N. LOMBARD.

PULP BEATING MECHANISM.

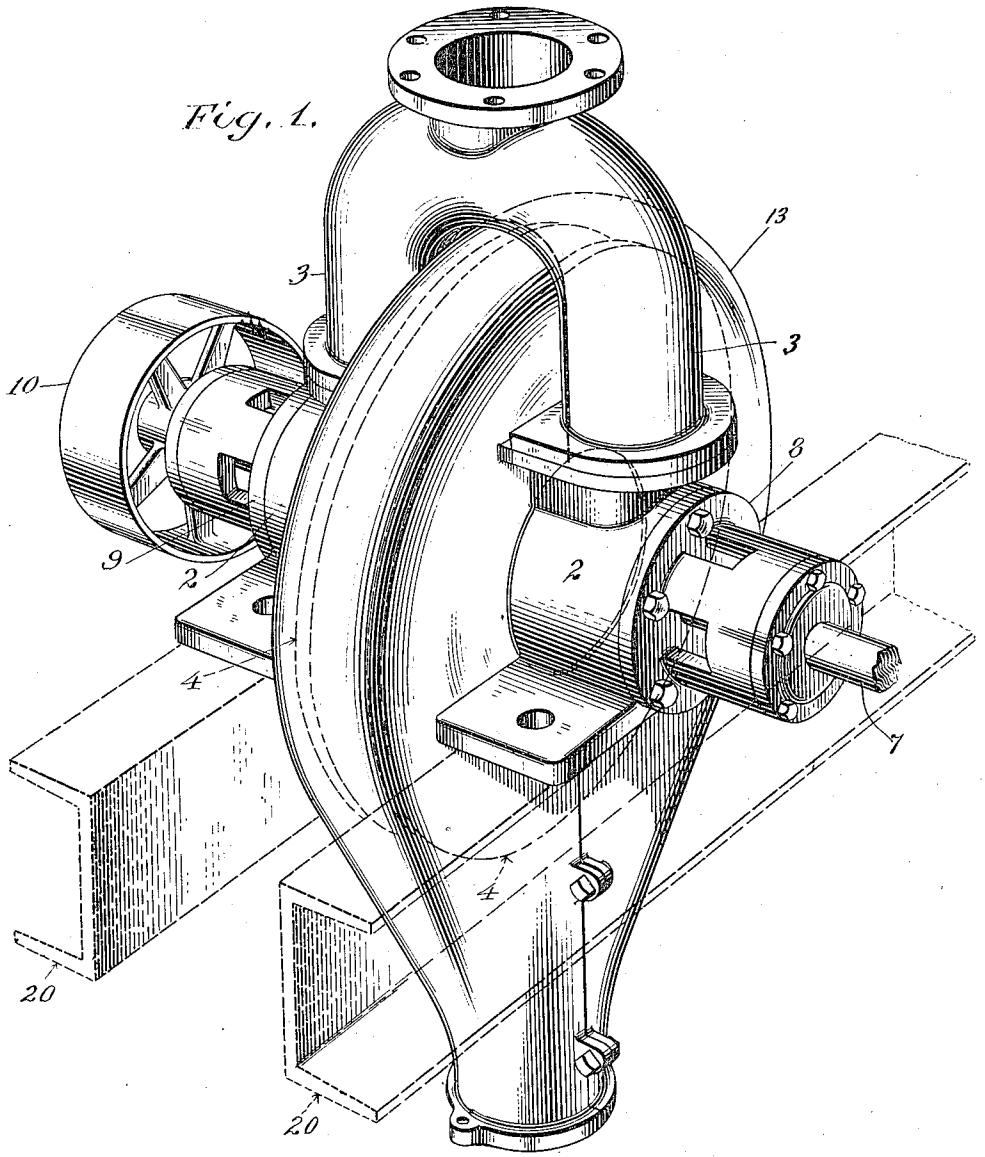
APPLICATION FILED MAY 19, 1915.

1,272,473.

Patented July 16, 1918.

3 SHEETS—SHEET 1.

Fig. 1.



Inventor

Nathaniel Lombard

By his Attorneys

Rogers, Kennedy & Campbell.

N. LOMBARD.

PULP BEATING MECHANISM.

APPLICATION FILED MAY 19, 1915.

Patented July 16, 1918.

3 SHEETS—SHEET 2.

1,272,473.

Fig. 5.

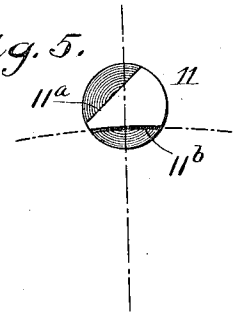


Fig. 2

Inventor

Nathaniel Lombard

By his Attorneys

Rogers, Kennedy & Campbell

N. LOMBARD.

PULP BEATING MECHANISM.

APPLICATION FILED MAY 19, 1915.

1,272,473.

Patented July 16, 1918.

3 SHEETS—SHEET 3.

Fig. 3.

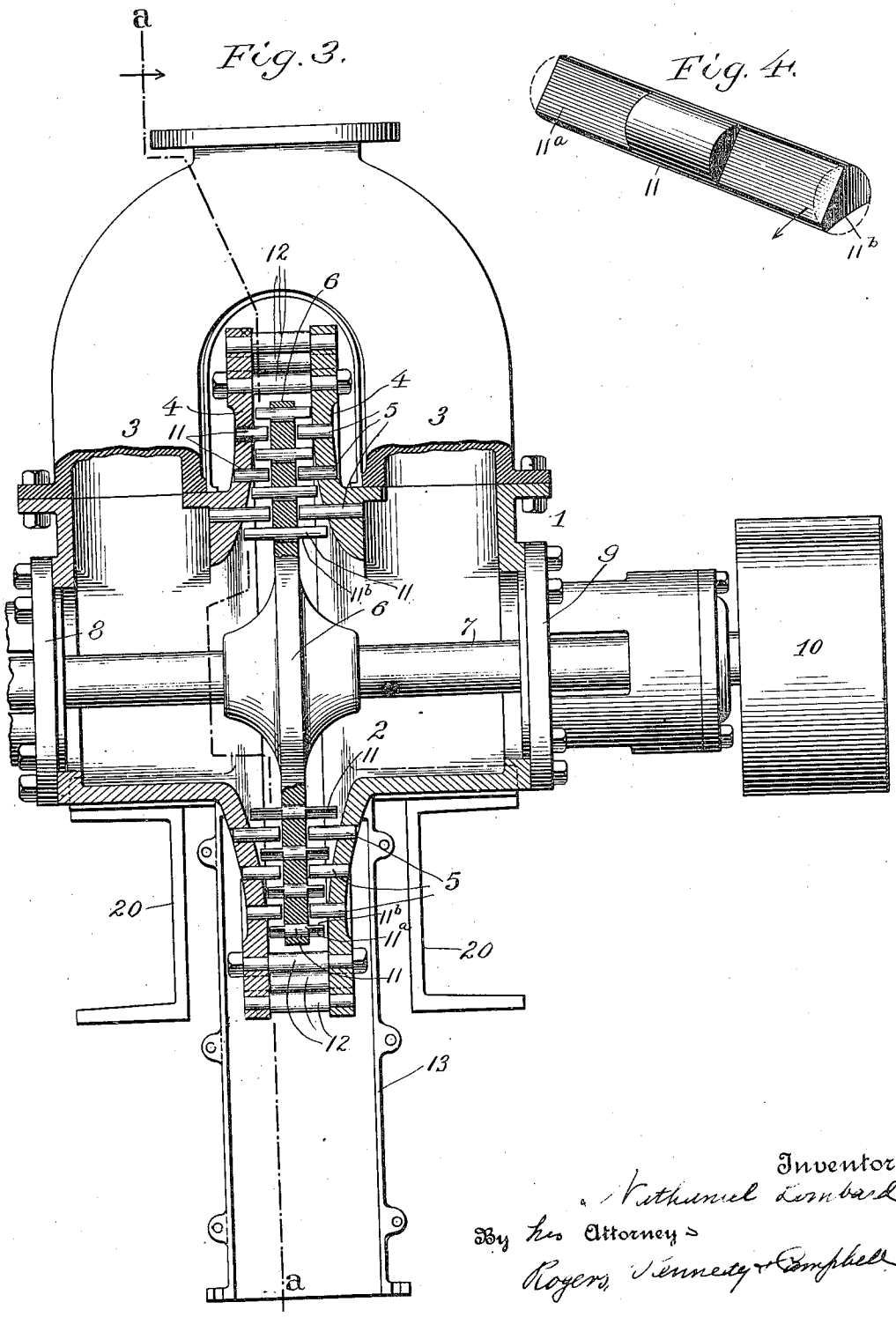


Fig. 4.

Inventor

Nathaniel Lombard

By his Attorneys

Rogers, Kennedy & Campbell

UNITED STATES PATENT OFFICE.

NATHANIEL LOMBARD, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO INTERNATIONAL PAPER COMPANY, A CORPORATION OF NEW YORK.

PULP-BEATING MECHANISM.

1,272,473. Specification of Letters Patent. Patented July 16, 1918.

Application filed May 19, 1915. Serial No. 29,035.

To all whom it may concern:

Be it known that I, NATHANIEL LOMBARD, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Pulp-Beating Mechanism, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to mechanism for beating pulp for use in the manufacture of paper, the design of the invention being to so act on the pulp that it will be brought to a condition, as regards the distribution and arrangement of the fibers, that is most favorable for the proper operation of the paper making machine.

My invention consists of coöperating devices adapted to operate on the pulp, said devices being of such relative form and arrangement that the pulp fed to them will be violently agitated and subjected to a general progressive movement, portions of the pulp throughout the mass in such movement, being subjected to repeated concussive blows, as a result of which the massy condition of the pulp will be destroyed and it will be subjected to a disintegrating action, the fibers being combed out lengthwise and distributed in a uniform condition, and this without danger of injury to the individual fibers or reduction in their length. To adapt the mechanism for operation in this manner, and with these results, two coöperating series of pins or projections are employed, the pins of one series being movable relatively to the pins of the other series through the mass of pulp between them. The pins of the fixed series are preferably carried by and extend inwardly in opposite directions from the adjacent faces of two fixed annular plates, the said pins being spaced from each other in a radial direction. The pins of the movable series are carried by, and project outwardly from the opposite sides of a rotary disk which extends outwardly between the fixed plates, which pins are spaced from each other in a radial direction, and are disposed opposite the spaces between the fixed pins, so that they will travel between the fixed pins in the rotation of the disk. The movable pins are so formed that while the pulp will be subjected to a beating action, the mass will be given a progressive movement outwardly between the plates and disk and will be discharged from between the outer edges of the plates, the outward flow of the pulp being retarded by suitable obstructing means at the outer edges of the fixed plates, whereby the beating action of the pulp will be prolonged.

The mechanism illustrated in the accompanying drawings embodies the features and characteristics above mentioned, and illustrates one form of my invention by way of example. It will be manifest, however, that it may be variously changed and modified without departing from the limits of my invention, provided the operation is substantially as indicated above. Further, it will be understood that the invention is not limited to any particular form or construction of the parts, except in so far as such limitations are specified in the claims.

In the accompanying drawings:

Figure 1 is a perspective view of my improved machine.

Fig. 2 is a side view partly in section and partly in elevation, with certain parts broken away to expose other parts to view.

Fig. 3 is a vertical sectional elevation on the line *a*—*a* of Fig. 2.

Fig. 4 is a perspective view of one of the pins of the movable series.

Fig. 5 is an end view of the same.

Referring to the drawings:

1 represents a suitable casing provided with a horizontal elongated central receiving chamber 2 to receive the pulp to be treated which pulp is supplied to the opposite ends of the chamber through branch supply-pipes 3 communicating at their lower ends with said chamber and extending upwardly and joining each other, at which point the pulp is introduced. Extending outwardly from the middle portion of the chamber are two vertical annular fixed plates 4 spaced apart from each other, the inner edges of the plates being firmly fixed to the casing 1. Projecting inwardly from the adjacent sides of these plates, are a number of horizontal cylindrical pins 5, the pins being arranged on each plate in a number of concentric circular rows which are spaced from each other in a radial direction. Extending between the annular plates is a rotary disk 6 which is mounted on a shaft 7 extending longitudinally through the receiving chamber, and which is journaled for rotation in bearings in cap plates 8 and 9 applied to the

ends of the chamber, the shaft being provided with a driving pulley 10, driven from any suitable source of power so as to impart a rapid rotary motion to the disk. Carried by the disk are a number of horizontal pins 11 which project outwardly in opposite directions from the sides of the disk and which are arranged in circular concentric rows spaced apart radially and disposed so that in the rotation of the disk, the pins 11 will pass through the spaces between the rows of fixed pins 5, the pins of the fixed and movable series thus overlapping each other as clearly shown in Fig. 3. Each of the pins 11 is formed with two flat surfaces, an outer surface 11^a which is inclined relatively to the direction of movement, and which slopes rearwardly and outwardly; and an inner surface 11^b which extends in a plane substantially parallel with the direction of movement, this surface 11^b being curved in an arc struck from a center coincident with the axis of rotation of the disk. The movable pins thus formed, present flat advancing surfaces disposed at an angle outwardly to the direction of advance, the result being that the pulp fed between the plates and disk will be caused by the advancing flat surfaces to move outwardly with a progressive motion.

The pulp being supplied to the ends of the receiving chamber through the branch supply pipes 3, and the disk being rapidly rotated, the pulp will flow outwardly from the receiving chamber and enter between the plates 4 and the intermediate disk, and will be subjected to the coöperative action of the fixed and movable pins, portions of the pulp throughout its mass being driven by the movable pins with great speed and caused to strike the fixed pins with concussive effect, while at the same time the mass of pulp will flow outwardly between the disks toward the point of discharge. In the movement of the pulp outwardly, it will be violently agitated by the coöperative action of the series of pins, and portions of the mass will be driven successively into contact with the pins of the successive series, the result being that the fibers will be subjected to a general combing action as they are dragged forwardly between and around the pins, whereby the individual fibers will be reduced in thickness, straightened out, uniformly distributed throughout the mass, and this without injury to or reduction in the length of the fibers.

In order that the pulp will not pass through the machine with undue speed, so that sufficient time will be afforded for the proper and effective beating action of the pins thereon, I propose to provide means for retarding the outward flow of the pulp after it leaves the pins. To effect this object I apply between the outer portions of the plates 4, obstructing devices in the form of cross bolts 12 extending across the space between said plates, and being arranged in concentric rows, with the individual bolts of one row staggered relatively to the bolts of the other row, the effect of which is to form circuitous passages between the bolts through which the outwardly flowing pulp is forced to pass after being freed from the action of the beating pins.

In the operation of the mechanism, the pulp is supplied continuously into the receiving chamber and it flows outwardly between the plates 4 and disk 6, being in such flow acted on by the coöperating series of pins in the manner described, the pulp being discharged from the plates through the circuitous passages between the cross bolts, and issuing from between the plates throughout the circumferential extent of the same.

In order that the issuing pulp may be collected to permit its convenient discharge at one point from the machine, I provide a housing 13 which is of flat general circular form so as to inclose the sides and peripheral edges of the plates 4. This housing contains a central opening which surrounds the central portion of a casing 1, and it extends between the branch supply pipes 3, and is firmly fixed to the casing 1 so as to completely inclose the plates 4 and form an annular passage therearound to receive the pulp issuing from between said plates. At its lower side the housing is formed with a depending discharge spout 15 through which the pulp finally leaves the machines.

The machine may be sustained or supported in any suitable manner and by appropriate means. In the present instance two beams 20 are employed, which extend beneath the casing 1 and on opposite sides of the housing, which beams give firm and rigid support to the entire machine.

Having thus described my invention, what I claim is:

1. In a pulp beating engine, the combination of two annular plates disposed side by side and having pins extending inwardly therefrom, a disk rotatable between said plates and provided on opposite sides with laterally projecting pins, the said disk and plate forming radial spaces between them extending at opposite sides of the disk and having non-communicating inner portions, the said pins on the disk and plates being formed and related to comb out the fibers, and means for feeding the pulp in separate streams to the opposite sides of the disk respectively into said non-communicating portions of the spaces.

2. In a pulp beating engine, the combination of two annular plates disposed side by side and having pins extending inwardly therefrom, a disk rotatable between said plates and extending across the open centers

of the annular plates, said disk being provided on opposite sides with laterally projecting pins, whereby radial spaces are formed between the plate and disk on opposite sides of the disk having non-communicating inner portions, the said pins on the disk and plates being formed and related to comb out the fibers, and means for feeding the pulp in separate streams to the opposite sides of the disk respectively into the inner non-communicating portions of the spaces.

3. In a pulp beating engine, the combination of two members provided on their adjacent sides with inwardly extending projections, one of said members being rotatable relatively to the other, said projections being formed and related to each other to comb out the fibers, and the projections on said movable member being provided with flat advancing faces inclined outwardly relatively to the direction of movement to urge the pulp outwardly between the members, and means for feeding the pulp between said members.

4. In a pulp beating engine, the combination of two members provided on their adjacent faces with inwardly extending projections, one of said members being movable relatively to the other, and the projections on the movable member being formed each with two surfaces diverging from each other in a direction opposite the direction of movement, one of said surfaces being flat, and inclined to urge the pulp outwardly between said members.

5. In a pulp beating engine, the combination of two members provided on their adjacent sides with inwardly extending lateral projections, one of said members being movable about an axis relatively to the other, and the projections on the movable member being provided with two surfaces, one inclined relatively to the direction of movement to urge the pulp outwardly from the axis of motion, and the other extending parallel or substantially so, with the direction of movement, and means for feeding the pulp between said members.

6. In a pulp beating engine, the combination of a plurality of coöperating members disposed relatively to receive the pulp between them and rotatable one relatively to the other about an axis, means for feeding the pulp between the inner portions of said members, said members being provided with means to subject the pulp to a beating action while urging it outwardly therebetween, and fixed means at the outer portions of said members independent of the beating means, in position to retard the outward flow of the pulp after it leaves the beating means to prolong the beating action thereon, said retarding means permitting the pulp to pass therethrough.

7. In a pulp beating engine, the combination of an annular fixed member a rotary member extending alongside the same, said members being provided on their adjacent faces with inwardly extending lateral projections formed to subject the pulp to a beating action and urge the same outwardly between the members, means for feeding the pulp between the inner portions of said members, and obstructing devices on the fixed member independent of the beating means in position to retard the outward movement of the pulp, said obstructing devices being formed to permit the passage of the pulp in its dischage from the said members.

8. In a pulp beating engine, the combination of two fixed annular members provided on their adjacent faces with inwardly extending projections, a disk rotatable between said plates and provided on opposite sides with outwardly extending projections, means for feeding the pulp between the disk and plates, whereby the pulp will be urged outwardly, and a series of obstructing devices bridging the space between the annular plates beyond the outer edge of the disk between which obstructing devices the pulp flows, whereby the outward movement of the pulp between said members is retarded.

9. In a pulp beating engine, the combination of two fixed annular plates provided on their adjacent faces with inwardly extending projections, a disk rotatable between said plates and provided on its opposite sides with outwardly extending projections, means for feeding the pulp between the disk and plates, whereby the pulp will be urged outwardly, and a series of obstructing devices independent of said projections and extending between the plates and presenting circuitous passages to retard the outward movement of the pulp.

10. In a pulp beating engine, the combination of opposing plates formed on their adjacent faces with inwardly extending projections, a disk rotatable between the plates and provided on opposite sides with outwardly extending projections, means for feeding the pulp between said disk and plates, whereby the pulp will be urged outwardly, and obstructing devices independent of said projections and extending between the plates outward of the disk, and serving to retard the outward movement of the pulp, said obstructing devices permitting the pulp to flow between them.

11. In a pulp beating engine, the combination of a casing provided with an elongated receiving chamber, two annular plates extending outwardly from the chamber in position to receive the pulp therefrom, a rotary disk in said chamber extending outwardly between the plates, said disk and plates being formed relatively to subject the pulp to a beating action, and said casing

being provided with branch supply pipes leading to the ends of the chamber, and a housing extending between the branch pipes and inclosing the outer edges of the plates.

12. In a pulp beating engine, the combination of a casing provided with an elongated receiving chamber, two annular plates extending outwardly from the chamber in position to receive the pulp therefrom, a rotary disk in said chamber extending outwardly between the plates, said disk and plates being formed relatively to subject the pulp to a beating action, and said casing being provided with branch supply pipes leading respectively to the ends of the chamber, and a housing extending between the branch pipes and inclosing the plates, said housing being provided with a discharge spout.

13. In a pulp beating engine, the combination of opposing fixed plates provided on their adjacent sides with inwardly extending pins, a disk rotatable between said plates and provided on opposite sides with outwardly extending pins overlapping the pins on the plates, and movable in the rotation of the disk between the same, said pins on the disk and plates being formed to comb out the fibers, and said pins on the disk being provided with surfaces inclined relatively to their direction of movement; whereby the movement of the pins through the mass of pulp will act to urge the same outwardly, and means for feeding the pulp between said plates and disk.

14. In a pulp beating engine, the combination of a fixed plate provided on its side with laterally extending pins, a rotary disk extending adjacent the plate and provided on its side with pins extending toward the plate, said pins on the disk being provided with two surfaces, one inclined relatively to their path of movement, and the other extending in a curve struck from a center coincident or substantially so with the axis of rotation of the disk.

15. In a pulp beating engine, the combination of means for subjecting the pulp to a beating action, said means operating to cause a progressive movement of the mass of pulp toward the point of discharge, and further relatively fixed means independent of the beating means for retarding said movement to prolong the beating action, said relatively fixed means being constructed to permit the pulp to pass through the same.

16. In a pulp beating engine, the combination of rotary means for subjecting the pulp to a beating action, said means operating to cause a movement of the pulp outwardly from the axis of rotation, and further relatively fixed means independent of the beating means for retarding said outward movement to prolong the beating action, said relatively fixed means being constructed to permit the pulp to pass through the same.

17. In a pulp beating engine, the combination of a fixed member provided on its side with laterally extending projections, a rotary member arranged alongside the fixed member and provided on its adjacent side with laterally extending projections coöperating with the projections on the fixed member in subjecting the pulp to a beating action, the said projections on the rotary member being formed with flat surfaces facing in the direction of rotation and inclined outwardly from the axis of rotation to cause the pulp to feed outwardly.

In testimony whereof, I have affixed my signature.

NATHANIEL LOMBARD.