No. 675,239. Patented May 28, 1901.

W. H. ORR.

MACHINE FOR REDUCING WOOD TO FIBER.

(Application filed Mar. 30, 1901.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

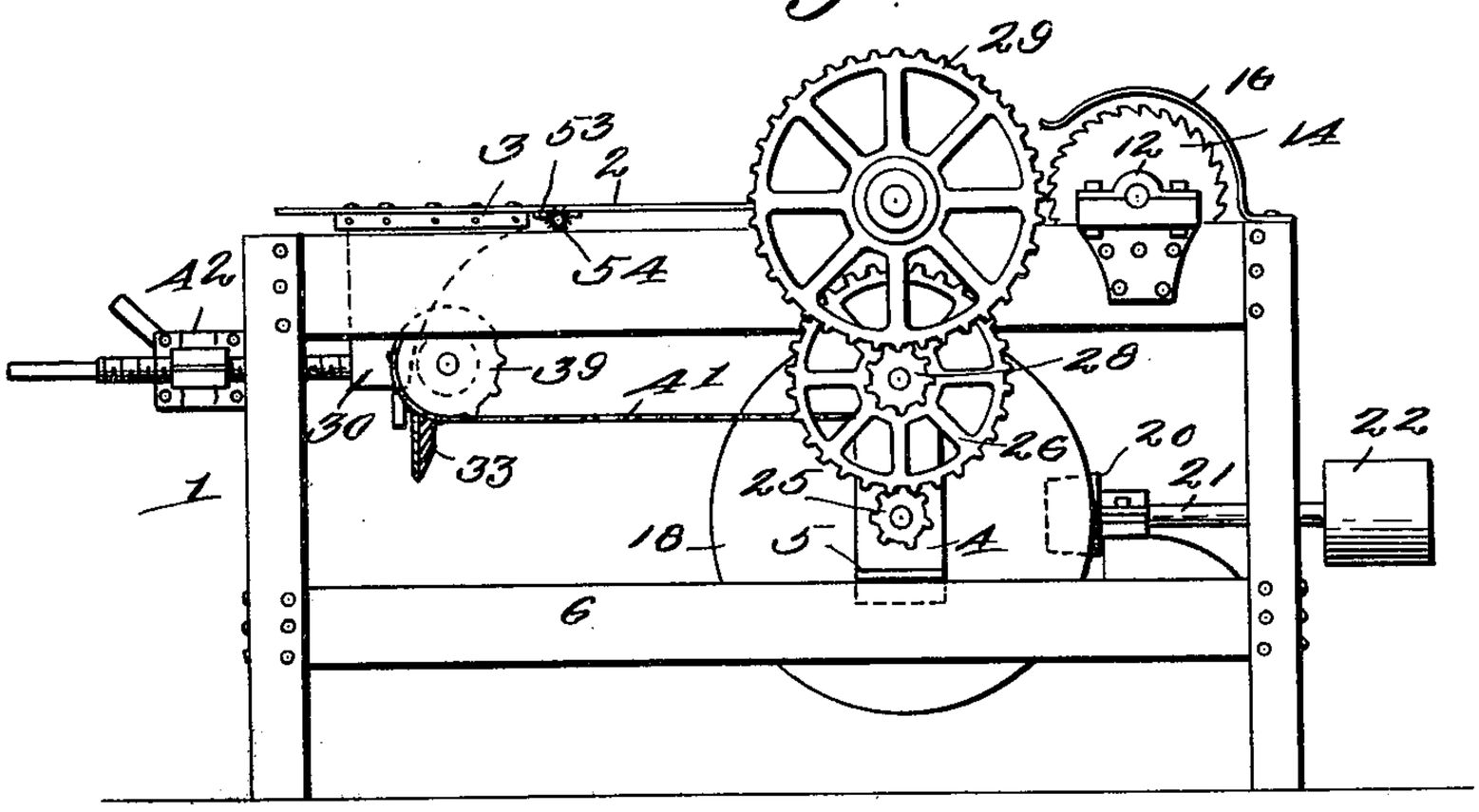
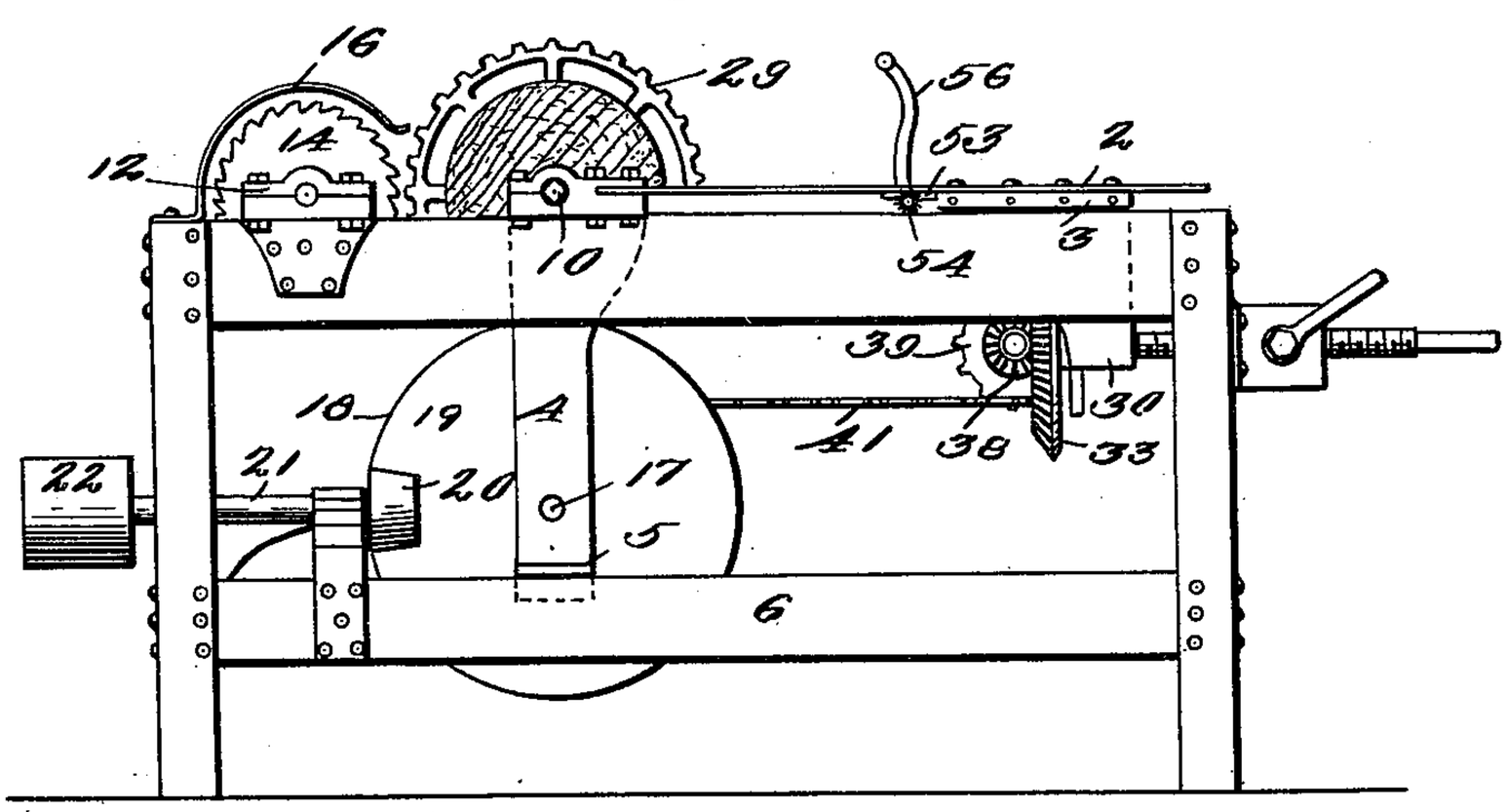


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

Fig. 3.

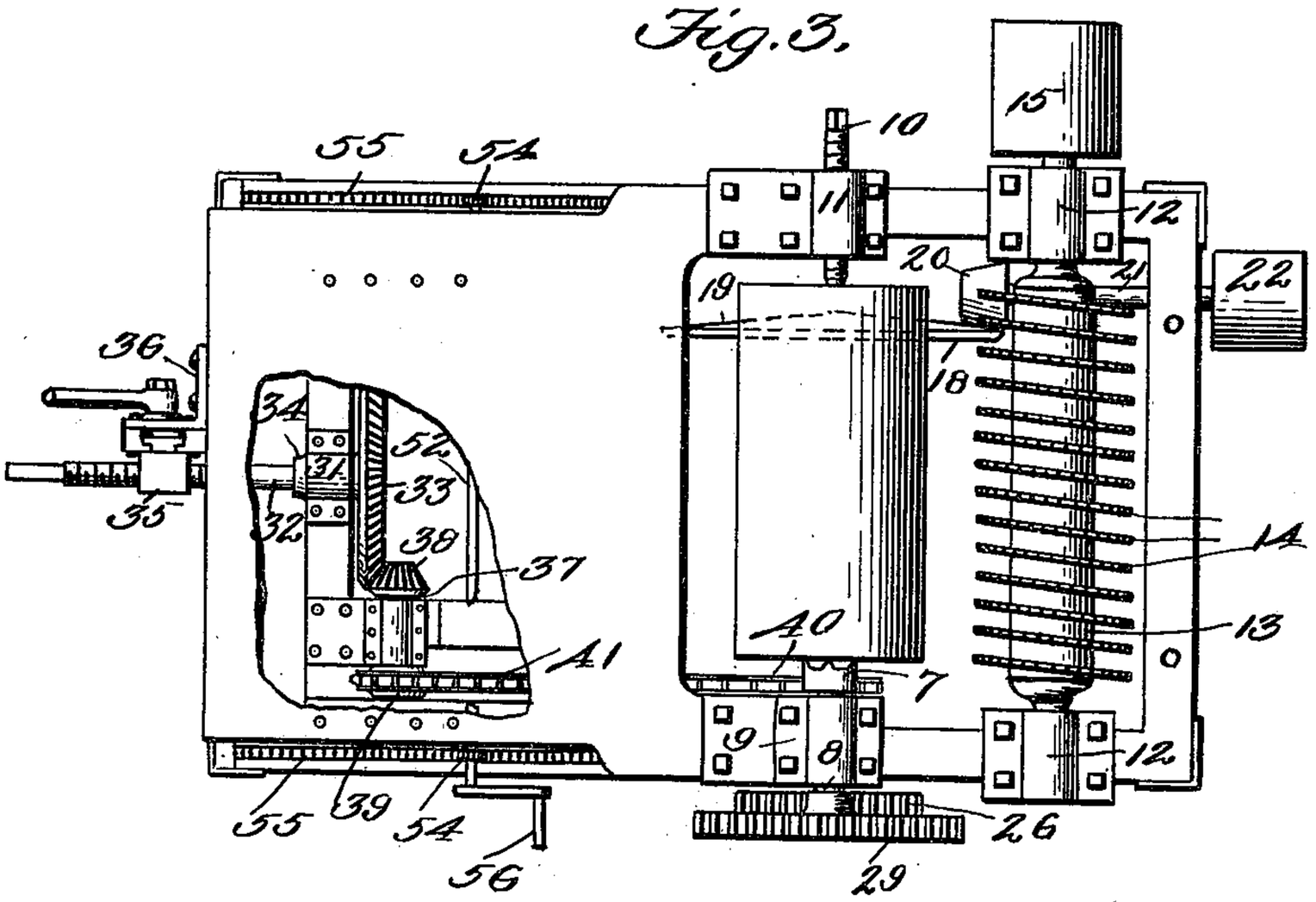


Fig. 4.

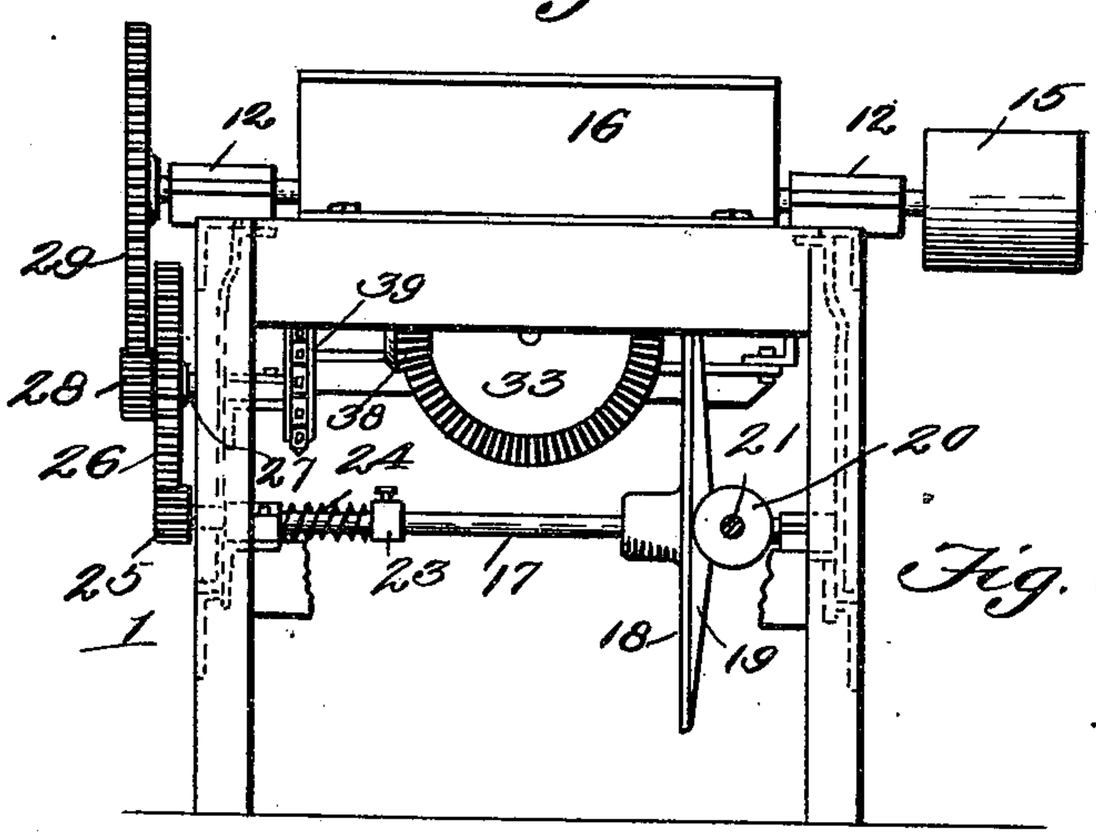


Fig. 5.

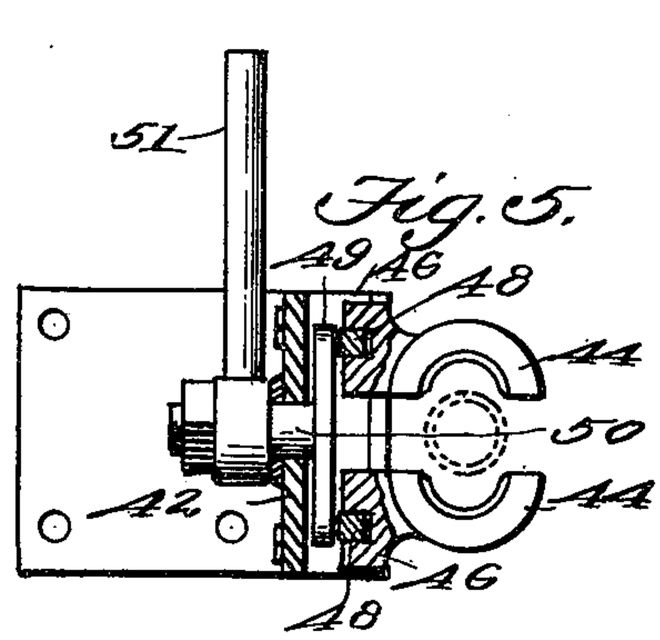


Fig. 6.

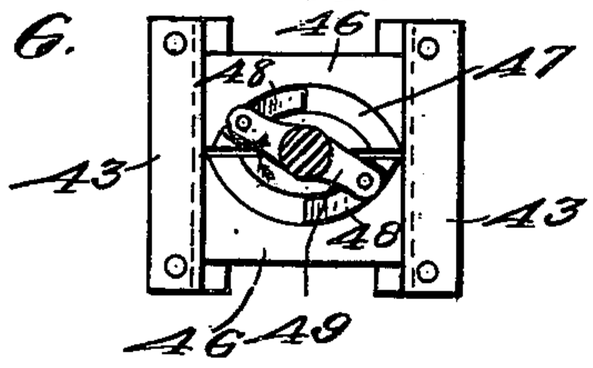
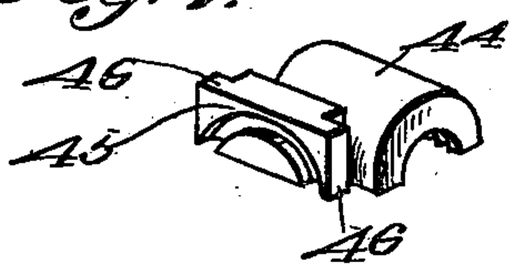


Fig. 7.



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UNITED STATES PATENT OFFICE.

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MACHINE FOR REDUCING WOOD TO FIBER.

SPECIFICATION forming part of Letters Patent No. 675,239, dated May 28, 1901.

Application filed March 30, 1901. Serial No. 53,700. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. ORR, a citizen of the United States, residing at Lima, in the county of Allen and State of Ohio, have invented new and useful Improvements in Machines for Reducing Wood to Fiber, of which the following is a specification.

This invention relates to machines for reducing wood to fiber, and has for its object to provide novel mechanism for automatically changing the speed of rotation of the log or cylindrical block of wood as the latter is reduced in diameter by the action of the saws. It also has for its object to provide improved means for feeding the log of wood to the saws; and, finally, it has for its object to improve and simplify the construction and render more efficient the operation of this class of machines generally.

To these ends my invention consists in the features and in the construction, combination, and arrangement of parts hereinafter described, and particularly pointed out in the claims following the description, reference being had to the accompanying drawings, forming a part of this specification, wherein—

Figure 1 is a view in side elevation of my improved machine. Fig. 2 is a similar view looking from the opposite side. Fig. 3 is a top plan view. Fig. 4 is an end elevation, and Fig. 5 is a detail view, illustrating the clamping-nut. Fig. 6 is a detail view of the means for opening and closing the nut, and Fig. 7 is a detail perspective view of one member of the sectional nut.

Referring to the drawings, the numeral 1 indicates the frame of the machine, on which is arranged a reciprocating carriage 2, that is provided with slides 3, adapted to travel on the top of the frame, and at its forward end is provided with depending bracket-arms 4, that carry slides 5 at their lower ends, which travel on the lower sides 6 of the frame. On the forward part of the frame is a supporting device for the log of wood, comprising a chuck 7, fixed or formed on the inner end of a short shaft 8, journaled in a bearing 9 at one side of the carriage, and a threaded centering-pin 10, working in a threaded bearing 11 at the opposite side of the carriage. The chuck 7 and centering-pin 10 respectively engage the centers of the opposite ends of the log of wood 11 to be operated on, the chuck serving as a means for communicating rotary motion to the log.

Fixed to the top of the forward portion of the frame 1 are bearings 12, in which is journaled a saw-arbor 13, having fixed thereon a plurality of circular saws 14, which are disposed obliquely to the saw-arbor in a well-known manner. A pulley 15 is fixed on one end of the saw-arbor, by means of which and a suitably-driven belt (not shown) the saws are rotated. A metallic hood 16 is fixed to the forward end of the frame 1 and overhangs the saws, said hood serving as a guard or shield to protect the attendant from injury.

Journaled in suitable bearings on the bracket-arms 4 is a shaft 17, on which is fixed a friction-disk 18 of relatively large diameter, the operative face 19 of said disk, as shown, being convex or slightly conical, or, in other words, said face of the disk gradually and uniformly tapers from its center to its perimeter. Arranged in contact with the face 19 of the friction-disk is a conical friction-pulley 20, preferably covered with rawhide or other suitable material adapted to increase the frictional engagement of the pulley with the disk. Said pulley is fixed on one end of a shaft 21, that is incapable of longitudinal movement, and on the other end of said shaft is fixed a belt-pulley 22, by means of which and a suitably-driven belt (not shown) rotary motion is communicated to the cone-pulley 20. On the shaft 17 is adjustably fixed by a set-screw a collar 23, between which and the adjacent bracket-arm 4 is arranged a coiled spring 24, which operates to hold the friction-disk and cone-pulley in close frictional contact, the arrangement being such that as the engagement between the friction-disk and pulley proceeds from the perimeter of the disk toward the center thereof the frictional contact between the two is increased, as hereinafter more fully explained and for the purpose set forth. On one end of the shaft 17 is fixed a small pinion 25, which gears with a relatively large gear-wheel 26, fixed on a shaft 27, journaled in one of the bracket-arms 4. On the shaft 27 is also fixed a small pinion 28, that gears with a large gear-wheel 29, mounted on the shaft 8, that carries the chuck 7. It will be obvious that rotary motion imparted to the

friction-disk 18 by the cone-pulley 20 will be communicated by the gearing described to the log 11 and that by reducing down the gearing, as described, the strain on the friction-disk and cone-pulley will be reduced to a minimum.

The means for feeding the carriage will now be described. Secured to the rear under side of the carriage is a bracket 30, carrying at its center a journal-box 31. Journaled in the box 31 is a shaft 32, having fixed on its forward end a beveled gear-wheel 33, and mounted on said shaft in rear of the journal-box is a collar 34, which prevents the shaft from having any endwise movement relatively to the carriage. From the collar 34 to near its rear end the shaft 32 is threaded, as shown, and works in a clamp-nut 35, supported by a bracket 36, fixed to the rear end of the frame 1, as will more fully hereinafter be described. Journaled on the bracket 30 is a short transverse shaft 37, carrying at its inner end a beveled pinion 38, that gears with the beveled gear-wheel 33, and having fixed on its outer end a sprocket-wheel 39. A corresponding sprocket-wheel 40 is fixed on the shaft 27, that carries the gear-wheel 26 and pinion 28, and said sprocket-wheels are geared together by a sprocket-chain 41, whereby when the gearing for rotating the log is put in motion the sprocket-wheels and chain will rotate the pinion 38 and gear-wheel 33, which in turn will rotate the feed-screw 32. As before described, the feed-screw has no endwise movement relatively to the carriage and works in the clamp-nut 35. Hence as long as the log-rotating mechanism continues to operate the feed-screw will feed the carriage, carrying the log toward the saws. As the log is fed to the obliquely-arranged saws the latter will operate to reduce the log to fiber in a well-known manner, and as the diameter of the log decreases under the action of the saws and the carriage is fed forward by the feed-screw the engagement between the operative face 19 of the friction-disk and the cone-pulley 20 is steadily shifted, the forward movement of said friction-disk bringing such point of engagement constantly nearer to the center of the friction-disk, thus constantly increasing the speed of rotation of the log of wood to compensate for the reduction in diameter thereof. As the point of engagement between the cone-pulley and friction-disk recedes from the perimeter of the latter toward its center it will be evident that the liability of the cone-pulley slipping on the face of the friction-disk will increase, and this is compensated for by making the face of the disk convex or beveled and by providing the coiled spring 24, as before described, whereby the cone-pulley exerts a wedge-like action on the convex face of the disk as the center of the latter is approached and thrusts the disk to one side against the action of the spring 24, and as the spring is placed under increased tension it forces the friction-disk against the cone-pulley with increased pressure, thereby increasing the frictional contact between the two. This increased pressure between the friction-disk and the cone-pulley and the increased speed of rotation of the log continues until the entire log has been reduced to fiber.

When the unthreaded rear end of the feed-screw comes into engagement with the clamping-nut, the feed-screw will cease to feed the carriage forward, and the latter will be thereby automatically arrested. The threaded end of the feed-screw in practice is made of such length that this automatic stoppage of the feed will occur only when the log has been entirely reduced to fiber by the saws.

In order that the carriage may be quickly run back to initial position by hand for the insertion of a new log of wood and also for adjusting the carriage to bring the log in proper position in relation to the same in starting the machine, I so construct the clamping-nut that it may be instantly thrown out of engagement with the feed-screw.

Referring to Figs. 5, 6, and 7 of the drawings, the numeral 42 indicates an angle-bracket bolted to the rear end of the frame of the machine, and bolted to the rearwardly-projecting portion of said bracket are two strips or battens 43, which are undercut on the inner sides of their adjacent edges, as indicated by dotted lines in Fig. 6, to form guide grooves or ways. The nut is made in two semicylindrical sections 44, threaded internally or on their inner sides, as shown, the threads uniting to form a continuous screw-thread when the two sections are brought into juxtaposition or closed. Formed with or attached to each of the sections of the nut is a bracket 45, provided on its opposite vertical edges with projecting flanges or feathers 46, which are free to travel in the ways or guide-grooves in the battens 43, as most clearly shown in Fig. 3 of the drawings. In the outer face of each of the brackets 45 is formed a segmental or arc-shaped groove or race 47, the arrangement being such that when the two brackets are brought together said races together form approximately an ellipse. The grooves 47 form cam-races, in which are fitted and adapted to freely move segmental cam-blocks 48, which are pivoted to the opposite ends, respectively, of a cross-head 49, mounted on a short shaft or pivot 50, journaled in the bracket 42. On the other end of the pivot or shaft 50 is fixed a handle 51. The threaded feed-shaft 32 passes between the two sections of the nut, as most clearly shown in Figs. 1, 2, and 3. When the two brackets 45 are in the position shown in Fig. 6, the sectional nut engages the threaded feed-screw, and as the saws operate to reduce the log the feed-screw is rotated by means of the mechanism described and is caused by the nut to move forward and feed the log to the saws. After the log has been completely reduced the handle 51 is given a

partial turn to turn the cross-head 49 in the direction of the arrow, thus moving the cam-blocks 48 toward the centers of the cam-races 47, and thereby forcing the brackets 45 apart. As the brackets separate they open or move apart the two sections of the nut and cause the latter to disengage the feed-screw. The carriage may then be quickly run back by hand to insert a new log. For returning the carriage I journal a shaft 52 in suitable bearings 53 on the under side of the top of the carriage, and on said shaft are fixed pinions 54, which engage racks 55 on the upper edges of the sides of the machine-frame. A crank-handle 56 is fixed on one end of the shaft 52. It will be evident without further description that by turning the shaft 52 in the proper direction the carriage can be rapidly run back to the rear of the machine. When the new log has been inserted, it is only necessary to turn the handle 51 in the proper direction to cause the cross-head to turn in a direction opposite to that shown by the arrow in Fig. 6, when the cam-blocks will draw the brackets 45 together and cause the two sections of the nut to engage the feed-screw.

I have shown and described the friction-disk 18 as being slightly conical on its operative face; but obviously said face may be slightly curved from near its center to its perimeter.

Having described my invention, what I claim is—

1. In a machine for reducing wood to fiber, the combination with a gang of rotary cutters, a carriage movable toward the cutters and provided with means for rotatably holding the log to be operated on by the cutters, gearing carried by the carriage for imparting rotary motion to the log-holding mechanism, a friction-disk carried by the carriage and arranged to drive said gearing, said friction-disk having its operative face beveled from its center to its perimeter, a rotatable cone-pulley in frictional engagement with the friction-disk, means for rotating the cutters and cone-pulley, and means for automatically feeding the carriage toward the cutters, substantially as described.

2. In a machine for reducing wood to fiber, the combination with a gang of rotary cutters, a carriage movable toward the cutters and provided with means for rotatably holding the log to be operated on by the cutters, gearing carried by the carriage for imparting rotary motion to the log-holding mechanism, a friction-disk also carried by the carriage and arranged to drive said gearing, the operative face of the friction-disk being beveled from its center to its perimeter, a rotatable cone-pulley in frictional contact with the friction-disk, means for rotating the cutters and cone-pulley, means for automatically feeding the carriage toward the cutters, and a spring arranged to force the friction-disk into engagement with the cone-pulley, substantially as described.

3. In a machine for reducing wood to fiber, the combination with a gang of rotary cutters, of a carriage movable toward the cutters and provided with means for rotatably holding the log to be operated on by the cutters, gearing carried by the carriage for imparting rotary motion to the log-holding mechanism, a friction-disk also carried by the carriage and arranged to drive said gearing, the operative face of the friction-disk being beveled from its center to its perimeter, a rotatable cone-pulley in frictional contact with the friction-disk, means for rotating the cutters and cone-pulley, means for automatically feeding the carriage toward the cutters, and a spring arranged to force the friction-disk into engagement with the cone-pulley with a constantly-increasing pressure as the point of engagement between said disk and pulley recedes from the perimeter of the disk toward the center thereof, substantially as described.

4. In a machine for reducing wood to fiber, the combination with a gang of rotary cutters, of a carriage movable toward the cutters and provided with means for rotatably holding the log to be operated on by the cutters, gearing carried by the carriage for imparting rotary motion to the log-holding mechanism, a shaft also carried by the carriage, a friction-disk fixed on said shaft and arranged to drive said gearing, the operative face of the friction-disk being beveled from its center to its perimeter, a rotatable cone-pulley in frictional contact with the friction-disk, a coiled spring arranged on the shaft of the friction-disk and arranged to force the latter into contact with the cone-pulley, means for rotating the cutters and cone-pulley, and means for automatically feeding the carriage toward the cutters, substantially as described.

5. In a wood-fiber machine, the combination with a gang of rotary cutters, of a carriage movable toward the cutters and provided with means for rotatably holding the log to be operated on by the cutters, depending bracket-arms carried by the carriage, a shaft journaled in said bracket-arms, a friction-disk fixed on said shaft and having its operative face beveled from its center to its perimeter, a cone-pulley in frictional engagement with the friction-disk, means for driving the pulley, a coiled spring arranged on the friction-disk shaft and operating to thrust said disk into engagement with the cone-pulley, reducing-gearing for communicating rotary motion from the friction-disk to the log, and means actuated by said bearing for automatically feeding the carriage forward toward the cutters, substantially as described.

6. In a wood-fiber machine, the combination with a gang of rotary cutters, of a carriage movable toward the cutters and provided with means for rotatably holding the log

to be operated on by the cutters, differential-speed gearing for rotating the log with a constantly-increasing speed of rotation as the diameter of the log is reduced, a feed-screw journaled in a part of the carriage and engaging a nut fixed on the frame of the machine, a beveled gear-wheel fixed on the feed-screw, a beveled pinion engaging said gear-wheel, and means actuated by the differential gearing for driving said pinion and feeding forward the carriage, substantially as described.

7. In a wood-fiber machine, the combination with a gang of rotary cutters, of a carriage movable toward the cutters and provided with means for rotatably holding the log to be operated on by the cutters, differential-speed gearing for rotating the log with a constantly-increasing speed of rotation as the diameter of the log is reduced, a feed-screw journaled in a part of the carriage and engaging a nut fixed on the frame of the machine, and means actuated by the differential gearing for rotating the feed-screw to feed forward the carriage, the rear end of said feed-screw being unthreaded, whereby when said unthreaded portion enters the nut the feed of the carriage will be automatically stopped, substantially as described.

8. In a wood-fiber machine, the combination with a gang of rotary cutters, of a carriage movable toward the cutters and provided with means for rotatably holding the log to be operated on, differential-speed gearing for rotating the log with a constantly-increasing speed as the diameter of the log is reduced, a feed-screw journaled in a part of the carriage and engaging a nut fixed on the frame of the machine, said nut comprising two sections movably arranged relatively to one another, means for moving the sections of the nut toward and from each other to engage and disengage the feed-screw, means actuated by the differential gearing for rotating the feed-screw to feed forward the carriage, and means for feeding the carriage rearward when the nut is disengaged from the feed-screw.

9. In a wood-fiber machine, the combination with a gang of rotary cutters, of a carriage movable toward the cutters and provided with means for rotatably holding the log to be operated on, mechanism for feeding the carriage forward, means for rotating the log, a feed-screw journaled in a part of the carriage and engaging a nut fixed on the frame of the machine, said nut comprising two semi-cylindrical sections carried by brackets movable toward and from each other in ways, said brackets having segmental cam-races formed in their faces, a pivot arranged between the brackets, a cross-head on said pivot, cam-blocks pivoted to the ends of said cross-head and loosely fitted in the cam-races, means for turning the pivot to cause the cam-blocks to separate and close together the brackets and the sections of the nuts carried thereby, means for rotating the feed-screw, and means for feeding the carriage rearward, when the nut is disengaged from the feed-screw, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

WILLIAM H. ORR.

Witnesses:
P. L. MAIRE,
WALTER K. CAMPBELL.