J. D. RICE.

PAPER PULP MACHINERY.

APPLICATION FILED OCT. 8, 1912.

1,110,233.

Patented Sept. 8, 1914.

5 SHEETS—SHEET 1.

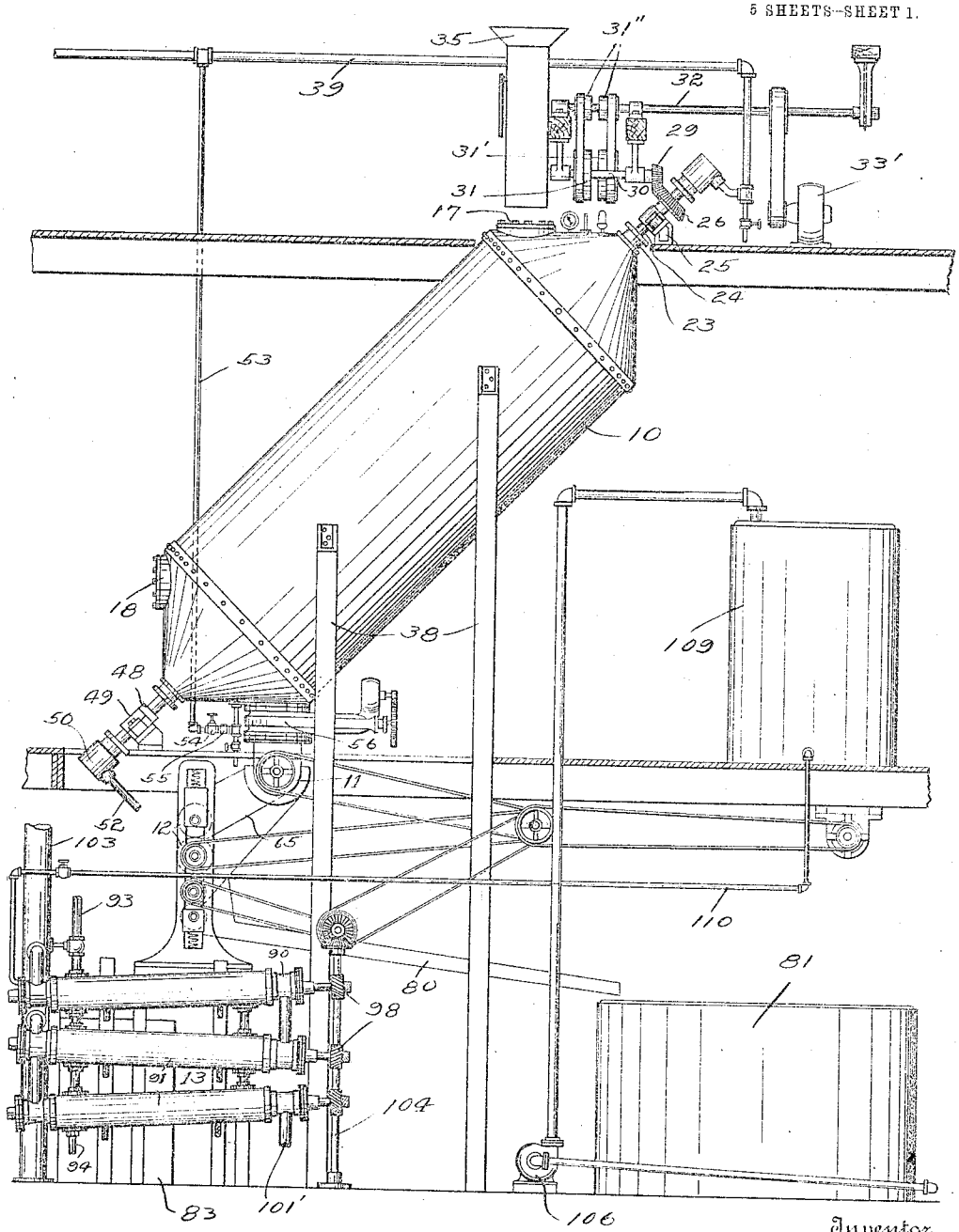


Fig. 1.

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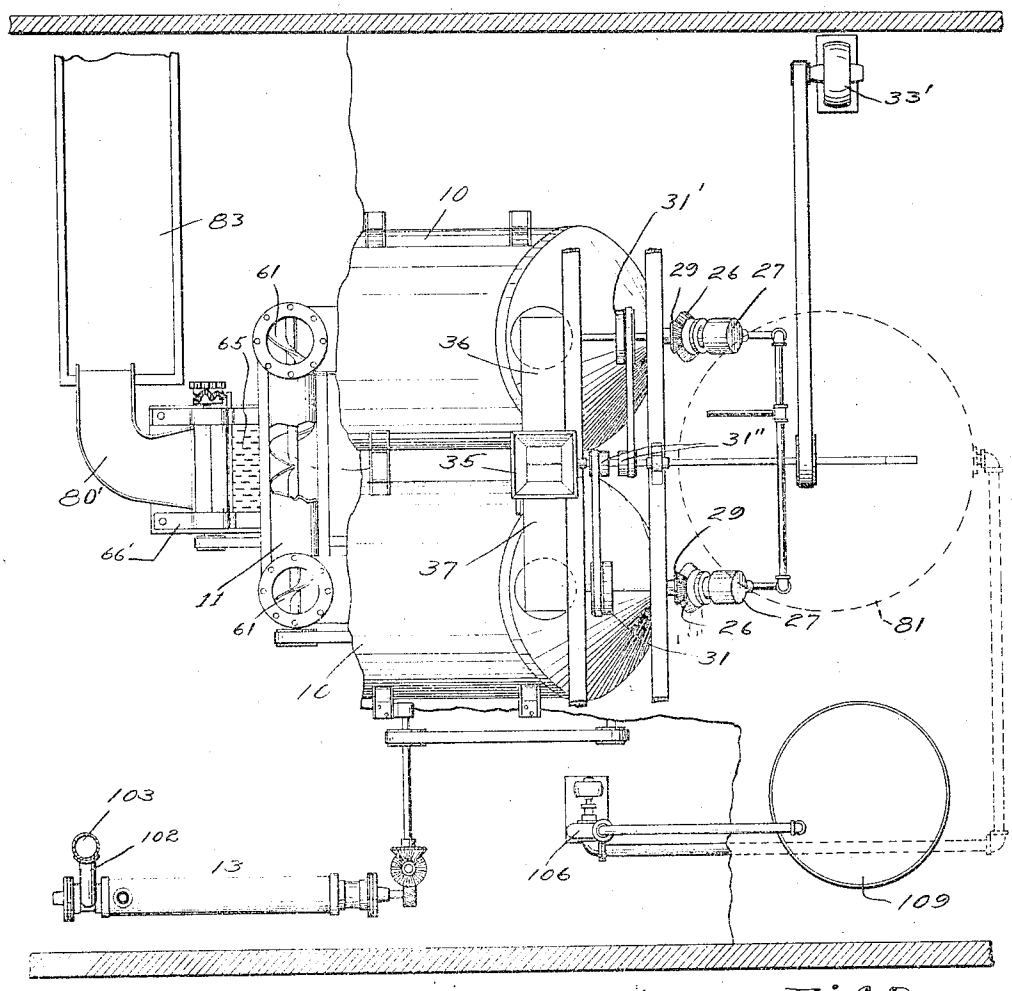


Fig. 2

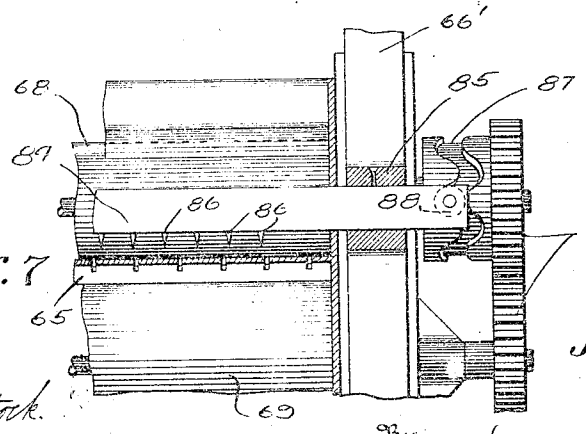


Fig. 7

Witnesses

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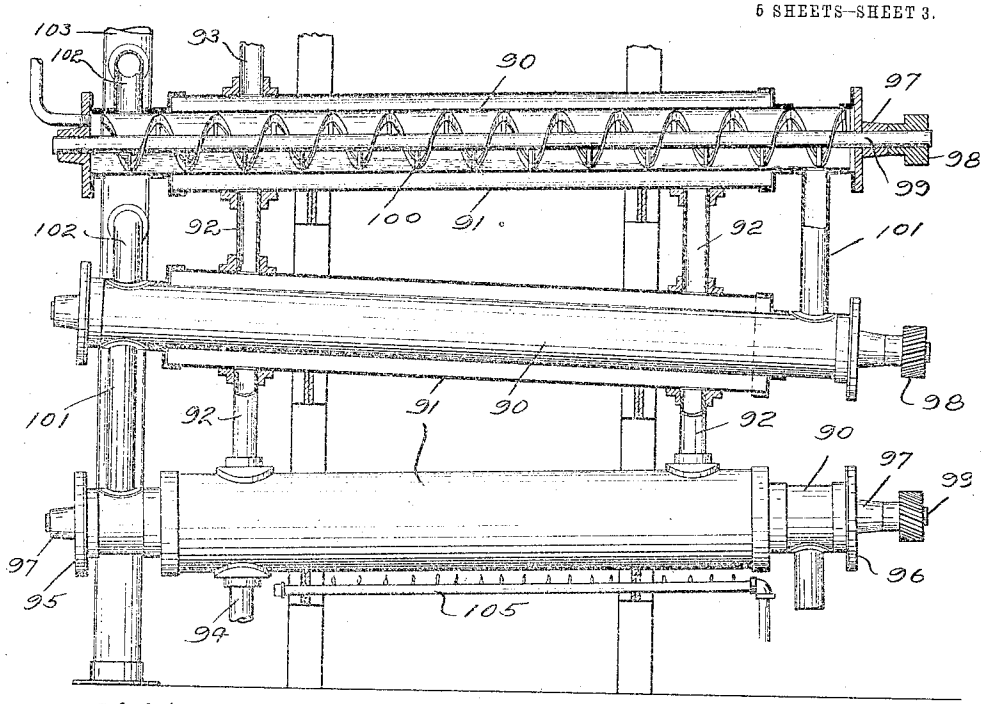


Fig. 3

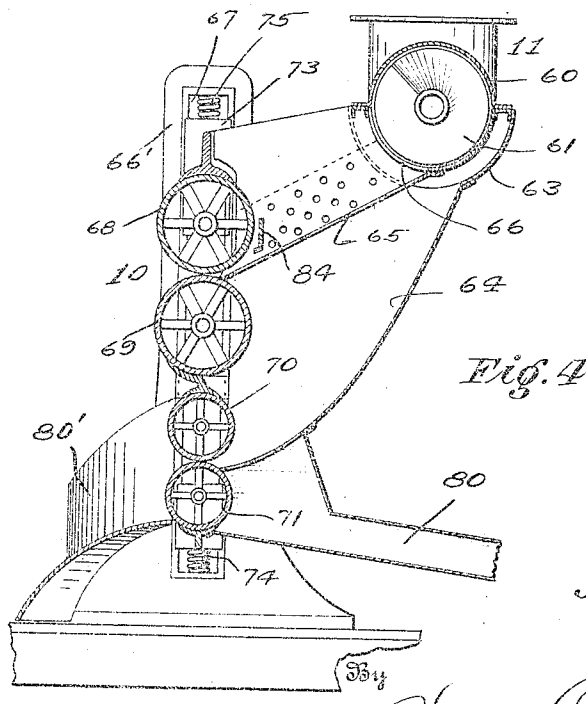


Fig. 4

Witnesses

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5 SHEETS—SHEET 4.

Fig. 6

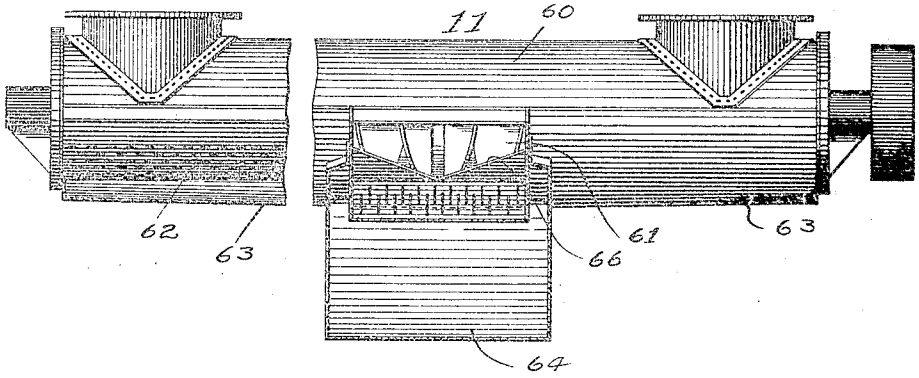
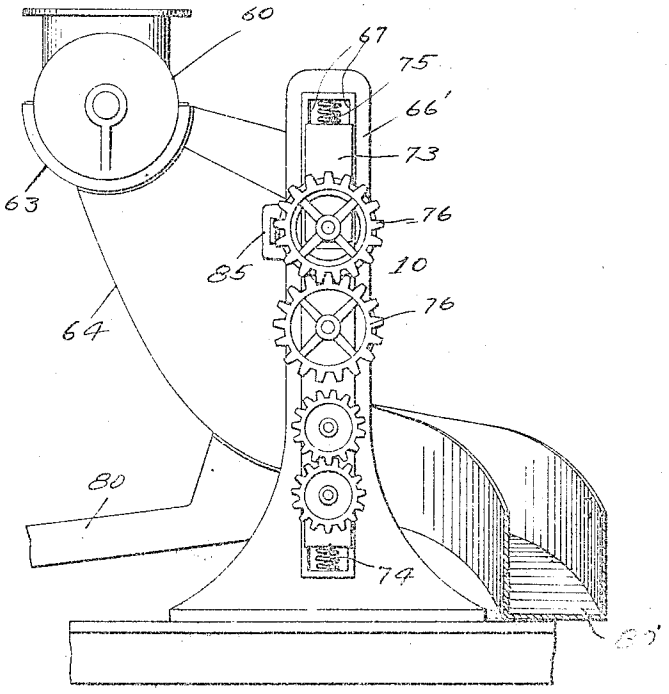


Fig. 5



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5 SHEETS—SHEET 5.

Fig. 8

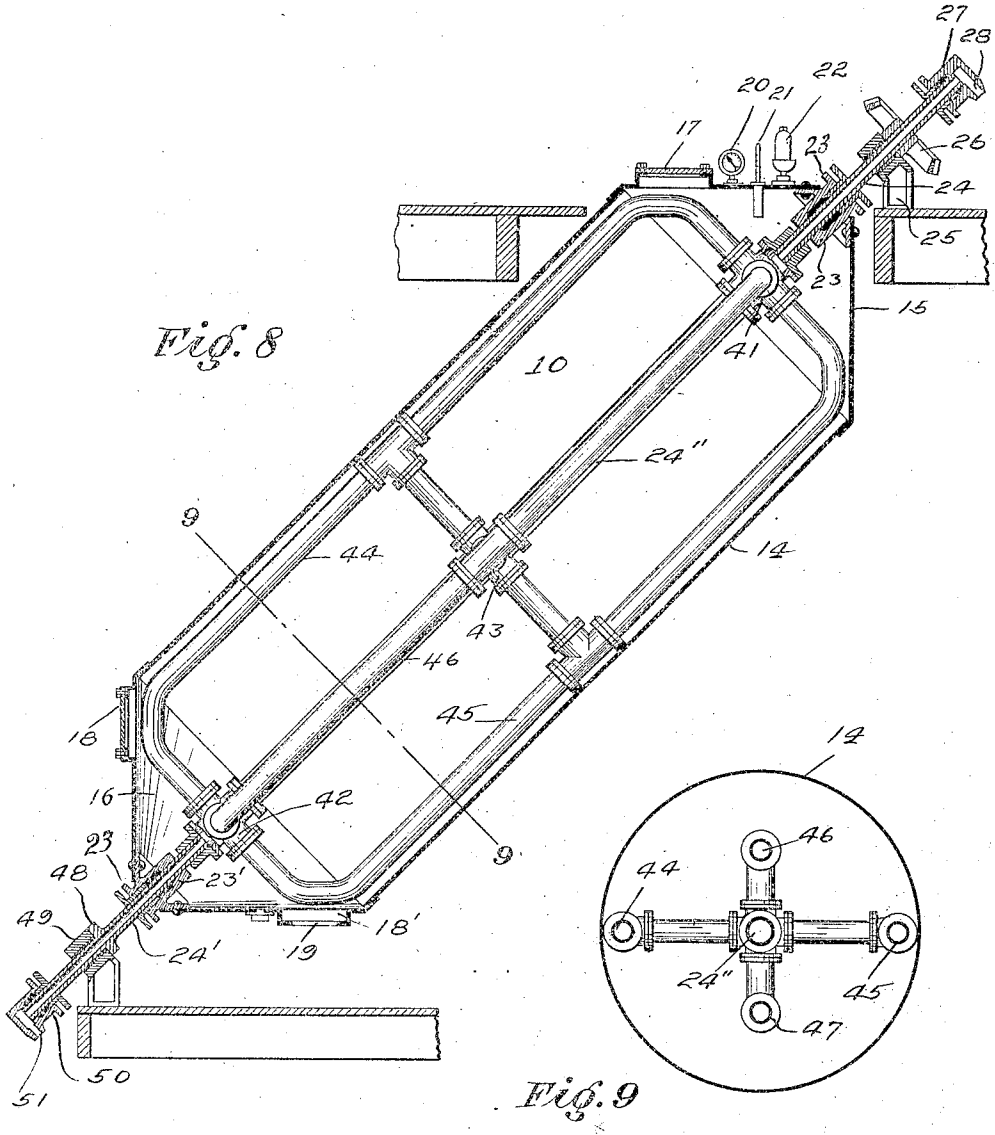


Fig. 9

Witnesses

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UNITED STATES PATENT OFFICE.

JESSE D. RICE, OF PIEDMONT, CALIFORNIA.

PAPER-PULP MACHINERY.

1,110,233. Specification of Letters Patent. Patented Sept. 8, 1914.

Application filed October 8, 1912. Serial No. 724,943.

To all whom it may concern:

Be it known that I, JESSE D. RICE, citizen of the United States, residing at Piedmont, in the county of Alameda and State of California, have invented certain new and useful Improvements in Paper-Pulp Machinery, of which the following is a specification.

This invention relates to improvements in paper pulp machinery and has for its principal object the production of a device or mechanism for cooking wood into pulp.

Another object of this invention is to free the pulp from the chemical liquids and to provide improved means for evaporating this liquid after the same has been extracted from the pulp.

With these and other objects in view, the invention consists of certain constructions, combinations and arrangements of parts as will be hereinafter fully described and claimed.

In the drawing Figure 1 is a view in elevation of the improved pulp making machinery. Fig. 2 is a plan view of the same, showing portions of the machinery broken away to disclose certain novel features. Fig. 3 is a view in elevation and partly in section of the evaporator for reducing the chemical liquids. Fig. 4 is a view in front elevation of a conveyer and squeezing rollers with chutes leading from the former to the latter. Fig. 5 is a view in elevation of the above from the opposite side. Fig. 6 is a view in front elevation of a conveyer used to carry the pulp from the cookers to the squeezing rollers. Fig. 7 is a fragmentary view in elevation of the device for spreading the pulp in front of the rolls. Fig. 8 is a longitudinal sectional view of the pulp cooker, and Fig. 9 is a view in section taken on line 9—9 of Fig. 8.

By carefully considering the drawings and referring to the several parts by reference numerals it will be seen that the improved machine consists in general of a plurality of steam pulp cookers, preferably two in number and indicated by the numeral 10. A screw conveyer 11 having right and left hand screws which conveys the pulp from the cookers is also provided to be used in connection with the cookers above described. The pressure rolls 12 for squeezing the liquid from the pulp and evaporators 13 for reducing said liquid to a solid state preparatory to recovery, are also provided to be used in connection with the other apparatus as described in the following specification.

The cookers 10 consist of a cylindrical shell 14 having their axes at about 45 degrees and having closed conical ends 15 and 16. A manhole 17 is provided upon the end 15 for facilitating the filling of the cooker. A manhole 18 is also provided upon the lower end 16 for convenience in making repairs. A manhole 18′ is provided with a flanged opening 19 and a cut-off valve is attached. A pressure gage 20, thermometer 21 and safety valve 22 are also provided for use in connection with the cooker.

Riveted to the heads 15 and 16 are flanged stuffing boxes 23 and 23′ through which stuffing boxes pass hollow shafts 24 and 24′. The former is journaled in a bearing 25 and has keyed thereto a beveled gear 26. This gear 26 is driven by a gear 29 which meshes therewith, which gear 29 is keyed to the shaft 30 and is driven or controlled by the tight and loose pulleys 31. A similar drive 31′ is provided for the other cooker, the pulleys 31 and 31′ being driven from pulleys 31″ on the shaft 32, which shaft 32 is driven by means of a belt from the motor 33′ or in any other desired manner.

A hopper 35 is provided for use in connection with the cooker and this hopper communicates with the chutes 36 and 37 so that the wood may be fed to the cookers.

On the projecting end of the hollow shaft 24 is mounted a stuffing box 27 having an inlet opening 28, which inlet opening is connected to a source of steam supply 39. The cookers themselves are suitably mounted upon columns 38, which columns are preferably independent of the adjacent building structure.

A pipe 24 is carried to the interior of each cooker and is there joined to a central pipe 24″ through a special fitting 41. Similar fittings 42 and 43 are provided at the opposite end and intermediate its length, by which arms 44 and 45, 46 and 47, are supported—see Fig. 8. The former two pipes are placed close to the outside of the shell whereas the latter two pipes are placed at a point midway between the shell and the center of the pipe. Attention is especially called to Fig. 9 which illustrates this structure.

Attached to the lower end of the pipe 24 is secured a hollow shaft 24′ which passes through the stuffing box 23′ and is provided

with the thrust collar 48 which collar 48 bears against a thrust bearing 49. A stuffing box 50 is provided on the end of this shaft having an outlet 51, which outlet 51 is connected by a pipe 52 to a steam trap or other waste.

The steam is supplied to the bottom of the cooker through the medium of the pipe 53 which pipe branches to each cooker and each branch is provided with a valve 54 and a check 55.

Gate valves 56 are attached to the flanged openings 19 which are most conveniently of the motor driven type and attached to the lower flanges of these valves is a screw conveyer 11. See especially Fig. 6. This conveyer consists of a casing 60 having therein a right and left hand screw 61 which screw is adapted to convey the material discharged therein from either cooker to the center of the conveyer. The lower part of the casing 60 is perforated as at 62 and a second casing 63 is provided concentric of the lower half of the casing 60. By the means just described the pulp passing through the casing 60 is partly drained of its liquid which liquid flows along the second casing 63 and down the chute 64. See especially Fig. 4. An opening 66 is provided at the center of the casing 60 at one side thereof to which is connected a discharge chute 65, the latter being located immediately above the chute 64, which chutes 64 and 65 are provided with perforations for allowing the liquid to drain into the lower chute or discharge chute 80. The wringing devices denoted by the numeral 10 consist of two side brackets 66′ suitably spaced to support the wringing rollers in an efficient manner. Upon these uprights 66′ are supported two large rolls 68 and 69, the roll 68 being journaled in a block 73, which block 73 is slidably mounted in the trackway 67 formed in the upright 66′. The roll 69 is mounted in fixed bearings and roll 68 is held in contact with the roll 69 by means of the springs 75 pressing on the sliding block 73. In a similar manner the small roll 70 is mounted in a fixed bearing and the roller 71 in a slidable bearing, the spring 74 holding these rollers in contact.

The lower end of the chute 65 is located adjacent the contacting point of the rolls 68 and 69, so that the main part of the cooked pulp passes down this chute and through these rolls. In each case the shaft of the fixed roll is the only one which is driven, the slidably mounted roll being driven from the fixed roll by co-meshing gears 76 indicated in Fig. 5. These gears are so formed as to have extra long teeth, so that the rolls may be forced apart for a suitable distance without interfering with their proper action. The liquid passed from the pulp runs down into a trough 80 and thence to a storage tank 81 while the dried pulp falls upon a chute 80′ and thence into the pulp beater 85.

A reciprocating rod 84 is mounted in the bearings 85 in the side brackets 66′ for assisting in the even distribution of pulp between the rolls 68 and 69. This bar 84 is provided with a plurality of scrapers 86, which scrapers level off the pulp as the pulp flows down the chute 65. Keyed to the shaft of the roll 68 is a face cam as illustrated in Fig. 7 having a groove 87 and on the end of the bar 84 is positioned a wheel 88, which wheel engages this groove and thus imparts a reciprocating motion to the bar 84.

The evaporator 13 consists of a number of cylindrical shells 90 mounted vertically one above the other and having their axes slightly inclined. Surrounding each of these cylinders is a steam jacket 91, the various jackets being connected together by short pipes 92. The steam inlet is indicated by the numeral 93 and the drain pipe is indicated by the numeral 94.

The ends of the cylindrical shells 90 are closed by suitable plates 95 and 96 containing bearings 97 in which the shaft 99 is journaled. Attached to this shaft is a spiral conveyer 100 which is rotated so as to convey the material toward the high end of the cylinder where the pipe 101 is attached and leads to the lower end of the next lower cylinder. The various shafts 99 may be conveniently driven through spiral gears 98 from the common upright spiral shaft 104. Vent pipes 102 are provided opening into a flue 103 carrying the vapor to a convenient point.

As there is a quantity of gas generated in the manufacture of the pulp as a by-product, it will be found convenient to burn a part of this generated gas under the evaporator as illustrated in Fig. 3 by means of a burner 105. It will be seen that this burner will keep the jackets superheated, thus hastening the evaporation of the liquid. A centrifugal pump 106 is provided, which pump draws the liquid from the tank 81 and discharges the liquid into a feed tank 109 from whence it flows through pipe 110 into the uppermost cylinder of the evaporator 13.

The operation of the device is as follows: The chopped wood is allowed to flow into the hopper 35 from the storage bin and is then directed through the proper chutes 36 and 37 to either of the cookers 10. The manhole 17 of the cooker is then closed tight and the shaft 30 is rotated. This shaft rotates the gear 36 and shaft 24 and then the beater pipes 44, 45, 46 and 47 which are within the cooker stir the material which is placed within the cooker 10. At the same time steam is admitted into the interior of these pipes and also directly into the mass within the cooker 10. This rotation is continued

and the heat from the pipes 44, 45 and 46 and the stirring action allows the mass to become quickly and uniformly heated, thus finishing the cooking process in a much shorter time than the usual type of machinery now in use. When the cooking is finished, the corresponding valve 56 is opened, allowing the contents to flow into the conveyer 11, which conveyer carries the material to the chute 65 where it is discharged and flows down to the squeezing rolls above mentioned. The device 84 spreads this material in an even layer and thus the material passes between the rolls 68 and 69 and has most of its liquid squeezed out of the same. What pulp passes through the perforations in the bottom of the conveyer and the chute 65 is then caught up by the chute 64 and passes through the rolls 70 and 71. The pulp then falls into the chute 80′ and thence into the beater. The liquid in the meantime is drained into the tank 81 from whence it is pumped to a gravity feed tank 109. From here the liquid flows into the evaporator 13. Here it is surrounded by the steam jacket and as it becomes thicker it is pushed forward by the conveyer and flows into the next lower conveyer till it emerges from the outlet 101′ as a semi-solid.

What is claimed is:

1. In a paper pulp making machine, the combination with a plurality of heaters, heating pipes positioned within said heaters, conveyers for conducting material from said heaters, and discharge means carried by the conveyers for separating the liquid discharged from said heaters from the pulp discharged from the said heaters.

2. In a paper pulp making machine, the combination with a plurality of heaters comprising casings, a plurality of heating pipes positioned in said casings, said heating pipes adapted to be rotated within said casings for stirring the contents thereof, conveyer means associated near the bottom of said casings for conveying material discharged from said casings to the desired point, and discharge chutes associated with said conveyers for separating the liquid discharged from said casings from the pulp discharged therefrom.

3. In a paper pulp making machine, the combination with a plurality of heating casings, a plurality of heater pipes carried within said casing, each of said casings provided with conical ends, journals carried at the conical ends of such casing, supporting pipes engaging said first mentioned pipes and passing through said journals, and means for feeding steam through said supporting pipes and into said first mentioned pipes for heating the same.

4. In a paper pulp making machine, the combination with a plurality of heaters, a conveyer positioned below said heaters, means for cutting off the feed of said conveyers from either one of said heaters, discharge chutes coöperating with said conveyer for receiving and separating the discharge from said heaters, and squeezing rollers coöperating with said chutes for separating the liquid from the pulp discharged from said conveyer.

5. In a paper pulp making machine the combination with a plurality of heaters, a conveyer associated with said heaters, chutes coöperating with said conveyers for partially separating the liquid from the pulp, squeezing rollers coöperating with said chutes for separating the pulp from the liquid discharged from said heaters, and evaporators coöperating with said chute and squeezing rollers for receiving the discharged liquid for evaporating the same and causing the liquid to be discharged in a semi-solid condition.

6. In a machine of the class described, the combination with a plurality of heaters, means for discharging material from said heaters, means for separating liquid from the pulp of the material discharged from said heaters, a refuse receptacle, a storage receptacle, a gravity feed receptacle, an evaporator having a pipe connection with the feed receptacle, means for driving said liquid from said storage receptacle into the feed receptacle, and means for conveying said material from said evaporator to a point of discharge.

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

JESSE D. RICE.

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