No. 701,413. Patented June 3, 1902.

W. K. SQUIER.

MACHINE FOR REDUCING WOOD TO FIBER.

(Application filed Jan. 30, 1902.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1.

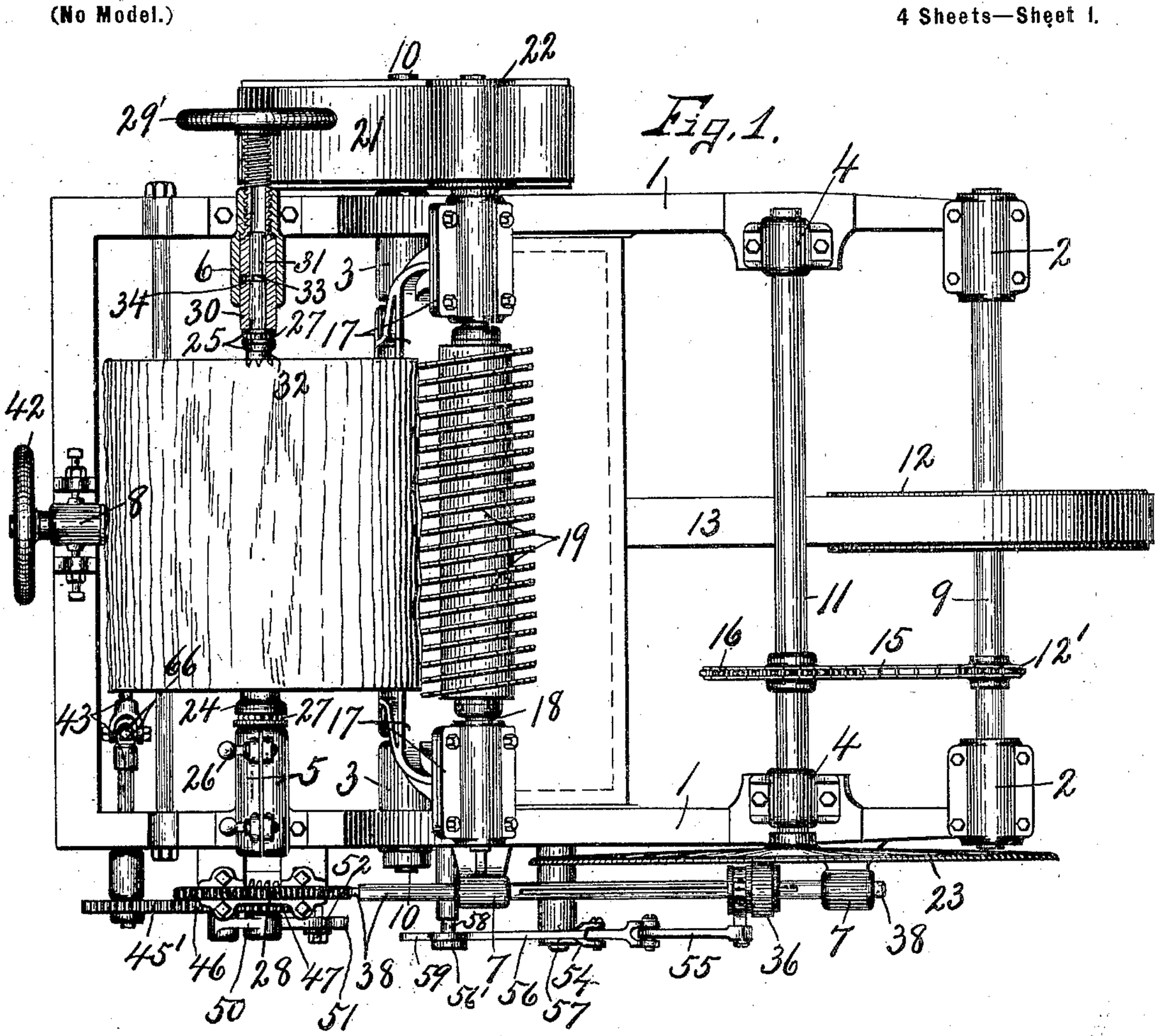
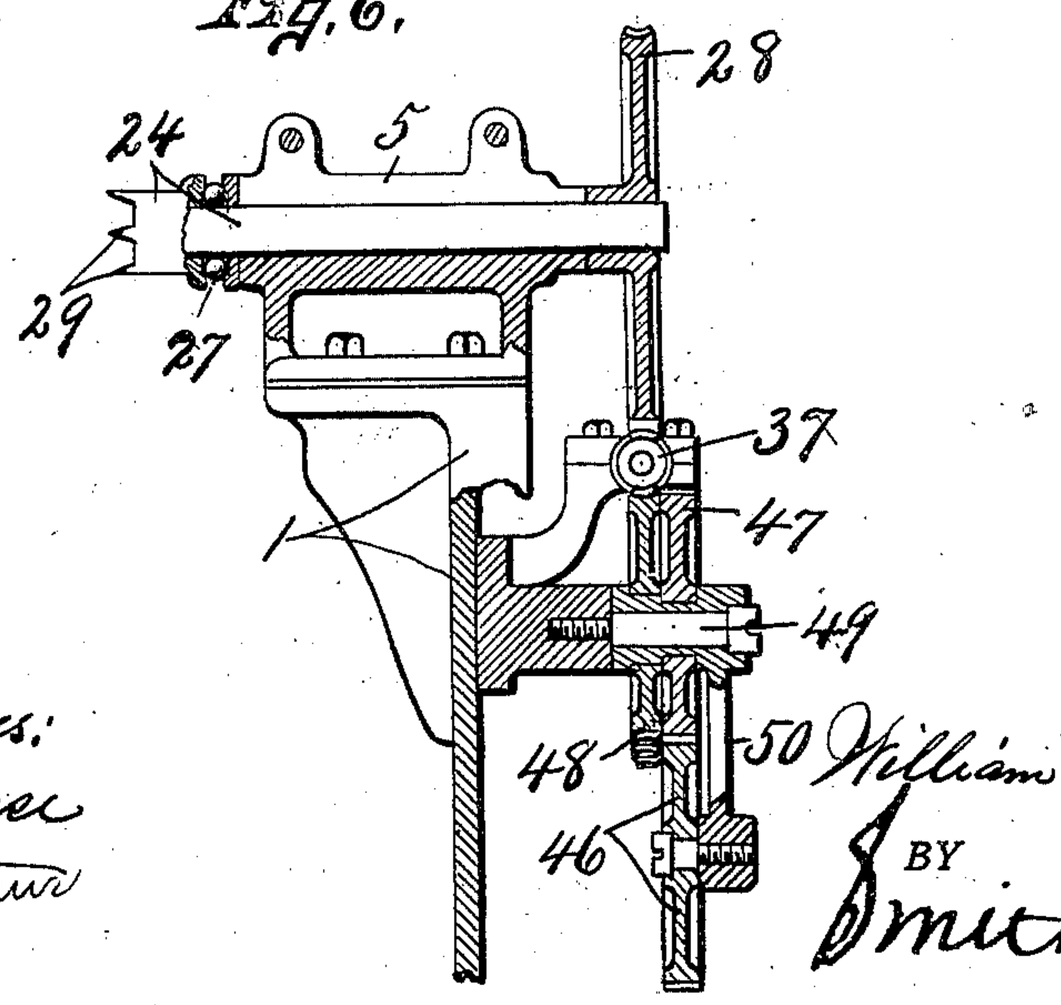


Fig. 6.



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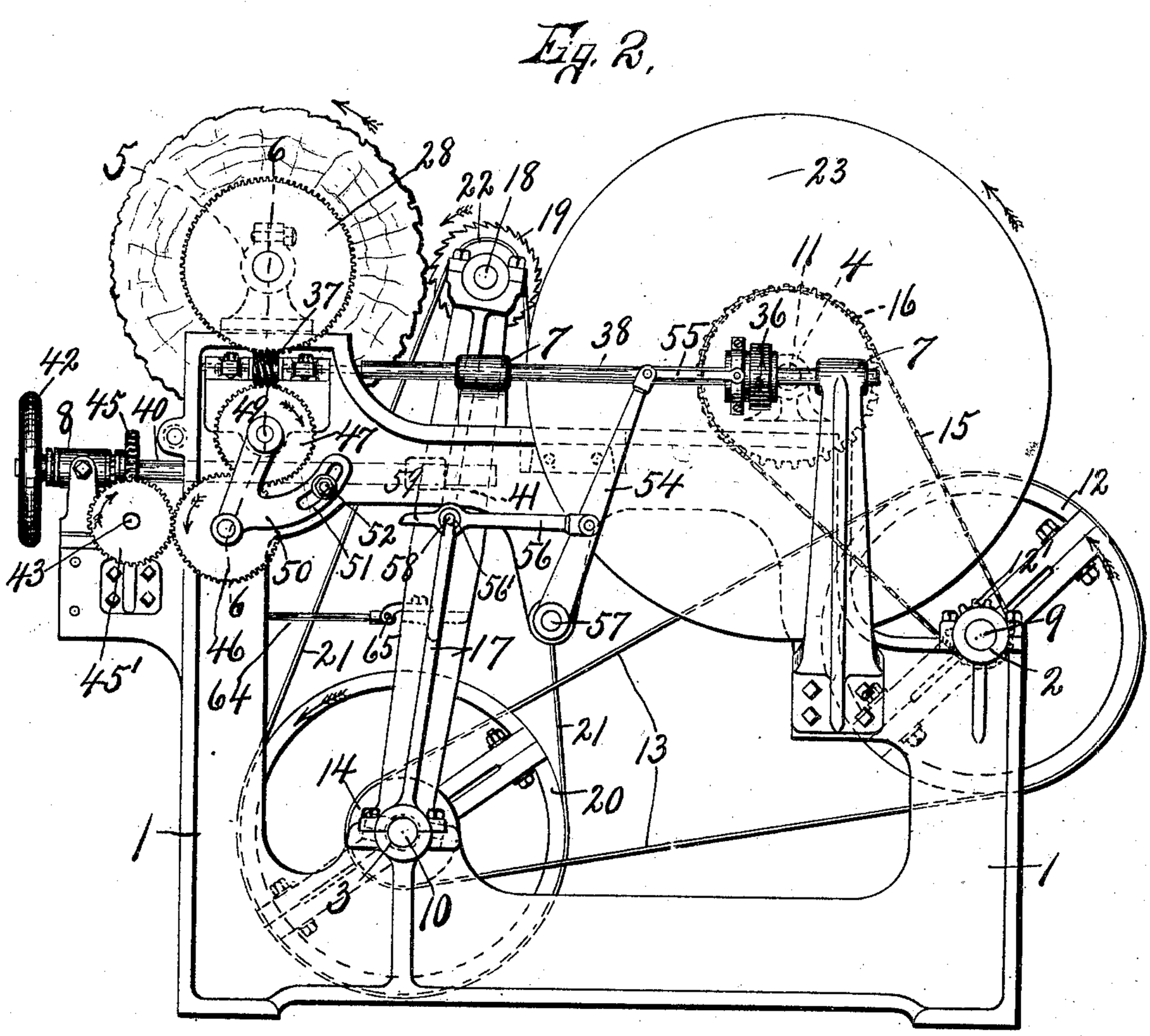
(No Model.) 4 Sheets—Sheet 2.

Fig. 2.



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(Application filed Jan. 30, 1902.)

(No Model.) 4 Sheets—Sheet 3.

Fig. 3.

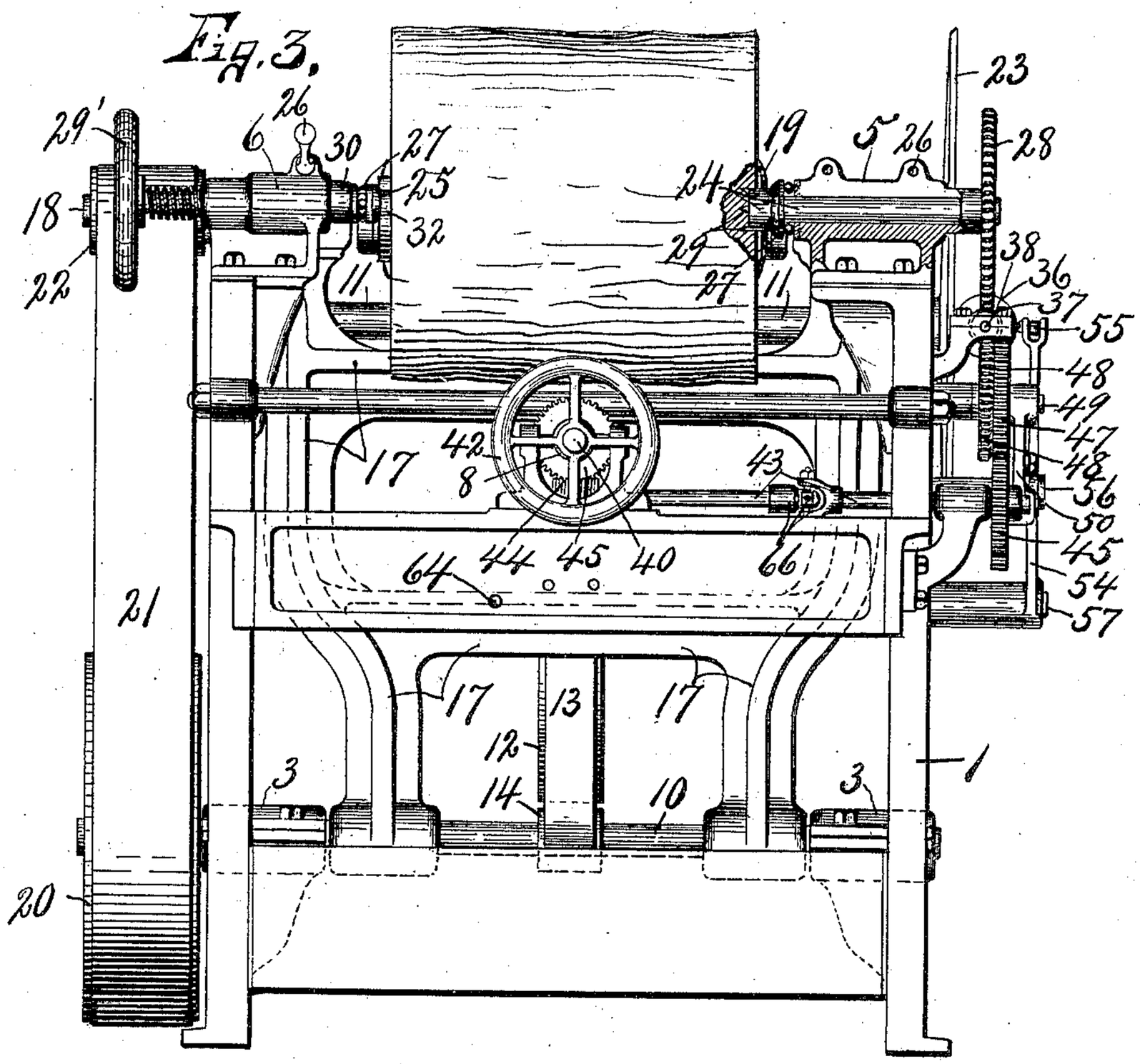
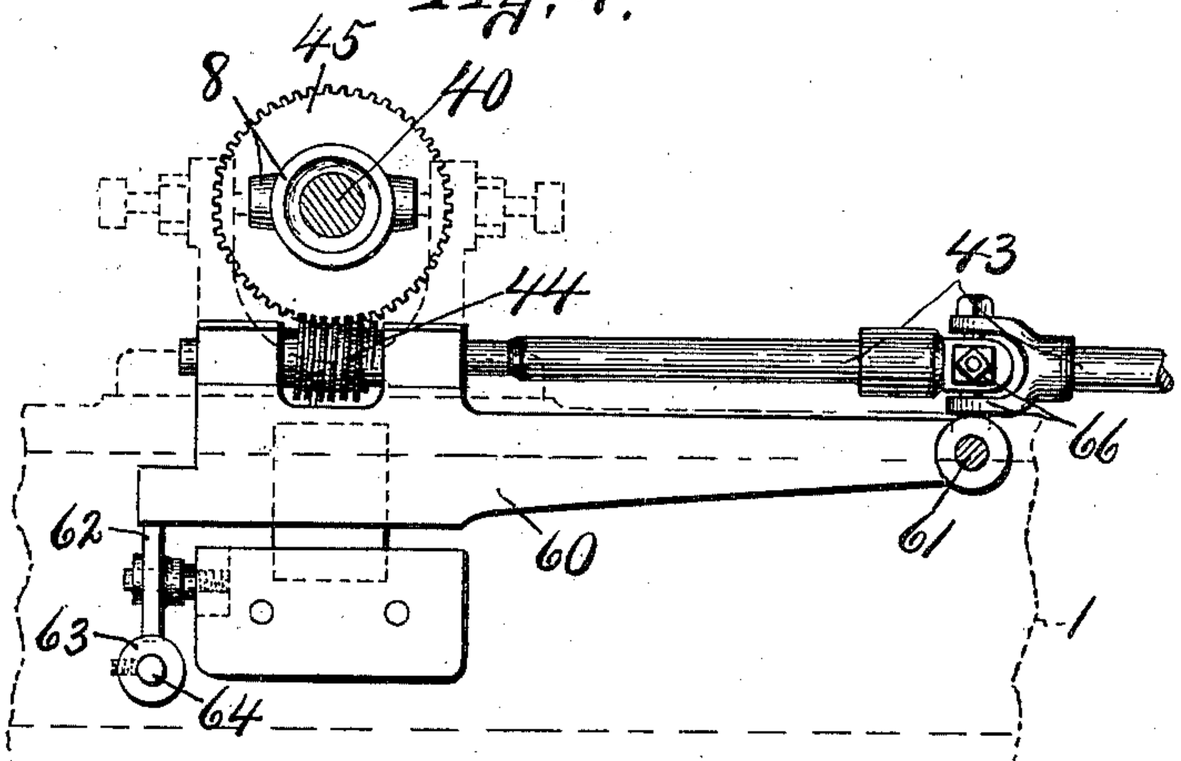


Fig. 4.



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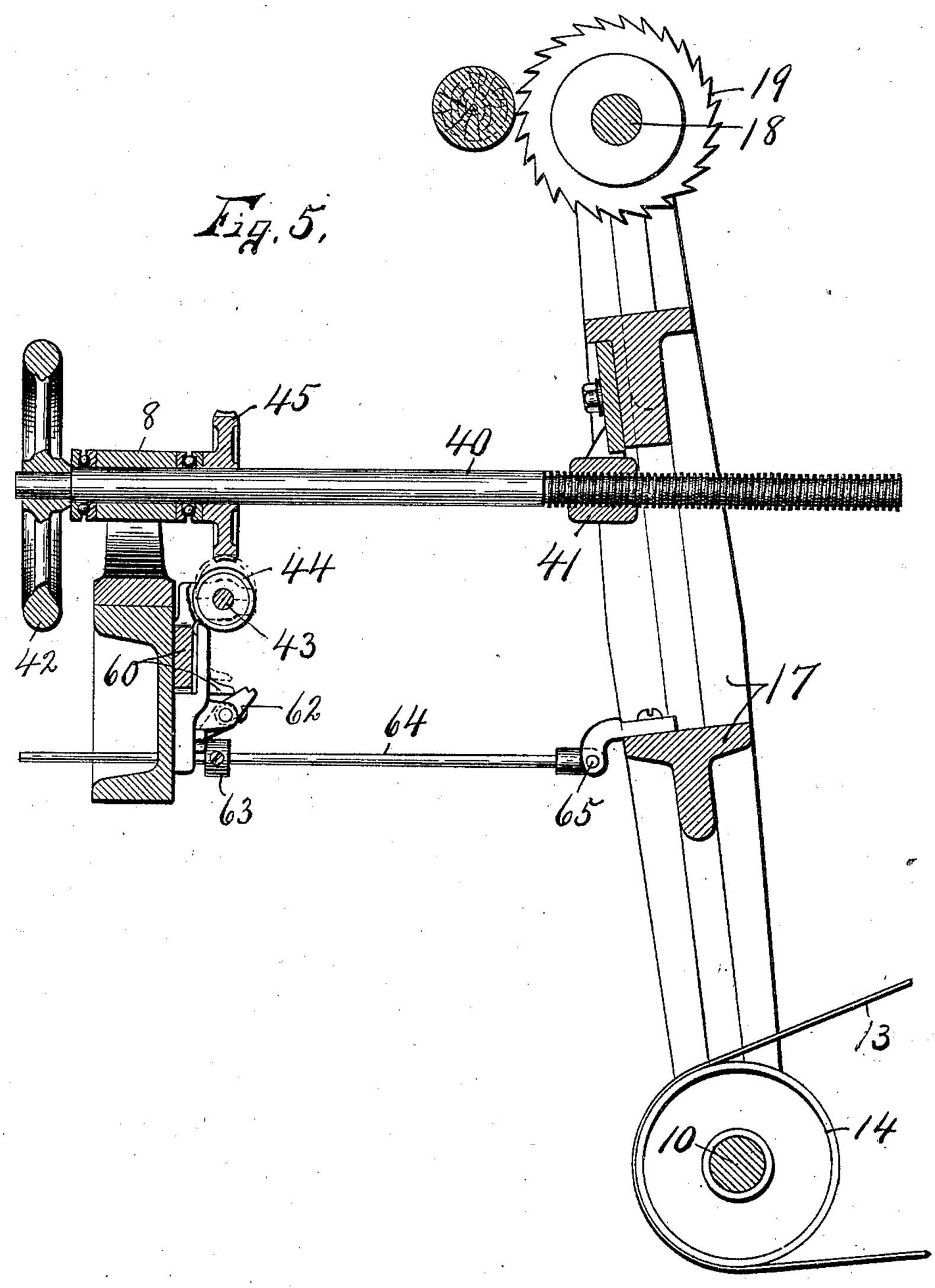
MACHINE FOR REDUCING WOOD TO FIBER.

(Application filed Jan. 30, 1902.)

(No Model.) 4 Sheets—Sheet 4.

Fig. 5.



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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. 701,413, dated June 3, 1902.

Application filed January 30, 1902. Serial No. 91,911. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM K. SQUIER, of Syracuse, in the county of Onondaga, in the State of New York, have invented new and useful Improvements in Machines for Reducing Wood to Fiber, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to improvements in machines for reducing wood to fiber.

One of the objects of this invention is to simplify the general construction and operation of this class of machines and at the same time to increase its durability and efficiency over the machines now in use.

Another object is to render the various mechanisms as nearly automatic in action as possible.

A further object is to so cut the wood from the block or log as to produce a long tenacious fiber adapted to be used as a bond for plastic bodies.

A still further object is to drive the rotary wood-carrier and the screw-feed for the cutter-support from a single driving member.

A more specific object is to rotate the wood-carrier and feed the cutter thereto at gradually-increasing rates of speed as the wood is reduced to fiber.

Another specific object is to provide friction variable-speed driving mechanism connected to actuate the wood-carrier and screw in such manner that the screw operates to vary the speed of its revolution and that of the carrier.

An additional object is to provide manually-controlled means for disconnecting the screw-feed from its variable speed-regulating mechanism.

Another additional object is to so connect and arrange the parts of the machine that the driving mechanism for the screw will be automatically disconnected therefrom when the cutter is moved to the limit of its inward movement or when the wood, block, or log is reduced to the minimum size.

To this end the invention consists in the combination, construction, and arrangement of the parts of a machine for reducing wood to fiber, as hereinafter fully described, and pointed out in the claims.

Referring to the drawings, Figures 1, 2, and 3 are respectively top plan, end, and front elevations of a machine embodying the various features of my invention, certain portions of the drawings in each of the Figs. 1 and 2 being broken away for disclosing the interior mechanisms. Fig. 4 is an enlarged detail view of the screw driving and releasing mechanism. Fig. 5 is an enlarged sectional view of the rocking cutter-supporting frame and its feeding mechanism and the means for holding and releasing the feeding mechanism. Fig. 6 is an enlarged sectional view taken on line 6 6, Fig. 2.

Similar reference characters indicate corresponding parts in all the views.

This machine is designed and constructed for the purpose of reducing large bodies of wood, such as logs cut into any desired lengths, into fiber which is adapted to be used as a bond for plastic materials, such as wall-plaster and similar material in which hair and like filamentous substances have heretofore been used for the same purpose. The principal advantages gained in this construction are that the action of the machine is substantially automatic throughout and that the fiber is cut or torn from the body of the wood in long, stringy, and fine particles, which in practice is a good substitute for hair or similar filamentous substances.

In the drawings I have shown a supporting-frame 1, which may be of any desired size, form, or construction, adapted to support the various mechanisms for carrying out the objects of my invention, said frame being usually provided with suitable bearings 2, 3, 4, 5, 6, 7, and 8, the bearings 2 serving to receive and support a suitable main driving-shaft 9, and the bearings 3 and 4 receive and support counter-shafts 10 and 11.

The main shaft 9 is provided with driving-wheels 12 and 12′, the wheel or pulley 12 being connected by a belt 13 to a smaller driven pulley 14 upon the counter-shaft 10, and the wheel 12′ preferably consists of a sprocket which is connected by a chain 15 to a larger sprocket 16, secured to the counter-shaft 11.

Pivotally mounted upon the driving-shaft 10 is a rocking frame 17, having its upper end provided with a mandrel or shaft 18, having a cutter-head 19 secured thereto, and the

shaft 10 is provided with a pulley 20, which is connected by a belt 21 to a smaller pulley 22, also secured to the mandrel or shaft 18.

The counter-shaft 11 is provided with a friction-disk 23, which is preferably secured to one end of said shaft at the outer side of the frame in such manner as to have a free bearing-surface adapted to be engaged by a friction member hereinafter described.

The bearings 2 and 4, which receive, respectively, the main shaft 9 and counter-shaft 11, are arranged at the rear of the machine, while the bearing 3 and counter-shaft 10, mounted therein, are usually arranged at the base at a point intermediate the front and rear of the machine, the front of the machine being regarded as the left-hand side in Figs. 1 and 2.

The bearings 5 and 6 are preferably mounted upon the upper face and at the front end of the frame 1 on opposite sides of said frame and are adapted to receive and support suitable carriers 24 and 25, which are adapted to engage the end faces of the block or log of wood for centering and holding the same in operative position. These bearings 5 and 6 may be formed integral with the frame or may consist of separate boxes suitably secured thereto and are preferably split longitudinally and provided with suitable clamping devices 26 for holding the wood-carriers in operative position from endwise or lateral displacement, it being understood that these blocks or logs of wood are usually quite heavy, and that the strain upon the carriers incidental to the operation of the cutters upon the wood is rather severe and somewhat irregular, and that the wood, block, or log tends to vibrate in the machine unless securely held by the head and tail blocks. Each of these revolving heads or centering devices is provided with antifriction end-thrust bearings 27, which enables the chucks to be forced with considerable pressure into engagement with the wood to be cut without binding in the bearings 5 and 6. The revolving member 24 usually consists of a spindle journaled in the bearing 5 and having its outer end provided with a worm-gear 28, and its inner end is provided with a spur-clutch 29, and the antifriction members 27 are interposed between a suitable shoulder formed on the inner end of the spindle and a wearing plate or surface upon the inner end of the bearing 5.

The revolving section 25 of the wood-carrier preferably consists of a sleeve 30, journaled in the bearing 6 and having its outer end threaded and provided with a handpiece 29′, and its inner end is preferably smooth and bears upon a like surface at the inner end of said bearing, being provided at its inner end with a wearing-plate for the adjacent end-thrust bearings 27. The threaded portion of this sleeve 30 is engaged with a similarly-threaded end of the bearing 6, so that as the sleeve 30 is rotated it is also moved endwise.

Journaled within the sleeve 30 is a spindle 31, having its inner end provided with a spur-head 32 for engaging the wood, block, or log and forcing the same firmly into engagement with the opposite spur-head 29, the adjacent bearings 27 being interposed between this spur-head 32 and the adjacent end of the sleeve 30.

In order to prevent the endwise movement of the spindle 31, said spindle is provided with an annular groove 33, in which is inserted a threaded stud 34, movable in a threaded aperture in the sleeve 30. It is apparent from the foregoing description that when it is desired to insert a log or block of wood in the machine for the purpose of reducing the same into fiber said log is first centered upon the spur-head 29 and the screw-sleeve 30 is then rotated so as to engage its spur-head 32 with the opposite end of the wood at substantially its center, said sleeve being screwed inwardly with sufficient force to cause the spurs to be forced deeply into the opposite ends of the wood block, whereupon the clamp 26 of the bearing 6 is operated to clamp the sleeve in its adjusted position, the opposite clamps 26 of the bearing 5 serving to take up any wear incidental to the rotation of the spindle journaled therein.

The means for rotating the wood-carrier preferably consists of a friction-wheel 36 and a worm 37, connected to the friction-wheel by a shaft 38, said friction-wheel being feathered upon the shaft and engaged with the friction-disk 23, and the worm 37 is engaged with the worm-gear 28. This shaft 38 is preferably arranged substantially horizontal and in a radial line from the center of the friction-disk 23, and the friction-wheel 36 is therefore movable endwise across the face of the disk 23 in a substantially radial line, for a purpose hereinafter described.

The means for moving the cutter-head against the surface of the wood or toward and away from the axis of the carrier preferably consists of a screw 40, having its inner end engaged with a threaded nut 41, secured to the rocking frame 17, and its outer end is journaled in the bearing 8 and provided with a suitable handpiece 42, whereby the screw may be rotated by hand, if desired, after releasing its driving member therefrom for rocking the frame 17, and thereby feeding the cutter 19 at the required speed toward and away from the axis of the wood-carrier. The nut 41 upon the rocking frame and the bearing 8 are preferably pivotally supported in order that the screw may readily adapt itself to the arc of movement of the cutter-supporting frame.

In order to render the feed of the cutter to the work automatic in its action, I preferably connect the screw 40 to the worm 37, and in order to carry out this purpose I provide a secondary shaft or spindle 43, which is mounted in a suitable bearing or bearings upon the frame 1 in proximity to the outer end of the screw 40 and at substantially right angles

thereto, the inner end of said shaft or spindle being provided with a worm 44, meshing with a worm-gear 45, secured to the screw 40, and the outer end of said shaft or spindle is provided with a gear 45′, which meshes with an idler 46, and this idler meshes in turn with another gear 47, to which is secured a worm-gear 48, meshing with the worm 37 of the driving-shaft 38. The gears 47 and 48 are mounted upon a shaft 49, journaled in a suitable bearing on the frame 1, and the gear or idler 46 is journaled upon a rock-arm 50, pivotally mounted upon the shaft 49 and provided with a slotted arm 51, adapted to receive a clamping-screw 52, which enters the slot of said arm and is engaged with the adjacent portion of the frame 1 for securing the rock-arm 50 in its adjusted position and holding the gear 46 in mesh with the gear 45. The object of this rock-arm is to permit various sizes of intermediate gear 43 to be used in connection with the gears 46 and 47 for varying the speed of rotation of the shaft 43 and screw 40, it being understood that either of the gears 46 or 47 may be changed for this purpose.

It is apparent from the foregoing description that the single member or worm 37 serves to rotate the wood-carrier and also to operate the screw-feed 40 for automatically feeding the cutter-head to the work.

The means for automatically increasing the speed of revolution of the wood-carrier and also of the screw which feeds the cutter to the work preferably consists of a rocking lever 54 and links 55 and 56, the lever 54 having its lower end pivoted to the frame at 57, and the link 55 is connected at one end to the friction-wheel 36 and its other end is connected to the upper or free end of the oscillating arm 54, and the link 56 is pivotally connected at one end to the intermediate portion of the arm 54 and its other end is provided with an open-sided bearing 56′, engaged with a pin or stud 58, which is secured to the rocking frame 17 at a point between its supporting-shaft 10 and the axis of the cutter-head. The front end of the link 56 is provided with an extension 59, which serves as a handpiece, whereby the operator may at any time disengage the link 56 from the pin or stud 58—as, for instance, when the cutter is passing through a knurly or knotted portion of the log or whenever the efficiency of the work requires a temporary slower or faster movement than would be produced by the screw 40. It is thus obvious that, although the machine is designed to automatically feed the cutter-support and wood-carrier at gradually-increasing rates of speed as the wood is worn away, said feed is entirely under the control of the operator by means of the detachable link connection 56 and that when said link 56 is detached from the rocking frame 17 the speed of rotation of the wood-carrier may be regulated to suit the conditions, while the cutter-head may be fed to the work manually by means of the handpiece 42 and screw secured thereto when the worm 44 is out of mesh with the gear 45.

When the log or block of wood is reduced to the minimum size and the cutter-head approaches the limit of its inward movement, it is desired that the feed of the cutters will be stopped automatically, and for this purpose I preferably mount the inner end of the shaft 43, carrying the worm 44, upon a vertically-movable support, which preferably consists of a suitable bearing mounted upon a rock-arm 60, which is pivoted at 61 in such manner that the inner end of the rock-arm is free to drop by gravity a sufficient distance to disengage the worm 44 from the worm-gear 45. The free end of this rock-arm, carrying the bearing for the worm 44, is held in position by a suitable detent 62, which is mounted upon the frame and is adapted to be operated by a shoulder 63, mounted upon a sliding bar 64. This bar is guided at one end in a suitable bearing in the frame 1, and its other end is pivotally secured at 65 to the rocking frame 17 in such manner that as said rocking frame is moved forwardly and the cutter-head approaches the limit of its inward movement the sliding rod 64 is simultaneously carried or forced forwardly until the shoulder 63 engages the detent 62 and releases the same from holding engagement with the free end of the arm or lever 60, whereupon said free end of the lever automatically drops, and thereby forces the worm 44 out of engagement with the worm-gear 45. The shaft 43, carrying the worm 44 and the gear 45, is preferably formed in sections, these sections being connected by a universal coupling 66, the pivotal center of which is in a transverse vertical plane substantially coincident with the pivot 61 of the rocking lever 60, the object of this being to permit the gravity movement of the bearing carrying the worm at the inner end of the shaft 43 when the same is released by the displacement of the detent 62 in the manner hereinbefore described.

Any desired means may be employed for returning the rocking lever 60 to its normal position, so that the worm 44 again engages the worm-gear 45 for the automatic operation of the screw. This lever being in proximity to the front of the machine, it is apparent that the same may be returned to its normal position by hand, the detent 62 being provided with a suitable spring for returning it to its normal position to automatically engage the adjacent end of the lever 60 and hold the same in its operative position.

In the operation of my invention the block or log of wood is placed in operative position upon the carriers 24 and 25, the rocking frame 17 being moved rearwardly a sufficient distance so that the cutters clear the periphery of the log, it being understood that the lever 56 is moved into holding engagement with the pin 58. The motive power is then set into operation, thereby rotating the cutter

and log simultaneously and also moving the cutter automatically and rotating the carrier for the log at gradually-increasing speeds as the log is reduced. If for any reason it is necessary to stop the increasing speed of feed of the cutter toward the log, the link 56 may be disengaged from the pin 58 by the operator, thereby stopping the automatic endwise feed of the disk 36 without retarding the movement of the log-carrier or screw, whereupon the disk 36 may be moved to any desired position relative to the axis of the disk 23 for rotating said log-carrier at the desired rate of speed. If it is necessary to increase or diminish the speed of movement of the rocking frame toward the log, the clamp 52 may be loosened and different gears substituted for the gears 46 and 47 or for the gear 45′, which will give the desired speed. Then the clamp 52 may be tightened for holding said gears in mesh.

The operation of my invention will now be readily understood upon reference to the foregoing description and the accompanying drawings, and it will be noted that the mechanisms for carrying out the essential objects of my invention may be considerably varied without departing from the spirit thereof. Therefore I do not limit myself to the precise construction shown and described.

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

1. A machine for reducing wood to fiber, comprising a rotary wood-carrier and a rotating cutter, an oscillatory support for one of the parts, and mechanism to rotate the carrier and simultaneously rock the support, a detent to hold parts of said mechanism in engagement, and means actuated by the rocking support to automatically trip the detent.

2. A machine for reducing wood to fiber, comprising a rotary wood-carrier and a rotating cutter, an oscillatory support for one of the parts, and mechanism to rotate the carrier and simultaneously rock the support at gradually-increasing speeds, one of the members of said mechanism being detachable to prevent the variable speed movement of the rocking support for the purpose set forth.

3. A machine for reducing wood to fiber, comprising a rotary wood-carrier and a rocking frame carrying a rotating cutter, and mechanism connected and operating to rotate the carrier and to simultaneously rock the frame to move the cutter to the work.

4. A machine for reducing wood to fiber, comprising a rotary wood-carrier and a rocking frame carrying a rotating cutter, a screw adapted to rock the frame, and driving mechanism connected and operating to rotate the carrier and screw simultaneously.

5. A machine for reducing wood to fiber, comprising a rotary wood-carrier and a rocking frame carrying a rotating cutter, a screw adapted to rock the frame, and driving mechanism connected and operating to rotate the carrier and screw simultaneously at gradually-increasing rates of speed.

6. A machine for reducing wood to fiber, comprising a rotary wood-carrier and a rocking cutter-support, a driving member for the cutter, and a screw actuated by said member and connected to rock the cutter-support for the purpose specified.

7. A machine for reducing wood to fiber, comprising a rotary wood-carrier, an oscillatory frame, a rotating cutter mounted on the frame, a rotating driving member to rotate the carrier, and a screw actuated by said member and connected to oscillate the frame for the purpose set forth.

8. A machine for reducing wood to fiber, comprising a rotary wood-carrier, a movable cutter-support, a screw connected to move the support, a friction-disk, a frictional wheel engaged with and actuated by the disk, a worm driven by the wheel and connected to drive the screw, and connections whereby said frictional wheel is moved across the face of the disk to increase the speed of movement of the support as the wood is reduced for the purpose set forth.

9. A machine for reducing wood to fiber, comprising a rotary wood-carrier, a rotating friction-disk, a rotary friction member movable across the face of the disk and receiving its rotary motion from the disk, said member being connected to drive the carrier, a screw connected to and actuated by the said member, and means actuated by the screw and detachably connected to said member to move the same across the disk, and a cutter coacting with the carrier to reduce the wood to fiber.

10. In a machine for reducing wood to fiber, a rotating wood-carrier, a cutter, a rotating friction-disk, a screw, a rotary shaft having means feathered thereon and engaged with the disk and a worm on the shaft connected to drive the carrier and screw, said screw being connected to move said means endwise on the shaft across the face of the disk.

11. In a machine for reducing wood to fiber, a rotating wood-carrier, a rotating friction-disk, a screw, rotary means engaged with the disk and connected to drive the screw, a movable cutter-support connected to and actuated by the screw, and means detachably connected to said cutter-support to move the former means across the face of the disk.

12. In a machine for reducing wood to fiber, a rotating wood-carrier, a rock-frame, a rotating cutter on the frame, a screw to rock the frame, a rotating friction-disk, a revoluble sliding member rotated by the disk and connected to drive the carrier and screw, and means connected to the rock-frame to slide said member across the disk.

13. In a machine for reducing wood to fiber, a rotating wood-carrier, a rock-frame, a rotating cutter on the frame, a screw to rock the frame, a rotating friction-disk, a revoluble

sliding member rotated by the disk and connected to drive the carrier and screw, and means detachably connected to the rock-frame to slide said member across the disk.

14. In a machine for reducing wood to fiber, a rotary wood-carrier, a rocking cutter-support, means to rock said support, a driving member for said means having independent movement away from said means, a detent holding said driving member in position, and additional means actuated by the rocking of the support to release the detent.

15. In a machine for reducing wood to fiber, a rotating wood-carrier, a movable cutter-support, a screw engaging the support to move the cutter to the work, driving means for the screw, one of the two last-named parts being movable toward and away from the other, a detent holding the movable part in operative position, and additional means operated by the support to trip the detent and thereby break the connection between the screw and its driving means.

16. In a machine for reducing wood to fiber, a rotating wood-carrier, a rocking frame, a rotating cutter on the frame, a screw for rocking the frame, a rotating friction-disk, and means driven by the disk and connected to rotate the carrier and screw, said means having an independent sliding movement across the disk, and connections between the rock-frame and said means to effect the sliding movement automatically.

17. In a machine for reducing wood to fiber, a rotating wood-carrier, a rocking frame, a rotating cutter on the frame, a screw for rocking the frame, a rotating friction-disk and means driven by the disk and connected to rotate the carrier and screw, said means having an independent sliding movement across the disk, connections between the rock-frame and said means to effect the sliding movement automatically, and additional means actuated by the rock-frame to break the connection between the screw and its driving means.

18. In a machine for reducing wood to fiber, a rotating wood-carrier, a rocking frame, a rotating cutter on the frame, a screw for rocking the frame, a rotating friction-disk, and means driven by the disk and connected to rotate the carrier and screw, said means having an independent sliding movement across the disk, connections between the rock-frame and said means to effect the sliding movement automatically, said latter connections having a manually-movable member adapted to break the connection between the rock-frame and said means.

In witness whereof I have hereunto set my hand this 21st day of January, 1902.

WILLIAM K. SQUIER.

Witnesses:
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MILDRED M. NOTT.