No. 608,213. Patented Aug. 2, 1898.

J. A. McHARDY.

RASP MACHINE.

(Application filed Oct. 4, 1897.)

(No Model.) 5 Sheets—Sheet 1.

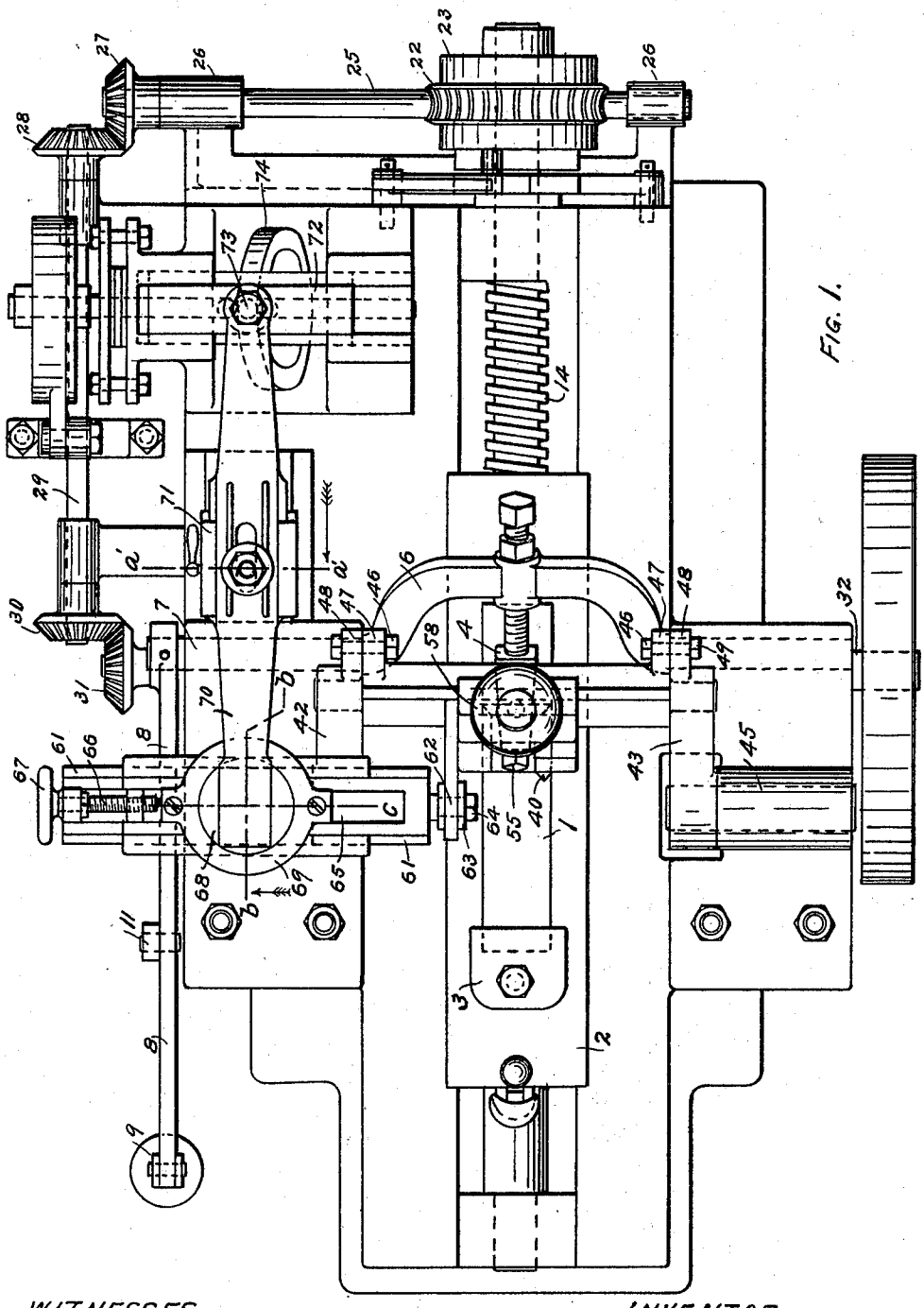

FIG. 1.

WITNESSES,
R. A. Bates
Ira L. Fish

INVENTOR,
James A. McHardy
BY Wilmarth H. Thurston
ATT'Y.

No. 608,213. Patented Aug. 2, 1898.

J. A. McHARDY.

RASP MACHINE.

(Application filed Oct. 4, 1897.)

(No Model.) 5 Sheets—Sheet 2.

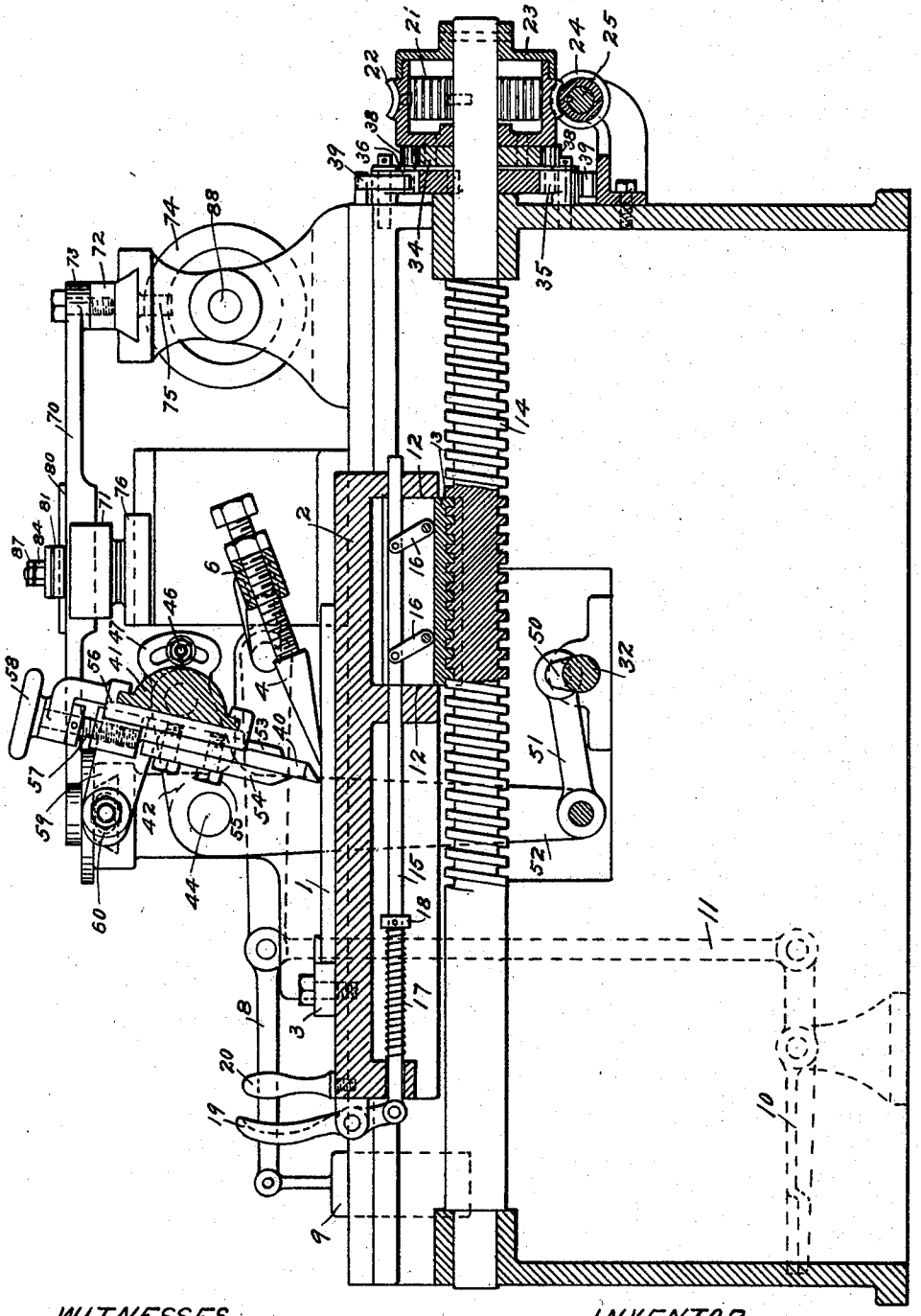

FIG. 2.

WITNESSES,

R. A. Bates

Ira L. Fish

INVENTOR,

James A. McHardy

By Wilmarth H. Thurston

ATT'Y.

No. 608,213. Patented Aug. 2, 1898.

J. A. McHARDY.

RASP MACHINE.

(Application filed Oct. 4, 1897.)

(No Model.) 5 Sheets—Sheet 3.

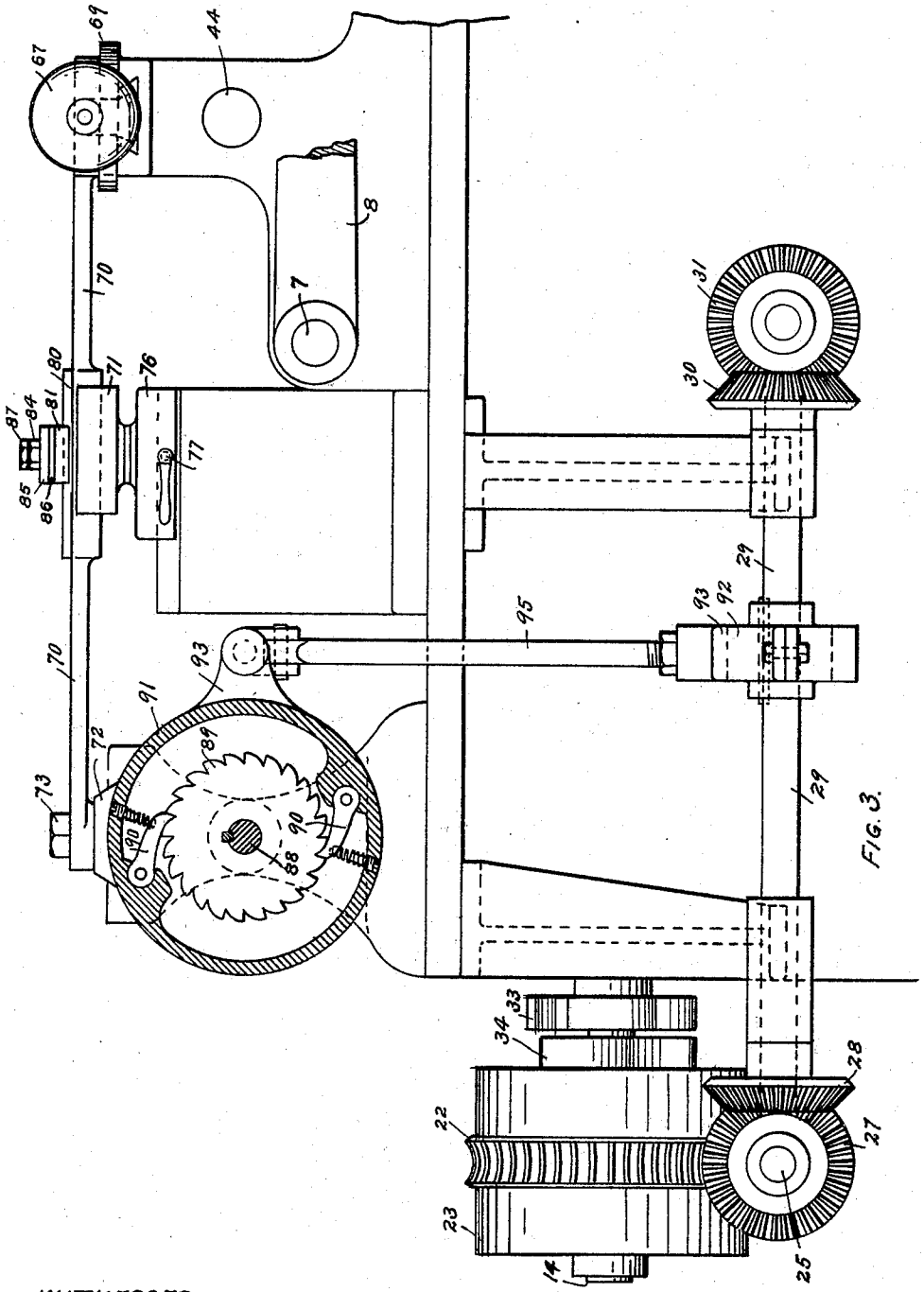

FIG. 3.

WITNESSES,

R. A. Bates

Ira L. Fish

INVENTOR,

James A. McHardy

By Wilmarth H. Shuster

ATT'Y.

No. 608,213. Patented Aug. 2, 1898.

J. A. McHARDY.

RASP MACHINE.

(Application filed Oct. 4, 1897.)

(No Model.) 5 Sheets—Sheet 4.

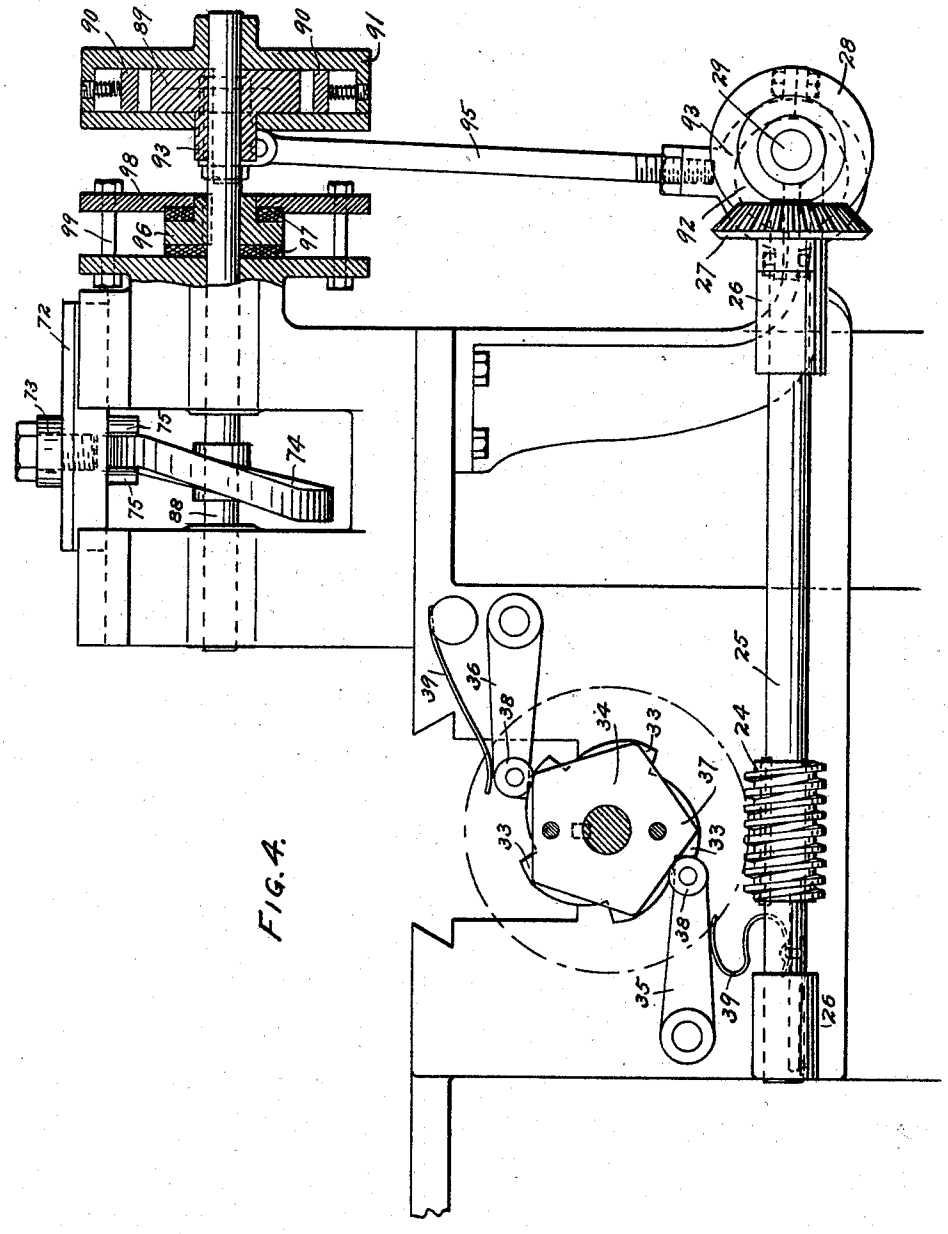

FIG. 4.

WITNESSES,

R. A. Bates

Iva L. Fish

INVENTOR,

James A. McHardy

By Wilmarth & Thurston
ATT'Y.

No. 608,213. Patented Aug. 2, 1898.

J. A. McHARDY.

RASP MACHINE.

(Application filed Oct. 4, 1897.)

(No Model.) 5 Sheets—Sheet 5.

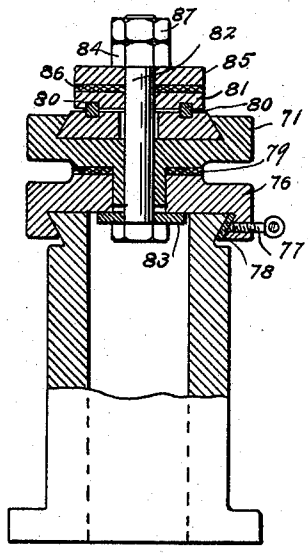

FIG. 5.

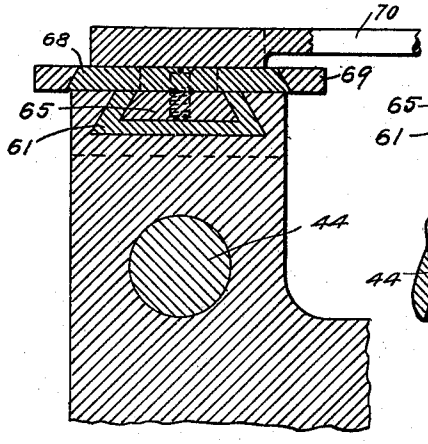

FIG. 6.

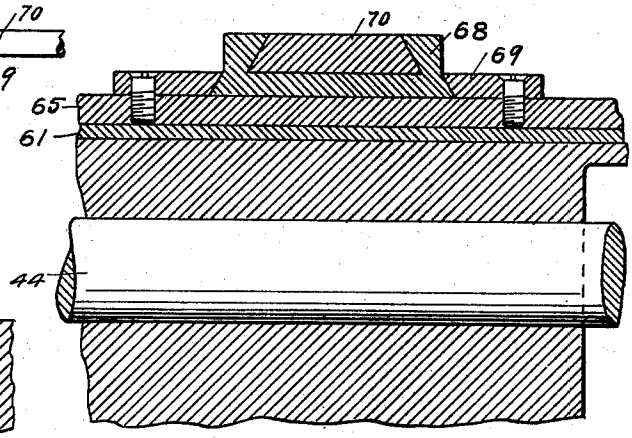

FIG. 7.

WITNESSES,

R. A. Bates

Ira L. Fish

INVENTOR,

James A. McHardy

By Wilmarth H. Thurston

ATT'Y.

UNITED STATES PATENT OFFICE.

JAMES A. McHARDY, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR TO THE NICHOLSON FILE COMPANY, OF SAME PLACE.

RASP-MACHINE.

SPECIFICATION forming part of Letters Patent No. 608,213, dated August 2, 1898.

Application filed October 4, 1897. Serial No. 653,962. (No model.)

To all whom it may concern:

Be it known that I, JAMES A. McHARDY, a subject of the Queen of Great Britain, residing in the city and county of Providence, in the State of Rhode Island, have invented certain new and useful Improvements in Rasp-Machines; and I do hereby declare the following specification, taken in connection with the accompanying drawings, forming a part of the same, to be a full, clear, and exact description thereof.

The present invention relates to rasp-cutting machines, and has for its object the production of a machine of the above class which shall be simple in construction and which may be run at a high rate of speed.

The machine shown in the drawings to illustrate one embodiment of the present improvements comprises a carriage for supporting the rasp-blank, which is fed a step forward after the completion of each row of rasp-teeth, and a head upon which the cutting-tool is mounted and which is moved back and forth to force the cutter into the blank and lift up the metal to form a tooth, the cutter being moved laterally after each downward movement.

The cutter is rigidly secured to the head and is moved through a definite path in each downward movement, so that the cutter enters the blank in the same manner and to the same extent whatever the variation in the character of the metal of the blank, and the teeth are therefore uniform in size and shape. With this manner of mounting the cutter upon the head it has been found that in order for the cutter to act in the most efficient manner said cutter should enter the blank at a certain angle and that this angle varies somewhat with the character of the metal operated upon, and one feature of the present invention therefore consists in so securing the head upon its support that it may be adjusted to vary the angle at which the tool enters the blank.

A further feature of invention relates to the construction and arrangement of the head with relation to its support, so that the operator may readily see the action of the cutter upon the blank, and thus be able to conveniently and accurately regulate the action of the cutter and produce a more perfect rasp at a higher rate of speed.

The blank-carriage is fed quickly forward after the completion of each row of teeth by means of a screw-threaded shaft, which is revolved intermittently by means of a mechanism which in itself forms a feature of invention, which feature is not limited in its application to use in connection with rasp machinery, but may be used in other relations. By this mechanism the shaft is revolved by a spring which is being energized while the shaft remains stationary and which is released at the proper time and instantly revolves the shaft a step forward and is then again restrained until the next forward movement of the shaft is to take place.

A further feature of invention relates to the mechanism for giving the cutter-carriage a tranverse movement on the head, and consists of certain combinations which will be hereinafter set forth in the claims.

The invention also includes certain further features and combinations set forth in the claims.

In the drawings, Figure 1 is a plan view of a machine embodying the features of the present invention in their preferred form. Fig. 2 is a longitudinal sectional view. Fig. 3 is a partial side elevation showing the gearing for driving the cam for operating the cutter-carriage and the gearing for energizing the spring for feeding the blank-carriage. Fig. 4 is a partial end elevation showing the same gearing. Fig. 5 is a sectional detail on line *a a*, Fig. 1. Fig. 6 is a detail sectional view on line *b b*, Fig. 1; and Fig. 7 is a detail sectional view on line *c*, Fig. 1.

Referring to the drawings, the rasp-blank 1 is carried by a carriage 2, guided in suitable ways in the frame of the machine, said blank being held in place by a clamp 3 and a presser-foot 4. The presser-foot is secured to a yoke 6, the pivot 7 of which extends outside the frame and has a lever 8 secured thereto, a weight 9 being secured to said lever to hold the presser-foot against the blank. The lever 8 may be rocked to lift the presser-foot for the removal and insertion of the blanks by a treadle 10, connected to the lever

8 by a link 11. The carriage 2 is provided with guides 12, between which is mounted a nut 13, which is engaged by screw-threads formed on the shaft 14. A rod 15 extends beyond the end of the carriage 2 and is connected to the nut 13 by links 16. The rod 15 is pressed inward to hold the nut in engagement with the shaft 14 by a spring 17, which engages the end of the carriage and a collar 18 on said shaft. A lever 19 is connected to the end of the said rod, and by operating said lever the nut may be moved out of engagement with the shaft 14, so that the carriage 2 may be moved on its ways as desired to bring the blank into proper relation to the cutter or to draw back the carriage for the purpose of removing a finished rasp and inserting a new blank. A handle 20 is secured to the carriage for moving it, and the lever 19 is preferably located adjacent said handle, so that the operator may grasp both the handle and lever, and thus manipulate the nut and carriage with one hand.

The shaft 14 is revolved to advance the carriage 2 after the completion of each row of teeth by means of a spring which is restrained and energized during the formation of a row of teeth and is then released and acts to instantly feed the carriage a step forward. The preferred manner of arranging the spring and the preferred form of the energizing and the restraining and releasing mechanisms is as follows: A coiled spring 21 has one end secured to the shaft 14 and the other secured to a rotary member in the form of a worm-gear 22, loosely mounted on the shaft 14. The gear 22 is preferably dished, as shown, and the spring is mounted in the recess thus formed and is protected by a cap 23, secured to the shaft 14 and having a flange overlying a flange on the gear 22. The gear 22 is continuously driven by a worm 24 on the shaft 25, mounted in bearings 26 at the end of the machine and having a gear 27 secured thereto. The gear 27 is engaged by a gear 28 on a shaft 29, which has a gear 30 secured thereto, which is engaged by a gear 31 on the end of the driving-shaft 32. A series of ratchet-teeth 33 are connected with the shaft 14 preferably by being formed on a ratchet-wheel 34, secured to said shaft, and two pawls 35 and 36 are arranged to alternately engage the ratchet-teeth 33, the arrangement being such that when pawl 35 is in engagement with one of said teeth the pawl 36 will rest upon the wheel half-way between two adjacent teeth. A series of cams 37, equal in number to the teeth on the ratchet-wheel, are secured to the gear 22 and engage rolls 38 on the pawls 35 and 36 and move said pawls alternately to release the spring 21. Springs 39 bear against pawls 35 and 36 and force them against the ratchet-wheel. Supposing the parts to be in the position shown in Fig. 4, the pawl 35 holds the shaft 14 against rotation while the gear 22 is revolving, thus energizing the spring 21, the pawl 36 resting half-way between two of the teeth 33. As the gear 22 revolves one of the cams 37 lifts the pawl 35 out of engagement with the ratchet-tooth, thus releasing the spring 21, which suddenly advances the shaft 14 until a tooth 33 strikes the pawl 36, when said pawl acts to restrain the spring 21, the pawl 35 resting half-way between two teeth. The spring is now again energized by the rotation of the gear 22 until one of the cams 37 disengages pawl 36, when the shaft 14 is again suddenly advanced until arrested by the pawl 35.

While the above construction is preferably used, it will be understood that the invention is not limited to such construction, but that the spring may be otherwise connected to the shaft either directly or indirectly, or that other forms of rotary members may be used instead of a shaft and that other means may be used for energizing said spring, or other means may be used for restraining and releasing said spring, without departing from the spirit of the present invention.

The cutter 40 is mounted upon a head 41, which is adjustably secured to a support formed by two arms 42 and 43, pivoted on studs 44 and 45, secured in the frame. The studs 44 and 45 are in line with each other, and the head extends between said arms substantially parallel to the axes of said pivots. The head 41 is pivoted to the arms 42 and 43, so that said head may be adjusted on its pivots to vary the angle at which the cutter 40 enters the blank 1. The head is secured in its adjusted position by means of bolts 46, which pass through slotted ears 47, formed on the head, and ears 48, formed on the arms 43 and 44, and are engaged by nuts 49, said bolts and nuts serving to clamp the head to the arms. The support is oscillated about its axis by means of cranks 50, (one only of which is shown,) formed on the driving-shaft 32 and connected by links 51 to arms 52, depending from the arms 42 and 43 and preferably formed integral therewith, said arms 42 and 43 and arms 52 forming in effect two bell-crank levers, between which the head 41 is carried. While it is preferred to use two arms 42 and 43, and thus support the head 41 at both sides, it will be understood that one of said arms might be omitted without departing from the present invention, and it will also be understood that when two arms are used one of the depending arms 52 may be omitted and the support rocked about its pivot by a single crank. By thus mounting the cutter upon a head extending from the support substantially parallel to its axis the operator has an unobstructed view of the cutter as it acts on the blank and can regulate its action with convenience and accuracy, and by operating the support by depending arms there is nothing above the head to cut off the light from the cutter or to interfere with the ready access to the devices for regulating the action of the cutter. In the machine shown the cut-

ter is rigidly mounted upon the head, and the axis of the head is so arranged with relation to the blank-carriage that the point of the cutter is carried downward and with an inward sweep toward a plain through the axis of the cutter perpendicular to the blank-carriage, and in order that said cutter may enter the blank smoothly and without producing any pressure upon the back of the tool the rear face of the cutter is so formed that it lies in or within the arc described by its point.

The cutter is secured in a slide 53 by means of a clamp 54, held in place by bolts 55. The slide 53 is guided in a carriage 56 and may be adjusted to vary the depth to which the cutter enters the blank by means of a screw-rod 57, provided with a hand-wheel 58. The cutter-carriage 56 is guided on ways formed on the head 41 and is given a step-by-step movement back and forth upon said head by the following mechanism: The carriage 56 is provided with an arm 59, in which is formed a slot 60, (shown in dotted lines, Fig. 2,) concentric with the axis of the head. A stud or pin 62, projecting from the end of a slide 61, extends through said slot, and said arm is held in place on said pin by a washer 63 and nut 64. The slide 61 is guided in suitable ways in the frame and is provided with guides, in which is mounted a second slide 65, which is connected to slide 61 by means of a screw-rod 66, passing through a lug on slide 61 and engaging a lug on slide 65 and provided with a hand-wheel 67. A pivot-plate 68 is mounted on the slide 65, being held in place by a disk 69. The plate 68 is provided with a groove in its upper face in which the end of a lever 70 slides. The lever 70 passes through a second pivot-plate 71, adjustably secured to the frame, and is connected to a slide 72 by a pivot 73. The slide 72 is mounted in guides on the frame and is acted on by a cam 74, which engages pins 75 on said slide. The pivot-plate 71 is pivoted to a carriage 76, mounted on ways formed on the frame and held in place by a screw 77, which engages the gib 78. By adjusting the carriage 76 the pivot about which the lever 70 oscillates may be shifted with relation to the slides 61 and 72 and the distance that the tool is moved transversely by the cam 74 regulated. A friction-washer 79 is interposed between the plate 71 and the carriage 76 to steady the movement of the lever 70 on the pivot. The lever 70 is provided with ribs 80, secured in its upper face, which are engaged by grooves in a disk or washer 81. A bolt 82 passes through the disk 81, a slot in the lever 70, plate 71, and carriage 76, and the head of said bolt engages a washer 83, which bears against the carriage 76. The upper end of the bolt carries a nut 84, which engages a washer 85, overlying washer 81 and separated therefrom by a yielding washer 86. By adjusting the nut 84 the friction between the plate 71 and the carriage 76 and between the lever 70 and the disk 81 may be adjusted, so that a steady and accurate movement will be imparted to the lever 70 and through it to the carriage 56. A lock-nut 87 holds the nut 86 in its adjusted position. By connecting the lever so that it has a sliding connection with two of its pivots, as above described, or in any other suitable manner, the amount of motion imparted to the carriage 56 by successive movements of the slide 72 will be in the same ratio as that between the successive movements of the slide 72, and by so constructing the cam 74 that it shall move the slide 72 equal distances each time the cam is advanced the teeth may be equally spaced across the rasp-blank. An adjustment of the pivot about which the lever fulcrums will not effect this equal spacing, although it will effect the distance between the teeth. While it is preferred to provide the sliding connections between the pivots on the slide connected to the carriage and the fulcrum-pivot, it will be understood that the same result may be effected by providing the sliding connections between any two of the pivots.

The cam 74 is secured to a shaft 88, which is suitably journaled in the frame and has a ratchet-wheel 89 secured to its outer end. The wheel 89 is engaged by two spring-pressed pawls 90, which are pivoted within a drum 91, surrounding the wheel 89, and pivoted on the shaft 88. The drum is rocked to give the cam 74 a step-by-step movement by means of an eccentric 92, secured to shaft 29, which is engaged by an eccentric-strap 93, connected to an arm 94 on said drum by a rod 95. A friction-disk 96 is secured to the shaft 88 and is engaged upon opposite sides by two friction-washers 97, one of which is interposed between said disk and the frame and the other between said disk and a disk 98. The disk 98 is secured to the frame by bolts 99, and by adjusting said bolts the friction upon the disk 96 may be adjusted so that the cam 74 will be given a steady and accurate movement.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a rasp-machine, the combination of a pivoted support, a head rigidly mounted on said support, means for mounting a cutter upon said head, and means whereby said head may be adjusted on said support to vary the angle at which the cutter enters the blank, substantially as described.

2. In a rasp-machine, the combination of a pivoted support, a head adjustably pivoted on said support, means for mounting a cutter on said head, and means for securing said head in its adjusted position on said support, substantially as described.

3. In a rasp-machine, the combination with a pivoted support, of a head pivoted on said support and provided with a slotted ear, a bolt passing through said slotted ear for securing said head to said support, and means

for mounting a cutter on said head, substantially as described.

4. In a rasp-machine, the combination with a pivoted support, of a head pivoted on said support, means for securing said head to said support, a cutter-carriage mounted on said head, and means for moving said carriage on said head, substantially as described.

5. In a rasp-machine, the combination with two arms having their pivots in line, of a head pivoted between said arms, means for securing said head to said arms, means for mounting a cutter on said head, and means for rocking said arms on their pivots, substantially as described.

6. In a rasp-machine, the combination with two arms having their pivots in line, of a head connecting said arms, a cutter-carriage mounted on said head, means for moving said carriage on said head, and means for rocking said arms, substantially as described.

7. In a rasp-machine, the combination with a pivoted support, a head rigidly secured thereto and extending laterally therefrom substantially parallel to the axis of said support, and means for mounting a cutter upon said head, substantially as described.

8. In a rasp-machine, the combination with a pivoted support, a head extending therefrom substantially parallel to the axis of said support, a cutter-carriage mounted on said head and means for moving said carriage laterally on said head, substantially as described.

9. In a rasp-machine, the combination with a pivoted support, a head rigidly secured thereto and extending therefrom substantially parallel to the axis of said support, means for mounting a cutter on said head, one or more arms depending from said support, and means for oscillating said arm or arms, substantially as described.

10. In a rasp-machine, the combination with a lever and means for rocking said lever on its pivot, of a head rigidly secured thereto and extending from said lever substantially parallel to its axis, and means for mounting a cutter on said head, substantially as described.

11. In a rasp-machine, the combination with two pivoted arms having their pivots in line, and means for rocking said arms on their pivots, of a head connecting said arms, and means for mounting a cutter on said head, substantially as described.

12. The combination with two rotary members, of a spring connecting said members, means for rotating one of said members, and means for restraining and releasing the other member, substantially as described.

13. The combination with a rotary member, of a spring for rotating said member, automatic mechanism for energizing said spring, and means for restraining and releasing said spring, substantially as described.

14. The combination with a rotary member, of a spring connected to rotate said member, automatic mechanism for energizing said spring, and means for restraining and releasing said shaft, substantially as described.

15. The combination with two rotary members, of a spring connecting said members, means for continuously rotating one of said members, and means for restraining and releasing the other member, substantially as described.

16. The combination with two rotary members, of a spring connecting said members, means for rotating one of said members, ratchet-teeth connected with the other member, pawls for alternately engaging said teeth, and means for alternately operating said pawls, substantially as described.

17. The combination with two rotary members, of a spring connecting said members, means for rotating one of said members, ratchet-teeth connected with the other member, two pawls one of which engages a tooth when the other is half-way between two teeth, and means for operating said pawls, substantially as described.

18. The combination with two rotary members, of a spring connecting said members, a ratchet-wheel secured to one of said members, pawls arranged to alternately engage the teeth of said ratchet-wheel, and cams carried by the other member for operating said pawls, substantially as described.

19. The combination with a shaft, of a gear on said shaft, a spring connecting said gear and shaft, a ratchet-wheel secured to said shaft, two pawls one of which engages a tooth when the other is half-way between two teeth, and a series of cams secured to said gear for engaging said pawls, substantially as described.

20. The combination with a carriage, of a shaft for feeding the same, a spring for rotating said shaft, mechanism for energizing said spring, and means for restraining and releasing said spring, substantially as described.

21. The combination with a carriage, of a shaft for feeding the same, a rotary member, a spring connecting said shaft, and member, mechanism for rotating said member, and means for restraining and releasing said shaft, substantially as described.

22. The combination with a carriage, of a nut on said carriage, a shaft provided with a screw-thread engaging said nut, a spring for rotating said shaft, mechanism for energizing said spring, and means for restraining and releasing said spring, substantially as described.

23. The combination with a carriage, of a shaft for feeding the same, rotary member, a spring connecting said shaft and member, means for rotating said member, a ratchet-wheel on said shaft, pawls for alternately engaging the teeth of said wheel, and means for operating said pawls, substantially as described.

24. In a rasp-machine, the combination with a head, of a cutter-carriage mounted thereon, a slide connected with said carriage, a lever, a pivot connecting said slide and lever, a pivot for said lever, a second slide, a pivot connecting said slide and lever, means for reciprocating said second slide, and a sliding connection between said lever and two of said pivots, substantially as described.

25. In a rasp-machine, the combination with a head, of a cutter-carriage mounted thereon, a slide connected with said carriage, a lever, a pivot connecting said slide and lever, an adjustable pivot for said lever, a second slide, a pivot connecting said slide and lever, means for reciprocating said second slide, and a sliding connection between said lever and two of said pivots, substantially as described.

26. In a rasp-machine, the combination with a head, of a cutter-carriage mounted thereon, a slide connected with said carriage, a lever, a pivot connecting said slide and lever, a pivot for said lever, a second slide, a pivot connecting said slide and lever, a cam for operating said second slide and a sliding connection between said lever and two of said pivots, substantially as described.

27. In a rasp-machine the combination with a head, of a cutter-carriage mounted thereon, a slide connected to said carriage, a pivot on said slide, a lever having a sliding connection with said pivot, an adjustable pivot with which said lever has a sliding connection, a second slide to which said lever is pivoted, and a cam for operating said second slide, substantially as described.

28. In a rasp-machine, the combination with a head, of a cutter-carriage mounted thereon, a slide connected to said carriage, a second slide mounted on said former slide, means for adjusting said slides with relation to each other, and means connected to said second slide for reciprocating said slides, substantially as described.

29. In a rasp-machine, the combination with a head, a cutter rigidly mounted on said head, means for operating said head to carry the point of the cutter through a definite path, a support on which said head is mounted, and means whereby said head may be adjusted on said support to vary the angle at which the cutter enters the blank, substantially as described.

30. In a rasp-machine, the combination with a cutter, of a head on which said cutter is mounted, a pivot for said head so arranged that the point of the cutter is carried downward and with an inward sweep toward a plane passing through said pivot perpendicular to the blank, means for oscillating said head, and means for adjusting said cutter on said head to vary the depth to which the cutter enters the blank, substantially as described.

JAMES A. McHARDY.

Witnesses:
IRA L. FISH,
R. A. BATES.