

W. L. WARD, H. D. REMSEN & E. C. BOERNER.

NUT MAKING MACHINE.

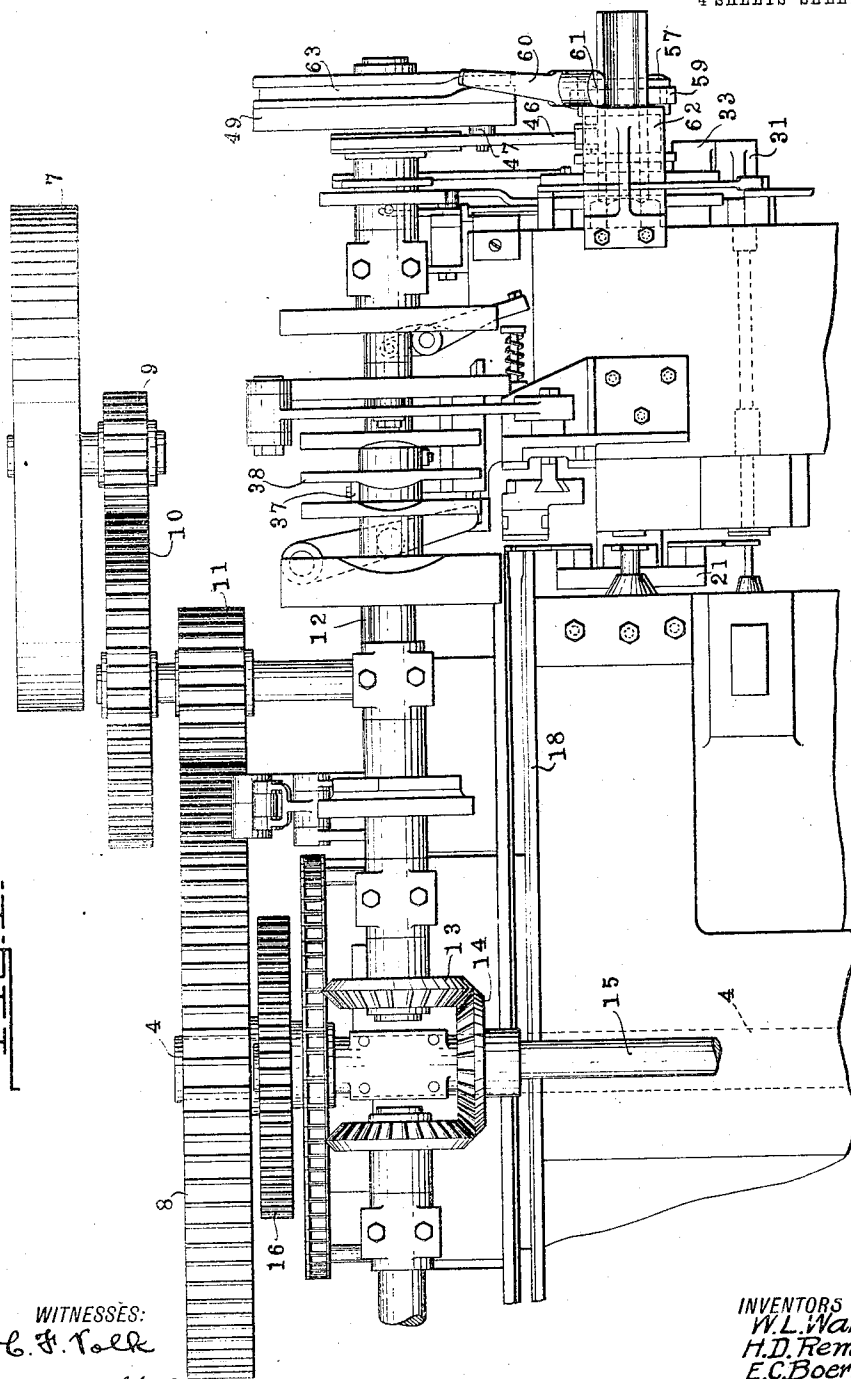
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4 SHEETS-SHEET 1.

1,128,641.

Fig. 1.



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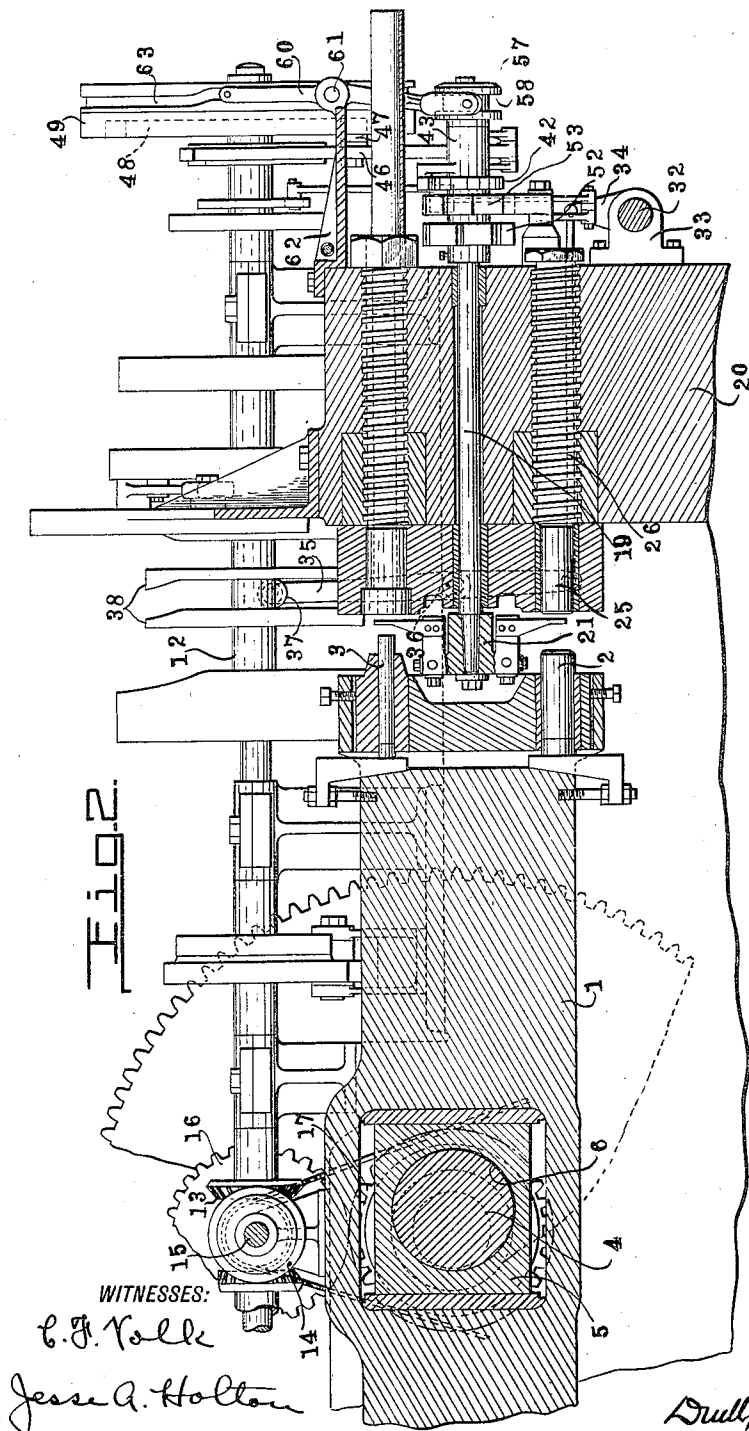
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4 SHEETS—SHEET 2.



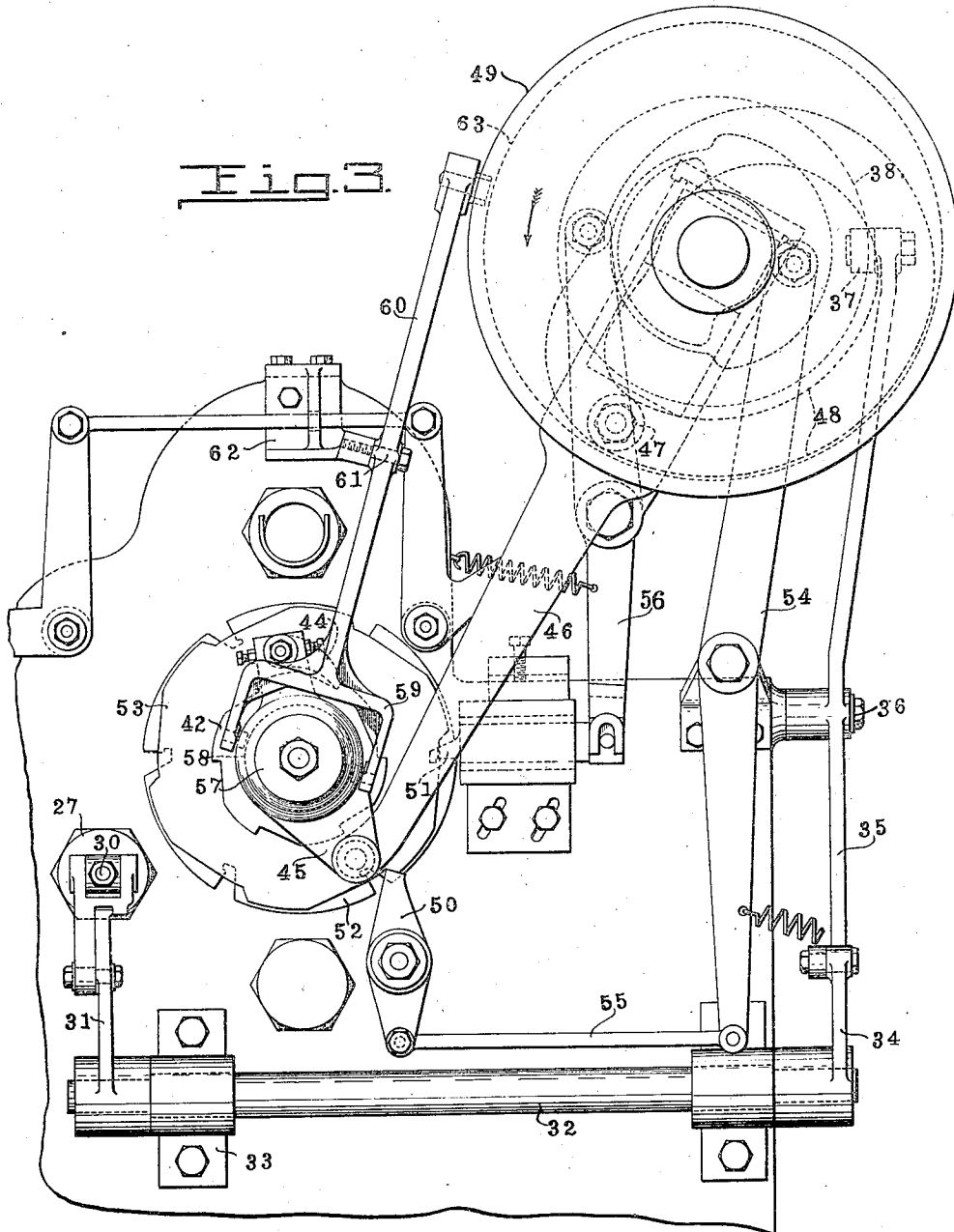
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4 SHEETS—SHEET 3.



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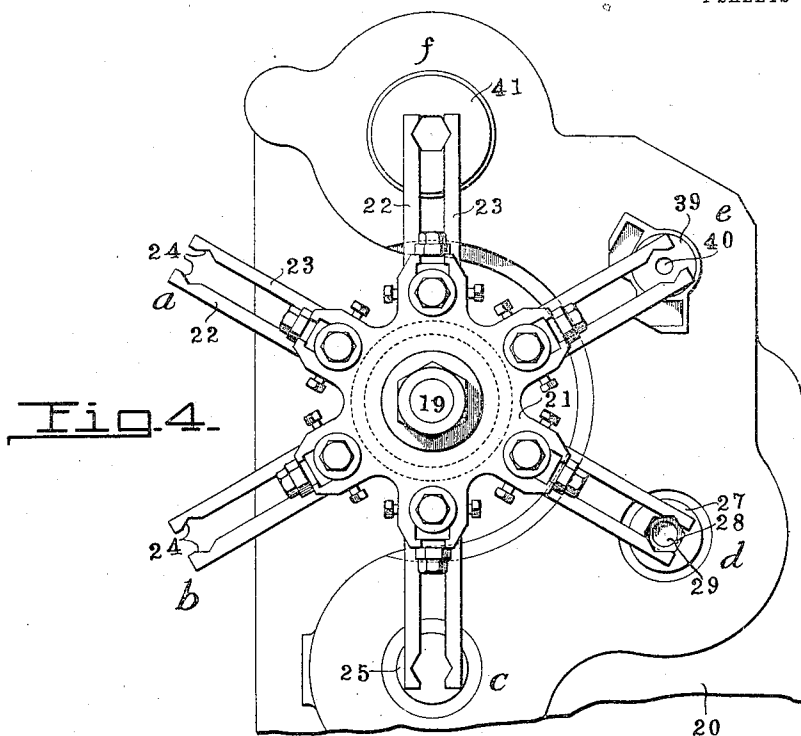
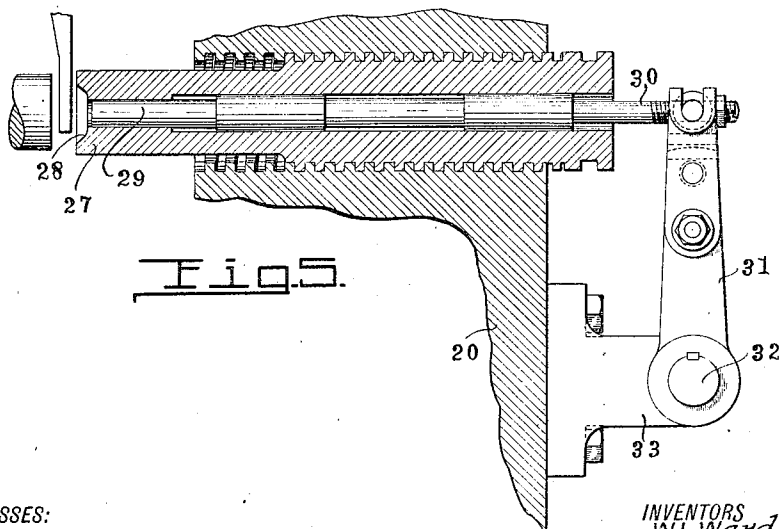
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4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

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NUT-MAKING MACHINE.

1,128,641.

Specification of Letters Patent.

Patented Feb. 16, 1915.

Application filed December 31, 1913. Serial No. 809,658.

To all whom it may concern:

Be it known that we, WILLIAM L. WARD, HERBERT D. REMSEN, and EMILE C. BOERNER, citizens of the United States, residing at Port Chester, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Nut-Making Machines, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to metal shaping or reforming mechanism, and with respect to its more specific features, to means instrumental in the production of nut-blanks and the like from stock-bars.

For various reasons known to those skilled in the art, it is desirable to produce nut-blanks from commercially available stock-bars of an inexpensive character by operations effected under normal temperatures and without the necessity of shaping the material while in a highly heated condition. Automatic machinery designed to fulfil these requirements is relatively complex, by reason of the several operations required to produce an efficient blank from a bar of stock, and it will be apparent that such complex mechanisms are rendered more practical and commercially available when any tendency to obstruct the normal continuous passage of the material through the machine is avoided.

One object of the present invention is to favorably dispose the material or blank at one or several points in its passage through the machine, so that certain conditions of the material, regarded as inherent or ordinarily accessory to the particular operation being performed, may not deleteriously affect the smooth and normal regular movements of the mechanically operating devices.

Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements and arrangement of parts which

will be exemplified in the construction hereinafter set forth, and the scope of the application of which will be indicated in the following claims.

The invention is herein disclosed in its association with a machine for making nut-blanks from stock-bars, and the figures of the drawings represent such portions of a nut-blank-making machine as may be required to clearly disclose the invention; like reference characters referring to like parts throughout the several views.

Figure 1 represents a plan view of a portion of a nut-blank-making machine; Fig. 2 represents a longitudinal section of Fig. 1; Fig. 3 represents an elevation of one of the operating parts; Fig. 4 represents a face view of the roulette; and Fig. 5 represents a section through the ejector for the crowning die.

The numeral 1 represents a substantially constructed reciprocatory head comprising a large solid casting mounted to slide in the main frame and adjustably supporting several finishing punches, pressing elements in the shape of plungers and punches, dependent on the operation to be performed.

The numeral 2 indicates the flattening punch or presser and 3 a plunger for forcing the nut-blanks through certain trimming dies hereinafter mentioned.

The head 1 is actuated from a main drive shaft 4 by means of a sliding block 5 which is journaled to the shaft 4 and is adapted to slide up and down through suitable bearings in said head, thus reciprocating the latter and with the required degree of power. The block 5 is pivoted in eccentric relation to the shaft 4, as by means of the eccentric 6. The reciprocatory movement of the block 5 is accomplished by a belt pulley 7, geared down to the main driving gear 8 by means of the intermediate spur gears 9, 10 and 11. The main driving gear 8 may be connected to the main driving shaft 4 by means of a clutch in the usual manner.

The numeral 12 indicates a longitudinally disposed, laterally placed horizontal cam

shaft, having a bevel pinion 13 meshing with a bevel pinion 14 secured to a cross shaft 15 supported on the frame of the machine, said shaft 15 having a pinion 16 meshing with a pinion 17 secured to the shaft 4.

The numeral 18 indicates a trackway along which certain hexagonal nut-blanks having unthreaded bolt openings and previously cut from a bar of metallic stock, are automatically fed, which blanks are eventually received by a certain "roulette", or blank-carrying device, to be hereinafter described. The special means for transferring the blanks from the track 18 to the roulette is irrelevant to the aspect of the invention at present under consideration and need not be described herein. It may here be noted, however, that the complete automatic machine for making nut-blanks, and of which the mechanism herein disclosed is described as forming a part, is fully described in a co-pending application filed June 27, 1910, Serial Number 569,053, and patented February 24, 1914, Patent No. 1,088,192, and with the exception of the longitudinal movement of the roulette and the mechanism for effecting such longitudinal movement the disclosure herein is designed to be the same, where required.

The numeral 19 indicates a shaft which passes from the rear or discharge end of the machine through the main frame 20 and terminates adjacent the adjacent end of the head 1. At its forward end this shaft carries the hub 21 of the roulette. In the preferred embodiment the nut-blanks to be operated upon are hexagonal, and the hub 21 is provided with a plurality of blank supports or carriers, preferably, a series of pairs of spring fingers 22 and 23, said pairs spaced apart at intervals of 60 degrees, each finger having a nick or V-shaped notch 24 to receive the corner of a blank, the blank being spring-held between the fingers of a pair. Six pairs of fingers are preferably employed, and the roulette is rotated at intervals through angles of 60 degrees, the pairs of fingers simultaneously disposing the blanks respectively carried thereby opposite certain blank-reforming devices, comprising the pressing elements or punches and plunger tools on the head 1, and oppositely disposed counterpart pieces, blocks and dies, etc., on the frame 1 around the shaft 19. In the present embodiment the blanks from the trackway 18 are delivered successively to the fingers of the roulette, each pair of fingers receiving a blank at the position indicated by the letter *a*. The blank is first carried through a dummy step to position *b* and thereafter in succession is carried to the positions *c*, *d*, *e* and *f*, at each of which latter certain operations are performed thereon by the plungers or punches on the head 1 co-

operating with the complemental pieces or dies on the frame. From the position *b* the rotation of the roulette 60 degrees will carry the blank opposite the flattening presser or plunger 2, at station *c* and while being flattened the blank is supported from the other side by the cooperative pressing element, die, or anvil, 25, adjustably secured to the main frame, as by means of the adjusting screw 26. After the flattening operation the roulette is again turned 60 degrees, bringing the blank opposite the pressing, preferably crowning die 27 secured in the main frame, the working end of this die being preferably countersunk, or concave, so that during the advance of its cooperative punch or plunger carried by the head 1 the nut-blank will be forced into the recess 28 of the crowning die and thus be given a crown. As the forces employed in this operation are considerable, there is a tendency for the blank to more or less firmly adhere to the die 27, and means are provided for forcing the same out of such die, to assist in positioning the crowned blank so that it may be freely carried along by the spring fingers or arms of the roulette. This ejector operates independently of the carrier and consists of a plunger 29 which reciprocates in the central bore of the crown die 27 and which may partially assist in forming the crown. The plunger 29 protrudes from the rear of the frame 20 in the form of a threaded shank 30, pivotally connected to a lever 31 secured to one end of a shaft 32 mounted in bearings 33 secured to the rear end of the stationary frame, the other end of shaft 32 carrying a lever 34 which is connected to a cam-actuated lever 35, fulcrumed at 36, and at its upper end carrying roller 37 actuated by a cam 38 on the shaft 12. At appropriate intervals the plunger 29 will be advanced to force out the crowned nut-blank and preferably position the same out of the transverse plane of the crowning die, and the roulette will then carry the nut-blank to the repunching position *e*. At this latter position is a blank-supporting die piece, or block, 39, having an aperture 40 for receiving the scrap. After the repunching operation, the blank is carried by the roulette to the retrimming piece or die 41, which has a hexagonal passage-way, or aperture, of appropriate size, and as the plunger or punch 3 advances, it will force the nut-blank through this aperture in the retrimming die 41, the edges of the aperture in the block 41 serving to shear, or shave off any excess metal on the edges of the blank. Through the successive movements of the plunger 3 the successive blanks are forced through the die 41, and these blanks are ultimately discharged at the rear of the frame 20. It will be understood that the head 1 is provided with a pressing ele-

ment or plunger opposite the crowning die, and with a punch or plunger opposite the opening 40 in the repunching die, in addition to the flattening and retrimming tools 2 and 3, and it will be further observed that the several flattening, crowning, repunching and retrimming die elements are mounted in the frame 20, and therefore relatively stationary.

On account of the operations on the nut-blanks by the several sets of blank reforming elements, as the coöperative punches and dies, referred to, said blanks not only tend to cling to the die parts, as explained in connection with the crowning die, but fins and other projecting portions may be made thereon, during other of these operations, and by means of these fins, etc., the ready rotary movement of the roulette may be restrained or prevented, the fins engaging the die parts, or frame, and obstructing, if not absolutely preventing, rotation. In consequence, the blanks may be displaced in the spring fingers, so as not to properly register in subsequent finishing positions, or the obstruction to rotation may even be such as to cause sufficient strain on the mechanism as to result in fracture of a part. This invention provides for the substantial avoiding of the displacements and strains referred to, as will now appear. The shaft 19 not only has intermittent rotary movement across the coöperative path of the sets of reforming elements to successively and simultaneously position the blanks in the spring fingers opposite the punches and dies, as described, but also has a movement in a direction at an angle to the direction or plane of its rotary path and preferably a slight longitudinal movement of reciprocation in its bearings in the frame 20, whereby the roulette is moved away from and toward the plane of the frame in which the stationary die parts are held.

The roulette shaft 19 extends a distance rearwardly of the frame 20 and carries an element of the mechanism, by means of which its intermittent rotary movements of 60 degrees are accomplished. In the present instance this element is a ratchet wheel 42, which is fixed to shaft 19 and has six teeth. Mounted on the shaft 19 is an oscillatory hub 43 having, at one side, a pivoted pawl 44 adapted to engage and operate the ratchet wheel 42 so as to intermittently rotate the roulette in a predetermined direction substantially parallel to the plane in which the several dies lie. Opposite the pawl the hub 43 has an arm 45, to which is pivoted one end of a rod 46 having a roller 47 engaging a cam groove 48 in the face of a disk 49 secured to the shaft 12, the rod 46 having a bifurcated portion guided on the shaft 12, as is usual in this character of cam connec-

tion. The cam groove 48 is of such shape as to cause the pawl 44 to operate to turn the ratchet wheel 42 one-sixth of a revolution for each rotation of shaft 12, so as to move the roulette one-sixth of a revolution, as before explained. Between the intervals of motion the shaft 19 and the roulette are locked against rotary motion and back lash by means of locking latches or pawls 50 and 51, which respectively engage with locking or toothed wheels 52 and 53 fixed to the shaft 19, these pawls being thrown into and out of locking engagement with the locking wheels by cams on the shaft 12 operating, the one through the rock lever 54 and the rod 55, and the other through the rock lever 56. On the end of the shaft 19 is fixed a sleeve or collar 57 having an annular peripheral channel, or recess, 58, engaged by a forked end 59 of a shift lever 60, said lever being fulcrumed at 61 on a substantial bracket 62 bolted to the frame 20, the opposite end of said lever 60 carrying a roller engaging a peripheral cam groove, or slot, 63 in the disk 49. The shape of the groove 63 is such as to cause the shaft 19 to longitudinally move in a direction to displace the roulette from the faces of the dies at each of the positions *a* to *f*, before the next subsequent rotary movement of the roulette and to move the roulette into coöperative relationship with said dies before or just as the punches or tools on the head 1 next operate on the blanks carried by the roulette. In this wise the blanks operated upon are moved away from the dies before the roulette starts to turn to its next succeeding position, and should there be fins, projections, etc., on the blanks, they will be moved with the blanks a sufficient distance from the dies to be disengaged therefrom and offer no obstruction to the normal rotary movement of said roulette. At the retrimming position, the blanks will be forced out of the roulette, and the longitudinal movement of the latter away from the retrimming die will space the arms of the roulette from the discharged blank or any fins or projections on the trailing end thereof. A slight longitudinal movement of the roulette is all that is ordinarily required, but the end of the pawl 44 may be extended in the direction of this movement in order to remain in position to engage the teeth of the ratchet wheel, notwithstanding longitudinal movement of said ratchet wheel. This extension of the end of the pawl 44 may be required, on account of its connection with the lever 46. In the illustration, Fig. 2, it will be observed that the roulette is in its position displaced from the plane of the die faces.

The operation of the device herein described will be apparent from the foregoing and need not be further explained, and it

will be noted that by the above-described construction is accomplished, among others, the object hereinbefore referred to.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope of the appended claims, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

Having described our invention, what we claim as new and desire to secure by Letters Patent is,—

1. In an apparatus of the character described, in combination, a carrier adapted to support a blank, blank reforming means comprising a die, means adapted to cause relative movement between said carrier and said die in a predetermined direction, means adapted to cause relative reciprocatory movement between said carrier and said die at an angle to said direction of movement, and means operable independently of said carrier adapted to position said pressed blank out of the plane of said die.

2. In an apparatus of the character described, in combination, a carrier adapted to support a blank, blank reforming means comprising a movable punch and a cooperative fixed blank-supporting piece, the latter having an aperture opposite said punch, means adapted to cause movement of said carrier across the path of movement of said punch, and means adapted to cause relative reciprocatory movement between said carrier and said piece at an angle to said last mentioned movement.

3. In an apparatus of the character described, in combination, a carrier adapted to support a blank, blank reforming means comprising a movable pressing plunger and a fixed cooperative piece providing a blank shearing edge and a passageway opposite said plunger, means adapted to cause movement of said carrier across the path of said plunger, and means adapted to cause relative reciprocatory movement of said carrier at an angle to said last mentioned movement.

4. In an apparatus of the character described, in combination, a carrier adapted to support a blank, blank reforming means comprising a movable pressing plunger and a fixed cooperative piece having an aperture therein opposite said plunger, means adapted to cause movement of said carrier across the path of said plunger, and means adapted to cause relative reciprocatory movement of said carrier at an angle to said last mentioned movement.

5. In an apparatus of the character described, in combination, a carrier adapted to

simultaneously support a plurality of blanks, blank reforming means comprising a movable plunger and a fixed cooperative concave die, and a movable punch and a fixed cooperative blank supporting piece having an opening opposite said punch, means adapted to cause movement of said carrier across the paths of movement of said plunger and punch, and means adapted to cause relative reciprocatory movement between said carrier and said die and piece at an angle to said last mentioned movements.

6. In an apparatus of the character described, in combination, a carrier adapted to simultaneously support a plurality of blanks, blank reforming means comprising a plunger and a fixed cooperative concave die, a punch and a fixed cooperative blank supporting piece having an opening opposite said punch, a second plunger and a fixed cooperative piece providing a shearing edge and a passageway opposite said second plunger, means adapted to cause movement of said carrier across the paths of said plungers and punch, and means adapted to cause relative reciprocatory movement between said carrier and said die and pieces at an angle to said last mentioned movements.

7. In an apparatus of the character described, in combination, a rotatable carrier adapted to support a blank, blank reforming means comprising a relatively stationary blank pressing element, means adapted to intermittently rotate said carrier across the cooperative path of said reforming means, and means adapted to reciprocate said carrier toward and from said blank pressing element.

8. In an apparatus of the character described, in combination, a rotatable carrier adapted to support a blank, blank reforming means comprising a relatively stationary blank shearing element, means adapted to intermittently rotate said carrier across the cooperative path of said reforming means, and means adapted to reciprocate said carrier toward and from said blank shearing element.

9. In an apparatus of the character described, in combination, a rotatable carrier, adapted to simultaneously support a plurality of blanks, blank reforming means comprising a relatively stationary blank pressing element and a relatively stationary blank shearing element, a plunger and a punch adapted to cooperate with said pressing and shearing elements, respectively, means adapted to intermittently rotate said carrier across the cooperative paths of said reforming elements, respectively, and means adapted to reciprocate said carrier toward and from said blank pressing and shearing elements.

10. In an apparatus of the character described, in combination, a rotatable carrier adapted to simultaneously support a plurality of blanks, blank reforming means comprising a relatively stationary concave die, a relatively stationary block having an opening therethrough, and a plunger and a punch adapted to cooperate with die and block, respectively, an ejector adapted to play in said opening, means adapted to intermittently rotate said carrier across the cooperative paths of said reforming elements, means adapted to reciprocate said carrier toward and from said die and said block, and means adapted to reciprocate said ejector.

11. In an apparatus of the character described, in combination, a rotatable carrier adapted to support a blank, blank reforming means comprising a relatively stationary blank pressing element, means adapted to intermittently rotate said carrier across the cooperative path of said reforming means, and means adapted to reciprocate said carrier toward and from said pressing element comprising a cam.

12. In an apparatus of the character described, in combination, a rotatable carrier adapted to support a blank, blank reforming means comprising a relatively stationary blank pressing element, means adapted to intermittently rotate said carrier across the cooperative path of said reforming means, comprising a ratchet wheel connected to move said carrier, an oscillatory pawl adapted to engage the teeth of said wheel, and means adapted to reciprocate said carrier toward and from said pressing element, said pawl being of a size to remain in the rotary path of the teeth of said wheel during the reciprocation of said carrier.

13. In an apparatus of the character described, in combination, a rotatable carrier adapted to support a blank, blank reforming means comprising a relatively stationary blank pressing element, means adapted to intermittently rotate said carrier across the cooperative path of said reforming means, comprising a ratchet wheel connected to move said carrier, an oscillatory pawl adapted to engage the teeth of said wheel, and cam operated means adapted to reciprocate said carrier toward and from said pressing element, said pawl being of a size to remain in the rotary path of the teeth of said wheel during the reciprocation of said carrier.

14. In an apparatus of the character described, in combination, a rotatable carrier adapted to support a blank, blank reforming means comprising a relatively stationary blank pressing element, means adapted to intermittently rotate said carrier across the cooperative path of said reforming means,

comprising a ratchet wheel connected to move said carrier, an oscillatory pawl adapted to engage the teeth of said wheel, means adapted to reciprocate said carrier toward and from said pressing element, said pawl being of a size to remain in the rotary path of the teeth of said wheel during the reciprocation of said carrier, and means adapted to lock said carrier against rotary movement between the intervals of movement thereof.

15. In an apparatus of the character described, in combination, a plurality of sets of cooperative pressing blank reforming elements, a carrier comprising a rotatably mounted shaft and a plurality of pairs of radially disposed blank supporting devices adapted to simultaneously position blanks in the cooperative paths of said reforming elements, means adapted to rotate said carrier intermittently, and means adapted to longitudinally reciprocate said shaft comprising a cam, a lever, a collar on said shaft having an annular channel engaged by one arm of said lever, and a continuously rotatable device comprising a cam slot engaged by another arm of said lever.

16. In an apparatus of the character described, in combination, a press element comprising a reforming tool, a second press element, means adapted to cause relative approaching movement between said elements to press and thereby reform a blank and relatively separating movement therebetween to relieve said pressure, a blank carrier comprising a blank-holding member movable across the path of said relative movement between said elements, and means adapted to cause said carrier to move said blank away from the plane of the operative face of one of said press elements between successive pressing operations of the latter.

17. In an apparatus of the character described, in combination, a press element comprising a reforming tool, a second press element, means adapted to cause relative approaching movement between said elements to press and thereby reform a blank and relatively separating movement therebetween to relieve said pressure, a blank carrier comprising a blank-holding member movable across the path of said relative movement between said elements, and means adapted to move said carrier at an angle to said last-mentioned movement between successive pressing operations of said pressing elements.

18. In an apparatus of the character described, in combination, press elements comprising a plurality of reforming tools, a plurality of other press elements disposed to cooperate with said first-mentioned press elements respectively, means adapted to cause relative approaching movement be-

tween said first-mentioned plurality of press
elements and said second-mentioned plu-
rality of press elements to simultaneously
press and thereby reform a plurality of
5 blanks, and relative separating movement
therebetween to relieve said pressure, a
blank carrier comprising a plurality of
blank-holding members movable across the
path of said relative movement between said
10 press elements, and means adapted to move
said carrier at an angle to said last-men-

tioned movement between successive press-
ing operations of said press elements.

In testimony whereof we affix our signa-
tures in the presence of two witnesses.

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Witnesses:

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