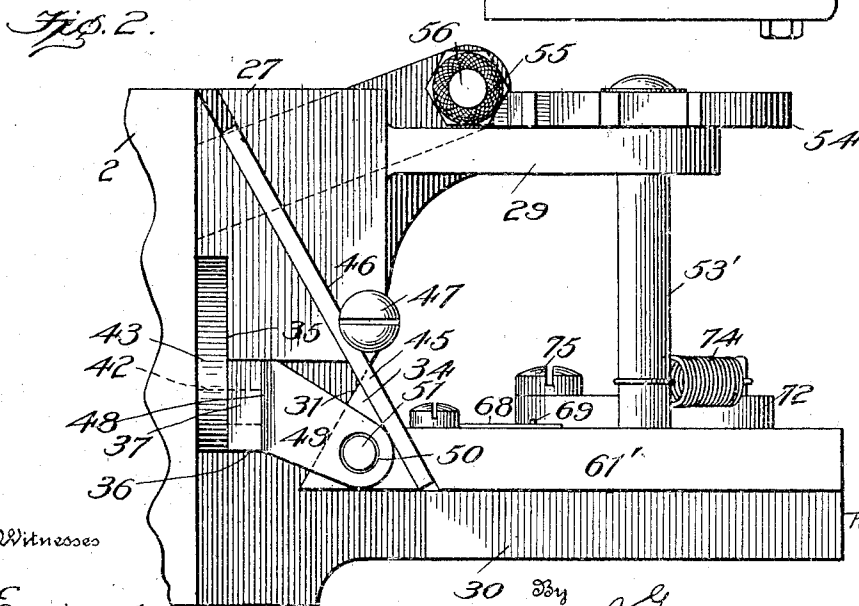
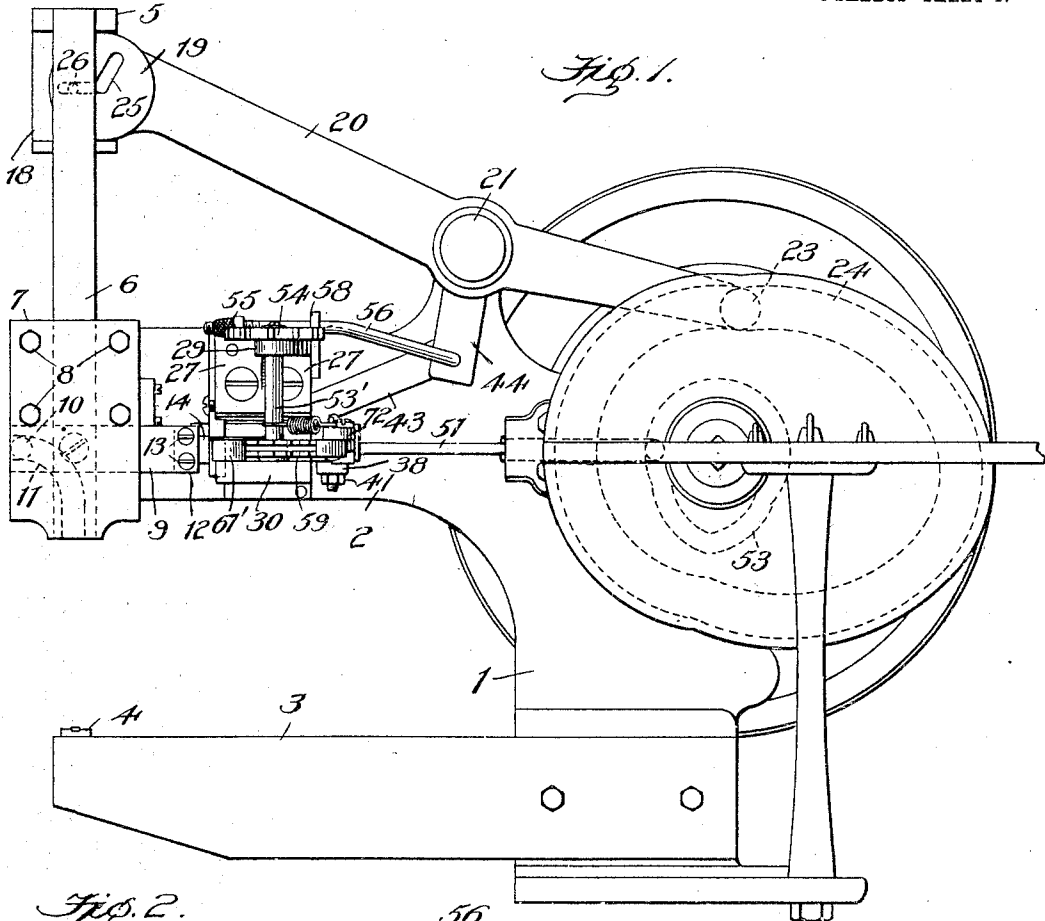


R. B. LEWIS.
MACHINE FOR SETTING AND FORMING METALLIC FASTENERS.
APPLICATION FILED APR. 7, 1905.

959,020.

Patented May 24, 1910.

3 SHEETS—SHEET 1.



Witnesses

Edwin L. Bradford
C. H. Myers

Inventor
Robert B. Lewis

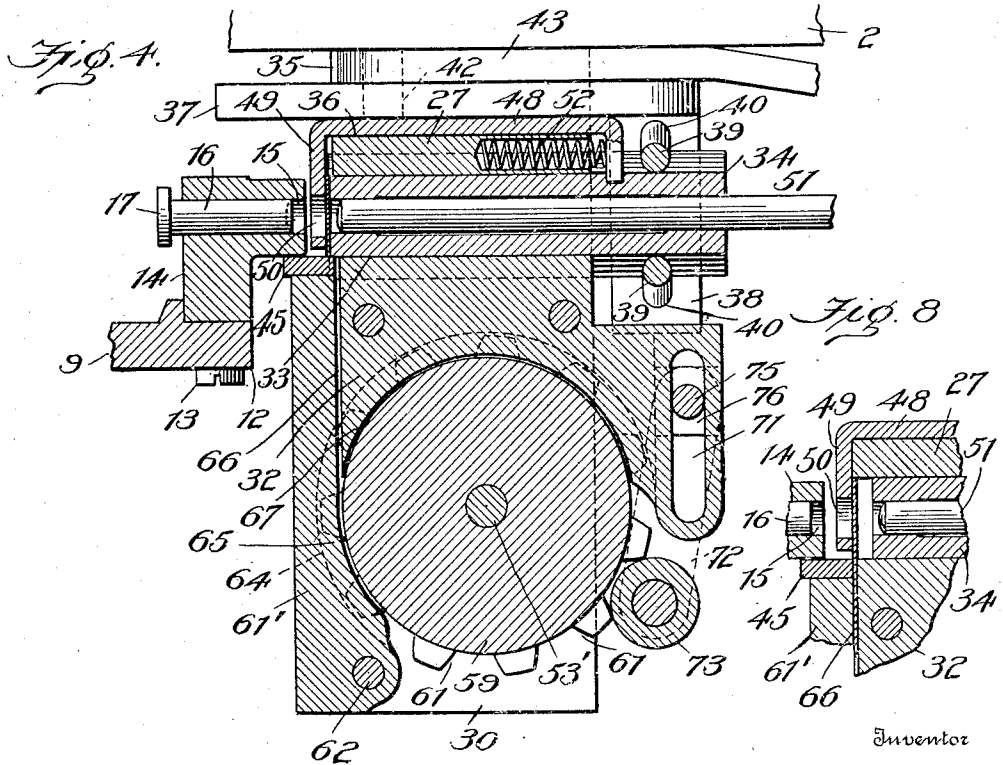
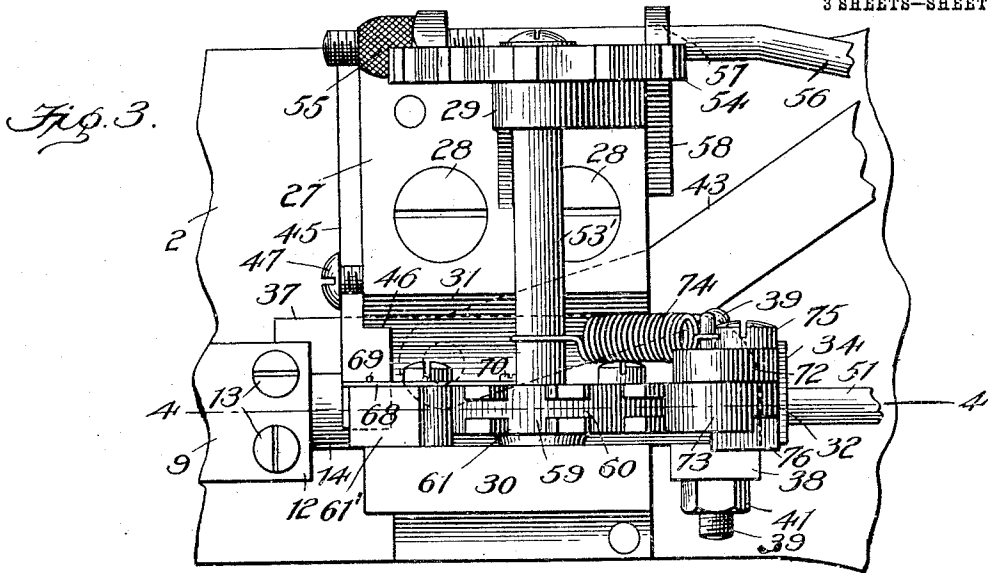
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3 SHEETS—SHEET 2.



Witnesses

Edwin L. Bradford
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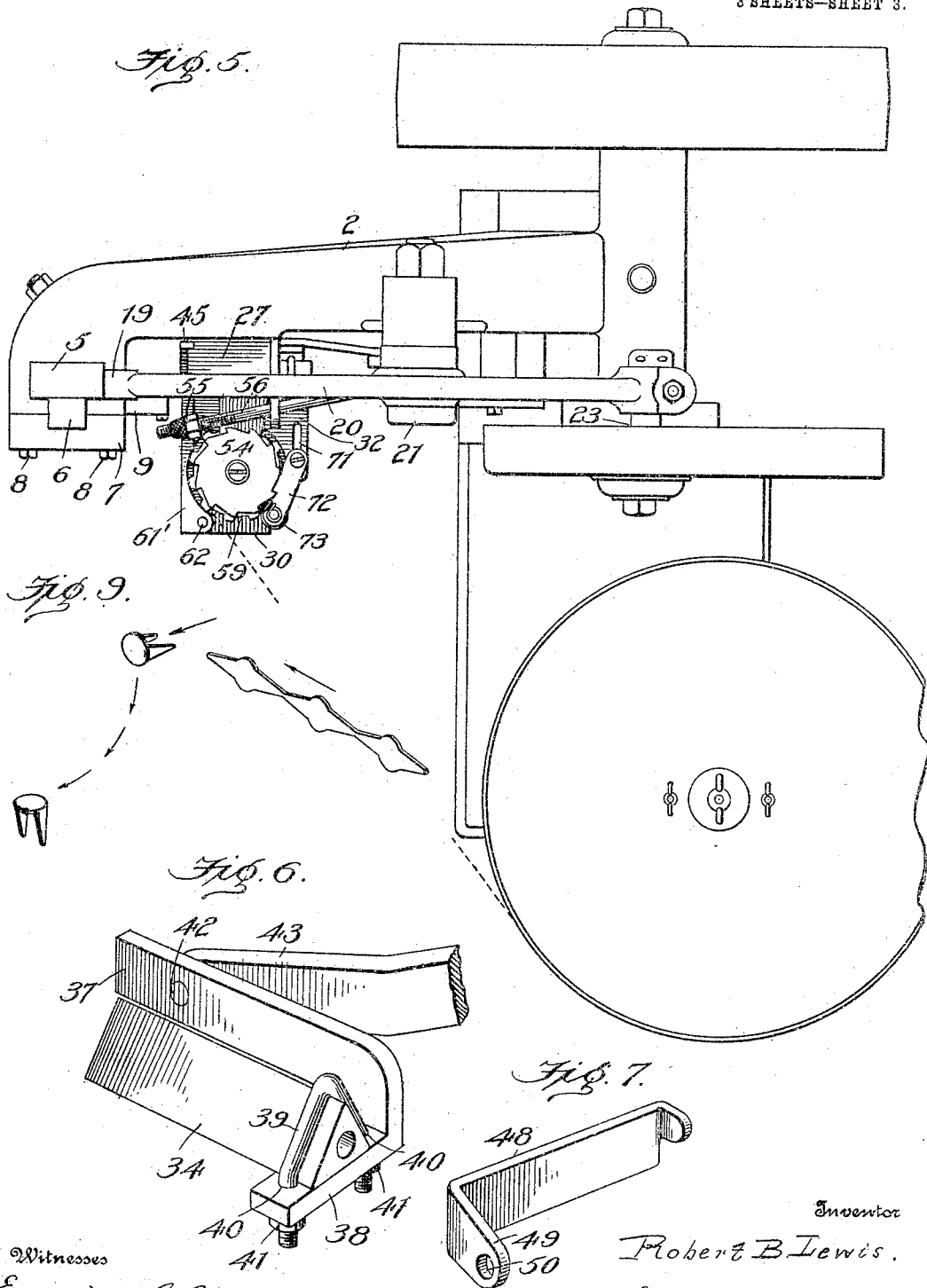
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3 SHEETS—SHEET 3.



Witnesses
 Edwin L. Bradford
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UNITED STATES PATENT OFFICE.

ROBERT B. LEWIS, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO AMERICAN METAL EDGE BOX COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF NEW JERSEY.

MACHINE FOR SETTING AND FORMING METALLIC FASTENERS.

959,020.

Specification of Letters Patent.

Patented May 24, 1910.

Application filed April 7, 1905. Serial No. 254,414.

To all whom it may concern:

Be it known that I, ROBERT B. LEWIS, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented new and useful Improvements in Machines for Setting and Forming Metallic Fasteners, of which the following is a specification.

My present invention has relation to new and useful improvements in a machine for forming and setting metallic fasteners of the general character or type embodied in my application for Letters Patent of the United States, Serial #179,209, filed October 30, 1903, and allowed December 6, 1904.

One of the objects of the present invention is to provide an improved and simplified feeding means for presenting the strip of fasteners to the severing and forming devices.

A further object is to provide a strip severing mechanism which will sever each fastener from the strip upon a line oblique to the longitudinal axis of the strip, so as to form the fasteners with the necessary penetrating points.

A further and important object is to provide a cutting die for accomplishing the severing operation, which die will be formed with a plurality of cutting edges, any one of which may be presented to perform the cutting operation.

A further object is to provide a simple and efficient clamping means for holding the fastener strip in engagement with the cutter during the cutting operation, while the strip is at rest, so that the severed fastener will be maintained in proper position to be engaged by the forming plunger.

A further object is to so construct and arrange the various elements in coöperative relation that they will at all times be easily accessible for adjustment, rearrangement or repair.

Other objects of advantage and importance will be made apparent during the detailed description of the invention to follow hereafter.

The invention consists in the novel construction of the various elements and their arrangement in operative combination to be fully described hereinafter and the novelty

of which will be particularly pointed out and distinctly claimed.

I have fully and clearly illustrated my invention in the accompanying drawings to be taken as a part of this specification and wherein—

Figure 1 is a view in side elevation of a machine embodying the improvements constituting my present invention. Fig. 2 is an end elevation of the improved strip feeding mechanism, the severing devices for severing a fastener from said strip, and the forming devices for properly shaping the fastener for use. Fig. 3 is a view in front elevation. Fig. 4 is a section on the line 4—4, of Fig. 3. Fig. 5 is a top plan of the complete machine. Fig. 6 is a detail perspective of the cutter-carrier, and the cutter secured in operative position thereon. Fig. 7 is a detail perspective of the retaining plate and former. Fig. 8 is a detail sectional view through the clamping device, cutter and forming plunger, showing the relative positions immediately prior to the cutting operation. Fig. 9 is a view of the strip and fasteners separated therefrom, showing the successive steps in the operation of cutting, forming and setting the fasteners.

Referring to the drawings, the various elements are shown as mounted upon a suitable frame-work comprising a standard 1, provided at its upper portion with a laterally projecting overhanging arm 2, which arm serves as a support for the fastener feeding, cutting, forming and setting devices. Extending from the base of the standard 1, is an arm 3, provided at one end with an anvil 4, upon which the work rests when the fasteners are being set. Extending vertically through the free end of the overhanging arm 2, is a reciprocating plunger 5, which serves a function to be set forth presently. Adjacent to the plunger 5 is a reciprocatory bar 6, which moves through a vertical groove in the side of the arm 2, the bar being retained in its groove by a removable cover plate 7, which is secured in position by bolts 8. This plunger 5 carries at its lower end a pivotally supported head 9, provided with a pin 10 at its upper end, which is arranged in a curved groove 11 in the cover-plate 7, heretofore mentioned,

the pin and slot serving when the plunger is reciprocated to swing said head to a horizontal position during the upward movement of the plunger, and to a vertical position during the descent of the latter. At its lower end, on the side opposite to the pin 10, the pivoted head 9 is formed with an extension 12, and removably attached to the lower end of the head 9, adjacent to the extension 12 by bolts 13, is a die element 14, having bored therein a female die 15, in which the fasteners are formed. Extending downwardly through the female die 15, is a die plunger 16 formed at its upper end with an enlarged head 17 to limit its downward movement and to receive the stroke of the reciprocatory plunger 5.

The reciprocatory plunger 5 is provided at its upper end with a horizontal guideway 18, which is open at each end. Fitting into the guideway 18 is the disk-shaped head 19 of a lever 20, which is fulcrumed as at 21, to the upper side of the overhanging arm 2, and the end of the lever opposite to the head 19 is provided with a laterally extending pin 23, engaging the groove of an operating cam 24, by means of which the lever 20 is rocked.

The disk-shaped head 19 of the lever 20, is formed with an angular slot 25, which receives a pin 26 projecting from the inner side of the reciprocatory bar 6. The formation of the slot 25 is such that on the first part of the downward movement of the lever 20, the plunger 5 and bar 6 descend together; but as the head 19 moves to the left in the guideway 18, the pin 22 reaches the vertical extension of the slot 25, and the downward movement of the bar 6 ceases. This is when the pivoted head 9 on the bar 6, is adjacent to the anvil 4. The plunger 5, however, continues to descend and its lower end strikes the enlarged upper end of the plunger 16, thereby forcing said die plunger downward and ejecting the fastener in the die 15.

All of the heretofore described elements and combinations are fully described in my allowed application for Letters Patent heretofore referred to, and it is not deemed necessary to further describe them for the purposes of this application.

I will now proceed to describe in detail the parts embodying my present invention. Rigidly attached to one side of the arm 2, is a bracket upon which are arranged in operative relation the parts constituting my invention. This bracket consists of a vertical base plate 27, held in position upon the arm 3, by means of bolts or other suitable fastening means 28, said plate having cast integral with the upper and lower edges thereof outwardly projecting arms 29, 30, which are disposed in parallel horizontal planes as shown.

In the front face of the plate 27 and closely adjacent the lower arm 30, is a transverse guideway for a reciprocating cutter, said guideway being formed by an undercut 31 in said plate, the wall of said undercut being inclined at an angle of sixty degrees, and merging with the upper surface of the arm 30. Bolted to the upper surface of said arm 30 is a block 32, formed upon its edge toward the undercut 31, with an incline 33, said block being spaced from the undercut a proper distance to form therewith and with the intervening portion of the arm 30, a guideway which has the form of an equilateral triangle in cross-section, and which guideway receives a cutter 34, which is also triangular in cross-section. This cutter consists of a bar of suitable tool steel which bar is, as above stated, triangular in cross-section and cut off square at each end, so as to provide a cutter having a plurality of cutting edges at its opposite ends any one of which may be employed to perform the function of severing the fasteners from the strip. This cutter is mounted upon a suitable carrier, which is constructed and operated as follows: Formed in the back-face of the base plate 27, or the face toward the arm 2, is a transverse guideway 35, extending entirely across said plate and in the floor of this guideway at the lower edge thereof is formed a square groove 36, in which is mounted for reciprocation a cutter carrier bar 37, provided at its rear end with a lateral projection 38, upon the upper side of which the rear end of the cutter 34 rests and is held. The cutter, as will be seen from the drawings, moves upon one of its flat sides on the upper surface of the arm 30, and this same flat side also rests upon the lateral projection 38, where it is clamped in position by a V-shaped yoke 39, which sets over the said cutter and the limbs of which pass downwardly through openings 40, in said lateral projection, the ends of said limbs being threaded and engaged on the under side of said projection by clamping nuts 41, which serve to draw the yoke down tightly upon the cutter so as to clamp the same firmly in position on the said lateral projection.

Projecting from the rear side of the cutter carrier bar is a pin 42, to which is pivotally connected one end of a reach bar 43, the opposite end of which is pivoted to an arm 44 forming part of the rocking lever 20, the arrangement being such that when said lever is operating to move the plungers 5 and 6 downwardly, the arm 44, through the reach rod, will throw the cutter carrier and cutter to the rear, but will move it to cutting position, when the plungers are being elevated.

As will more fully appear hereinafter, the cutter just described moves at right

angles to the line of feed of the fastener strip, and is so adjusted that upon the limit of its forward stroke it coöperates with a fixed cutter to sever a single fastener from the strip as it is fed between said fixed and movable cutters, said cutters coöperating in such a manner as to sever the fastener from the strip on an oblique line for the purpose heretofore stated. This fixed cutter consists of a straight metal blade 45, the cutting edge of which is set on an oblique line across the line of feed, and so located that it will be engaged by the front cutting edge of the movable cutter, said fixed cutter being set at an angle to the surface of the arm 30, the same as that of the cutting edge of the movable cutter. This fixed cutter may be secured in position in any suitable manner, but I have shown it as set in a groove 46 in the side of the plate 27, and held in place therein by a binding screw 47, threaded into said plate and adapted when screwed home to bear with its head against the outer edge of the cutter-blade, whereby the latter is securely clamped in position. This simple form of fastening means greatly facilitates the removal and replacing of the blade when it may be necessary to sharpen or repair the blade or to substitute therefor a new one.

Means is provided for maintaining the fastener about to be severed from the strip, in close engagement with the movable cutter, so that said fastener will always be in proper position to be accurately engaged by the forming die in shaping the fastener and driving it into the female die 15 in the oscillating head 9. This means consists of a retaining or clamping plate 48 arranged for a slight sliding movement in the groove 35, heretofore mentioned, and between the cutter carrier bar and the floor of said groove, said carrier bar serving to maintain said clamping plate in position in the groove. At its forward end this clamping plate extends slightly beyond the side face of the plate 27 and is bent laterally and downwardly as at 49, so that said end extends into the path of movement of the movable cutter and is located beneath or back of the blade of the fixed cutter, as shown in the drawings. In the end 49 of this clamping device is made a circular opening 50, the center of which coincides with the center of the triangular cutter, and the center of a male forming plunger 51, which reciprocates through a guideway extending centrally and longitudinally through the movable cutter, the operation of which plunger will be more fully set forth presently. The inner face of this end portion 49, of the clamping device, or that face toward the movable cutter, is normally disposed in line with the cutting edge of the fixed cutter in which position it is held

by means of an expansive spring 52, arranged in a seat in the side face of the plate 27 toward the rear end of the cutter, which spring exerts its force against a lateral projection on the rear end of the clamping plate to normally hold the forward end of said plate in the position stated. The clamping plate being in the position stated, and the strip of fasteners being advanced to bring one fastener in position to be severed from the strip, the movable cutter advances until it moves the fastener into close engagement with the inner face of the clamping plate, and the further movement of the cutter will force the clamping plate against the action of the spring 52, so that the fastener is firmly and immovably held between the clamping plate and the end of the cutter, and the continued forward movement of the cutter brings the strip between the cutting edges of the fixed and movable cutters to sever the fastener from the strip.

Extending through the reciprocating cutter, as heretofore stated, is a forming plunger 51, the rear end of which engages a cam groove 53 formed in the operating cam 24, and which cam groove is so formed that immediately after the fastener is severed from the strip, said plunger will be advanced to force the fastener through the opening in the clamping plate, which operation bends up the penetrating prongs on the severed fastener. The continued movement of the forming plunger pushes the fastener into the female die 15 of the head 9, from which die the fastener is driven into the article to receive it, in a manner heretofore stated.

The means for feeding the strip of fasteners to the cutting and forming means will now be described.

In the arms 29 and 30 is journaled for rotation a vertical shaft 53', upon the upper end of which is rigidly secured a ratchet-wheel 54, the teeth of which are adapted to be engaged by a nut 55 carried upon the free end of an actuating rod 56, the opposite end of which is loosely connected to the rocker-arm 44, forming a part of the lever 20, as heretofore stated. This actuating rod 56 reciprocates through a guide-opening 57 located in the end of a bracket arm 58 rigidly secured to the plate 27, the rod 56 being so bent that upon a forward movement of the arm 44, the nut 55 will move clear of the ratchet wheel 54 but upon movement in the opposite direction the nut will engage with the teeth of the wheel to rotate the latter, the distance of one notch. It will be perceived that the nut 55 may be readily adjusted along the rod 56, owing to its threaded engagement therewith, in order that it may be placed in the proper position to coact with the teeth of the ratchet wheel at the proper time.

Upon the opposite end of the shaft 53' to that carrying the ratchet wheel and closely adjacent the upper surface of the arm 30, is a feed-wheel 59, by means of which the strip of fasteners is fed to the cutting and forming means heretofore described. The periphery of the feed-wheel is cut away centrally to form a groove 60, extending entirely around the wheel; and the walls of said groove are cut away transversely, as at 61, in regular intervals, according to the length of the fasteners composing the strip being fed to the machine. In feeding the strip the fasteners lie with their heads in the transverse spaces formed by cutting away the walls of the groove 60, and the teeth so formed on the wheel engage the heads to feed the strip. This feed wheel 59 coöperates in its feeding operation with a strip guide 61', pivotally mounted at one end upon a pin 62, located at the outer end of the arm 30, said strip-guide, when in operative position, being disposed and held closely adjacent the periphery of the feed-wheel. That portion of the strip guide adjacent to the feed-wheel and with which the wheel coöperates in feeding the strip, is formed with a curved recess 64, coincident with the curve of the periphery of the feed wheel, and in the bottom of this recess is located a curved rib 65, which projects into the groove in the periphery of the feed wheel, and serves to tightly hold the strip of fasteners, so that said strip will be prevented from doubling or buckling in passing to the cutter. From the lower end of the recessed portion the strip guide is flat and rests against the end of the block 32, the latter lying against one end of the fixed cutter, and formed with marginal side flanges against which the strip guide rests; said flanges serving to maintain a space 66 between said strip guide and block constituting a passage for the strip, which extends at right angles to the cutter guide and opens closely adjacent the fixed cutter and through which the strip passes into position to be acted upon by the cutters. The block 32 is formed on the side toward the feed wheel to constitute a guard to prevent the strip from wrapping around the wheel instead of passing down through the space 66. This is done by forming the block on the edge toward the feed wheel with a curved recess in which the periphery of the wheel rotates, the curved wall of said recess being formed with a rib 67 which extends into the groove of the feed wheel, said rib terminating flush with the end of the block past which the strip moves in being fed to the cutters, said rib lying in close engagement with the floor of the groove in the feed wheel so that the fastener strip is prevented from passing in any other direction than between the end of the block 32, and the flat portion of the strip guide. The

strip-guide is held in operative place by means of a holding strip 68, one end of which is formed with an opening to engage a pin 69, on said guide, and the other end of which is secured to the guard-plate by means of a fastening screw 70. When it is desired to swing the strip guide away from the end of the guard plate, it is only necessary to release the holding strip from engagement with the pin 69.

In the heel of the guard plate is formed a slot 71, in which is adjustably mounted a pivoted arm 72, the free end of which carries a roller 73 laterally offset therefrom and arranged to engage the feed roller in the spaces between the teeth thereof, the engagement being maintained by means of a contractile spring 74, one end of which is connected to the arm 72, adjacent the free end thereof, the opposite end of said spring being anchored to the vertical shaft 53'. It will be seen that the function of this arm is to provide a means for securing the feed wheel against movement in either direction except when rotated by means of the ratchet wheel 54. The arm 72 is preferably secured in position in the slot 71 by means of a screw 75, and clamping nut 76, which it will be seen, readily permit an adjustment of the arm lengthwise of the slot.

I attach particular importance to the form and construction of the movable cutter, as shown in the drawings, and as described. It will be seen that by forming this cutter from a polysided bar of metal and cutting the ends off square as shown, I not only provide a cutter having a plurality of cutting edges, any one of which may be used to coöperate with the fixed cutter, but also provide a reversible cutter, the edges on either end of which may be used. This latter will be found of advantage for the reason that the cutting edge of the movable cutter must always be sharp in order to cleanly sever the fastener from the strip, and should one of the edges become dulled it is not necessary to regrind the same, but merely to adjust the bar to bring one of the unused edges into proper position for use. After all of the edges upon one end have become dulled, the bar may be reversed and the edges on the opposite end used. The edges are sharpened by merely grinding square across the ends of the bar, which again furnishes the bar with a new set of cutting edges.

The operation of the invention as above described, is as follows: The actuating lever 20, moving upward to raise the plungers 5 and 6 and swing the pivoted head to the side, as shown in Fig. 1 to receive a formed fastener, the depending arm 44 moves forward and through the reach rod 43 moves the cutter forward and clamps the fastener to be severed from the strip between the end of the movable cutter and the clamping de-

vice 48, and the continued movement of the movable cutter moves the fastener strip into engagement with the fixed cutter and the two cutters sever a fastener from the strip.

5 The forming plunger 51 then advances through the movable cutter and pushes the severed fastener through the opening 50 in the clamping plate which operates to bend the penetrating prongs back at an angle to
10 the head or body of the fastener, and the continued forward movement of the forming plunger pushes the fastener into the female die 16 in the head 9. The foregoing operation having taken place, the continued operation
15 of the cams retracts the forming plunger 51, and throws the head 9 downwardly to permit the fastener carried by the latter to be set as heretofore stated, the plungers 5 and 6 being moved downwardly
20 by the lever 20 being swung downwardly at its forward end, and this movement of the lever swings the arm 44 to the rear, which moves the cutter 34 back from cutting position and also operates the rod 56 to bring
25 the nut 55 thereon into engagement with the ratchet wheel 54 to rotate the same and thereby rotate the feed wheel to advance the fastener strip to bring a new fastener into position between the cutters ready to be
30 acted upon on the next upward movement of the lever 20.

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

35 1. In a machine of the character described, a plurality of plungers, a normally horizontal female die pivoted to one of the plungers, means for moving said die to a vertical position on the downward movement
40 of the plungers, a bar having a cutting edge movable toward and from the die, a forming plunger movable through the movable cutter and co-acting with the die, a clamping plate movable with the cutter and having an opening
45 through which passes the forming plunger, a fixed blade cooperating with the cutting edge of the bar, and means for feeding a strip of fasteners between the movable cutter and the plate.

50 2. In a machine of the class described, a forming die, a bar having a cutting edge on one of its ends and movable toward and from the die, a clamping plate co-acting with the end of the bar provided with the cutting
55 edge, a forming plunger movable through the bar and the plate, and cooperating with the die, and means for feeding a strip of fasteners between the plate and the bar.

60 3. In a machine of the class described, a fixed cutter and a movable cutter cooperating

therewith, means for feeding a strip of fasteners between said cutters, a clamping plate to hold the strip in engagement with the movable cutter during the cutting operation, said plate having an opening there-
65 through, a forming plunger cooperating with said opening to form the severed fastener, and means to actuate said plunger.

4. In a machine of the class described, a fixed cutter and a movable cutter cooperating therewith, a clamping plate having an opening therethrough and cooperating with the movable cutter to hold a strip of fasteners, means for feeding a strip of fasteners
70 between the movable cutter and the clamping plate and in front of said opening, and a forming plunger movable through the opening whereby to form the fasteners.

5. In a machine of the character described, a strip-feeding means, a fixed cutter set at
80 an oblique line to the longitudinal axis of the strip, a cutter-guide, a cutter-carrier movable parallel to said guide, a cutter slidably mounted on said guide, and comprising a prismatic bar having a plurality of cutting
85 edges, a lateral extension on said carrier, and means for adjustably securing the slidable cutter on said extension so that one of its cutting edges will cooperate with the fixed cutter, and means for actuating the carrier
90 to bring the movable and fixed cutters into cooperation.

6. In a machine of the character described, a strip-feeding means, a fixed cutter set at
95 an oblique line to the longitudinal axis of the strip, a triangular cutter-guide, a longitudinally adjustable triangular cutter-bar having a plurality of cutting edges, a reciprocating carrier for the bar, and means for clamping the cutter bar adjustably to the
100 carrier so that one of its cutting edges will be in position to cooperate with the fixed cutter.

7. In a machine of the character described, a strip-feeding means, a fixed cutter set at
105 an oblique line to the longitudinal axis of the strip, and a longitudinally adjustable cutter comprising a polysided bar having its ends cut off square to provide a plurality of cutting edges at each end of said bar, said
110 bar being arranged to have one of its cutting edges in position to cooperate with the fixed cutter.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.
115

ROBERT B. LEWIS.

Witnesses:

CHESTER A. SAYBOLT,
FRANK HALEY.