(No Model.) 2 Sheets—Sheet 1.

C. H. DOUGLAS.

MACHINE FOR MAKING BLANKS FOR CHAIN CUTTER TEETH.

No. 383,347. Patented May 22, 1888.

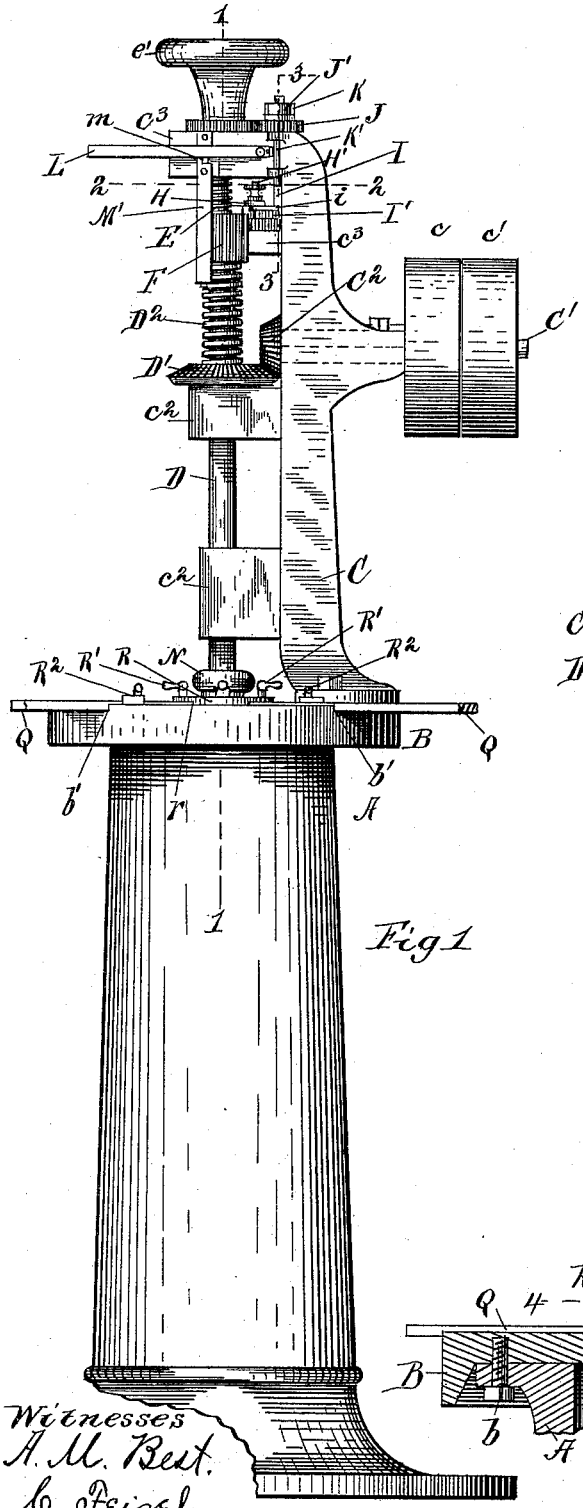

Fig 1

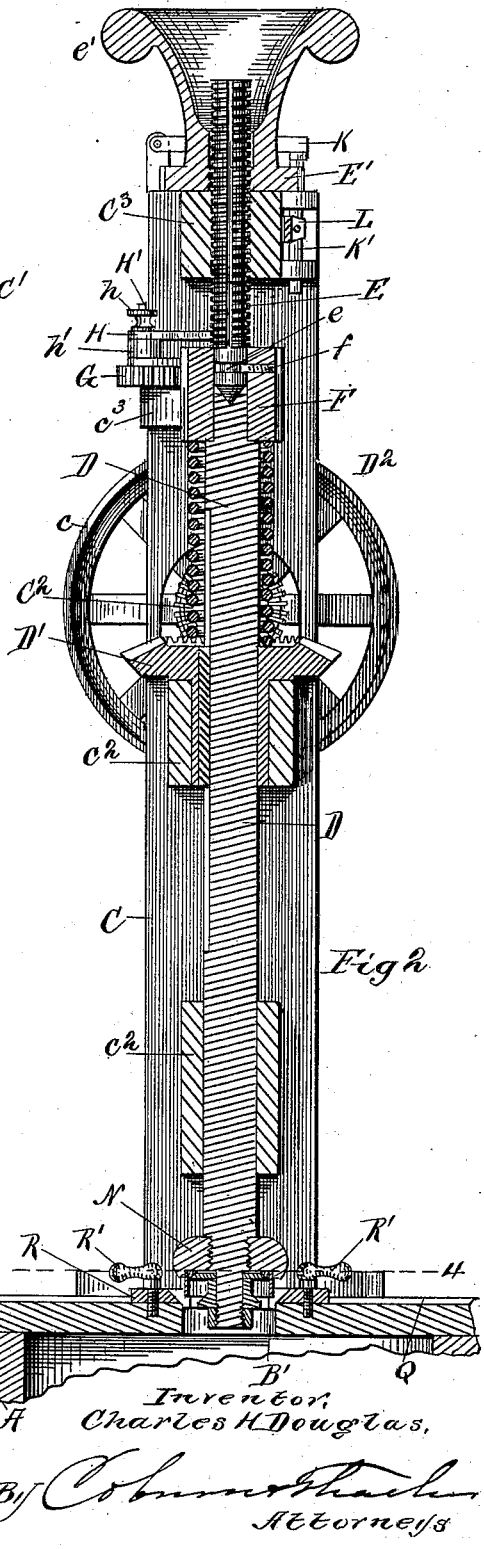

Fig 2

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(No Model.) 2 Sheets—Sheet 2.

C. H. DOUGLAS.

MACHINE FOR MAKING BLANKS FOR CHAIN CUTTER TEETH.

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Fig 3

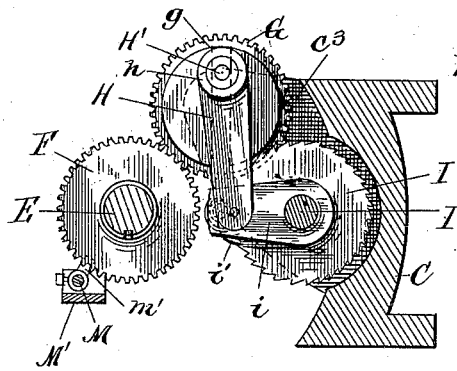

Fig 4

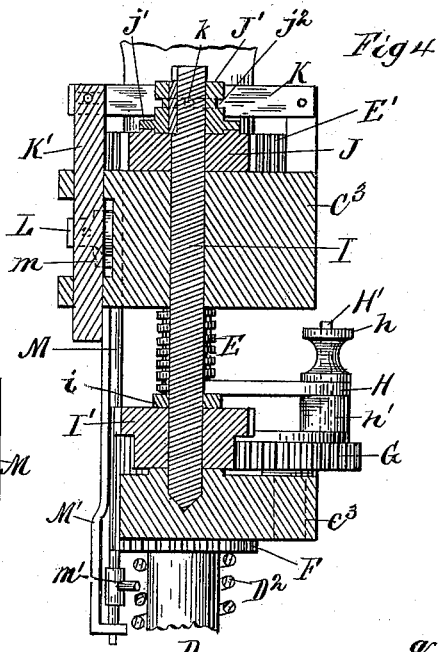

Fig 5

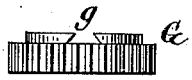

Fig 6

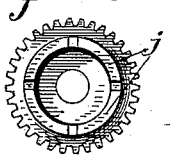

Fig 7

Fig 8

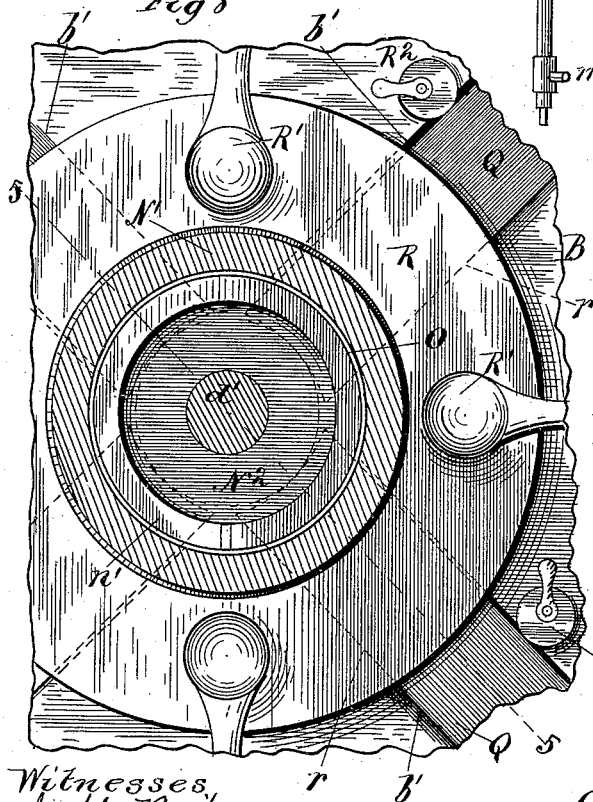

Fig 9

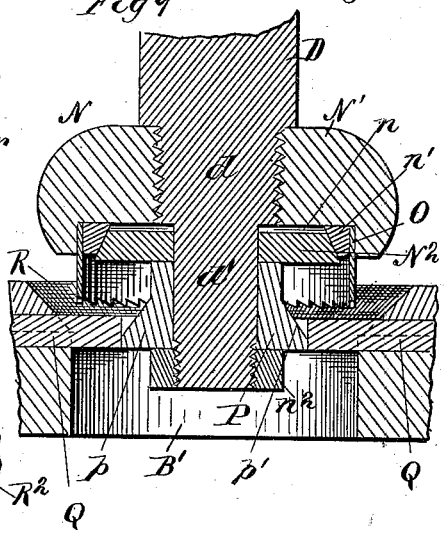

Fig 10

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UNITED STATES PATENT OFFICE.

CHARLES H. DOUGLAS, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO CHARLES S. BAKER, OF SAME PLACE.

MACHINE FOR MAKING BLANKS FOR CHAIN-CUTTER TEETH.

SPECIFICATION forming part of Letters Patent No. 383,347, dated May 22, 1888.

Application filed October 15, 1887. Serial No. 252,501. (No model.)

To all whom it may concern:

Be it known that I, CHARLES H. DOUGLAS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Machines for Cutting Blanks for Chain-Cutter Teeth, which is fully set forth in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of a machine embodying my invention; Fig. 2, a sectional view of the same, taken on the line 1 1 of Fig. 1; Fig. 3, a detail plan section taken on the line 2 2 of Fig. 1; Fig. 4, a detail sectional view taken on the line 3 3 of Fig. 1; Fig. 5, a detail view of one of the gear-wheels; Fig. 6, a detail plan view of the clutch-pinion; Fig. 7, a detail view of the clutch-operating rock-shaft detached; Fig. 8, a detail plan section taken on the line 4 4 of Fig. 2; Fig. 9, a detail sectional view taken on the line 5 5 of Fig. 8, and Fig. 10 a detail view of one of the blanks produced by the machine. Fig. 1 is on a scale about one-quarter of the full size. Figs. 2 to 7, inclusive, are on a scale twice as great as that of Fig. 1; and Figs. 8, 9, and 10 are on a scale four times as large as Fig. 1, the parts being shown full size.

Like letters refer to like parts in all the figures of the drawings.

My invention relates to machines for cutting blanks for the teeth of chain-cutters.

In an application filed by me March 17, 1884, Serial No. 125,645, I have set forth an endless chain-cutter for mortising-machines of my invention; and the object of my present invention is to provide a machine whereby blanks may be produced, from which blanks the teeth composing the endless chain-cutter set forth in the said prior application may be readily constructed.

To this end my invention consists in certain novel features, which I will now proceed to describe, and will then more particularly point out in the claims.

In the drawings, A represents a suitable base, upon which is mounted a work-holding table, B. This work-holding table is removable from the base A, for the purposes hereinafter described, being secured to the table by means of screw-bolts *b*, or in any other suitable manner.

C represents a standard mounted on the table B and extending upward therefrom, said standard being provided with suitable bearings to receive a shaft, C′, provided with fast and loose pulleys *c* and *c′*, by means of which it may be driven from any suitable source of power. At its front end the shaft C′ is provided with a bevel-pinion, C^2.

D represents a mandrel mounted in suitable bearings, c^2, on the standard C and vertically movable therein. Within the upper bearing, c^2, is mounted a bevel-pinion, D′, which meshes with the bevel-pinion C^2 on the shaft C. The bevel-pinion D′ is held in its bearing in any suitable manner, so as to prevent longitudinal movement thereof, and is splined upon the mandrel D, so as to cause the said mandrel to rotate along with the said bevel-pinion, while at the same time the mandrel is free to move vertically within the same.

In order to feed the mandrel D, I employ a screw, E, extending through a suitably-threaded aperture in the arm C^3 of the standard C, and provided with means by which the said screw may be fed up or down, as desired, and the lower end of this feed-screw is swiveled to the upper end of the mandrel to cause it to move vertically along with the said screw, while at the same time it is permitted to rotate independently thereof. This swiveled connection is shown in the present instance as effected in the following manner: An elongated pinion, F, is secured on the upper end of the mandrel D and receives the lower unthreaded end of the feed-screw E, which extends into the bore of the said pinion and is grooved circumferentially, as shown at *e*, to receive a pin, *f*, passing through the pinion into the said groove. Any other approved form of swivel-connection may be substituted for that shown.

D^2 represents a spring coiled around the mandrel D and bearing with its lower end against the pinion D′, or any other suitable fixed abutment, while its upper end bears against the under side of the pinion F, or against any other suitable abutment on the mandrel D. This spring serves to thrust the

mandrel D upward, so as to prevent any lost motion between the said mandrel and the feed-screw E which might exist in the swivel-joint connecting the two.

In order to provide an automatic power-feed for the mandrel D, I have devised the following mechanism: The elongated pinion F, carried by the mandrel D, meshes with a pinion, G, mounted on a suitable support, c^3, on the standard C. This pinion has adjustably connected to it a pitman, H, the connection being preferably effected in the manner shown, in which a transverse dovetailed groove, *g*, is formed in the top of the pinion G to receive the correspondingly-shaped head of the pivot-bolt H′ of the pitman H. A nut, *h*, on the projecting upper end of the pivot-bolt H′ serves to clamp the parts in position after adjustment, and a washer or block, *h*′, is interposed, if necessary, between the pitman H and the top pinion, G. It will readily be seen that by this means the pivot of the pitman H may be located at any desired distance from the center of the pinion G, so as to vary the throw of the said pitman H, and thereby regulate the feed.

I represents a vertical shaft mounted in suitable bearings in the support c^3 and in the arm C^3 of the standard C. The shaft has rigidly attached to it, near its lower end, a ratchet-wheel, I′, and above this wheel is a vibrating arm or lever, *i*, mounted loosely on the shaft I, and having connected to it, near its outer end, the end of the pitman H. Upon this vibrating arm is mounted a spring-pawl, *i*′, adapted to engage with the teeth on the ratchet-wheel I′, to actuate the same and thereby impart an intermittent or step-by-step rotary motion to the shaft I.

J represents a clutch-pinion mounted loosely on the shaft I above the arm C^3, and meshing with a corresponding pinion, E′, which is splined on the feed-screw E, and is thus adapted to impart a rotary motion to the said feed-screw. The pinion E′ is preferably provided with a hand-grasp, *e*′, by means of which it may be operated by hand when desired. The pinion J is, as hereinbefore stated, mounted loosely upon the shaft I, but is adapted to be connected thereto by means of a suitable clutch, J′, splined on the shaft, the said pinion being provided on its upper surface with a suitably notched or recessed flange, *j*, with which corresponding pins, *j*′, on the clutch J′ may be caused to engage, and thereby connect the said pinion to the shaft J. The clutch J′ is carried by a lever, K, provided with pins *k* to engage with a groove, j^2, in the hub of the clutch, so that the lever K may move the said clutch vertically upon the shaft I, while at the same time the clutch is left free to rotate.

K′ represents a vertically-sliding piece mounted in suitable bearings in the arm C^3 and connected at its upper end to the lever K.

L represents a lever pivoted on the arm C^3 and connected to the sliding piece K′ near its pivot, the main portion of said lever extending forward within reach of the operator and serving as a means for connecting and disconnecting the clutch J′ and pinion J. The portion of the lever L in front of its pivot is of sufficient length to normally thrust the sliding piece K′ upward and thereby hold the clutch and pinion normally in their disengaged position.

In order to provide an automatic stop for the feed, I employ a vertical rock-shaft, M, mounted in a suitable support, M′, attached to the arm C^3. This rock-shaft is provided at its upper end with a pin, *m*, which, when the rock-shaft is in the position shown in the drawings, extends under the lever L and supports the same in a raised position. At its lower end the rock-shaft M is provided with a pin, *m*′, preferably adjustable and so arranged that as the pinion F on the mandrel D is carried downward by the feed screw it will, when it comes in contact with the said pin, engage with the same and turn the rock-shaft sufficiently to disengage the pin *m* from underneath the lever L, thereby allowing said lever to drop and disconnecting the clutch mechanism to stop the feed. It will thus be seen that when this device is used the power-feed may be automatically stopped at the desired point.

At its lower end the mandrel D is provided with a reduced threaded portion, *d*, and below this it is further provided with an extension, *d*′, of a further reduced diameter and also threaded at its extremity. Upon this lower end of the mandrel is mounted a suitable chuck, N, preferably constructed as follows: A body portion, N′, is screwed upon the threaded portion *d* of the mandrel D, and is provided on its under face with a circular recess, *n*, to receive the cutting tool. This latter consists of a tubular cutter or saw, O, fitting within the recess *n* and provided with suitable cutting-teeth upon its lower edge. A split ring, *n*′, is arranged within the recess *n* to bear against the cutter O, and has its inner surface beveled, as shown in Fig. 9 of the drawings. A correspondingly-beveled disk, N^2, is mounted upon the portion *d*′ of the mandrel D, and serves when forced upward to spread the split ring *n*′ and force the same against the cutter O, thus holding this latter firmly against the wall of the recess *n* in the body N′ of the chuck. This beveled disk N^2 is operated by means of a nut, n^2, on the lower threaded end of the part *d*′ of the mandrel D, said nut serving through its pressure on the intermediate gage-piece, P, mounted loosely on the part *d*′ between the said nut and disk, to force the disk N^2 upward to clamp the cutter.

The gage-piece P consists of a cylindrical body provided at its lower end with an enlarged disk-shaped portion, *p*, which serves, in the manner hereinafter described, as a stop for the bars from which the blanks are cut and determines, in conjunction with the cutter O, the width of the blanks. The upper portion of this gage-piece is of less diameter than the lower portion, *p*, being connected thereto by

an inclined portion, p', the object of this construction being to prevent the blanks when cut from clogging between the cutter and gage.

The work-holding table B is constructed in the following manner: A series of grooves, b', is formed therein, the said grooves being arranged radially to a central aperture, B', in the table and being also radial to the axis of the mandrel D and cutter O. Any desired number of these grooves may be employed, and in the present instance I have shown four; but it is obvious, of course, that more or less than this number may be used. These grooves are of a width slightly greater than that of the bars Q from which the blank is to be cut and of a depth about equal to one half the thickness of the said bars. Surrounding the central aperture, B', in the table B is a cap-piece, R, provided with grooves r corresponding to the grooves b' in the table B, and forming, in conjunction with the said grooves, apertures through which the bars Q pass.

The cap-piece R is connected to the table B by means of screws R', which serve to clamp the cap upon the bars after these latter have been adjusted into proper position. In order to secure the bars Q accurately in the grooves b' in a position radial to the cutter, I employ clamping devices consisting of cams R^2, pivoted upon the table B adjacent to one side of the grooves b' therein, and serving to clamp each bar against the opposite wall of the groove within which it rests. These cams are so arranged as to clamp the bars against that side of the grooves toward which the cutter moves while operating upon the bars, so that when clamped in position the cutter will not tend to disarrange the bars.

The operation of the machine is as follows: The bars Q are first placed upon the table and a preliminary cut made upon their inner ends to form the same to the arc of a circle corresponding to the curvature of the saw or cutter. The operation of cutting the blanks then proceeds regularly, as follows: The bars Q, resting in the grooves b', are moved inward until their ends come in contact with the gage-piece P, the cap R having been previously loosened and the cams R^2 thrown open in order to permit this movement of the bars. The bars being thus in position, they are clamped against the sides of the grooves b' by means of the cams R^2, and are further held firmly in position to prevent any vertical movement by tightening the cap R. The machine is then caused to feed downward by raising the lever L and resting the same upon the pin m of the rock-shaft M, thereby causing the clutch J' to engage with the pinion J, and imparting a rotary movement to the feed-screw E through the mechanism hereinbefore described. As the mandrel D is fed downward, it is revolved by means of the bevel-pinions C^2 and D', and the tubular cutter or saw O cuts from each bar Q a blank, q, having the configuration shown in full lines in Fig. 10 of the drawings. The gage-piece P, being reduced at its upper portion, prevents the blanks from clogging between the cutter and gage-piece after being severed from the bars, and the space between the lower portion of the said gage-piece and the path of the cutter O determines accurately the precise width of the blanks q. When the cutter has passed entirely through the bars and severed the blanks, the pinion F will, through the medium of the pin m', actuate the rock-shaft M and disengage the pin m thereof from the lever L, so that this latter will drop and disconnect the clutch mechanism of the power-feed, this action taking place automatically at the desired point. The pin m' is adjustable vertically upon the rock-shaft M in order to stop the feed at any desired point.

The precise rate of the feed may be readily regulated by adjusting the connection between the pitman H and gear-wheel G in the manner hereinbefore described. The power-feed may be stopped and started, if desired, at any point by hand through the medium of the lever L, or it may be entirely disconnected and a hand-feed substituted by rotating the gear-wheel E' through the medium of the hand-grasp e' thereon.

One set of blanks having been cut from the ends of the bars Q, the clamping devices and the cap are loosened and the bars again moved inward against the gage-piece P, the mandrel D having been previously raised to its original position. The bars are then again clamped in position in the manner previously described, and the series of operations repeated indefinitely until the bars have been entirely cut up into blanks. The entire chuck N may be removed at any time and another one of a different size, carrying a different-sized cutter, may be substituted therefor. The gage-piece P is also independently removable, so that blanks of any desired size may be accurately produced in large quantities and with great rapidity at a minimum cost.

The blanks q serve to form the intermediate or central links in the chain-cutter of my invention hereinbefore referred to, the finished form of the link being shown in dotted lines in Fig. 10. The principal object of the present invention is to accurately form the curvature of what will be the inner side of the finished link, so as to cause it to conform exactly to the supporting-roller and sprocket-wheel in the machine to which it is to be applied.

It is obvious that various modifications in the details of construction may be made without departing from the principle of my invention. Moreover, it will readily be seen that the machine hereinbefore described, although devised more particularly for the cutting of the particular form of blanks set forth, is applicable to numerous other uses, and I therefore do not wish to be understood as limiting myself either to the precise application of said machine hereinbefore set forth, or to the precise details of construction described and shown in the drawings.

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

1. In a machine for cutting blanks, &c., the combination, with a suitable work-holding table for holding the bars from which the blanks are to be cut, of a tubular cutter or saw for severing the ends of the bars, substantially as and for the purposes specified.

2. In a machine for cutting blanks, &c., the combination, with a suitable table for holding the bars from which the blanks are to be cut in a position radial to the cutter, of a gage-piece to determine the position of the bars, and a tubular cutter or saw to sever the ends of the bars when in position, substantially as and for the purposes specified.

3. In a machine for cutting blanks, &c., the combination, with the tubular cutter and its rotary mandrel, of automatic feed devices for feeding the cutter to the work, substantially as and for the purposes specified.

4. In a machine for cutting blanks, &c., the combination, with the tubular cutter and its rotating mandrel, of automatic feed devices for feeding the cutter to the work, and an automatic stop for disconnecting the feed devices at a predetermined point, substantially as and for the purposes specified.

5. In a machine for cutting blanks, &c., the combination, with the tubular cutter and its actuating mechanism, of the work-holding table provided with seats or grooves to receive the bars from which the blanks are to be cut, said seats or grooves being arranged radially to the cutter and having suitable clamping devices to retain the bars in position, substantially as and for the purposes specified.

6. In a machine for cutting blanks, &c., the combination, with the tubular cutter and its operating mechanism, of the table B, having central recess or aperture, B′, and radial grooves *b′*, and the cap-piece R, provided with corresponding grooves *r*, and having clamping-screws R′, substantially as and for the purposes specified.

7. In a machine for cutting blanks, &c., the combination, with the tubular cutter and its operating mechanism, of the table B, provided with radial grooves *b′*, and the clamping-cams R^2, arranged at one side of said grooves, substantially as and for the purposes specified.

8. In a machine for cutting blanks, &c., the combination, with the rotating and vertically-movable mandrel, of a chuck removably secured on the end thereof, and a tubular cutter or saw mounted in said chuck, substantially as and for the purposes specified.

9. In a machine for cutting blanks, &c., the combination, with the mandrel D, having threaded portion *d*, of the chuck-body N′, having recess *n*, the tubular cutter O, arranged in said recess, the split ring *n′*, having beveled inner wall, the beveled disk N^2, and the nut n^2, for operating said disk, substantially as and for the purposes specified.

10. In a machine for cutting blanks, &c., the combination, with the mandrel D and the tubular cutter O, secured in a suitable chuck thereon, of a gage-piece mounted on said mandrel below the cutter, substantially as and for the purposes specified.

11. In a machine for cutting blanks, &c., the combination, with the mandrel D and the tubular cutter O, mounted in a suitable chuck, N, thereon, of the gage-piece P, mounted on said mandrel below the cutter and contracted at its upper portion within the cutter to prevent clogging, substantially as and for the purposes specified.

12. In a machine for cutting blanks, &c., the combination, with the cutter-mandrel D and the feed-screw E, swiveled to its upper end, of a spring arranged to thrust the mandrel upward against the feed-screw to prevent lost motion, substantially as and for the purposes specified.

13. In a machine for cutting blanks, &c., the combination, with the mandrel D, its actuating-pinion D′, splined thereon, the pinion F, secured on the upper end to drive the feed-train, and the feed-screw E, swiveled in the pinion F, of the spring D^2, coiled around the mandrel D and bearing against the pinions D′ and F, substantially as and for the purposes specified.

14. The combination, with the longitudinally-movable rotating mandrel D and elongated pinion F, secured thereon, of the pinion G, pitman H, adjustably connected thereto, shaft I, having ratchet-wheel I′, and vibrating arm *i*, with spring-pawl *i′*, pinion J, loosely mounted on shaft I, clutch J′, splined on said shaft and adapted to engage the pinion J, pinion E′, arranged to mesh with the pinion J, and feed-screw E, swiveled to the upper end of the mandrel, splined in the pinion E′, and passing through a suitable fixed nut or threaded aperture in the frame, substantially as and for the purposes specified.

15. The combination, with the cutter-mandrel and its feed-screw, of the feed-train connecting the two, clutch mechanism arranged in said feed-train to connect or disconnect the mandrel and feed-screw, and a lever connected to the said clutch to hold it normally in its disconnected position, substantially as and for the purposes specified.

16. The combination, with the clutch-pinion J and clutch J′ in the feed-train, of the lever K, connnected to the said clutch, the sliding piece K′, connected to said lever, and the lever L, having its fulcrum near the sliding piece engaging the same and extending forward therefrom, said lever serving by its weight to hold the clutch normally in its disengaged position, substantially as and for the purposes specified.

17. The combination, with the cutter-mandrel, its feed-train, the clutch mechanism arranged therein, and the lever L for operating the same, of the rock-shaft M, provided with pin *m* to support said lever, and having pin *m′* arranged in the path of the pinion on the

cutter-mandrel, substantially as and for the purposes specified.

18. The combination, with the cutter-mandrel, its feed-train, the clutch mechanism arranged therein, and the lever L for operating the same, of the rock-shaft M, provided with pin *m* to support said lever, and having pin *m'* arranged in the path of the pinion on the cutter-mandrel, said pin *m'* being adjustable upon the rock-shaft, substantially as and for purposes specified.

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W. C. CORLIES.