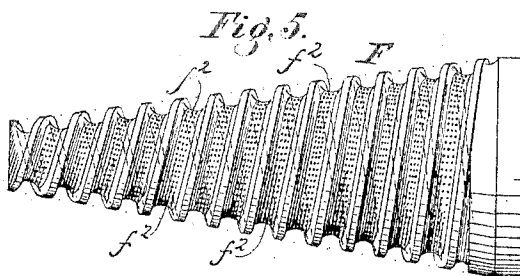
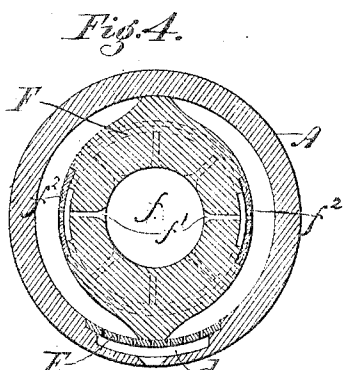
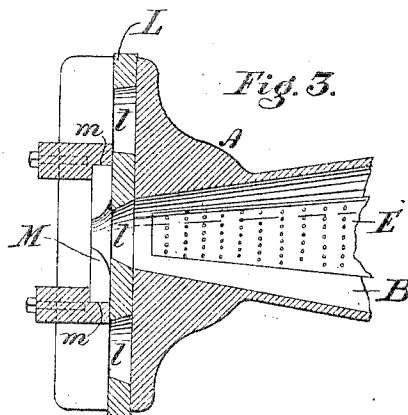
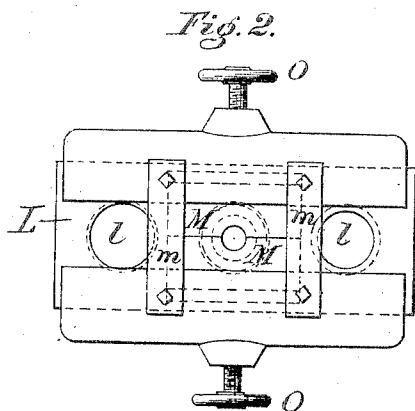
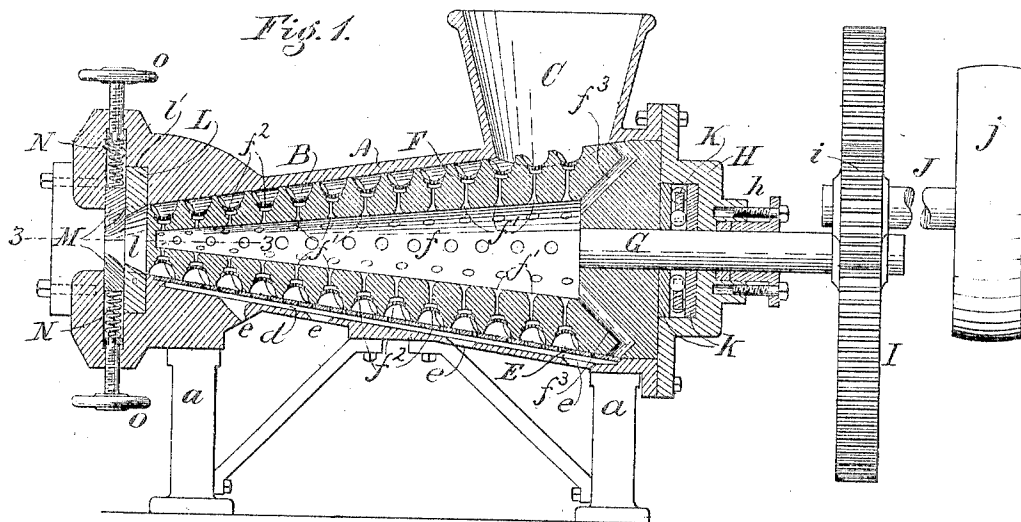


No. 797,374.

PATENTED AUG. 15, 1905.

C. W. ROBERTS.
MACHINE FOR PRESSING WATER FROM WOOD PULP,
APPLICATION FILED JAN. 16, 1902.



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UNITED STATES PATENT OFFICE.

CHARLES W. ROBERTS, OF CARTHAGE, NEW YORK, ASSIGNOR OF ONE-HALF TO FRED P. LUCE AND CALVIN G. SUTLIFF, OF LOCKPORT, NEW YORK.

MACHINE FOR PRESSING WATER FROM WOOD-PULP.

No. 797,374.

Specification of Letters Patent.

Patented Aug. 15, 1905.

Application filed June 16, 1902. Serial No. 111,826.

To all whom it may concern:

Be it known that I, CHARLES W. ROBERTS, a citizen of the United States, and a resident of Carthage, in the county of Jefferson and State of New York, have invented new and useful Improvements in Machines for Pressing Water from Wood-Pulp, of which the following is a specification.

This invention relates to a machine for expressing or extracting liquid from solid material, and is more particularly intended for removing water from wood-pulp.

The wet wood-pulp after it has been strained or screened and before it is shipped to the paper manufacturer or made into paper is usually passed through what is known as a "wet machine," which removes a part of the water from the pulp and forms the latter into a sheet. The sheet of pulp after passing through the wet machine still contains considerable water, which it is desirable to eliminate. The present machine is intended to operate upon the pulp either before or after it has passed through the wet machine.

The object of the invention is to provide a machine of simple construction which will extract practically all of the water from the pulp and which is provided with means whereby the pulp can be dried uniformly regardless of the quantity of wet pulp introduced into the machine or of irregularities in the feed and whereby the percentage of water removed from the pulp can be easily regulated as found necessary or desirable.

In the accompanying drawings, Figure 1 is a longitudinal sectional elevation of a machine embodying the invention. Fig. 2 is an elevation of the discharge end of the machine. Fig. 3 is a horizontal section through the discharge end of the machine in line 3 3, Fig. 1. Fig. 4 is an enlarged transverse section through the expressing-chamber and pressure-screw. Fig. 5 is an elevation of the pressure-screw.

Like letters of reference refer to like parts in the several figures.

A represents the casing or shell of the machine, which in the machine shown in the drawings is supported in position by suitable supports or legs *a* and is provided with a longitudinal tapering or frusto-conical chamber or bore B. The chamber is open at its small end and closed at its large end and is pro-

vided at or near the large end thereof with a feed opening or hopper C, into which the wet pulp to be treated is placed or fed in any suitable manner. A portion of the wall of the expressing-chamber, preferably the lower portion, is perforated to provide an exit from the chamber for the water expressed from the pulp. In the construction shown the lower portion of the casing or shell is provided with a longitudinal groove or channel *d* and discharge-openings *e*, leading therefrom, and over the channel is supported in any convenient or suitable manner a perforated steel plate E, the inner face of which is flush with the inner surface of the expressing-chamber and constitutes a portion thereof. This plate is preferably removably or detachably arranged in the chamber in order that when worn the plate may be removed and replaced by a new one.

F represents a pressure device or screw which is rotatably mounted in the expressing-chamber and is tapered correspondingly to the chamber. When the screw is rotated, it forces the pulp, which is introduced into the chamber through the hopper, toward and out of the small open end of the expressing-chamber. As the chamber tapers toward the pulp-discharge, the pulp is compressed or compacted and the water is expelled therefrom and escapes from the chamber through the perforations in the lower portion thereof. A screw having two or more threads is preferably employed. Where a screw with a plurality of threads is employed, the pulp which enters the chamber between the threads of the screw is divided into smaller quantities without lessening the output of the machine. The water can thus be more completely extracted from the pulp, for a much larger percentage of water can be squeezed from a small quantity of pulp than from a large quantity. Then, too, the plurality of threads permits of each thread having the necessary pitch to exert the desired pressure and carry the pulp through the expressing-chamber and prevent choking the machine. It is also desirable to provide means for carrying the water directly and quickly from the pulp in all parts of the channels of the threads and prevent it from collecting in the channels. For this purpose in the construction shown the screw is made hollow or provided with a

longitudinal bore f^2 , which communicates with the thread-channels through holes f' in the screw. Preferably the bottom of each channel is provided with a perforated metal strip or plate f^2 , wound in helical form in the screw-channel and confined in a groove in the bottom thereof over the holes f' . At its large end the pressure-screw is provided with one or more conduits or passages f^3 for carrying the water from the central bore of the screw to the discharge-channel d in the bottom of the expressing-chamber.

Any suitable means is provided for rotating the pressure-screw. In the construction shown in the drawings, G represents a shaft which is secured to the screw and extends axially from the large end thereof through a stuffing-box or packing-gland h , provided in a head or plate H, which is detachably secured to and closes the large end of the tapering casing or shell. The shaft is provided with a gear-wheel I, with which meshes a gear-pinion i on a power-shaft J, which is journaled in suitable bearings (not shown) and is provided with a drive-pulley or the like j . As considerable end thrust is exerted on the screw, due to the pressure required to force the pulp through the small discharge-opening of the chamber, it is desirable to reduce the friction at the large end of the screw, and for this purpose an antifriction thrust-bearing K is located in a pocket or depression formed in the removable head H around the shaft G. The bearing may be of any suitable or usual construction. That shown comprises two disks k of hardened metal arranged against the end of the screw and inner face of the removable head, respectively, and interposed antifriction-balls.

L represents a die or plate which is movably supported across the small end of the casing or shell and is provided with a series of discharge-openings l of different sizes, either of which can be brought into register with the small open end of the expressing-chamber by shifting the die or plate. Any desired number of discharge openings or nozzles may be provided in the plate, three being shown in the drawings. Each of the discharge openings or nozzles is tapered or conical, so that as the pulp is forced through the same by the screw the core of pulp is compressed or compacted and more or less of the water is expelled from the same, according to the size of the discharge-opening and the quantity of pulp the machine is working upon. If little water is to be expressed or if the supply of pulp to the machine is great, the die or plate is shifted to place a large opening opposite the discharge end of the chamber, while if more water is to be expressed or if the supply to the machine is small one of the smaller openings is placed opposite to the discharge end of the chamber. In the construction shown in the drawings

the die or plate is slidably mounted in transverse ways or grooves l' formed in the end of the casing or shell on opposite sides of the end opening of the chamber. In the operation of the machine the die or plate is held from transverse movement in its ways by the core of pulp passing through the discharge opening or nozzle of the die or plate.

The machine is provided at its discharge end with a clamp or die, composed of separable halves or sections M, which grasp and retard or restrain the pulp discharging from the machine. The sections of the clamp or die are slidably mounted in suitable ways m on the casing and are provided in their adjacent edges with recesses or openings, which together form a discharge-opening for the pulp axially in line with the discharge end of the expressing-chamber. In the construction shown the clamp or die sections are arranged outside of the adjustable die-plate and are pressed toward each other by coil-springs arranged in pockets between the clamp or die sections and the inner ends of adjusting-screws or the like O, working in threaded holes in the end of the casing, by which the pressure of the springs on the clamp or die sections can be increased or decreased. The opening of the clamp shown is tapered, and its smallest diameter is less than the least diameter of the smallest hole in the adjustable die-plate, and its large inner end is rounded, so that when the larger openings of the die-plate are used an abrupt shoulder or obstruction will not be formed at the outer end of the opening of the die-plate. The pulp issues from the machine in the form of a core or plug the shape of the discharge-opening and is compressed or squeezed by the clamp. The core of pulp is so dense that if allowed to remain in the die and clamp for a while—for instance, over night—it would be a matter of considerable difficulty to remove it, and it would be necessary to bore or dig it out to again start the machine if a solid die or clamp were used. As, however, the sections of the clamp are separable, they can be opened or separated, thereby loosening the core and permitting the same to be taken out of the clamp with great ease. The spring-pressed clamp-sections shown grip and compress or squeeze the core of pulp with more or less pressure, according to the adjustment of the adjusting-screws, and thus take care of irregularities in the density of the pulp, insuring an even compression of all the pulp. The clamp can be easily adjusted to exert the necessary pressure on the core of pulp without stopping the machine. While the sectional clamp or die is shown as acting in conjunction with the adjustable die-plate, it will be understood that it would also be desirable without the adjustable die-plate and also that separable clamp and die sections rigidly backed by adjusting-screws instead of the spring-pressed clamp-

sections shown would operate efficiently to compress the pulp and to release the same to facilitate its removal by the separation of the clamp or die sections.

I claim as my invention—

1. The combination of a tapering expressing-chamber having an open end for the discharge of the pulp, a tapering screw in said chamber for forcing the pulp out of said discharge end of the chamber, and a die at the discharge end of said chamber having means for providing unobstructed tapering discharge-openings of different diameters for the pulp, said discharge-openings being in shape similar to the open end of the expressing-chamber whereby said means do not offer an obstruction to the discharge of the pulp, substantially as set forth.

2. The combination of an expressing-chamber, having an open end for the discharge of the pulp, a screw in said chamber for forcing the pulp out of said discharge end of the chamber, and a die movably mounted at the discharge end of the chamber, and provided with tapering discharge-openings of different diameters adapted to be placed in line with the discharge end of the chamber, said discharge-openings being in shape similar to the open end of the expressing-chamber, whereby said means do not offer an obstruction to the discharge of the pulp, substantially as set forth.

3. The combination of an expressing-chamber having an open end for the discharge of the pulp, a screw in said chamber for forcing the pulp out of said discharge end of the chamber, a die having an unobstructed tapering discharge-opening for the pulp, and a device having a tapering discharge-opening for the pulp of smaller diameter than and arranged in line with the discharge-opening of said die, substantially as set forth.

4. The combination of an expressing-chamber provided with a pulp-discharge, and a discharge for the water expressed from the pulp, a pressure device in said chamber, a movable die mounted in transverse ways at the discharge end of the expressing-chamber and provided with a plurality of discharge-openings of different sizes for the pulp, substantially as set forth.

5. The combination of an expressing-chamber provided with a discharge-opening for the pulp, a clamp or die composed of separable sections forming an opening in line with the discharge-opening of said expressing-chamber through which the pulp discharges, said sections being separable to release the core of pulp, and a pressure device for forcing the pulp through said clamp-opening, substantially as set forth.

6. The combination of an expressing-cham-

ber provided with a discharge-opening for the pulp, an expansible clamp device provided with an opening therein in line with the discharge-opening of said chamber through which the pulp discharges, and a pressure device for forcing the pulp through said clamp-opening, substantially as set forth.

7. The combination of an expressing-chamber provided with a discharge-opening for the pulp, an expansible clamp device provided with a tapering opening therein in line with the discharge-opening of said chamber through which the pulp discharges, and a pressure device for forcing the pulp through said clamp-opening, substantially as set forth.

8. The combination of an expressing-chamber provided with a discharge-opening for the pulp, a pressure device in said chamber, and a laterally-expansible clamp arranged adjacent to the discharge-opening of said chamber and adapted to grip the core of pulp, substantially as set forth.

9. The combination of an expressing-chamber having a discharge-opening for the pulp, a pressure device in said chamber, and a clamp arranged adjacent to the discharge-opening of said expressing-chamber and comprising opposable jaws movable relative to each other and yieldingly held toward each other, substantially as set forth.

10. The combination of an expressing-chamber provided with a discharge-opening for the pulp, a pressure device in said chamber for forcing the pulp through said discharge-opening, and a clamp arranged adjacent to said discharge-opening and composed of two opposable spring-pressed jaws which are movable relative to each other, substantially as set forth.

11. The combination of an expressing-chamber provided with a discharge-opening for the pulp, a pressure device in said chamber for forcing the pulp through said discharge-opening, two spring-pressed clamping-jaws arranged adjacent to said discharge-opening and movable transversely of said discharge-opening toward and from each other, and means for adjusting the pressure of the jaw-springs, substantially as set forth.

12. The combination of an expressing-chamber, a pressure device therein, a die provided with a plurality of discharge-openings for the pulp and movable to bring either of said openings in line with said chamber, and a clamp device arranged adjacent to said die and adapted to yieldingly grip the core of pulp, substantially as set forth.

Witness my hand this 6th day of June, 1902.

CHARLES W. ROBERTS.

Witnesses:

EMMA LA ROCK,
WILBUR A. PORTER.