No. 709,576. Patented Sept. 23, 1902.

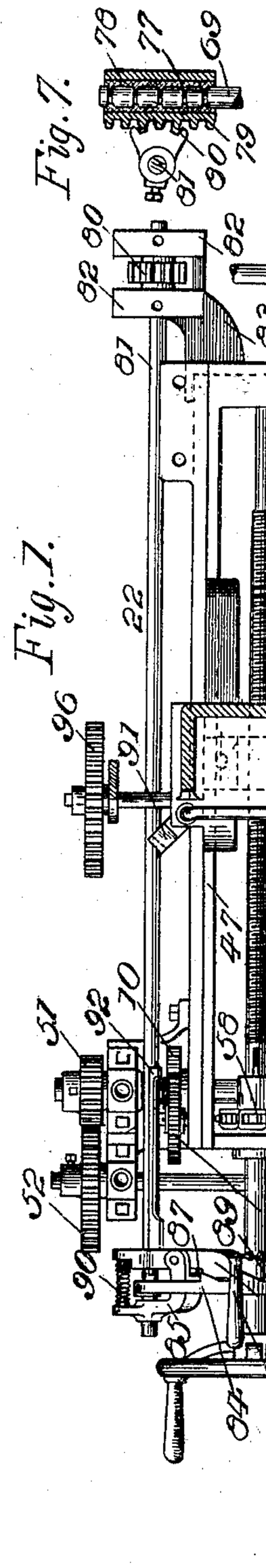
H. M. HOOVER.

MACHINE FOR PRODUCING WOOD FIBER.

(Application filed June 26, 1901.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.



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(No Model.) 3 Sheets—Sheet 2.

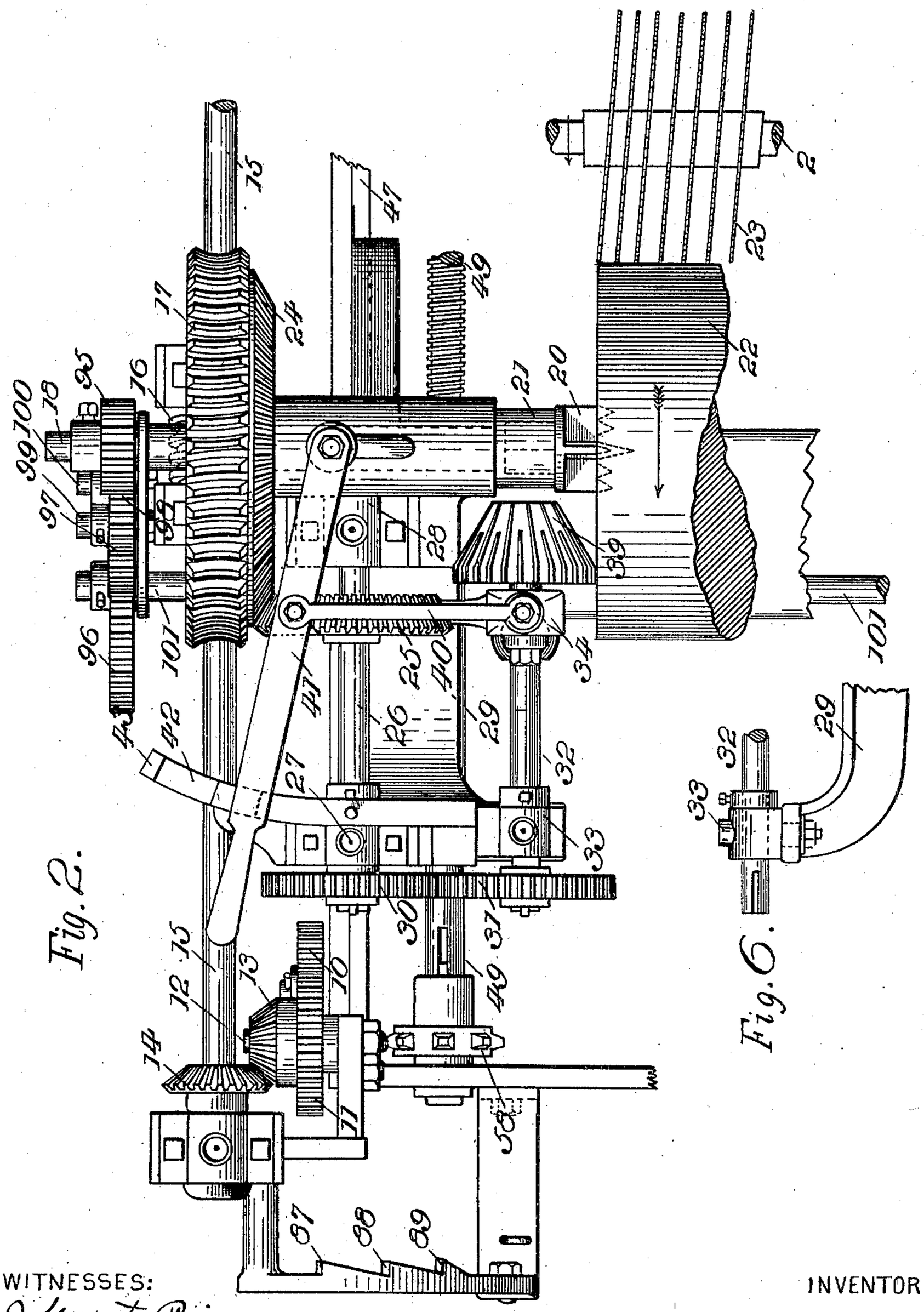

Fig. 2.

Fig. 6.

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(No Model.) 3 Sheets—Sheet 3.

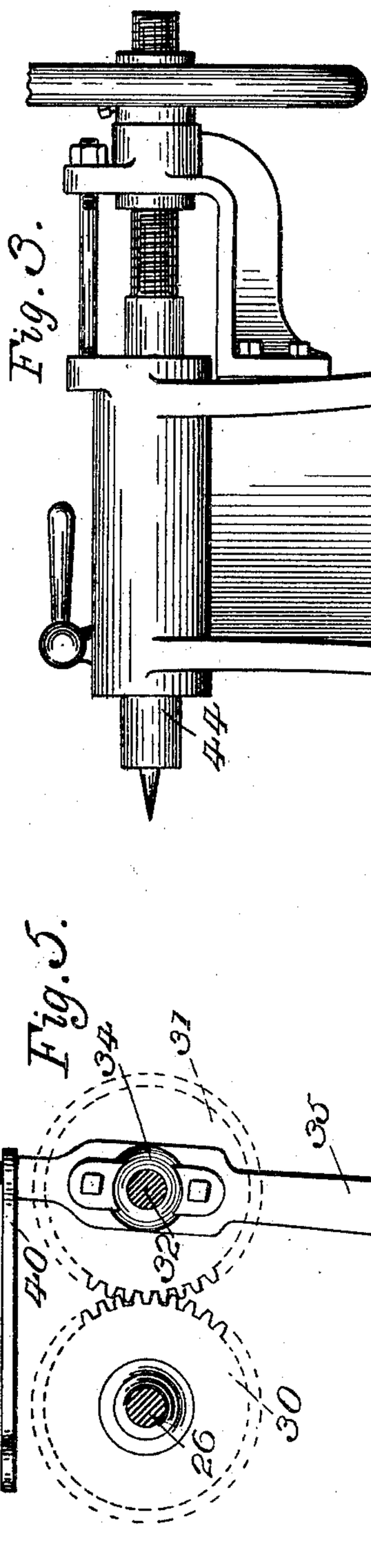

Fig. 3.

Fig. 5.

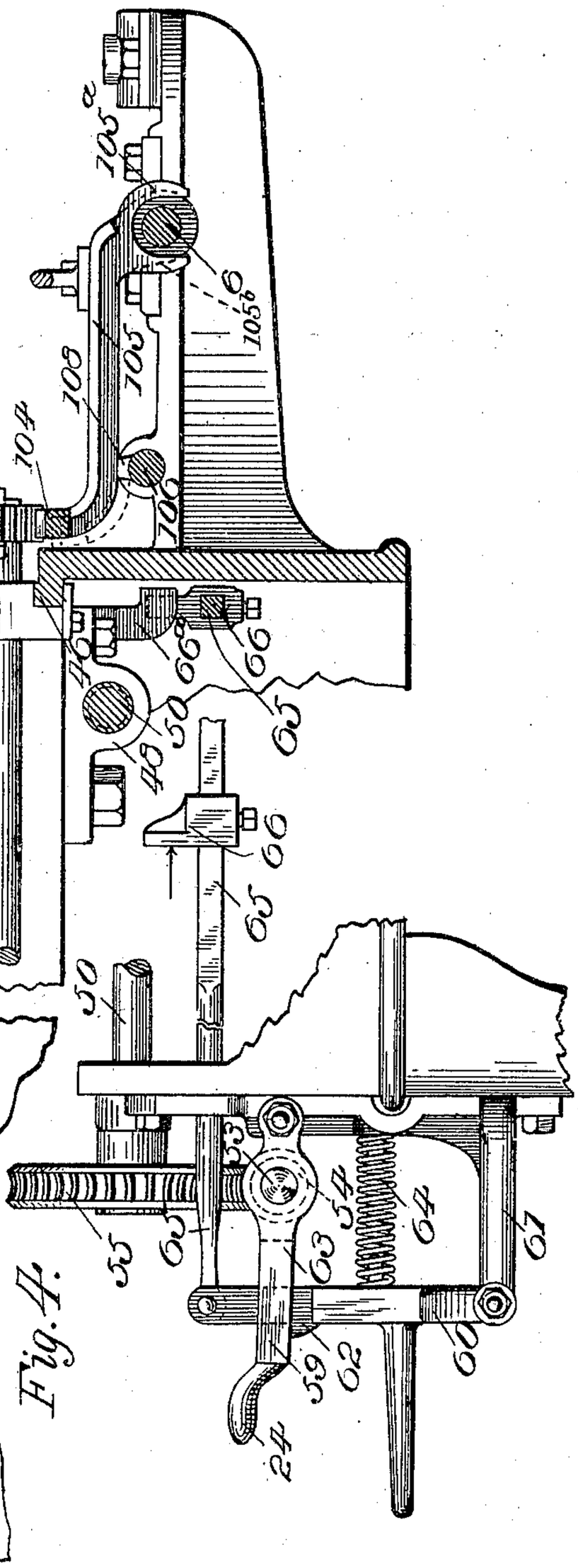

Fig. 4.

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UNITED STATES PATENT OFFICE.

HORACE M. HOOVER, OF PERRYSBURG, OHIO.

MACHINE FOR PRODUCING WOOD FIBER.

SPECIFICATION forming part of Letters Patent No. 709,576, dated September 23, 1902.

Application filed June 26, 1901. Serial No. 66,141. (No model.)

To all whom it may concern:

Be it known that I, HORACE M. HOOVER, a citizen of the United States, residing at Perrysburg, in the county of Wood, State of Ohio, have invented a certain new and useful Improvement in Machines for Producing Wood Fiber, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to a machine specially adapted to the production of wood fiber to be used as a base for plastering material, and the machine is an improvement on the class of machine shown and described in my United States Patent No. 624,938, granted May 16, 1899.

It is my object to so improve the mechanism that a rapid movement may be given to the carriage carrying the head and tail stocks when the bolt of wood supported thereby is not being operated upon by the cutters and to give said carriage a comparatively slow movement during the time the work is being performed. I also provide an auxiliary feed for the bolt of wood, whereby the latter is prevented from jumping or "stuttering" under the action of the cutters.

Various other improvements are made, as will be hereinafter more particularly described and then definitely set forth by the claims at the end hereof.

In the accompanying drawings, which represent what I at present consider the preferable embodiment of my invention, Figure 1 is a top plan of my machine with the head and tail stocks cut away and removed, so as to better show the gearing. Fig. 2 is an enlarged top plan of the head-stock and the gearing coacting therewith. Fig. 3 is a front elevation of the tail-stock and part of the carriage and a portion of the mechanism controlled thereby; and Figs. 4, 5, 6, and 7 are details which will be more fully referred to hereinafter.

Referring now to the details of the drawings by numerals, 1 indicates a pulley driven from any suitable source of power, but preferably from a pulley (not shown) on the end of cutter-head spindle 2. (Seen only in Fig. 2.) This pulley 1 is carried by the shaft 3, on which is fixed the bevel-gear 4, meshing with and driving a similar gear 5, fast on a spindle 6. A friction-wheel 7 is slidingly secured to this spindle and transmits motion therefrom to the shaft 8 through the friction-disk 9. On the opposite end of this shaft 8 is a pinion 10, meshing with and driving gear 11, journaled on a short shaft 12, (see Fig. 2,) the gear 11 having integrally secured thereto the bevel-gear 13, driving the shaft 15 through its companion gear 14. A worm 16 is splined to this shaft 15 and drives the worm-wheel 17, fixed on the head-stock spindle 18. An eccentric clutch-lever 19 (see Fig. 1) is placed on the shaft 8 between a collar 20, fixed to said shaft, and an eccentric collar 20^a, so that when the lever 19 is thrown in one direction its wedging surface acts between the collars 20 and 20^a and makes frictional contact between the friction-wheel 7 and its disk 9, and when the lever 19 is moved in the opposite direction the friction-wheel 7 runs free. It follows from the foregoing that when the friction-wheel 7 and disk 9 are in frictional contact a comparatively slow motion is transmitted from the pulley 1 to the head-stock shaft 18. At the opposite end of this spindle 18 is a socket 21, receiving the square shank of a removable spur 20, which enters the end of and forms one of the centers for the bolt of wood 22 to be reduced, (see Fig. 2,) the other end of the bolt being supported by the tail-spindle 44. (See Fig. 3.) The spur 20 is not quite sufficient to keep the bolt steady, as the latter is likely to jump or "stutter" under the action of the cutters 23, and I therefore provide an auxiliary feed comprising a bevel-gear 24, formed integral with the worm-wheel 17, which meshes with a similar bevel-gear 25, fast on shaft 26, supported in boxes 27 and 28, the first of which is carried on a bracket 29, projecting from the head-stock. On the end of shaft 26 is gear 30, loosely meshing with a companion gear 31, carried by a shaft 32, supported by a box 33, pivotally supported on the arm 29. The shaft 33 is connected with a box 34, which is carried by an upright bar 35, (see Fig. 5,) pivotally supported at 36 and carrying an arm 37, pressed upward by a spring 38. From the outer end of the box 34 is supported a toothed wheel 39, (see Fig. 2,) the teeth of which "bite" into the bolt of wood 22. At the upper end of the

upright bar 35 is connected a link 40, to which is pivotally connected a handle or lever 41, arranged to engage a notch 42 in a segment 43 and hold the toothed wheel 39 away from the bolt of wood 22, thus acting against the power of the spring 38. The operation of these parts is such that when the lever 41 is released from its notch 42 the spring 38 acts on the arms 37 and 35, moving one end of the shaft laterally (the other end turning slightly in its pivoted box 33) and forces the teeth of wheel 39 into the bolt of wood, and when the said toothed wheel 39 is rotated through the medium of the gears 30, 31, and 24, and 25 a positive feed is thereby given to the bolt of wood, and the toothed wheel thereby helps to drive the bolt, steadying it and keeping it from jumping or stuttering. It is obvious that the toothed wheel 39 can adjust itself to any irregularities in the end of the bolt of wood, as it is spring-actuated, and that as the bolt is reduced in size below the point of contact shown in Fig. 2 the cone or bevel part of the toothed wheel will follow the edge of the end of the log or bolt until it is nearly or quite finished. When the operator wishes to remove the reduced or useless core from the machine, the lever 41 is thrown back into its notch 42 in the segment 43 and the toothed wheel moved backward, so that it is out of the way during the removal of the core.

Having described the means for giving rotary motion to the head-stock spindle, I will now describe the mechanism for giving reciprocating motion to the carriage 45, so as to feed the bolt of wood to the knives or cutters and move the head and tail stocks back again to release the core and have a new bolt placed in position.

The carriage 45, which is shown in Figs. 1 and 3 as sliding on ways 46 and 47 and from which the head and tail stocks are removed in said Fig. 1, has threaded blocks 48 bolted to its under side, through which pass the feed-screw shafts 49 and 50. These shafts are rotated from the shaft 8, on the outer end of which is a gear 51, meshing with a somewhat-larger gear 52, fast on the worm-shaft 53, carrying a worm 54, which operates the large worm-wheel 55, fixed to the screw-shaft 50. This shaft has a sprocket-wheel 56 secured to it and a sprocket-chain 57 runs therefrom to a similar sprocket-wheel 58 on the companion screw-shaft 49, so that when the shaft 8 revolves motion is transmitted to the worm-shaft 53 and from it simultaneous motion is imparted to the two screw-shafts 49 and 50, whereby uniform reciprocating motion is given to each side of the carriage 45. It will be seen, however, that this motion is only possible as long as the wheel 7 and disk 9 are in frictional contact, as the shaft 8 is driven from this friction-gearing. The outer end of the worm-shaft 53 is carried in a pivoted arm 59, (see Fig. 4,) so that when this arm is dropped slightly on its pivot the worm 54 is out of gear with its worm-wheel 55, and hence no further motion is given to the screw-shafts 49 and 50, and motion of the carriage therefore ceases. To automatically cause this effect when the carriage 45 reaches the end of its movement after the bolt has been sufficiently reduced, I provide the mechanism seen in Fig. 4, in which 60 represents an upright suitably pivoted to the bracket 61 and on which upright is formed a rest 62, arranged to hold the pivoted arm in such a position that the worm 54 and its wheel 55 are in mesh, the arm 59 having an opening 63 formed therein, so that when the upright 60 is pressed inward against the power of its spring 64 the seat 62 no longer supports the pivoted arm 59, and the latter therefore drops. To cause this movement, I pivotally connect a long rod 65 to the upright 60, which rod runs almost the length of the machine and has secured to it a stop-block 66, against which a projection 66[a] on the carriage abuts when it reaches the end of its movement and pushes it in the direction of the arrow, thus causing the rod 65 and upright 60 to move and allow the pivoted arm 59 to drop and release the worm 54 from the worm-wheel 55, and thus stop the further movement of the carriage. When it is desired to again feed the carriage, it is only necessary to lift the pivoted arm 59 and the spring 64 will force the upright 60 outward until its seat 62 comes into position to support the pivoted arm 59 and hold the worm 54 and its wheel 59 in mesh. It will be obvious from an inspection of the sizes of the various gears that the motion imparted to the carriage 45 from its feed-screws 49 and 50 is rather slow, a slow feed being adapted to feeding the carriage when the bolt is being reduced.

While the carriage 45 may be moved as desired by a hand-wheel 67, fast on the feed-screw 49, I much prefer to employ a supplemental feed mechanism for rapidly moving the carriage when the bolt is not being operated upon, and this mechanism will not be described.

Near one end of the continuously-rotated shaft 3 is secured a gear 68, driving the shaft 69 through the medium of the gears 70 and 71. This shaft 69 is supported by the bearing-boxes 72 and 73 at one end, and on opposite sides of the box 73 are fixedly secured to the shaft 69 two friction-disks 74 and 75, which are arranged to drive the friction-wheel 76, fast on the end of the feed-screw 50. It follows from this construction that when the friction-wheel 76 is in contact with one of the friction-disks 74 and 75 a rapid movement is imparted to the carriage 45, which moves it back to its initial position, and when the said wheel 76 is in mesh with the other of said disks the carriage is rapidly fed forward. At the opposite end the aforesaid shaft 69 is grooved, as seen at 77 in Fig. 7, and is babbitted into a box 78, on the under side of which is formed a rack 79, meshing with a segment 80, secured to a rock-shaft

81, the segment 80 and box 78 fitting within the arms 82 of a bracket 83. The rocking of this shaft 81 moves the segment 80, which acts on the rack 79 and moves the box 78 and its shaft 69, so as to place either of the friction-disks 74 or 75 in contact with the friction-wheel 76 or move them to the intermediate position. The opposite end of the rock-shaft 81 is journaled in a suitably-supported quadrant-frame 84, and a lever 85 is keyed to the shaft 81 and has a bent end passing through an opening in said quadrant-frame. A latch or operating-handle 86 is pivoted to the bent lever 85 and engages the several notches 87, 88, and 89 in the quadrant-frame, a spring 90 being provided between the end of the lever 85 and the latch 86, tending to keep the latter in engagement with one of said notches. It will be evident that as the latch or handle 86 is moved from one notch to the other, so as to rock the shaft 81, the shaft 69 is moved to shift the friction-disks 74 and 75, so as to cause the carriage to move in either direction or to remain stationary. After the bolt has been properly reduced and the carriage is at the end of its stroke the operator moves the latch or handle so as to rock the shaft 81 and move its connected parts as described and return the carriage to the front end of the machine. To automatically stop the carriage when it reaches the front end, I form or connect a foot 91 on the carriage, which acts against a properly-formed arm 92, rigidly connected to the rock-shaft 81, and rocks the shaft, the spring 90 yielding so that the latch can jump over into its appropriate middle notch 88 and the carriage comes to rest.

As the bolt of wood is reduced in size under the action of the wabbling cutters 23 (shown in Fig. 2) it is advisable to gradually increase the speed of rotation of the head-stock spindle, and to accomplish this I provide mechanism controlled by the forward movement of the carriage 45 for moving the friction-wheel 7 nearer the center of the friction-disk 9, and thus giving the head-stock spindle a higher speed. Near the end of the head-stock spindle is keyed a gear 95, which drives the larger gear 96 through two smaller gears 97 and 98, revolving on the short shafts 99 and 100. The large gear 96 is keyed to shaft 101, extending across the carriage, (see specially Figs. 1 and 3,) and the opposite end of this shaft is journaled in the carriage at 102 and supports and drives a pinion 103, which is arranged so that a movable rack 104 can engage therewith. This rack 104 is supported by a pair of arms 105, which are in turn supported by the shaft 6, the friction-wheel 7 on the latter being controlled in its reciprocating movement by a forked or bifurcated arm 105^a, (see Figs. 1 and 3,) projecting from one of the arms 105, between which arm 105^a and a loop or eye 105^b, also forming part of arm 105, there projects a collar 105^c, fast on a sleeve 105^d, (the last two seen only in Fig. 1,) projecting from said friction-disk 9. A rock-shaft 106 is journaled under said arms 105 and has a handle 107 at one end by which it may be manually moved. A cam-like arm 108 projects from said rock-shaft 106, so that when the shaft is in the position indicated in Fig. 3 this cam-arm 108 holds the arms 105 and their rack 104 upward, so that the rack 104 and its pinion 103 mesh. When the shaft 106 is rocked, the cam-arm 108 allows the arms 105 and their rack to drop into the position shown in dotted lines, when the rack and pinion no longer touch each other. It is to be noted here that the cam-arm 108 is cut away at 109, so that the arms 105 may drop downward when they have moved the friction-wheel 7 near enough to the center of the friction-disk 9 to give the maximum speed to the head-stock spindle, and as the arms drop into said notches the rack 104 of course drops away from its pinion 103.

From the above it will be seen that as the carriage moves toward the cutters the pinion 103 causes the rack 104, its arms 105, and the friction-wheel 7 to move in the opposite direction, so as to transmit a higher speed to the head-stock spindle as the bolt carried thereby is reduced, and as soon as the arms 105 reach the notches or cut-away places 109 the arms descend and release the rack 104 from the pinion 103 and prevent further movement.

Although I have at various stages herein described the operation of various portions of the mechanism, it will probably be best to describe the operation of the machine as a whole. The operator first drives the separable or detachable spur 20 into the end of a bolt of wood, inserts the square shank of the spur into its socket 21, and secures the opposite end in the usual manner by running up the tail-spindle 44. The latch or handle 86 is next moved so as to move the friction-disks 74 and 75 (which have been running idle) until the disk 75 is in contact with the friction-wheel 76, which starts the carriage feed-screws 49 and 50 and rapidly moves the carriage, with its bolt of wood, toward the cutters or knives 23. Just as the carriage reaches the cutters the operator moves the handle 86 to its intermediate position, when the carriage stops, the friction-disks 74 and 75 now running idle again. The slow feed is now to be given to the carriage, and hence the operator raises the arm 59 so as to move the worm 54 in mesh with the worm-wheel 55, starting the feed-screws 49 and 50, and moving the carriage, with its bolt, slowly against the cutters or knives. When the carriage moves to the end of the stroke and the bolt is reduced to a core, the projection 66^a on the carriage strikes the stop-block 66, moving the long rod 65 and upright 60, so as to allow the worm 54 to drop out of gear with its worm-wheel 55, when the carriage immediately ceases to move. The operator now

moves the latch or handle 86 in a direction opposite to that before mentioned, so as to move the friction-disk 74 in contact with friction-wheel 76 and rapidly move the carriage back to its initial position, at which point the foot 91 acts on the part 92 and rocks the shaft so as to move the friction-wheels 74 to their inactive positions, when the carriage comes to rest, and the useless core can be removed from the carriage 45 and a new bolt inserted. The machine can now be operated as before, or if it is necessary to stop it temporarily or to leave it for any purpose the cam-lever 29 can be moved to release the pressure between the friction-disk 9 and its wheel 7, and the only parts of the machine left running will be the cutter-head, the shafts 6 and 69, and the gearing interposed between the said shafts.

It is manifest that many changes may be made in my machine, which is now shown only in its preferable embodiment, and I intend the following claims to cover all modifications that naturally fall within the scope of my invention.

What I claim as new is—

1. In a machine of the character described, a cutter-head, a carriage carrying head and tail stocks, a screw-shaft for advancing said carriage to and from said cutter-head, automatic means for operating said screw-shaft rapidly, and means for operating it relatively slower, substantially as described.

2. In a machine of the character described, a cutter-head, a carriage carrying head and tail stocks, a screw-shaft for advancing said carriage, a worm and worm-wheel near one end of said shaft for operating it, and means near the opposite end of said shaft for giving it a relatively high speed, substantially as described.

3. In a machine of the character described, a cutter-head, a carriage carrying head and tail stocks, a screw-shaft for advancing said carriage, a worm and worm-wheel near one end of said shaft, and friction-gearing near its other end, substantially as described.

4. In a machine of the character described, a cutter-head, a carriage for supporting the work, means for giving it a comparatively slow movement when the work is being done, and automatic means for shifting it rapidly in each direction, substantially as described.

5. In a machine of the character described, a cutter-head, a carriage for supporting the work, means for giving the carriage a comparatively slow motion, when the work is being done, automatic means for shifting it rapidly in each direction, and an automatic device for stopping it, substantially as described.

6. In a machine of the character described, a cutter-head, a carriage for supporting the work, a screw-shaft for advancing said carriage, a worm and worm-wheel for rotating said shaft, and means actuated by the carriage for separating said worm and worm-wheel, substantially as described.

7. In a machine of the character described, a carriage, a screw-shaft for moving it, a worm-wheel, a worm, a pivoted arm supporting said worm in mesh with said worm-wheel, and automatic means for releasing said pivoted arm and allowing the worm and its wheel to separate, substantially as described.

8. In a machine of the character described, a carriage, a screw-shaft for moving it, a worm-wheel on said shaft, a worm meshing therewith, a pivoted arm supporting said worm, an upright for holding said arm with the worm and its wheel in mesh, and means operated by the carriage for moving said upright and allowing the arm and worm to drop, substantially as described.

9. In a machine of the character described, a cutter-head, a carriage for supporting the work, means for giving motion to the carriage, a rock-shaft controlling said means, and means for rocking said shaft as the carriage nears the end of its movement to stop the carriage, substantially as described.

10. In a machine of the character described, a cutter-head, a carriage for supporting the work, means for giving motion to the carriage, a rock-shaft controlling said means, a quadrant, and a spring-actuated arm acting between said rock-shaft and quadrant, substantially as described.

11. In a machine of the character described, a cutter-head, a carriage for supporting the work, means for giving motion to the carriage, a rock-shaft controlling said means, a quadrant, a spring-actuated arm acting between the rock-shaft and quadrant for manually rocking said shaft, and means for automatically rocking said shaft by the movement of the carriage, substantially as described.

12. In a machine of the character described, a cutter-head, a carriage for supporting the work, means for giving motion to said carriage comprising a screw-shaft, friction-disk and shiftable friction-wheels, a shaft supporting said friction-wheels, a rock-shaft and means for rocking it, and gearing between said shafts whereby the rocking of the shaft shifts the friction-wheels and their shaft, substantially as described.

13. In a machine of the character described, a cutter-head, a carriage for supporting the work, means for giving the carriage movement comprising a screw-shaft, a longitudinally-movable shaft, and gearing between said shafts, a rock-shaft and means for rocking it, and a rack and segment between said rock-shaft and the longitudinally-moving shaft, whereby the rocking of the rock-shaft controls the said gearing, substantially as described.

14. In a machine of the character described, a head-stock spindle and its center, a wheel acting on the work, and mechanism driven by said spindle for positively rotating said wheel and thereby rotating the work independently of said center.

15. In a machine of the character described,

a head-stock spindle, a wheel acting on the work and adapted to rotate the same, and intermediate gearing between the head-stock spindle and said wheel for giving it motion, substantially as described.

16. In a machine of the character described, a head-stock spindle, a wheel acting on the work and adapted to rotate the same, and a train of gears between the head-stock spindle and said wheel for rotating the latter, the said wheel being spring-actuated so as to follow any irregularities of the work, substantially as described.

17. In a machine of the character described, a head-stock spindle, and a spring-actuated wheel driven from said spindle for acting against and rotating the work, substantially as described.

18. In a machine of the character described, a head-stock spindle, a spring-actuated wheel driven from said spindle for acting against and rotating the work, and means for holding said wheel away from the work, substantially as described.

19. In a machine of the character described, a head-stock spindle, a toothed wheel, a spring acting to press said toothed wheel into the work, and intermediate mechanism between the head-stock spindle and said wheel for driving the latter, substantially as described.

20. In a machine of the character described, a head-stock spindle, a toothed wheel acting to press against and rotate the work, a shaft carrying said wheel, a pivoted bearing-box for said shaft, and intermediate mechanism for driving said shaft and wheel, substantially as described.

21. In a machine of the character described, a frame, a carriage, changeable-speed gearing for giving the work rotary motion, a pinion operated from said carriage, a movable rack meshing with said pinion and arranged to be moved thereby, the movement of one of the elements of the changeable gearing being controlled by the movement of said rack, substantially as described.

22. In a machine of the character described, a frame, a carriage, changeable-speed gearing for giving the work rotary motion, a pinion operated from said carriage, a longitudinally-movable rack moved by said pinion, an arm projecting from said rack and controlling the movement of one of the elements of said changeable-speed gearing, whereby the rotary movement of the said pinion moves the rack and changes the speed of the work, substantially as described.

23. In a machine of the character described, a frame, a carriage, changeable-speed gearing for giving the work rotary movement, a pinion operated from said carriage, a rack moved longitudinally by said pinion, the movement of one of the elements of said speed-gearing controlled by the longitudinal movement of the rack, and means for putting said rack and pinion in and out of gear, substantially as described.

24. In a machine of the character described, a cutter-head, a carriage carrying head and tail stocks, mechanism controlled both manually and automatically for giving rapid movement to said carriage in each direction and means for moving the carriage relatively slower, substantially as described.

25. In a machine of the character described, a cutter-head, a carriage carrying head and tail stocks, a screw-shaft for advancing said carriage to and from said cutter-head, manual and automatic means for operating said screw-shaft rapidly and means for operating it relatively slower, substantially as described.

26. In a machine of the class described, a head-stock spindle and its center, a wheel acting on the end of the work for feeding the same, and mechanism for positively rotating said wheel and thereby rotating the work independently of said center, substantially as described.

27. In a machine of the class described, a head-stock spindle, a wheel for feeding the work, and mechanism for positively rotating said wheel and thereby rotating the work; the said wheel being conical or tapering whereby it continues to feed the work as the latter is reduced in size, substantially as described.

In testimony whereof I affix my signature, in the presence of two witnesses, this 21st day of June, 1901.

HORACE M. HOOVER.

Witnesses:

EDITH M. BURGE,

CANDACE LECKLIDER.