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DEFIBERIZER

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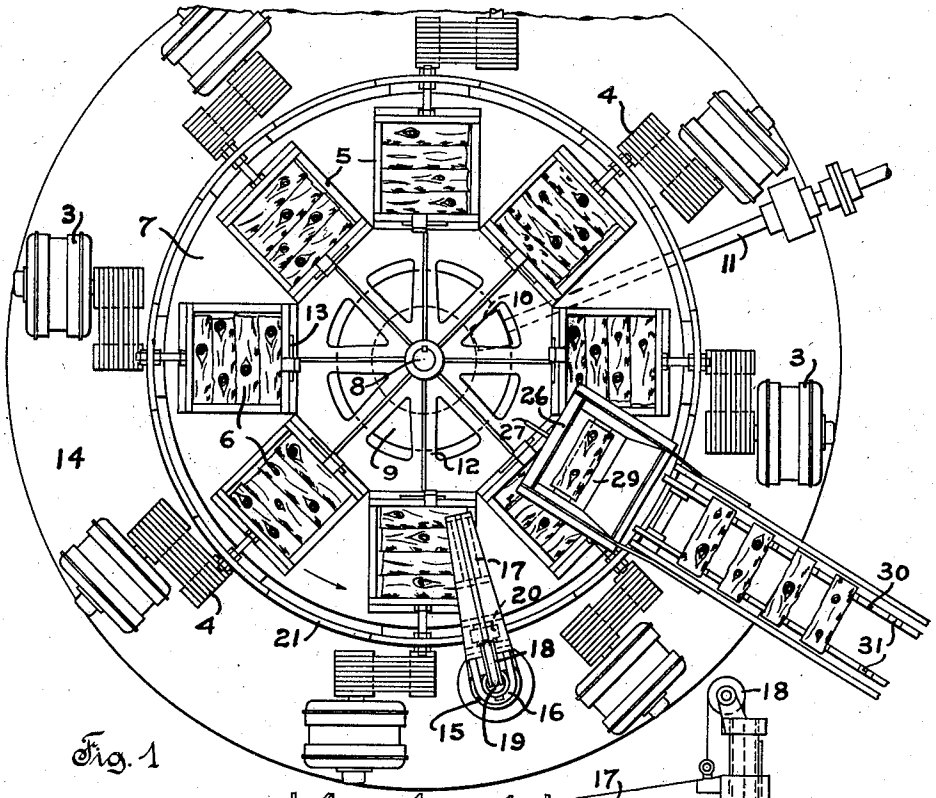

Fig. 1

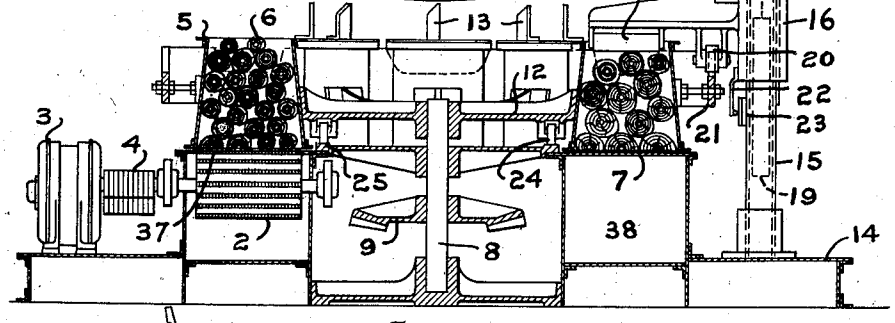

Fig. 2

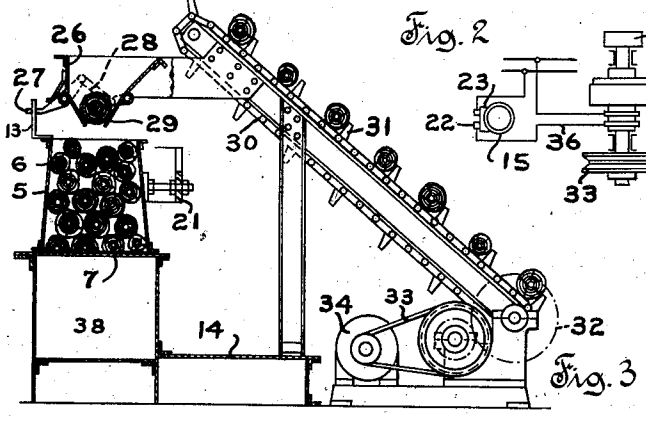

Fig. 3

Fig. 4

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DEFIBERIZER

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10 Claims. (Cl. 83—75)

The present invention relates in general to improvements in the art of defiberizing materials such as wood, and relates more specifically to improvements in the construction and operation of machines for automatically defiberizing logs or slabs of wood or bark in order to facilitate the production of fiber pulp or the like.

An object of the invention is to provide an improved defiberizer which is simple in construction and highly efficient in operation.

It has heretofore been proposed to defiberize wood and bark with the aid of a pair of oppositely rotatable rotors having a plurality of needles radiating from the rotor axes and providing peripheral points movable through openings in a table over which a reciprocable hopper or carriage is adapted to transport the pieces of fibrous material. It has also been proposed to defiberize such materials by similarly reciprocating a material confining hopper or carriage in proximity to one or more rotors having rigid peripheral teeth or points movable through an opening in a hopper supporting table. The operation of these prior defiberizers has indicated that the reciprocable carriage is far more efficient when the material is being advanced against the defiberizing points in a direction opposite to the direction of travel thereof, than when the hopper and points are moving in the same direction, even if the latter movement is at differential speeds. The harmonic motion resulting from reciprocation of the carriage also results in loss of production due to the intermittent stoppage of the carriage at the end of each stroke.

It is a more specific object of the present invention to provide improved means for presenting the fibrous material to the defiberizing points in machines of the type referred to generally above, so that most effective defiberization and maximum capacity result. It is another specific object of the present invention to provide improved means for automatically feeding fibrous material to a defiberizing machine in order to reduce to a minimum the cost of production of the fiber. These and other objects and advantages will appear from the following detailed description.

A clear conception of an embodiment of the invention and of the mode of operating machines built in accordance therewith, may be had by referring to the drawing accompanying and forming a part of this specification in which like reference characters designate the same or similar parts in the various views.

Fig. 1 is a fragmentary top view of an improved defiberizing machine comprising a multiplicity of defiberizing rotors and a series of hoppers or carriages successively movable in proximity to the rotors.

Fig. 2 is an irregular vertical section through the defiberizing machine of Fig. 1, the section being taken at the left of the figure through the central plane of one of the defiberizing rotors, and at the right of the machine through the fibrous material feed control mechanism.

Fig. 3 is a fragmentary vertical section through the machine, the section being taken at the fibrous material or log supply mechanism.

Fig. 4 is a fragmentary top view of a portion of the control mechanism for feeding logs to the machine.

The improved defiberizer specifically illustrated in the drawing comprises in general a plurality of defiberizing rotors 2 each having a multiplicity of peripheral defiberizing points; a table 7 having local openings 37 therein through which the defiberizing points of the rotors 2 are movable during revolution of the rotors; a series of transporting hoppers or carriages 5 movable in succession over the openings 37 in a direction opposite to the direction of travel of the defiberizing points through these openings; and mechanism for automatically maintaining a predetermined quantity of fibrous material or logs 6 in each of the carriages 5.

The rotor 2 may be of the improved type disclosed in applicants' copending application Ser. No. 430,213, filed February 21, 1930, wherein the defiberizing teeth or points are rigidly attached to rotor core, and each of the rotors 2 is rotatable independently of the others by means of a motor 3 and a multiple V-belt drive 4. As shown, all of the motors 3 are mounted upon a common annular base 14, and these motors are moreover rotatable in the same direction.

The table 7 is likewise of annular formation, being disposed within and slightly above the base 14, the openings 37 in the table 7 through which the defiberizing points of the rotors 2 are movable, being disposed radially with respect to a central upright shaft 8. The shaft 8 is adapted to be rotated by means of a horizontal drive shaft 11 and bevel gears 9, 10, and has a spider 12 secured to its upper extremity. The annular series of transporting hoppers or carriages 5 which are movable in succession over the openings 37 of the table 7, is rigidly attached to the periphery of the spider 12, and the latter may be provided with rollers 24 coacting with a rail 25, for relieving the pressure and reducing the friction between the hoppers and the table 7. As previously stated, the

hoppers or carriages 5 are movable in a direction opposite to the direction of travel of the defiberizing points of the rotors 2 through the openings 37, and provision should be made for elevating or lowering the rotors 2 so that the defiberizing points will project more or less over the upper surface of the table 7.

The mechanism for automatically maintaining a predetermined quantity of fibrous material such as logs 6 in each of the carriages 5, comprises a gaging device and a loading rig operable by the gaging device when the supply of logs 6 in a carriage 5 reaches a predetermined low limit.

The gaging device consists of a roller 17 which is adapted to engage the upper logs 6 in each of the carriages 5, as the carriages pass beneath the roller 17, if the carriage is sufficiently loaded. The roller 17 is carried by a bracket 16 which is vertically slidably mounted upon a fixed column 15. Carried by the slidable bracket 16 is a roller 20 which is adapted to coact with a track 21 secured to the moving hoppers 5 when the adjacent carriages are insufficiently loaded, this track 21 being provided with depressions for permitting the roller 17 to move downwardly through the upper openings of the carriages 5 as they come in proximity to the gaging device. A counter weight 19 located within the column 15 is secured to the bracket 16 by means of a cable passing over a pulley 18 mounted upon the upper end of the column, and this counter weight serves to counterbalance the major portion of the weight of the bracket 16 and rollers 17, 20. A movable contact 22 is secured to the bracket 16 and is adapted to close the circuit between a pair of fixed contacts 23, when the roller 17 is permitted to drop a predetermined distance into a passing carriage 5.

The improved loading rig for delivering logs to the successive carriages 5 comprises an endless elevator 30 having cleats or lugs 31 for raising logs placed upon the elevator while in motion, and this elevator is adapted to deliver the successive logs into a hopper 26 located above the path of travel of the carriages 5. The discharge portion of the hopper 26 is provided with gates 29 operable by a releasing lever 27 and linkage 28, the lever 27 being in turn operable by means of cams 13 carried by the successive individual carriages 5. The operation of the elevator 30 is effected through gearing 32 and a clutch 33, the latter being a magnetic clutch controllable by the contacts 22, 23 of the gaging device. The constantly rotatable member of the clutch 35 is rotatable by means of a motor 34 and a V-belt drive 33, and the arrangement is such that although the motor 34 is operating at all times, the loading elevator 30 will operate only when the supply of logs 6 in a passing carriage 5 has dropped below the predetermined desired quantity. The magnetic clutch 35 is connected with the contacts 22, 23 by means of electrical connections 36, as indicated in the diagram of Fig. 4.

During normal operation of the defiberizing unit, the motors 3 are functioning to rapidly rotate the toothed rotors 2 and the hoppers 5 are being advanced over the table 7, thereby causing the rotors 2 to defiberize the lowermost logs in the advancing carriages 5 and to deliver the fiber to a conduit 38 located beneath the table 7 from which the fiber may be withdrawn by suction. As the carriages 5 pass the gaging roller 17, this roller drops in contact with the upper logs within the successive carriages 5. If the supply of logs is sufficient to maintain the bracket 16 at a height sufficient to prevent engagement of the contacts 22, 23, then the loading rig does not come into action. If, however, the supply of logs 6 is sufficient to permit the bracket 16 to drop and to produce engagement of the contacts 22, 23, then the magnetic clutch 35 becomes effective to cause the elevator 30 to deposit logs 6 in succession into the hopper 26. As the carriages 5 having insufficient logs 6 therein, pass the hopper 26, the lever 27 engages the cam 13 of the insufficiently loaded carriage, and causes the gates 29 to open and to deliver a log thereto. It will be understood that the motion of the carriages 5 is relatively slow as compared to the rotation of the rotors 2, and the delivery of a single log to each carriage 5 as it passes beneath the hopper 26, is ordinarily sufficient to maintain the desired quantity of logs in the successive carriages.

From the foregoing description, it will be apparent that in the improved defiberizing machine, the fibrous material is constantly advanced toward a succession of oppositely moving defiberizing teeth, at a uniform speed, thereby producing most efficient defiberization and also enhancing the capacity to a maximum. The improved gaging device and loading rig automatically maintain the successive carriages 5 properly supplied with logs 6, and the machine therefore requires minimum attention. While an annular table 7 and series of carriages 5, have been illustrated, it will be apparent that the endless series of carriages may assume any desired form. The quality and quantity of fiber produced, may be readily varied by vertically adjusting the rotors 3, and all portions of the mechanism are freely accessible for inspection.

It should be understood that it is not desired to limit the invention to the exact details of construction and operation herein shown and described, for various modifications within the scope of the claims may occur to persons skilled in the art.

It is claimed and desired to secure by Letters Patent:

1. In combination, a rotor having peripheral defiberizing points, a table having an opening through which said points are movable in a predetermined direction, and a series of transporting carriages movable in succession over said opening in a direction opposite to said direction of travel of said points, said carriages each including a hopper having relatively fixed opposed side walls flaring outwardly adjacent the lower end and producing a cross-sectional area of the hopper which increases toward the lower end thereof to thereby facilitate free gravitation of material therein toward said opening.

2. In combination, a series of rotors each having peripheral defiberizing points, a table having an opening at each of said rotors through which said points are movable in a predetermined direction, and a series of transporting carriages continuously movable in succession over said openings in a direction opposite to said direction of travel of said points, each of said carriages including a hopper having a side wall flaring outwardly toward its lower edge and producing a cross-sectional area of the hopper which increases toward the lower end thereof to thereby facilitate free gravitational drop of material therein toward said table.

3. In combination, a rotor having peripheral defiberizing points, a table having an opening through which said points are movable in a predetermined direction, a series of transporting

carriages each including a hopper for containing material to be defiberized and movable in a closed path and in succession over said opening in a direction opposite to said direction of travel of said points, and means cooperative with the material in said hoppers and responsive to the level of said material automatically responsive to the amount of material in said hoppers for maintaining a predetermined quantity of fibrous material in each of said hoppers.

4. In combination, a plurality of rotors each having peripheral defiberizing points, a table having an opening at each of said rotors through which said points are movable in a predetermined direction, an endless series of transporting carriages movable in succession over said openings in a direction opposite to said direction of travel of said teeth, and means cooperative with the material in said hoppers and responsive to the level of said material for automatically maintaining a predetermined quantity of fibrous material in each of said carriages.

5. In combination, a plurality of rotors each having peripheral defiberizing points, a table having an opening adjacent to each of said rotors through which said points are movable in a predetermined direction, a series of transporting carriages movable in succession over said openings in a direction opposite to said direction of travel of said points, said carriages each including a hopper having opposed side walls flaring outwardly adjacent their lower edges and producing a cross-sectional area of the hopper which increases toward the lower end thereof to thereby facilitate free gravitational movement of material therein toward said opening, and means cooperative with the material in said hoppers and responsive to the level of said material for automatically maintaining a predetermined quantity of fibrous material in each of said hoppers.

6. In combination, a plurality of rotors each having peripheral defiberizing points rigidly associated therewith, a table having an opening adjacent to each of said rotors through which the points thereof are movable in a predetermined direction relative to said table, an endless series of transporting carriages movable in succession over said openings at uniform speed and in a direction opposite to said direction of travel of said points, each of said carriages having downwardly diverging opposite side walls for permitting free gravitation of logs therein toward said table, and means cooperative with and operable by the logs in said carriages for automatically maintaining a predetermined quantity of logs in each of said carriages.

7. Apparatus for reducing fibrous bodies to a mass of separated fibrous particles, comprising a rotor having peripheral defiberizing points, a table having an opening through which said defiberizing points project and are movable in a predetermined direction, and a series of carriages each including a hopper adapted to contain the fibrous bodies and having an opening at its lower side through which said fibrous bodies project into the path of said defiberizing points, said carriages being movable in a closed path and across said defiberizing points in a direction opposite to said direction of travel of said points in contact with said fibrous bodies, opposed side walls of said carriages being flared outwardly adjacent their lower edges and producing a cross-sectional area of the hopper which increases toward the lower end thereof to thereby facilitate free gravitation of the fibrous material within said hoppers toward said table.

8. Apparatus for reducing fibrous bodies to a mass of separated fibrous particles, comprising a rotor having peripheral defiberizing points, a table having an opening through which said defiberizing points project and are movable in a predetermined direction in the operation of said rotor, a series of carriages each including a hopper adapted to contain the fibrous bodies and having an opening at its lower side through which said fibrous bodies project into the path of said defiberizing points, said carriages being movable in a closed path and across said defiberizing points in a direction opposite to the direction of travel of said points in contact with said fibrous bodies, opposed side walls of said carriages being flared outwardly adjacent their lower edges and producing a cross-sectional area of the hopper which increases toward the lower end thereof to thereby facilitate free gravitational movement of the material in said hoppers, and means cooperative with the material in said hoppers and responsive to the level of said material for feeding fibrous bodies to said carriages and automatically operative to maintain a predetermined quantity of fibrous material in said hoppers.

9. Apparatus for reducing fibrous bodies to a mass of separated fibrous particles severed from said bodies in the direction in which the fibers thereof extend, comprising a plurality of rotors having peripheral defiberizing points, means for supporting said rotors and having openings through which said defiberizing points project and are movable in a predetermined direction due to rotation of said rotor, an endless series of carriages each including a hopper adapted to contain the fibrous bodies to be reduced and open at its lower side to permit said defiberizing points to project into the path of and act upon said fibrous bodies, said carriages being movable across said defiberizing points in the general direction in which the fibers of said bodies extend and opposite to the direction of travel of said points, and means responsive to the amount of material in said hoppers for automatically feeding fibrous bodies to said hoppers and operative to maintain a predetermined quantity of fibrous bodies in said hoppers.

10. In combination in an apparatus for reducing fibrous bodies to a mass of separated fibrous particles, a series of rotors each having circumferentially spaced peripheral defiberizing points, a support having an opening at each of said rotors through which said defiberizing points are movable during their circumferential travel, a series of transporting carriages movable in a predetermined direction in a closed path in succession over said openings, means for supplying fibrous bodies to said carriages, and means for automatically controlling the supply of fibrous bodies to said carriages to maintain thereon a desired amount of said fibrous bodies, said controlling means including an element cooperative with the fibrous bodies on said carriages and operative to permit the supply of additional fibrous bodies to a carriage when the amount of fibrous bodies thereon falls below a predetermined value.

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