(No Model.)

2 Sheets—Sheet 1.

F. LACKNER.

NUT MACHINE.

No. 355,456. Patented Jan. 4, 1887.

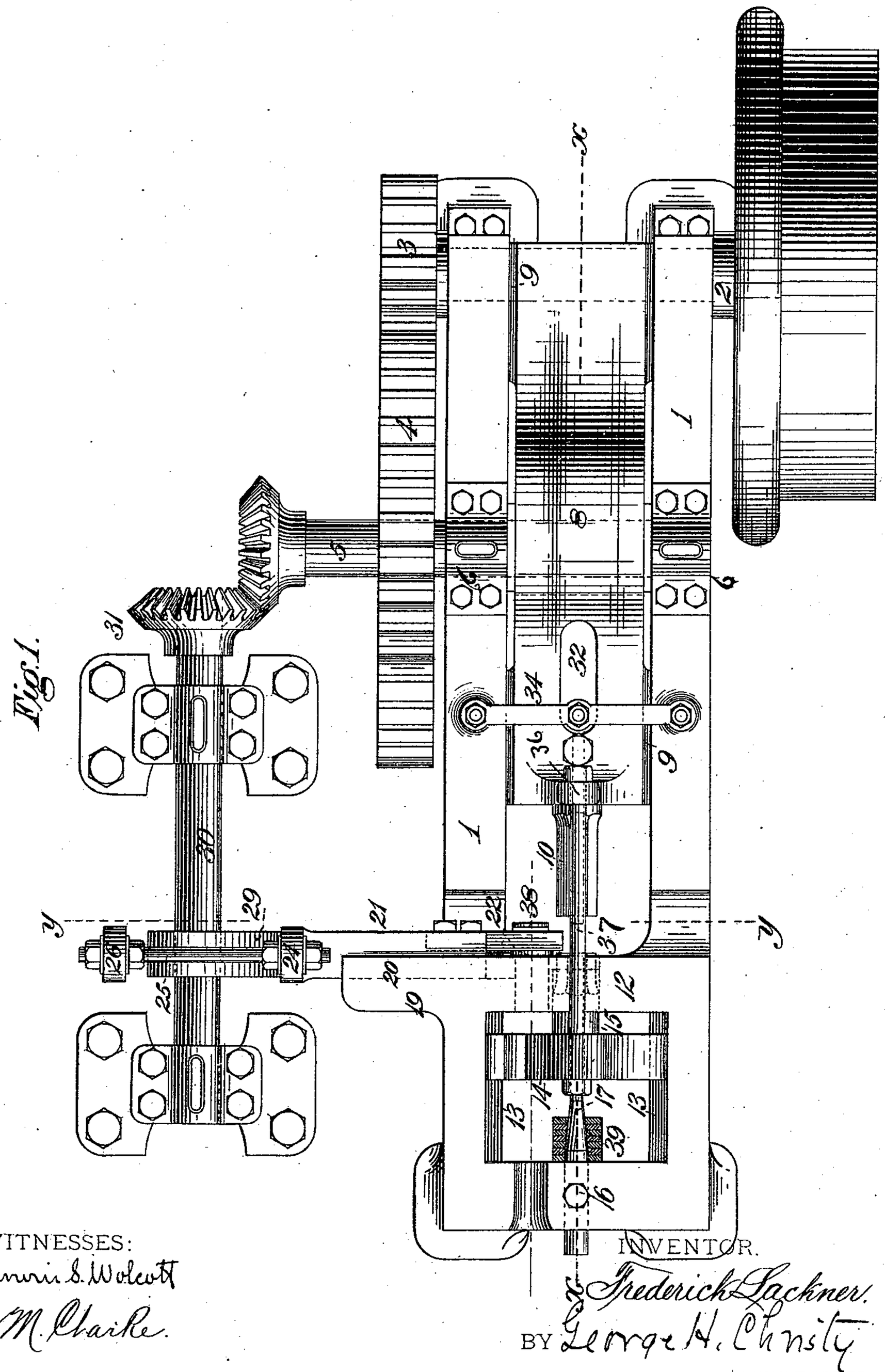

Fig. 1.

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(No Model.)

2 Sheets—Sheet 2.

F. LACKNER.

NUT MACHINE.

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Fig. 2.

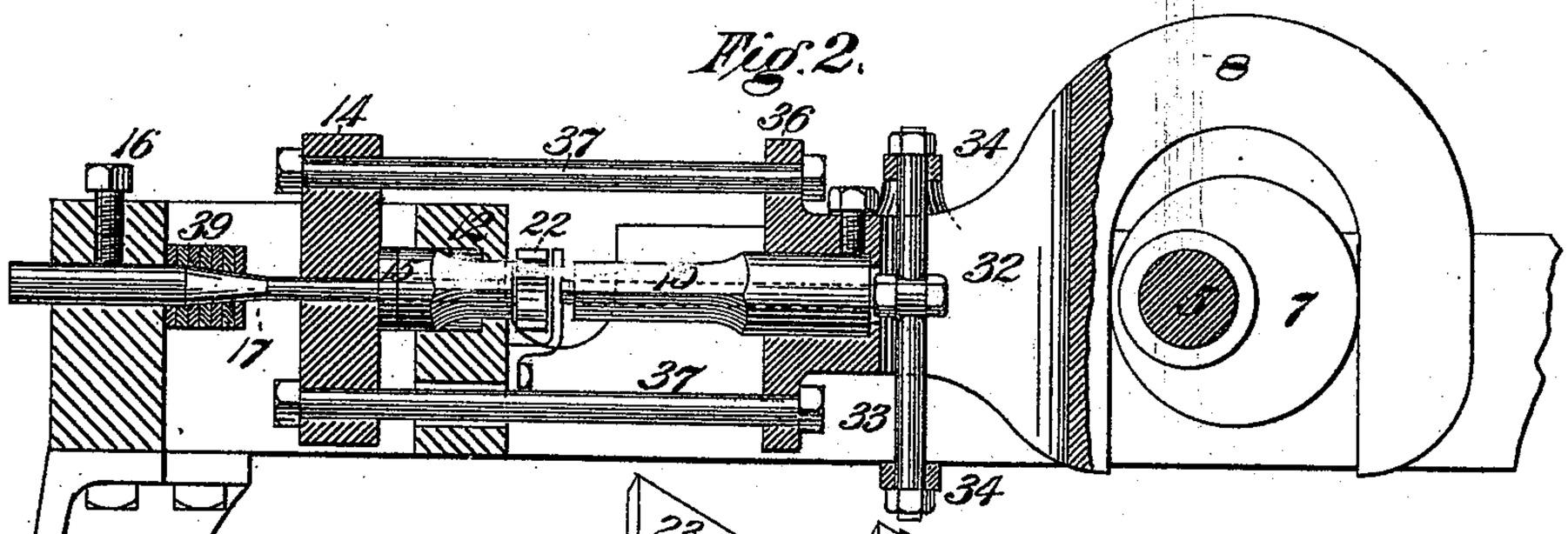


Fig. 6.

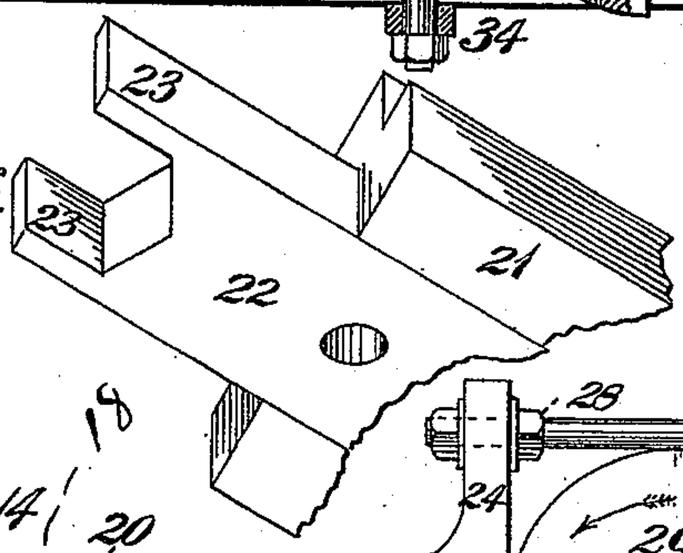


Fig. 3.

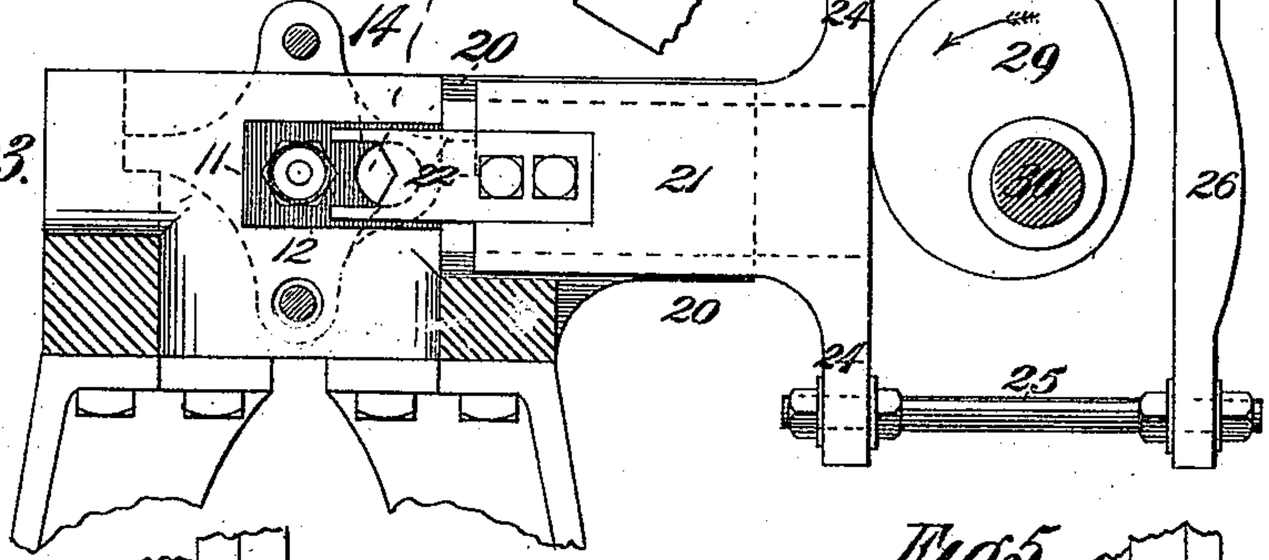


Fig. 4.

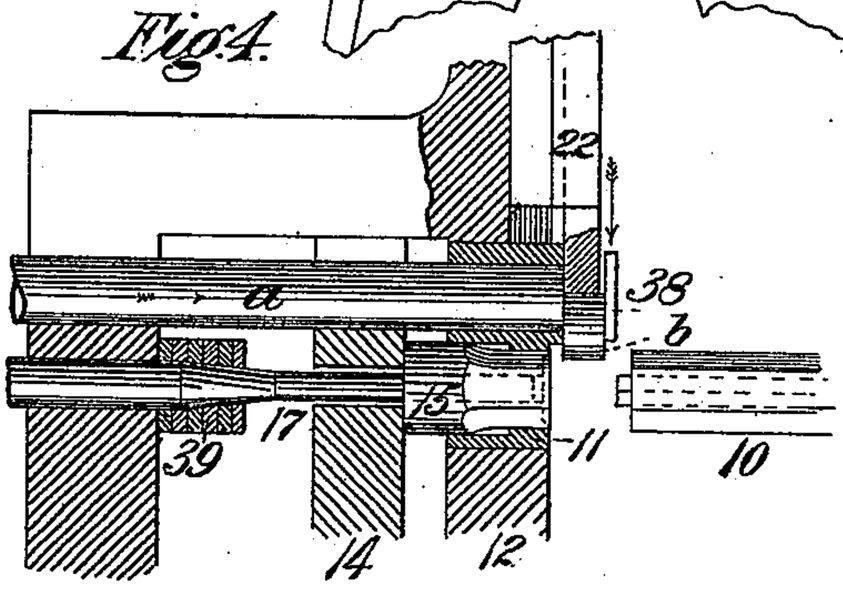


Fig. 5.

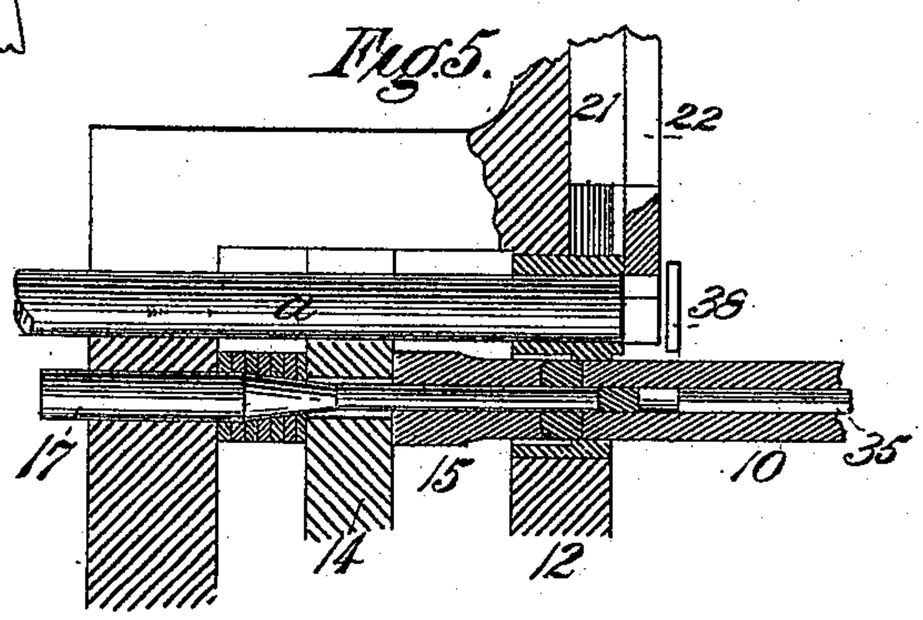
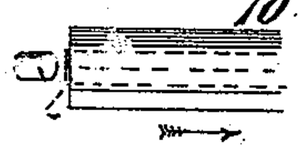


Fig. 7.



INVENTOR.
Frederick Lackner.
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UNITED STATES PATENT OFFICE.

FREDERICK LACKNER, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THOMAS NEELY, EDWIN BINDLEY, AND JOHN BINDLEY, ALL OF SAME PLACE.

NUT-MACHINE.

SPECIFICATION forming part of Letters Patent No. 355,456, dated January 4, 1887.

Application filed May 8, 1885. Serial No. 164,838. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK LACKNER, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, a citizen of the United States, have invented or discovered certain new and useful Improvements in Nut-Machines, of which improvements the following is a specification.

In the accompanying drawings, which make part of this specification, Figure 1 is a top plan view of my improved nut-blank-forming machine. Fig. 2 is a central vertical section of the same on line *x x*, Fig. 1. Fig. 3 is a transverse section in the line *y y*, Fig. 1. Figs. 4 and 5 are horizontal sections of the parts of the machine directly operative in making the blank, showing the beginning and end of the blank-forming operations. Fig. 6 is a detail view of the cutter on an enlarged scale. Fig. 7 is a detail of the die and its stripping-piston.

The invention herein relates to certain improvements in machines for forming hexagonal nut-blanks. The operations of said machines consist in severing heated bars or rods into certain lengths or sections, and in simultaneously compressing such lengths or sections longitudinally, thereby causing them to assume hexagonal shapes or contours, and punching holes longitudinally through the blanks, these compressing and punching operations being effected while the blanks are held in a suitable die or matrix, said blanks being caused to expand or spread laterally to fill the die by the conjoint action of the perforating and compressing punch and die. In this class of machines as heretofore constructed it is extremely difficult to obtain such accuracy of movement of the parts as to effect a complete filling of the die box or matrix, the result of such incomplete filling being a blank having walls of uneven thickness surrounding the longitudinal hole or opening therethrough. Another difficulty encountered in these machines has been the clogging up of the hollow die with the material removed from the center of the blank, and also the incorrect adjustment of the severed section in front of the die or matrix preparatory to its being forced therein.

The object of my invention is to so construct a machine as to obviate the difficulties above referred to, thereby insuring the formation of true regular nut-blanks; and to this end my invention consists in the construction and combination of parts, substantially as hereinafter described and claimed.

At one end of the frame 1 is journaled the power-shaft 2, on which is secured the pinion 3, adapted to intermesh with the gear-wheel 4, secured to the counter-shaft 5, mounted in suitable bearings, 6, upon the bed 1. On the shaft 5, between the bearings 6, is secured the cam 7, over which is placed the yoke 8, said yoke being extended at its front and rear ends, which are provided with laterally-extended wings 9, adapted to slide in bearings formed on the inner surfaces of the side bars of the frame 1. In the front end of the yoke 8 is secured the hollow die 10, adapted to fit snugly within the die box or matrix formed in the block 1. This block 11 is secured in any suitable manner within the block 12, said block 12 extending transversely across the frame 1, and preferably formed integral therewith, as shown. On the side bars of the frame, in front of the block 12, are formed the guideways 13, on which is mounted the sliding head 14, having secured therein the hollow die 15. In the end of the frame is secured, by the set-screw 16, the punch 17, which projects rearward through the sliding head and the hollow die 15 into the die box or matrix in the block 11, its front end being just within the box or matrix, as clearly shown in Figs. 4 and 5. The free end of the punch is made of uniform diameter for a portion of its length, as shown, and fits closely within the hollow die 15, which serves to support and steady the punch during the operation of the machine, as will be more fully hereinafter stated.

The block 11, in which the nut-forming matrix is cut, is extended laterally, as shown in Figs. 3, 4, and 5, and in such extension is formed a transverse hole or opening, 18, through which is fed the bar or rod *a*, from which the nut-blanks are cut, corresponding perforations being formed in the sliding head 14 and the end of the frame, as shown, the rod being fed by hand or any suitable feeding mechanism from the front of the machine. In the bracket 19, formed on or secured to the frame 1 in line with the block 12, are formed suitable guide-

ways, 20, on which is mounted the reciprocating block 21, having the cutter 22 secured therein, said cutter being provided with the prongs 23, adapted to pass above and below the portion or section *b* of the bar to be severed. The rear end of the block 21 is provided with the vertical arms 24, through the ends of which are passed the rods 25, and on the outer ends of the rods is mounted the cross-bar 26. The ends of the rods are threaded, and on the threaded portions are screwed the nuts 27 and 28, by means of which the cross-bar 26 can be adjusted to and from the arms 24 to take up wear on the cam or arms. In the yoke thus formed is located the cam 29, mounted on the shaft 30, having on its rear end the beveled pinion 31, intermeshing with the corresponding pinion secured on the end of the shaft 5. The cam 29 is so constructed as to move the cutter 22 not only across the feed-opening in the block 11, but also to move it until the severed section *b*, supported by the prongs 23, lies in front of and in line with the nut-forming matrix.

In the front end of the yoke 8 is formed the vertical slot 32, communicating with the horizontal opening in which the hollow die 10 is secured. Through the vertical slot 32 passes the bar 33, secured at its ends to the cross-bars 34, attached at their ends to the side bars of the frame. To the bar 33 is secured one end of the delivery-piston 35, fitting within the die 10, and being so constructed that its front end will project slightly beyond the front end of the die when the latter is at the rear limit of its motion.

On the front end of the yoke 8 are formed the lugs 36, through which are passed the rods 37, the front ends of said rods passing loosely through the sliding head 14. These rods are adapted to cause the sliding head to move with the yoke during its rearward movement, and to permit said yoke to move independent thereof during its forward stroke. The length of section to be severed from the bar *a* is regulated by the stop 38, secured to the block 12 in line with the feed-opening in the box.

The operation of the machine is as follows: The bar *a*, having been properly heated, is fed through the feed-opening 18 in the block 11 until it abuts against the stop 38. The cutter 22 is then moved forward by the cam 29, severing a section, *b*, from the bar and carrying the same in front of the matrix 11 and the die 15, which during this part of the operation lies within the matrix 11. The die 10 is now moved forward against the section *b*, held in the cutter. The onward movement of the die forces the section into the matrix, the die 15 being free to move back. As the section of the bar is being pushed into the matrix it is forced over the punch 17, the front end of the punch lying, as above stated, in the matrix, and being gradually uncovered as the die 15 is forced back. It will be observed in this connection that as the punch is supported or braced by the die 15, with the exception of that portion entering or within the section *b*, there is no possibility of any lateral displacement of the punch; hence a true perforation of the section *b* is secured. The die 15 continues to move back until the punch 17 has been forced through the section *b*. The motion of the die 15 is then stopped by the abutment 39, against which the sliding head 14 strikes. This abutment consists of a series of washers placed around the punch 17, between the sliding head 14 and the end of the frame. After the motion of the die 15 has been arrested, as above stated, the die 10 continues its forward movement sufficiently far to effect the amount of end compression necessary to complete the expansion of the section *b* into the matrix commenced by the punching operation. As the punch passes centrally through the section *b*, and as the pressure is equal on all parts of the ends of the section, it follows that the section will be caused to expand equally in all directions and completely fill the matrix. After the compression has been completed, as above stated, the die 10 is withdrawn from the matrix, and during its rearward movement the sliding head 14 is drawn in the same direction by the rods 37, thereby causing the die 15 to move through the matrix and force out the completed blank. The rods 37, however, are of such a length that the die 10 has a movement equal to the amount of compression effected before the rods 37 will engage the sliding head; hence the die 10 will be free of the blank before the latter emerges from the matrix. As the die 10 is drawn back it slides over the delivery-piston 35, which will punch out the metal forced into the die by the punch 17 during its operation, as above stated. As this metal is removed from the die at each revolution of the machine, there is no liability of clogging the die, as frequently happens where the metal is forced through the die by successive operations—*i. e.*, the metal removed from one blank being forced through and out of the die by the metal removed from successive blanks.

It has been ascertained by experience that in the class of machines where the punch reciprocates to effect the perforation of the blank the punch is liable to bend, and consequently produce an angular opening through the blank; but by supporting the punch laterally and causing the blank to move over the punch a true perforation of the blank is obtained.

It has heretofore been customary in this class of machines to operate the cutters by a lever actuated by a grooved cam on the power-shaft; but in such a construction the moving parts are rapidly worn away and twisted out of line, the consequence of such wear and distortion being an improper presentation of the section *b* to the matrix—*i. e.*, the section *b* is not carried sufficiently far to be truly pushed into the matrix; but by applying power to the cutter or its carrier directly in line with the motion of said cutter or carrier an equal and uniform

movement of the cutter is obtained without liability to twisting the parts out of line, and with a minimum of wear.

In place of using a matrix adapted to form hexagonal blanks, it may be constructed to form blanks of any desired shape, the contour of the dies being correspondingly changed.

I claim herein as my invention—

1. In a nut-machine, the combination of a cutter adapted to sever the section or blank and transfer it to a position in front of the nut-forming matrix, and a rotating cam located in line with the motion of the cutter and adapted to reciprocate the same, substantially as set forth.

2. In a nut-machine, the combination of the yoke 8, carrying the die 10, the die box or matrix, the movable die 15, and the sliding head 14, the head 14 being so connected to the yoke 8 as to move therewith during the rearward movement of the yoke, and to be independent thereof during the forward movement of the yoke, substantially as set forth.

3. In a nut-machine, the combination of the yoke 8, carrying the die 10, the die box or matrix, the movable die, the latter being operated in one direction by the yoke in its movements, substantially as set forth.

4. In a nut-machine, the combination of the yoke 8, vertically slotted, as described, and carrying the hollow die 10, the bar 33, passing through said slot and secured to the frame of the machine, and the delivery-piston 35, secured to the bar 33, substantially as set forth.

In testimony whereof I have hereunto set my hand.

FREDERICK LACKNER.

Witnesses:

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R. H. WHITTLESEY.