(No Model.)

E. P. ELY.

MACHINE FOR THE REDUCTION OF WOOD PULP.

No. 305,063. Patented Sept. 16, 1884.

Fig. 2.

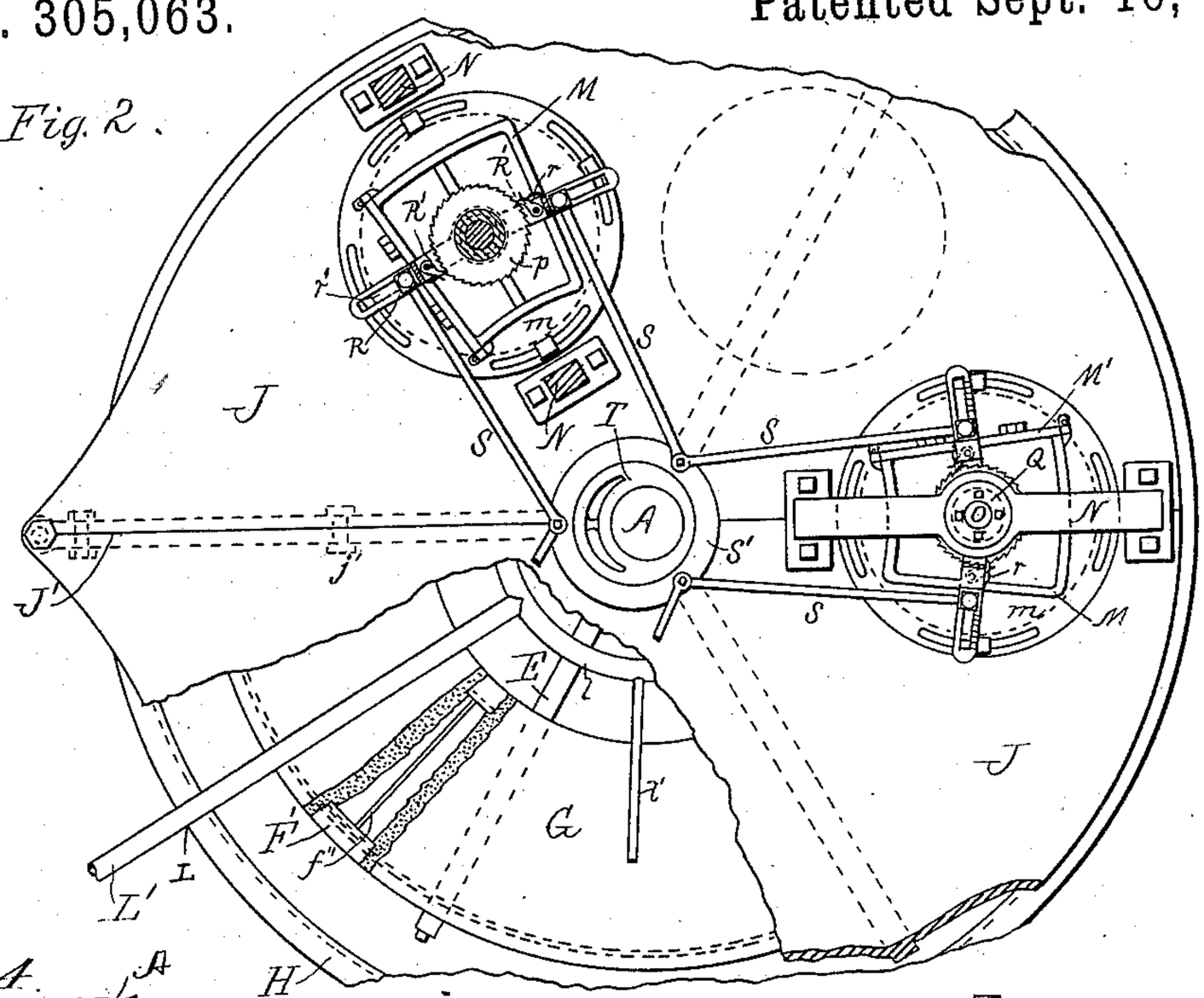

Fig. 4.

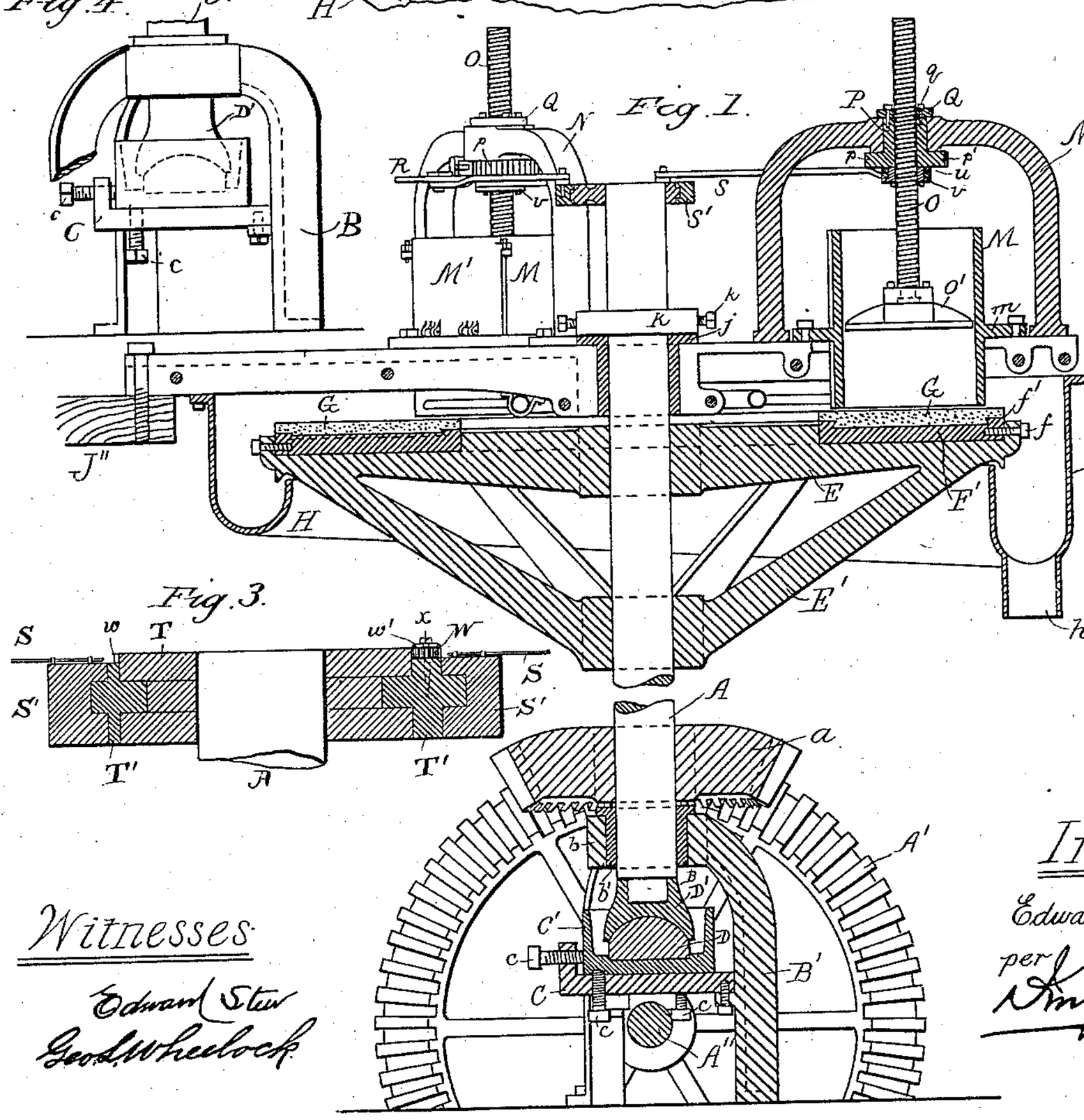

Fig. 1.

Fig. 3.

Witnesses

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MACHINE FOR THE REDUCTION OF WOOD PULP.

SPECIFICATION forming part of Letters Patent No. 305,063, dated September 16, 1884.

Application filed December 11, 1883. (No model.)

To all whom it may concern:

Be it known that I, EDWARD P. ELY, a citizen of the United States, residing at South Wallingford, in the county of Rutland, and the State of Vermont, have invented certain new and useful Improvements in Machines for the Reduction of Wood Pulp, of which the following is a specification.

My present improvements relate to an automatic feeding device, means for the vertical adjustment of the main shaft, and also to details of construction hereinafter specifically referred to, and pointed out in the claims.

My invention consists of a wood-pulp machine having a vertical main spindle or shaft provided with a bevel-wheel keyed to it or cast in one with it at a suitable distance from its lower end, the bevel-wheel being operated by a second and larger gear-wheel upon the horizontal or driving shaft. The lower end of the vertical spindle is provided with a cast-iron cap, concave on its under side, which rests and turns upon a wooden step whose convex portion fits into the concavity of the cap. The wooden step is set in a tank adapted to hold water, by which means the friction upon the bearing-surfaces is to a great extent dispensed with. This tank is supported upon a bridge-tree having set-screws extending through the bottom and sides for regulating the position of the tank both horizontally and vertically. A bearing surrounding the spindle and provided on its inner periphery with brass journals, and having legs, preferably three in number, extending to the floor, is adapted to steady the movement of the spindle. The bridge-tree is supported on the same legs as the bearing. Keyed to or cast in one with the vertical spindle are radial arms, preferably seven in number, which support on their outer ends a ring formed of cast-iron or other suitable material, and upon which is placed the emery ring or wheel for grinding or reducing the wood pulp. Brackets extend from these radial arms downwardly to the main spindle, for strengthening the arms and to assist in supporting the rings. Outside of and surrounding the emery-ring is a trough, which is adapted to receive the wood pulp as it drops from the ring, and to convey it, by means of a suitable pipe or conduit, to a sifter or sieve for the assortment of the particles. Above the annular trough is formed a table, which serves as a cover for the trough. The cover or table is provided with strengthening arms or ribs, which extend from the main shaft to the outer edge. It is also divided in sections and provided with bolts, screws, or other means of convenient attachment. The cover and the trough are bolted or otherwise suitably secured to each other. Just above the cover, and surrounding the shaft, is a collar having screws which are countersunk within the shaft, the said collar being adapted to prevent the cover rising at this point while the machine is in operation. The cover is provided with suitable openings, preferably seven in number, through which extend the hoppers or feed-boxes. These hoppers have surrounding flanges which rest upon the cover. A yoke extends upward from the cover at each hopper for supporting the automatic feeding mechanism, which is constructed as follows: A vertical screw provided with a suitable follower moves up and down in the hopper. A ratchet-nut or bushing provided on its inner periphery with a screw-thread, through which the aforesaid vertical screw passes, is placed between the upper terminals of the yoke. This bushing or ratchet-nut is rotated by means hereinafter described, and in rotating moves the vertical screw up and down without turning it. The bushing is provided with a collar, which rests upon the upper surface of the yoke, and which prevents the bushing from moving downward. A collar or flanged ring is placed below the yoke to support the inner ends of the feed-levers. The feed-levers are connected by means of radiating arms to the main shaft or spindle of the machine. The main shaft is provided with a cam or eccentric, around which is placed a strap, and to the latter the radiating arms are connected. As the main shaft rotates, the arms operate the feed-levers, and the latter, by means of dogs with which they are provided, and which engage with milled portions or ratchets on the outer periphery of the bushings, rotate said bushing and feed the vertical screw aforesaid. The feed-levers are provided with longitudinal slots, in which the radiating arms are attached, and which per-

mit the feed to be increased or diminished by lengthening or shortening the leverage. I do not limit myself to slots, however, as I contemplate dispensing with them and using a sliding collar upon the feed-levers.

Referring to the accompanying drawings, which form a part of this specification, Figure 1 represents an elevation, partly in section, of my machine. Fig. 2 is a plan view of a portion of the same, and Fig. 3 is a sectional view of a means for adjusting the feed. Fig. 4 is an elevation of the lower shaft bearing and support.

A represents the main shaft or spindle, provided with a bevel-wheel, *a*, keyed to or cast in one therewith.

A′ is a similar and larger bevel-wheel, placed upon the horizontal driving-shaft A″.

B represents a bearing, whose outer portions, *b*, are preferably of iron, and whose inner portion, *b′*, is preferably of brass. This bearing is provided with three legs or supports, B′. By this means the lower portion of the main shaft or spindle is steadied. Between and supported by the legs B′ is a bridge-tree or seat, C. Upon this bridge-tree is placed a water-tank, C′. The bridge-tree C is provided with set-screws *c*, preferably three through the bottom and three through the sides. The object of these screws is to adjust the tank both in a horizontal and a vertical direction and to take up the wear in the bearing-surface of the emery-ring.

Within the tank C′ is placed a step, D, of wood or other suitable material, having a convex upper surface. Upon the step D rests the cap D′ of the main shaft or spindle A. The bearing portions of the step and cap being constantly surrounded with water, the friction naturally arising between said surfaces is greatly reduced.

Radial arms E, preferably seven in number, extend from the main shaft or spindle A. Brackets E′ are provided to connect the outer ends of these arms with the shaft A for the purpose of strengthening said arms. Near the outer ends of the arms E is placed a ring, F′, preferably of cast-iron. Bolts *f* secure the arms to the said ring. The ring F′ is provided with inwardly-projecting lugs or flanges *f′*. The top of the ring F′ is formed into grooves and ridges, as shown at *f″*. Upon the ring is cast an emery-ring, G. The grooves and ridges *f′* prevent the ring G′ from slipping on the ring F′ when it is rotating; or a suitable binding material may be formed by short pieces of wire projecting from the upper surface of the ring F′. Surrounding the outer edge of the emery-ring is the annular trough H, having at one side a suitable exit-pipe, *h*.

Above the trough H is arranged a covering or table, J. This table is provided with a bushing, *j*, of brass where it surrounds the shaft A. Ribs or braces J′ underneath extend outwardly from the bearing to the edge of the table when the table is bolted to the floor or frame at J″. The table is formed in two or more sections, which are bolted together at *j′*.

Surrounding the shaft A just above the table is a collar, K. It is provided with screws *k*, which enter the shaft and hold the collar rigidly to it. The object of this collar is to prevent the table from springing up in the center.

By this arrangement of the parts above described it will be seen that the cover may be easily removed, and the emery-ring, when worn or broken, taken out and renewed with little or no trouble. It will also be seen that the emery-ring extends slightly into the trough. Entering from the side of the machine at L is a water-pipe, L′, having an annular extension, *l*, and radiating branches *l′*. These branches extend over the emery-ring, as shown, and are suitably perforated for feeding the water to said ring.

Within the cover are formed openings, through which the hoppers or feed-boxes M extend. They are provided with surrounding-flanges *m* which rest upon the cover J. The hoppers M extend downwardly to the emery-ring sufficiently close to prevent any small slivers of wood from slipping through. They are provided also with doors M′, for feeding in the wood. These hoppers are formed, preferably, as shown, with converging sides and curvilinear but parallel or concentric ends. N are yokes resting on the cover or table, and adapted to support vertical screws O, having followers O′. The screws move up and down, but do not turn.

Between the upper terminals of the yoke N are placed bushings P. These bushings are provided on their inner surfaces with screw-threads, and are adapted, when rotating, to move the vertical screws O up and down. Collars Q, having small screws *q* for fastening them to the bushings P, ride upon the yokes N and prevent the bushings from dropping. The projections *p* of the bushings prevent them from rising. At *p′* are shown milled or ratchet portions of the bushings, with which engage the dogs R′ of the feed-levers R. Springs *r* are provided to keep the contact of the dogs and ratchets permanent. The levers R are connected by means of the radiating arms S to a strap, S′, which surrounds and is adapted to be operated by a cam or eccentric, T, on the main shaft or spindle A. The feed-levers R are provided with longitudinal slots *r′*, by means of which the radiating arms may be adjusted so as to vary the amount of feed at will by modifying the leverage. Upon the sides of these slots are placed scales for the more convenient adjustment of the measurements. The inner ends of the feed-levers are provided with rings U, which encircle a ring, V, to provide a pivot or fulcrum for the said levers. Flanges retain the levers in position.

In Fig. 3 is shown a double or compound cam or eccentric, T and T′. The inside cam, T, is attached rigidly to the main shaft A, the

outside cam, T′, being supported by and turning upon T. The cam T is provided with a rack, *w*, and the cam T′ with a pinion, W, which gears with the aforesaid rack. A washer, *w′*, and bolt *x*, provide means for securing the cams in position. When it is desired to regulate the feed and modify the throw of the radiating arms S, the cam T′ is turned upon the cam T, set in any desired position by means of the bolt *x*.

Having thus described my invention, what I claim as new therein, and desire to secure by Letters Patent, is—

1. In a wood-pulp machine, an automatic feeding device having a vertical screw provided with a follower, in combination with the radiating arms, the feed-levers having dogs, and the ratchet-nut or bushing for raising and lowering the screw, as set forth.

2. In a wood-pulp machine, a feed consisting of a follower attached to a screw which is moved by a ratchet-nut or bushing, the said nut being rotated by dogs attached to the feed-levers, in combination with the flanged collar for supporting said levers, as set forth.

3. In combination with the ratchet-nut or bushing for raising and lowering the feed-screw, the collar attached to said bushing and adapted to rest upon the yoke and to retain said bushing in position.

4. In combination with the ratchet-nut or bushing and the feed-levers of the machine, the collars or flanged ring attached to the bushing and adapted to support the levers, as set forth.

5. In a wood-pulp machine, the combination of the automatic feeding device and the supporting-yoke, as described.

6. The combination of the case or table, the supporting-yoke, and the automatic feeding device, as described.

7. In a wood-pulp machine, the combination of the automatic feeding device with the feed-levers, providing means for regulating the amount of feed, as described.

8. In a wood-pulp machine, the combination of the automatic feeding device with the feed-levers, provided with gages for the adjustment of the radiating arms and the regulation of the feed, as set forth.

9. In a wood-pulp machine, the vertical shaft or spindle provided with a cam or eccentric, in combination with the strap having radial arms for operating the feeding mechanism.

10. In a wood-pulp machine, the vertical shaft or spindle provided with a cam or eccentric, in combination with the strap and radial arms, said strap and arms being doubly connected, as and for the purpose set forth.

11. In combination with the radial arms and means for operating the same, the slotted feed-levers for regulating the amount of feed, substantially as set forth.

12. In a wood-pulp machine, the combination of the main shaft or spindle and the compound cams or eccentrics for operating and regulating the feed, as set forth.

13. In a wood-pulp machine, the combination of the compound cams or eccentrics, the surrounding strap, and the radial arms, all adapted to operate substantially as and for the purposes set forth.

14. In a wood-pulp machine, the combination of the main shaft or spindle, the compound cams or eccentrics, the surrounding strap, the radiating arms, and the feed-levers, all arranged substantially as set forth, and for the purpose of operating and regulating the feed.

15. In a wood-pulp machine, the combination of the compound cams or eccentrics, the surrounding strap, the radiating arms, the feed-levers, and the feeding mechanism.

16. The combination of the inside cam, provided with a ratchet portion on its outer periphery, with the outside cam, having a pinion-wheel pivoted to it for adjusting and setting the cams in relation to each other.

17. In a wood-pulp machine, the annular cover or table formed in sections having means of attachment to each other, and adapted to be separated and removed, as and for the purpose set forth.

18. In a wood-pulp machine, the annular cover or table provided with the strengthening-ribs, as described.

19. In a wood-pulp machine, the hoppers or feed-boxes formed with parallel or concentric ends and converging sides, as and for the purpose set forth.

20. In a wood-pulp machine, the water-pipe entering at the side of the machine, and provided with an annular extension, and radiating perforated sub-pipes suspended from the cover and extending over the ring for supplying water to the latter, as set forth.

21. In a wood-pulp machine, the combination of the table provided with a hub and metallic bushing with the spindle having a collar and set-screws, the said collar being adapted to turn with the spindle and prevent the table from rising, as set forth.

22. In a wood-pulp machine, a metallic ring covered on one or more of its surfaces with emery, for the purposes described.

23. In a wood-pulp machine, the combination of the emery and the metallic rings having dovetail portions, as described, and intermediate ribs or binding-wires, as set forth.

24. In a wood-pulp machine, the combination of the annular trough for holding the pulp, as described, with the emery-ring extending into said trough, and having means of rotation, substantially as set forth.

25. The combination of the annular trough, the cover or table, and the emery-ring, substantially as set forth.

26. The combination of the annular trough, the cover or table formed in section for the

purpose described, and the emery-ring adapted to be withdrawn when the cover is removed, as set forth.

27. In a wood-pulp machine, the combination of the annular trough, the table or cover, the emery-ring extending into said trough, with the main shaft or spindle, provided with radiating arms for supporting said ring, all arranged substantially as and for the purposes set forth.

28. In a wood-pulp machine, the combination of the emery-ring whose outer edge is adapted to rotate in the annular trough provided with a cover, as described, with the hoppers extending through said cover nearly to the emery-ring, as set forth.

29. In a wood-pulp machine, the combination of the supporting-yoke, the automatic feeding device, and the hopper for holding the wood, as set forth.

30. In a wood-pulp machine, the combination of the table or cover, the supporting-yoke, the automatic feeding device, and the hopper, as described.

31. In combination with the automatic feeding device and means for supporting and operating the same, the hopper for holding the wood and the rotating emery-ring for reducing it.

32. In a wood-pulp machine, the combination of the main shaft or spindle with the lower bearing, provided with two or more legs or supports for steadying the aforesaid main shaft, as described.

33. In a wood-pulp machine, the combination of the lower bearing and its supporting-legs with the bridge-tree or seat for holding a water-box, as set forth.

34. In a wood-pulp machine, the combination of the bridge-tree or seat, provided with set-screws on its lower surface and on its sides for regulating the position of the water-tank both horizontally and vertically, with the said tank, substantially as described.

35. In a wood-pulp machine, the combination of the main shaft or spindle, the step, and the water-tank, provided with means of vertical and horizontal adjustment, substantially as described.

36. In a wood-pulp machine, the combination of the main shaft or spindle, the metallic cap, the step having a convex upper surface, and the adjustable water-tank, all arranged substantially as described, and for the purposes set forth.

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