(No Model.)

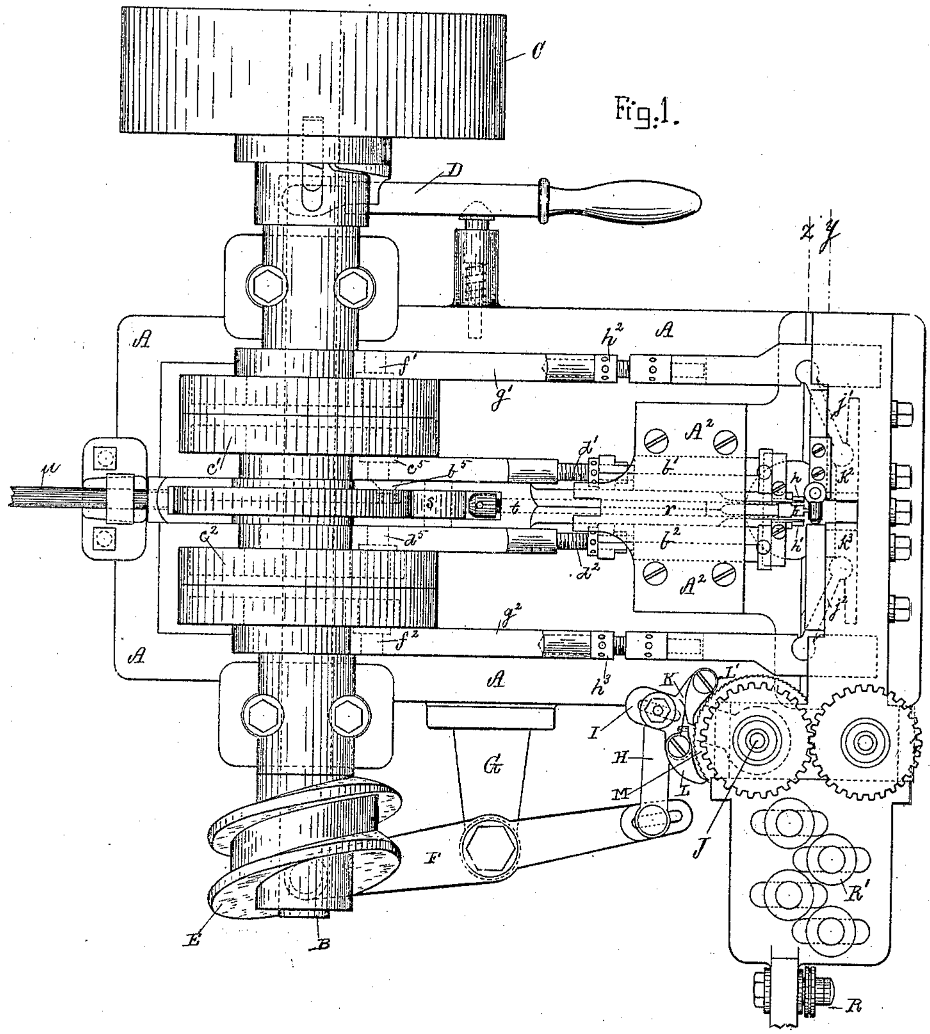
4 Sheets—Sheet 1.

E. H. TAYLOR.

STAPLE MAKING MACHINE.

No. 418,145. Patented Dec. 24, 1889.

Fig. 1.



Witnesses.

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(No Model.) 4 Sheets—Sheet 2.

E. H. TAYLOR.

STAPLE MAKING MACHINE.

No. 418,145. Patented Dec. 24, 1889.

Fig. 7

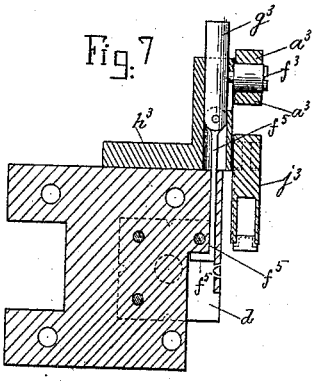


Fig. 8.

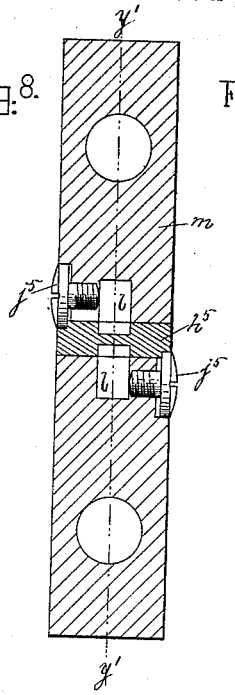


Fig. 9

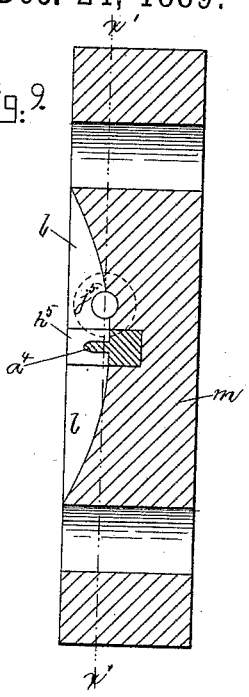
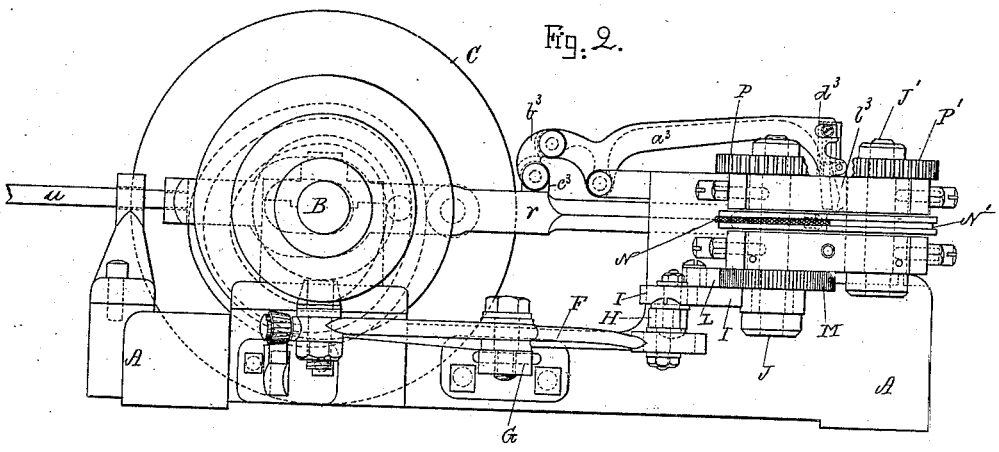


Fig. 2.



Witnesses.

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(No Model.)

4 Sheets—Sheet 3.

E. H. TAYLOR.

STAPLE MAKING MACHINE.

No. 418,145. Patented Dec. 24, 1889.

Fig. 3.

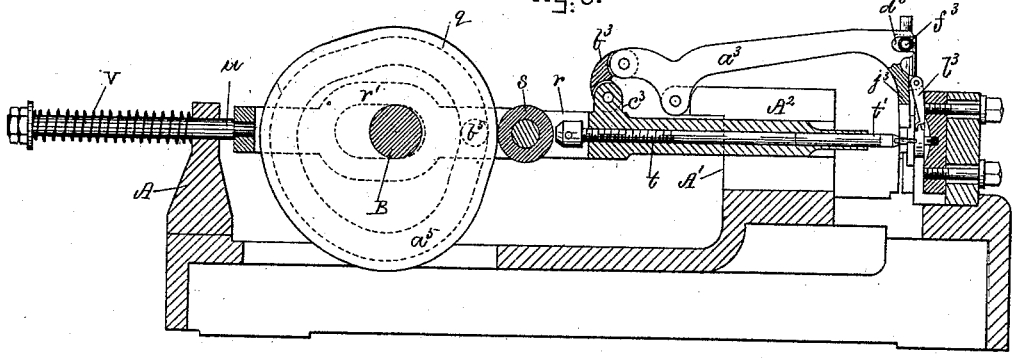


Fig. 6.

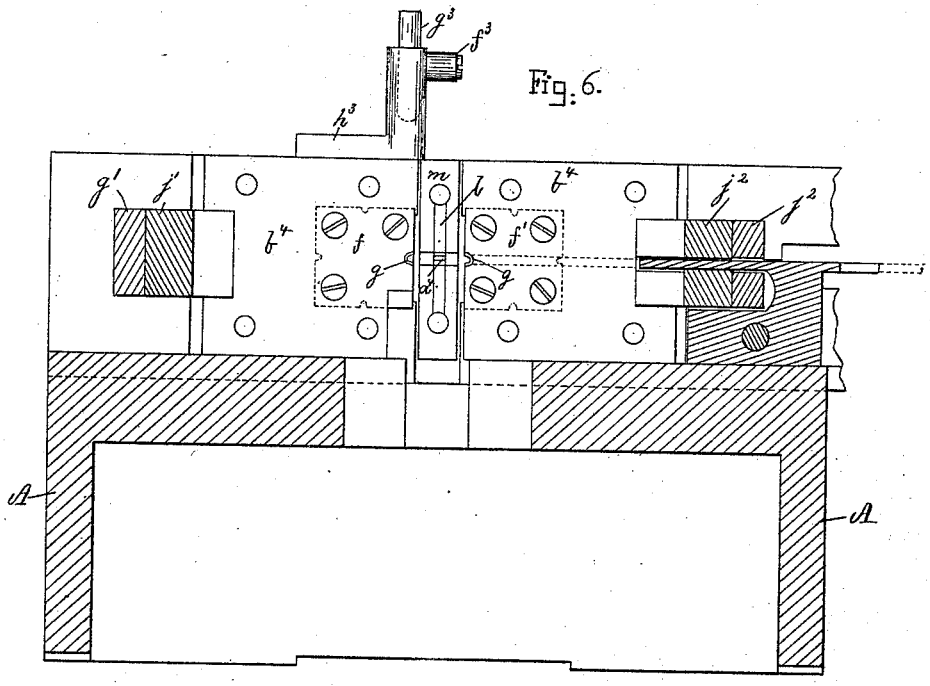
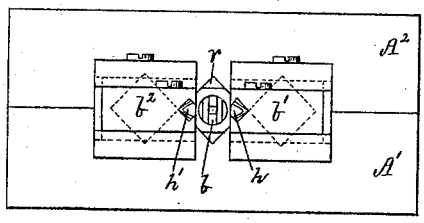


Fig. 10.



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(No Model.) 4 Sheets—Sheet 4.

E. H. TAYLOR.

STAPLE MAKING MACHINE.

No. 418,145. Patented Dec. 24, 1889.

Fig. 5.

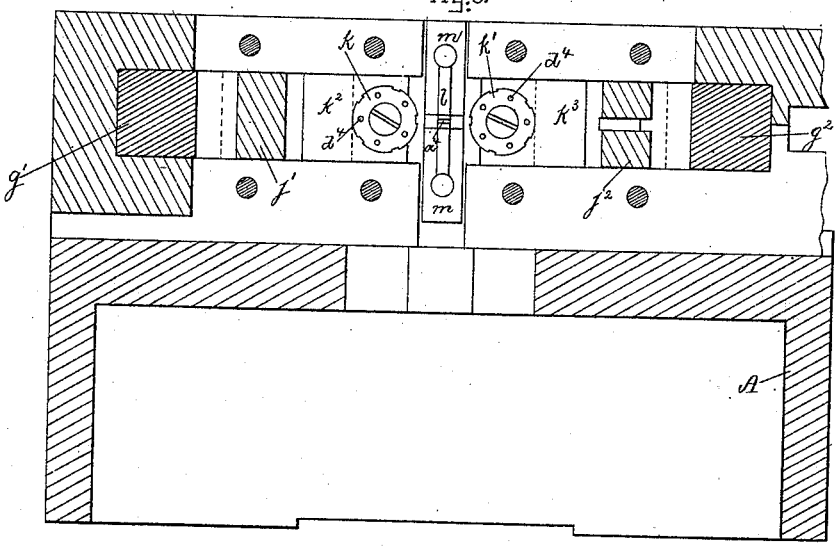

Fig. 11.

Fig. 4.

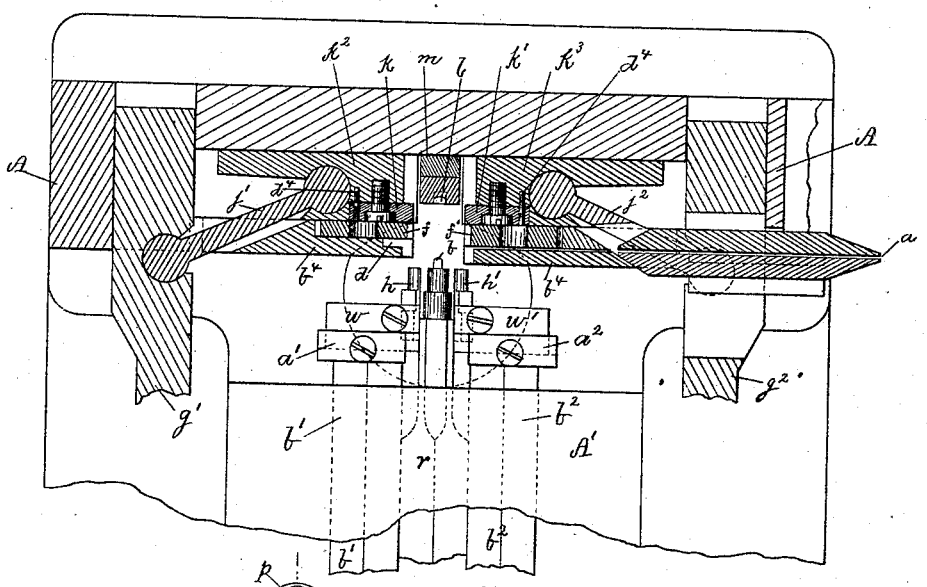

Fig. 12.

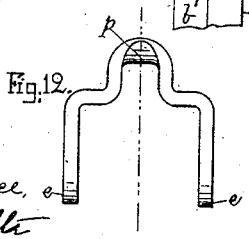

Fig. 13.

Witnesses.

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UNITED STATES PATENT OFFICE.

EUGENE H. TAYLOR, OF LYNN, ASSIGNOR TO THE AMERICAN SHOE TIP COMPANY, OF BOSTON, MASSACHUSETTS.

STAPLE-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 418,145, dated December 24, 1889.

Application filed January 9, 1889. Serial No. 295,837. (No model.)

To all whom it may concern:

Be it known that I, EUGENE H. TAYLOR, of Lynn, county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Machines for Making Staples for Attaching Buttons, of which the following is a specification, reference being had to the drawings accompanying and forming a part hereof, in which—

Figure 1 is a plan view of my machine. Fig. 2 is a side elevation. Fig. 3 is a vertical longitudinal section through the center of the machine. Fig. 4 is a horizontal section through the front of the machine, showing the die, as also the blocks which press the sides of the fastener. Fig. 5 is a vertical section on line *y*, Fig. 1, showing an elevation of the side-pressing or prong-forming dies. Fig. 6 is a vertical section on line *z*, Fig. 1, showing an elevation of the stationary cutting-dies. Fig. 7 is a cross-section of the frame in which one of the stationary cutters is set, showing the clearer which discharges the waste pieces from the machine. Fig. 8 is a cross-section on line x' x', Fig. 9, showing the projection which cooperates with the moving die to form the concave neck of the fastener or staple. Fig. 9 is a section on line y' y', Fig. 8. Fig. 10 is a front elevation of the movable cutters and former-die. Fig. 11 is a horizontal section, enlarged, of one of the dies which shapes the prongs of the fasteners. Figs. 12 and 13 are respectively a side elevation and section of a fastener such as my machine is designed to make when fitted with dies of the form shown in the accompanying drawings.

The object of my invention is the construction of a machine for making staples or fasteners for use in attaching buttons to leather or similar material; and it consists of the apparatus, hereinafter described, embodying mechanism for feeding the flat wire from which the staple is made into the machine for cutting the wire so fed in into lengths or sections each sufficient for one staple, for bending the section of wire into the staple shape—that is, with prongs substantially parallel to each other—and for dieing up a portion of the back or bow of the staple, so as to make it concave in cross-section, all as will be hereinafter more fully described.

Throughout the accompanying drawings like letters of reference indicate like parts.

A is the bed of the machine, which may be of any desired shape, but which is shown as a rectangular box within and upon which the mechanism is supported.

B is the main shaft, which is mounted in bearings in the bed, (see Fig. 1,) and which carries at one end a driving-pulley C, which, by means of shipper mechanism D of well-known construction, may be made fast or loose on the driving-shaft. At the other end of the driving-shaft a cam-wheel E is secured, which reciprocates the lever F, which is pivoted to a stud G, projecting from the bed or frame A. The other end of the lever F is slotted, as shown, Fig. 1, to receive a stud in the end of a link H, the other end of said link being connected by a slotted connection with the end of the arm I, which is pivoted on a vertical shaft J. The arm I has on either side thereof a short arm or projection K, upon which are pivoted the pawls L L′. These pawls engage with the teeth of the ratchet-wheel M, fast on the shaft J. The shaft J is set in a projection from the bed or frame of the machine and carries a feed-roll N, (see Fig. 2,) which has a peripheral projection somewhat roughened or corrugated, which cooperates with a corresponding recess or groove in the periphery of the companion feed-roll N′, and acts to seize the flat wire and feed it forward. On the upper end of the shaft J is secured a gear P, which meshes with a corresponding gear P′ on the upper end of the vertical shaft J′, and operates to revolve the shaft J′ and so to cause the companion feed-roll N′ to operate.

As will be clear, the reciprocation of the arm I will cause an intermittent movement of the feed-rolls, and the length of their movement may be controlled by means of the slotted connections of the link H with the arm I and the lever F. Before the wire reaches the feed-rolls it passes through the vertical and horizontal strengthening-rolls R R′. After the wire passes through the feed-rolls it enters a narrow channel or guideway, (shown at *a*, Fig. 4,) and passing through this guideway projects across the space (shown near the center of Fig. 4) directly in front of

the male die *b*, its forward end being received in a recess, (shown at *d*, Fig. 4.) The forward end of the wire, when in this position, is ready to be cut, and as the ends of the prongs are rounded, as shown at *e*, Fig. 13, the cutters are adapted to cut a section from the wire with rounded ends. This is effected by the stationary cutters *f f'*, which have a round notch or concavity cut from them, as shown at *g*, Fig. 6, corresponding to the round required for the end of the staple-prong, and which co-operates with correspondingly-rounded reciprocating cutters *h h'*, which are actuated as hereinafter described. As these cutters *h h'* move forward they pass between the stationary cutters *f f'*, cutting off the section of wire and carrying it forward between the stationary cutters until its ends approach the blocks *k k'*. The blocks *k k'* being nearer together than the stationary cutters *f f'*, the section of wire is bent and carried forward between them by the die *b*, which continues to move forward after the moving cutters *h h'* have stopped. The die *b* corresponds in shape to the interior shape of the fastener or staple, and serves as a mold around which the fastener or staple is bent and shaped, the sides of said die being straight and parallel to each other, and the pressing-faces of the side-pressing blocks *k k'* being also straight throughout and parallel to each other, thus forming fasteners or staples with straight parallel prongs, as shown in Fig. 12. The die *b* continues its forward movement, carrying the center of the section of wire into a recess (shown at *l*, Fig. 4) in block *m*. At the same time the blocks *k k'* are moved up sidewise—that is, caused to approach each other—by mechanism which will be hereinafter described, thus pressing those portions of the wire which form the prongs of the fastener against the sides of the die *b*. The tip of the die *b* is concave in vertical section, and the bottom of the recess *l* is provided with a projection at a^4, Fig. 9, having a convex end, so that the pressure of the forward end of the die *b* in the recess *l* and against the projection a^4 curves the arch or neck of the staple, making it concave in cross-section, as shown at *p*, Figs. 12 and 13. The moving die *b* then recedes and allows the formed fastener to drop out of the machine or to be pushed out by the clearing devices hereinafter described. The stationary cutters *f f'* consist of plates having four round notches in their edges, so that if the cutters become worn or dull the cutter-blocks may be shifted or turned over, so as to bring new cutters into position. As these cutters are readily movable by removing the cutter-plates b^4 and removing the screws which secure the cutters to their plates, (see Fig. 6,) other cutters adapted to produce different-shaped prongs or fasteners of a different size may be readily substituted for them. In the same manner the pressing-blocks *k k'*, which are secured in place by screws, as shown, may be readily removed and others substituted, and the same is true of the movable cutters *h h'* and the die *b*. The side-pressing blocks *k k'*, which form the prongs of the staple, are provided with pins d^4, which project into holes in the blocks k^2 k^3, which carry the blocks *k k'*, said pins being index-pins to assist in setting the blocks *k k'* in position.

The mechanism for operating the die *b* is as follows: A throw-cam *q* is fast on the shaft B, (see Figs. 1 and 3,) and this cam works in a slotted rod or bar *r*, having a friction-roll *s*, journaled in the slot directly in front of the cam *q*. The bar *r* is enlarged, as shown at *r'*, Fig. 3, and is slotted horizontally at the enlarged part to accommodate the shaft B, which passes through it. The forward end of the rod or bar *r* slides in a groove or way in the stationary supporting-piece A', which is fast to the frame of the machine and carries a rod *t*, which projects longitudinally into an aperture in the bar *r*, formed to receive it. In front of the rod *t* in the forward end of the bar *r* the shank or rearward projection *t'* of the die *b* is set, the die being allowed to extend forward in front of the end of the bar *r*. The rear end of the rod *t* is screwed into the bar *r*, and is provided with a head or nut by which the rod *t* may be screwed inwardly or outwardly to adjust the die *b*, as desired. In the rear of the throw-cam *q* a rod *u* is set in the bar *r* and projects through a hole in the rear of the frame A. The rear end of the rod *u* is provided with a nut, and between this nut and the frame A a spiral spring *v* encircles the rod. As the cam *q* revolves, it acts against the friction-roll *s* and forces the bar *r* and the operating-die *b* forward a distance equal to the throw of the cam, while as the cam revolves past its point of greatest throw the spring *v*, which has been compressed by moving the bar *r* forward, acts to draw the bar *r* back, thus drawing back the die *b* and keeping the roll *s* pressed against the periphery of the cam *q*. It is clear that by this mechanism the die will be reciprocated. An additional cam for operating this device is provided for greater safety. It consists of a cam a^5, (shown in dotted lines, Fig. 3,) cut in the face of the cam-wheel *q*. A cam-stud b^5, set in the bar *r*, engages with a cam a^5 and would operate the die in case the throw-cam *q* or spring *v* should fail to work.

The moving cutters *h h'* are set in blocks *w w'*, which, for purposes of lateral adjustment, are in turn mounted in slotted blocks *a' a²*, the latter being set on the forward end of bars *b' b²*, which are arranged to slide in grooves cut in the frame part A' on either side of and parallel with the die-bar *r*. The bars *b' b²* project backwardly to the main shaft, their rear ends being enlarged and slotted to receive said shaft. On the main shaft are set two cam-wheels *c' c²*, (see Fig. 1,) and on the faces of these wheels, next the said bars *b' b²*, are cut cams which engage with studs c^5 d^5 set on the said bars, and which

cause the bars a' a^2 and the cutters h h' to reciprocate as the shaft revolves. The bars a' a^3 are provided at d' d^2, Fig. 1, with a nut and screw, for purposes of adjustment.

For the purpose of moving the blocks k k' sidewise to press the prongs of the staple into position, I provide the rods or bars g' g^2, which at their rear ends are enlarged and slotted, to receive the main shaft, in the same way as are the rods b' b^2, and which are provided with cam-studs f' f^2, which engage with cam-slots cut in the faces of the cam-wheels c' c^2, (see Fig. 1,) which act to reciprocate the said rods or bars g' g^2. The rods g' g^2 are also provided with a nut-and-screw device at h^2 h^3, for purposes of adjustment, and their forward ends slide in slots or ways cut in the forward part of the frame. (See Fig. 1.) The links j' j^2 constitute a pair of half-toggles connecting at one end with the forward ends of the rods g' g^2, and at the other end by a similar socket-joint connection to blocks k^2 k^3, which carry the blocks k k'. (See Fig. 4.) The blocks k^2 k^3 are arranged to slide at right angles to the rods g' g^2 in grooves or ways crosswise of the machine. It will be clear that as the rods g' g^2 are forced forward by their cams the blocks k^2 k^3 and k k' will be forced inwardly by means of the half-toggle links j' j^2, and will press the prongs of the staple or fastener closely against the sides of the die b, and that at each revolution of the main shaft a fastener will be formed.

When the cutters h h' cut a section of wire from the continuous piece sufficient to form a fastener, there is a small piece of waste which is cut out, and which is, when cut, in the space d, Fig. 4. This waste piece is allowed to drop out of the space d clear of the machine. To insure the dropping of the waste pieces in case they should stick, I provide a rod f^5, Fig. 7, having a bent and flattened lower end, which is reciprocated in the space d by means of the vertically-reciprocating rod g^3, to which the upper end of the rod f^5 is pivoted, and which acts to clear the space d. For the purpose of clearing each fastener from the machine as it is formed in case it should stick in the die, I have provided the following device: I pivot a lever a^3, of the shape shown, Fig. 3, to a lug on the rear portion of the stationary plate A^2, which is secured on top of the part A' of the frame. The rear end of this lever is connected by a pivoted link b^3 to a projection c^3 on the slide-rod r. The other end of the lever a^3 is provided with an open slot or U-shaped notch d^3, which receives a stud f^3, which may be provided with an anti-friction roll, if desired, said stud f^3 being set in a short rod g^3, (see Fig. 7,) which slides vertically in an aperture made to receive it in the block h^3, which is secured on the frame of the machine. This rod g^3 operates the clearer f^5, as previously explained. The forward end of the lever a^3 has a downward projection j^3, which is forked at its lower end, as shown, Fig. 7, so that as the forward end of the lever a^3 is forced downwardly the forked end of the projection j^3 will move down onto the die b, striking a fastener which might stick to the die and throwing it downwardly clear of the machine. On the front of the projection j^3 a finger l^3 is pivoted, as shown, Fig. 3, so as to hang downwardly in front of the projection j^3. A spring behind the finger keeps its lower end against the face of the die or die-holder. Said lower end of the finger is provided with two small projections, as shown, which pass the opening of the recess l as the finger l^3 is forced downwardly, and thus come in contact with a fastener which might stick in the recess and force the fastener downwardly out of the machine. It will be clear that as the die rod or bar r is reciprocated the lever a^3 will be rocked on its pivot, and the forward end of the lever will reciprocate in substantially a vertical line, clearing by positive action any fastener which may stick in either the die b or in the recess l.

The recessed or female die m, which co-operates with the forward end of the male die b to form the arched neck of the fastener or staple, is constructed as shown in Figs. 8 and 9. It consists of an oblong block of metal, as there shown, which has a concavity or slot l cut in the face thereof, the width of which equals the width of the arched neck of the staple. Midway of this recess the die is slotted crosswise to receive the piece h^5, which piece is provided centrally, where it crosses the slot l, with a convex projection a^4, left in the central portion of the piece h^5, and the co-operation of this convex projection a^4 with the concave tip of the male die b produces a concavity in the middle or top of the neck of the fastener, as already described, and as shown at p, Figs. 12 and 13. It will be clear that a cross-section of the slot or recess l of the female die through the projection a^4 will be substantially of the shape of the neck of the fastener. For retaining and adjusting the piece h^5 in the die m, I provide on either side thereof screws j^5, (see Fig. 8,) the heads of which bear on shoulders at either end of the piece h^5, and thus serve to retain and adjust the piece h^5 in position in the die.

As above stated, the side-pressing blocks k k' move inward toward the male die and act to press the prongs of the staple against the same. In this way a staple with parallel prongs or with the prongs set in a given position may be accurately obtained. If a female die be used with rigid sides, the prongs of the staple are apt to spread after it leaves the dies, owing to the spring of the metal, and thus a staple with accurately-set prongs cannot be produced with certainty. For many purposes, as where the staples are to be driven by machinery, it is desirable that their prongs should be accurately set in position relatively to each other and to the neck or crown of the staple.

What I claim is—

1. In a staple-making machine, the combination, with a reciprocating male die having straight parallel sides, of a pair of side-pressing blocks having a movement toward and from each other and from the said male die, the pressing-faces of the said side-pressing blocks being straight throughout and parallel to each and to the sides of said male die, substantially as set forth.

2. In a staple-making machine, the combination, with a reciprocating male die having parallel opposite sides and a projecting tip, of a female die having a recess to receive said tip, and a pair of side-pressing blocks reciprocating toward and from each other and the said male die and having pressing-faces which are straight throughout and parallel to each other and to the straight sides of the said male die, substantially as set forth.

3. A staple-making machine having a male die of the shape of the interior of a staple, said die having a concavity on the tip or forward portion thereof, and a co-operating recessed die having a convex projection in the recess thereof, whereby by the co-operation of said concave and convex portions a staple having a portion of its neck concaved may be produced, substantially as described and shown.

4. In a staple-making machine, the combination, with a male die, a recessed or female die, and a pair of side-pressing blocks, of a pair of stationary and a pair of movable cutters, said stationary cutters being located behind the side-pressing blocks and said movable cutters being located on either side of said male die and having a movement parallel therewith, substantially as shown and described.

5. In a staple-making machine having a male die and a co-operating female die, the combination therewith of the rod r, which actuates the male die, the lever a^3, pivoted to a stationary part of the machine, the pivoted link b^3, connecting the rear end of said lever with said rod r, said lever having at its forward end a downward projection adapted to clear the formed staples from the male die, substantially as shown and described.

6. In a staple-making machine, the combination, with the male and female co-operating dies, of the rod r, the link b^3, the lever a^3, and the pivoted finger l^3, for the purposes and substantially as shown and described.

7. In a staple-making machine, the combination, with the male and female co-operating dies, of the rod r and its actuating-cam, the link b^3, the lever a^3, pivoted to a stationary part of the machine, the vertical rod g^8, engaging with the forward end of said lever, and the clearer f^5, connected with said vertical rod, for the purposes and substantially as shown and described.

8. In a staple-making machine having a male die and a co-operating recessed or female die, the combination therewith of the blocks k^2 k^3, which carry the side-pressing blocks k k', the half-toggles j' j^2, engaging at one end with said blocks k^2 k^3 and at the other with the reciprocating rods g' g^2, and said rods g' g^2 and their actuating-cams, substantially as shown and described.

9. In a staple-making machine, the combination of the male and female co-operating dies, the rod r and its actuating-cam, the stationary cutters f f', the moving cutters h h', their actuating-rods b' b^3 and their cams, the pressing-blocks k k', their half-toggles j' j^2, and actuating-rods g' g^2 and their cams, substantially as shown and described.

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