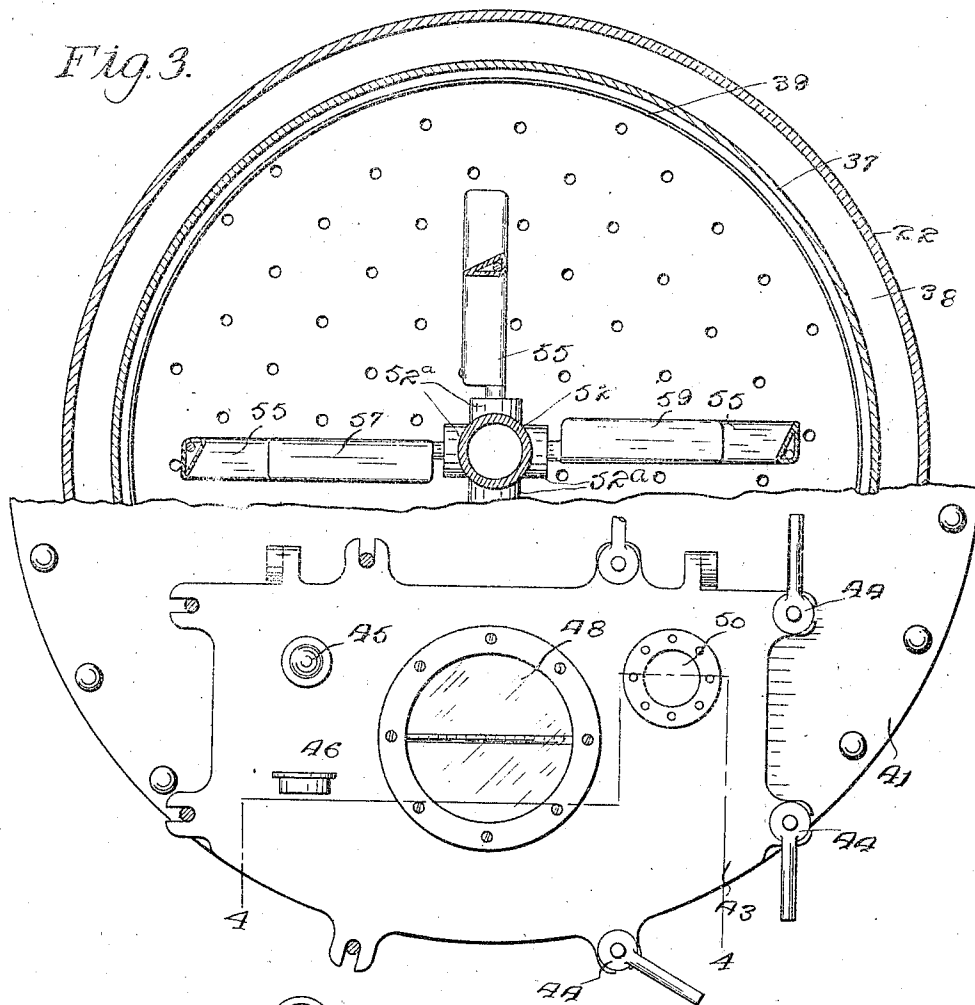
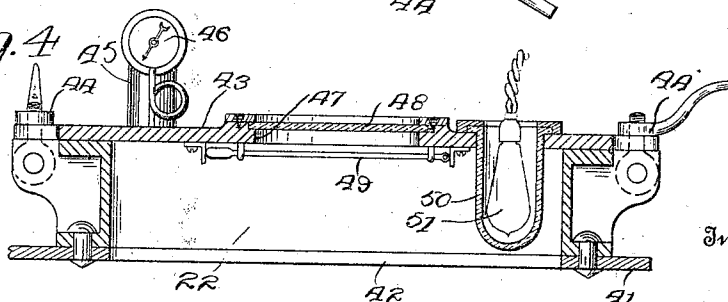


Fig. 4.



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5 SHEETS—SHEET 4.

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Fig. 5.

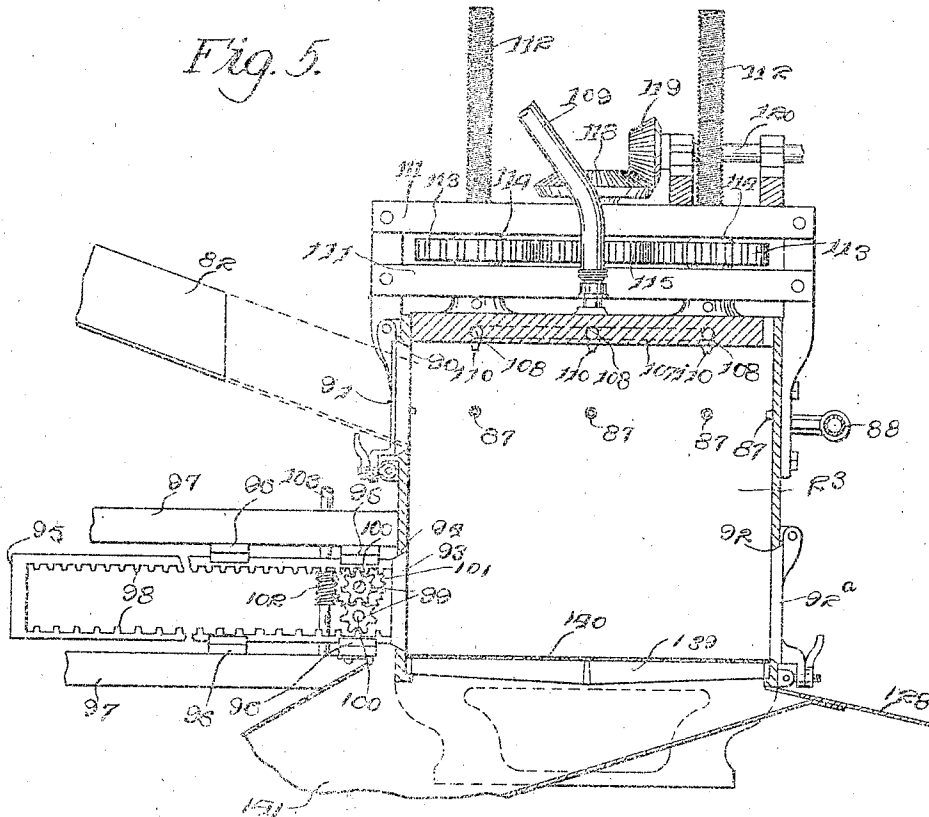
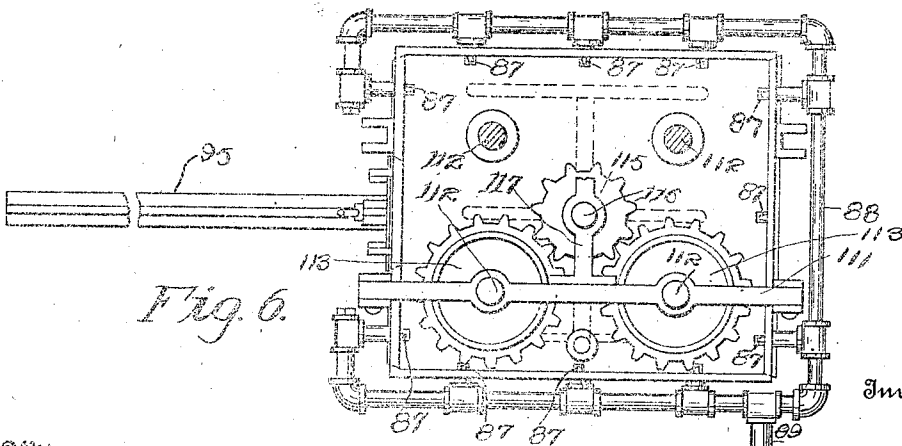


Fig. 6.



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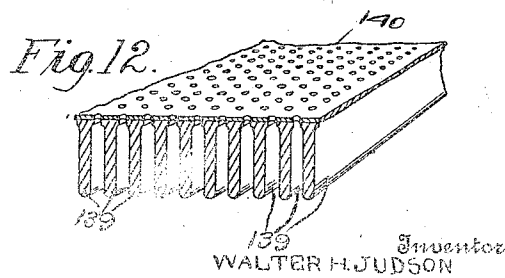
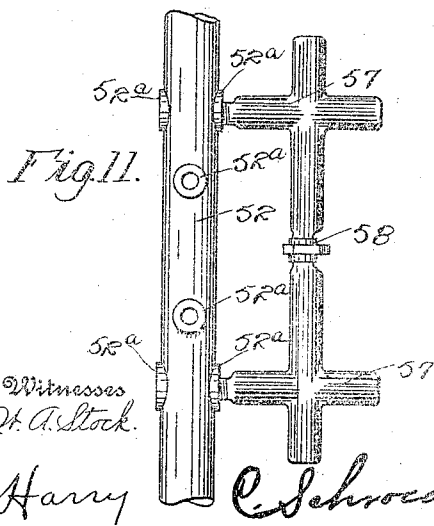
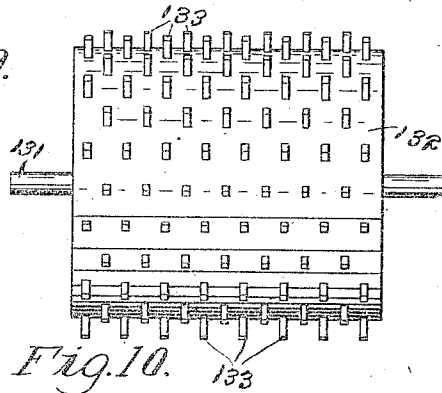
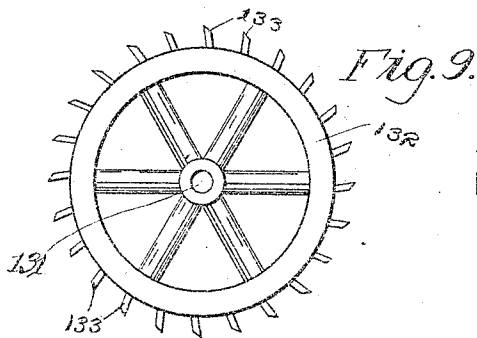
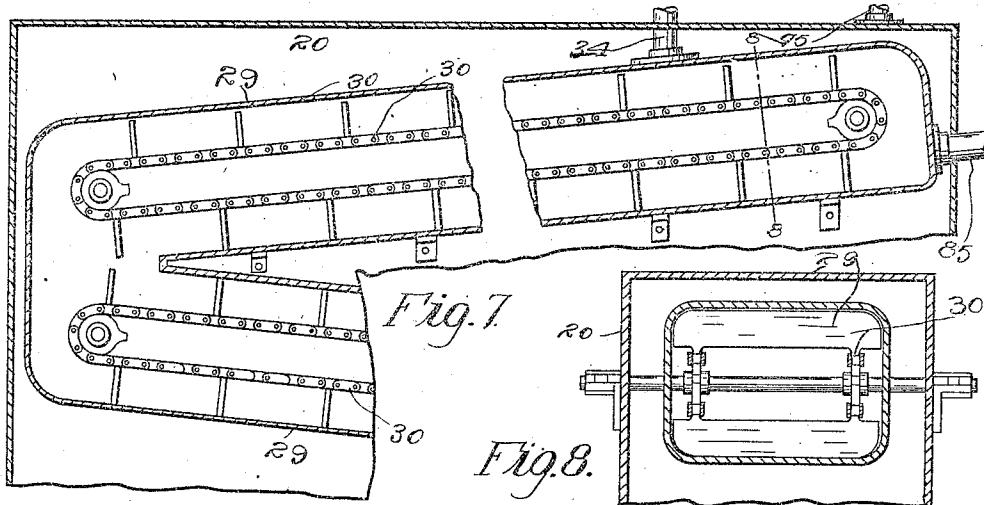
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5 SHEETS—SHEET 5.



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UNITED STATES PATENT OFFICE.

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PULP-MACHINE.

1,015,803.

Specification of Letters Patent.

Patented Jan. 30, 1912.

Application filed April 13, 1911. Serial No. 620,811.

To all whom it may concern:

Be it known that I, WALTER H. JUDSON, a citizen of the United States, residing at Oakland, in the county of Alameda and State of California, have invented certain new and useful Improvements in Pulp-Machines, of which the following is a specification.

This invention relates to the subject of pulp making, and the principal object of the same is to provide a simple and easily operated pulp making machine in which the pulp material is rapidly digested and delivered to a press, and from the press delivered to a disintegrator from which the pulp is discharged to the usual beater, said digester, press and disintegrator being carried by a common support and operated by a common source of power.

In addition to the foregoing prominent features, the invention contemplates novel means whereby the liquid employed is drained from the digester and press and subjected to an evaporating operation to remove the water therefrom, the valuable chemicals being conducted to a suitable retort.

The invention also contemplates novel means for heating the digester and evaporator, and treating the pulp to a water bath while in the press, and numerous other details of construction and arrangement of parts, as will be fully described.

One preferred and practical embodiment of the invention is shown in the accompanying drawings, wherein:—

Figure 1 is a view in elevation, partly in vertical section of the improved pulp making machine. Fig. 2 is an enlarged central vertical sectional view of the digester. Fig. 3 is a top plan view, partly in section, thereof. Fig. 4 is a vertical sectional view, taken on the line 4—4, Fig. 3. Fig. 5 is a central vertical sectional view of the press. Fig. 6 is a top plan view thereof. Fig. 7 is a fragmentary vertical sectional view of the evaporator. Fig. 8 is a transverse vertical sectional view taken on the line 8—8, Fig. 7. Fig. 9 is an end and Fig. 10 a front elevation of the disintegrator. Fig. 11 is a fragmentary view in elevation of the stirrers of the digester. Fig. 12 is a detail fragmentary perspective view of the bottom of the press.

The improved pulp making machine has

been shown mounted upon a supporting frame including the base 15, standards 16 and the three platforms 17, 18 and 19, respectively. Platform 17 is arranged above platform 18, and platform 19 is arranged intermediate of and to one side of platforms 17 and 18, this being a convenient structure, but it will be clear that other arrangements may be resorted to, if desired. An evaporating receptacle 20 is carried by base 15; a receiving tank 21 is carried by platform 18; a digester 22 is carried by platform 17; and a press 23 is carried by platform 19. A motor 24 is carried by platform 18 and has a belt connection 25 with a drive shaft 26 that is horizontally journaled in suitable bearings and extends above platforms 18 and 19, and below platform 17.

A vertical flue 27 extends from the lower portion of one end of evaporator 20, said flue being provided with baffle plates 28 that are arranged in staggered relation. A sinuous casing 29 is arranged in said evaporator and a plurality of endless flight conveyers 30 are arranged in said casing. The conveyers are driven by power taken from a vertical shaft 31, the upper end of which carries a bevel gear 32 that is in mesh with a similar gear 33 carried by power shaft 26. A vent pipe 34 connects the upper portion of casing 29 with flue 27. The upper portion of casing 29 projects through the upper portion of one end of evaporator 20, and the lower end 35 of said casing is elongated and projects through and well beyond the lower portion of said evaporator and depends over a hopper 36 leading to a retort, not shown. The lower conveyer flight extends the full length of the elongated end 35 of casing 29.

The digester 22 is formed of the outer receptacle, to which said numeral 22 has been applied, an inner receptacle, 37 that is spaced therefrom to provide a steam jacket 38. A perforated lining 39 is provided for the inner receptacle 37. The digester is provided with an outwardly-projecting flange 40 at its upper end which forms a seat to which the cover plate 41 is fastened. Plate 41 is provided with an opening 42 that is controlled by a hinged door 43, latches 44 being provided for retaining the door closed. Door 43 is equipped with a safety valve 45, a pressure gage 46, and a sight opening 47 that is sealed by a sheet of glass 48, or other

transparent material. A thermometer 49 is suspended from the bottom surface of door 43 in position to be inspected through the sight opening 47. A transparent receptacle 50 depends from the door 43 and an incandescent electric lamp, or other source of light, 51, is disposed in said receptacle to illuminate the interior of the digester.

A vertically-arranged centrally-located hollow shaft 52 extends through the digester 22 and its upper end projects through the cover plate 41 and is reduced and journaled in a stuffing box 53. The lower end of shaft 52 engages a seat 54 in the bottom of the inner receptacle 37. Shaft 52 is provided with a plurality of lateral nipples 52^a to which upper and lower hollow horizontal blades 55 are coupled. Blades 55 are connected in pairs by the hollow vertical stirrer blades 56. Blades 55 and 56 are preferably triangular in cross section and are pitched so that the blades 55 throw the material toward the center of the digester, and blades 56 are pitched so that they throw the material away from the center—thus obtaining a thorough stirring operation. Stirrer blades 57 are inclosed in spaced relation by the blades 55 and 56, blades 57 being horizontally arranged in pairs that are coupled together, as indicated at 58. Blades 57 are of the same shape as blades 55. Shaft 52 is provided with a central horizontal partition 59 that causes the steam to circulate through the stirrer blades.

The projecting upper end of shaft 52 is reduced and carries a beveled gear 60 that is engaged by a similar gear 62 carried by a shaft 63 that is journaled in bracket bearings 64 carried by cover plate 41. Shaft 63 has a belt connection 65 with drive shaft 26.

A steam pipe 66 extends from a source of steam supply, not shown, and has a branch connection 67 with the lower portion of the steam jacket 38. A steam outlet 68 is provided for jacket 38, said outlet being disposed opposite and in a higher plane than the steam inlet of said jacket and having a pipe connection 69 with the evaporator 20. A controlling valve 70 is provided for pipe 69. Steam pipe 66 extends into the upper end of shaft 52, a stuffing box 71 being provided to avoid escape of steam. Outlet pipe 69 has a branch pipe connection 72 with the base of shaft 52, said pipe 72 being equipped with a controlling valve 73 and at its junction with shaft 52, extends through a stuffing box 74. A drain pipe 75 connects the bottom of steam jacket 38 with evaporator 20, a trap 76 being carried by said pipe 75 to catch sediment. Pipe 75 is equipped with a controlling valve 77. The bottom of digester 22 is provided with a cavity 78 and a burner 79 projects therein to apply heat to the said digester.

A discharge opening 80 is formed in the

bottom of digester 22, and a controlling door 81 is provided therefor. A chute 82, formed of telescoping sections, is arranged beneath the digester and in position to receive material discharged through opening 80. A drain pipe 83 is provided for the interior of digester 22 and extends into tank 21. Pipe 83 is equipped with a controlling valve 84. Tank 21 has a pipe connection 85 with the upper portion of the conveyer casing 29, said pipe being equipped with a controlling valve 86.

The press box 23 is provided with a plurality of internal laterally-projecting nozzles 87 which receive water from a pipe 88 that surrounds said box, said pipe 88 being in communication with a supply pipe 89. Box 23 is provided with an upper inlet opening 90 equipped with a sealing door 91, said opening being in alinement with chute 82 so that when said chute is extended, its free end will enter opening 90 and deliver material to said box. Box 23 is provided with a discharge opening 92 in the lower portion. Discharge opening 92 extends the entire length of the press box 23 and a sealing door 92^a is provided for the same. A plunger or ejector 93 is slidable across the bottom of press box 23 and enters said box through an opening 94 that is opposite opening 92. Ejector 93 includes a bar 95 that is slidable in guides 96 carried by supporting beams 97 of one of the standards 16 and box 23, said bar being provided with upper and lower racks 98 that are engaged by meshed pinions 99 mounted on stub shafts 100. One of said stub shafts also carries a drive gear 101 that is in mesh with a worm 102 carried by a shaft 103, the upper end of which is equipped with a beveled gear 104 adapted to be selectively engaged by the beveled gears 105 and 106 which are slidable on shaft 26. Gears 105 and 106 engage opposite sides of gear 104 and it will be clear that by manipulating said gears 105 and 106, the ejector 93 will be projected into press box 23 to force material therefrom, or withdrawn therefrom.

A plunger 107 is vertically movable in box 23 and is equipped with water channels 108 that are in communication with a flexible water supply pipe 109, said channels being equipped with pendent nozzles 110. Supporting bars 111 extend across the top of press box 23 and the externally-threaded shafts 112 of plunger 107 are slidable there-through. Bars 111 are arranged in pairs, the members of which are in spaced superimposed relation, and a pinion 113 has a hub 114 threaded on each shaft 112. The pinions 113 are arranged between the members of each pair of bars 111, and said pinions are rotated by a drive gear 115 on a shaft 116 journaled in a central supporting bar 117, said shaft carrying a beveled gear

118 at its upper end that is engaged by a beveled gear 119 carried by a shaft 120 journaled in bearings carried by the bars 111. Shaft 120 is provided with pulleys 121 and 122. Main shaft 26 has pulleys 123 and 124 loose thereon, said pulleys being provided with clutch teeth. A clutch member 125 is slidable on shaft 26 and has its faces equipped with clutch teeth for selective engagement with pulleys 121 and 122. Pulley 121 has a straight belt connection 126 with pulley 123, and pulley 122 has a crossed belt connection 127 with pulley 124. The described gearing obviously provides means for raising and lowering plunger 107 without affecting the direction of rotation of shaft 26.

An inclined discharge chute 128 projects from box 23 at the discharge opening 90, and is equipped with a pendent outlet 129 that is over a trough 130 leading to a beater, not shown. Chute 128 has a shaft 131 extending transversely across the same and upon which a drum 132 is mounted, the periphery of which is provided with shredding teeth 133 that are arranged in staggered relation. Shaft 131 has a belt and pulley connection 134 with a pulley 135 mounted on a shaft 136, said shaft 136 carrying a gear 137 that is in mesh with a gear 138 carried by shaft 26. The bottom of box 23 is formed of spaced parallel bars 139 upon which a screen 140 is placed. A chute 141 is disposed beneath the bottom of box 23 and extends into tank 21.

The operation of the pulp making machine is as follows:—The pulp material is placed in the digester 22 in which water and the usual chemicals have been placed, the digester and the stirrer blades having been heated by the steam from pipe 66, and the digester being further heated by the burner 79. The blades are then rotated and the pulp material is quickly digested. When the digesting or cooking operation is finished, the pulp is discharged through opening 80 to the chute 82 and said chute delivers the pulp to the press box 23. While in box 23, the pulp is washed by the water from nozzles 87 and 110, and then compressed into a block by the plunger 107. The liquid squeezed from the pulp passes through the bottom of box 23 and by means of chute 141 is discharged into tank 21. When compressed, the block of pulp is forced from press box 23 by the ejector 93 and falls into chute 128, where it is shredded by the shredder 132, and then delivered to the trough 130 of the beater.

The liquid contents of digester 22 are delivered to tank 21 by the pipe 83 where it mixes with the liquid from box 23 that has been delivered to tank 21 by the chute 141. Tank 21 discharges the liquid into

the upper end of the conveyer casing 29. Steam enters the evaporator 20 through pipes 69 and 75 and thereby heats the casing 29 so that the water will be evaporated from the chemicals. The conveyers 30 agitate the liquid and drop the same from section to section, thus facilitating the evaporation of the water, and the valuable chemicals thus separated from the water are delivered to the retort hopper 36. The bottom of evaporator 20 is in the form of a removable pan 142, that facilitates the cleaning of said evaporator.

What I claim as my invention is:—

1. A pulp making machine comprising a digester, a tank, a press, a drain connection between the digester and the tank, a drain connection between the press and the tank, an evaporator, a sinuous casing in said evaporator, liquid agitating means in said casing, a drain connection between said tank and the said casing, and means for supplying steam to the evaporator.

2. A pulp making machine comprising a digester, a press, a tank, drain connections between the digester, the press and the tank, an evaporator, a casing therein, a drain pipe connection between the tank and said casing, and means for supplying steam to the evaporator.

3. A pulp making machine comprising pulp making means, a receiving tank having drain connections with said means for removing the liquid therefrom, an evaporator, means for heating the evaporator, a casing in said evaporator, means for delivering the liquid from the tank to said casing, and means in said casing for agitating the liquid therein.

4. A pulp making machine comprising pulp making means, a tank having drain connections with said means for delivering the pulp making liquid to said tank, an evaporator, a sinuous casing therein, liquid agitating means in said casing, a drain connection between the tank and said casing, and means for supplying heat to said evaporator.

5. A pulp making machine comprising a digester, a press, a tank, means for conveying the pulp liquid from said digester and press to said tank, an evaporator for removing water from said liquid, and means for conveying the liquid from said tank to said evaporator.

6. A pulp making machine comprising pulp making means, means for removing the pulp liquid therefrom, a tank for receiving said liquid, an evaporator, a casing in said evaporator, means for delivering the liquid from the tank to the casing, liquid agitating means in said casing, and means for delivering steam to said evaporator.

7. A pulp making machine comprising an evaporator, a sinuous casing in said

evaporator, conveyers in said casing, means for supplying heat to said evaporator, pulp making mechanism, and means for removing the pulp liquid from said mechanism

5 and delivering the same to said casing.

8. A pulp making machine comprising an evaporator, a sinuous casing therein having its upper end projecting through the upper portion of said evaporator, the lower
10 portion of said casing being elongated and projecting through the lower portion of said evaporator and terminating in a pendant discharge end, endless conveyers in said casing means for operating said conveyers,
15 pulp making mechanism, means for removing pulp liquid therefrom and delivering the same to the projecting upper end of said casing, means for supplying steam to said evaporator, an outlet flue for said
20 evaporator provided with baffle plates, and a vent connection between the casing and said flue.

9. A pulp making machine comprising a supporting frame, a digester carried thereby and provided with a discharge outlet, a
25 press provided with an inlet opening, a chute for conducting material from the discharge opening of the digester to the inlet opening of the press, a discharge outlet for the press, an ejector for said press, a chute
30 at the discharge outlet of said press, a shredder in said chute, an evaporator, and means for removing pulp liquid from the press box and delivering the same to the said
35 evaporator.

10. A pulp making machine comprising a digester provided with a steam jacket, hollow stirrers in said digester, means for
40 supplying steam to said jacket and stirrer, means for rotating said stirrers, a press in communication with said digester, a shredder receiving the pulp from said press, an evaporator, means for delivering steam
45 from said jacket and stirrers to said evaporator, a casing in said evaporator, and means for delivering pulp liquid from the digester and press to said casing.

11. A pulp making machine comprising a digester, a press, means for delivering material from said digester to said press, nozzles in said press, means for supplying
50 water to said nozzles, a plunger provided with water channels, nozzles for said channels, means for supplying water to said
55 channels, means for operating said plunger, an ejector for removing material from said press, means for operating the ejector, a discharge chute for said press, a shredder in said chute, an evaporator, and means for
60 delivering pulp liquid from said digester and press to said evaporator.

12. A pulp making machine comprising a digester formed of an inner and an outer receptacle arranged in spaced relation to
65 provide a steam jacket, the bottom of said

digester being provided with a cavity, a burner in said cavity, means for supplying steam to said jacket, hollow stirrers in said digester, means for supplying steam to said stirrers, means for rotating said stirrers, an evaporator, means for delivering steam from said jacket and stirrers to said evaporator, a press, a casing in said evaporator, and means for removing pulp liquid from said digester and press and delivering the same to said casing.

13. A pulp making machine comprising a digester, a press, a chute formed of telescoping sections for delivering material from said digester to said press, means for ejecting material from said press, a chute receiving the material ejected from said press, a shredder in said chute, an evaporator, and means for delivering pulp liquid from the digester and press to said evaporator.

14. A pulp making machine comprising a frame, a power shaft journaled therein, means for operating said shaft, a digester carried by said frame, stirrers therein, means actuated by said shaft for operating said stirrers, a press, means for delivering pulp from the digester to the press, a plunger in said press, means actuated by the shaft for operating the plunger, an ejector for said press, means actuated by said shaft for operating the ejector, a chute receiving the ejected material from said press, a shredder in said chute, means actuated by said shaft for operating the shredder, an evaporator, means for supplying steam thereto, a casing, means for delivering pulp liquid from said digester and press to said casing, agitators in said casing, and means actuated by said shaft for operating said agitators.

15. A pulp making machine comprising a digester, a cover therefor provided with an inlet opening, a door for said opening provided with a sight opening, a transparent cover for said sight opening, a thermometer suspended beneath said transparent cover, a transparent cavity in said door, illuminating means in said cavity, a press, means for delivering material from said digester to said press, a shredder receiving material from said press, an evaporator, and means for delivering pulp material from said digester and press to said evaporator.

16. A pulp making machine comprising a digester provided with a discharge outlet, a press provided with an inlet opening, a chute for delivering material from the outlet of the digester to the inlet of the press, a plunger in said press, an ejector slidable across the bottom of said press, a discharge chute for said press, a shredder in said chute, an evaporator, and means for delivering pulp liquid from said digester and press to said evaporator.

17. A pulp making machine comprising
digesting means, compressing means, a tank
having drain connections with said digest-
ing and compressing means, an evaporator
5 for removing water from the pulp liquid,
and means for delivering pulp liquid from
said tank to said evaporator.

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

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