No. 731,630. PATENTED JUNE 23, 1903.

E. A. SUVERKROP & R. COATES.

STAPLE MACHINE.

APPLICATION FILED MAR. 1, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

FIG. 1.

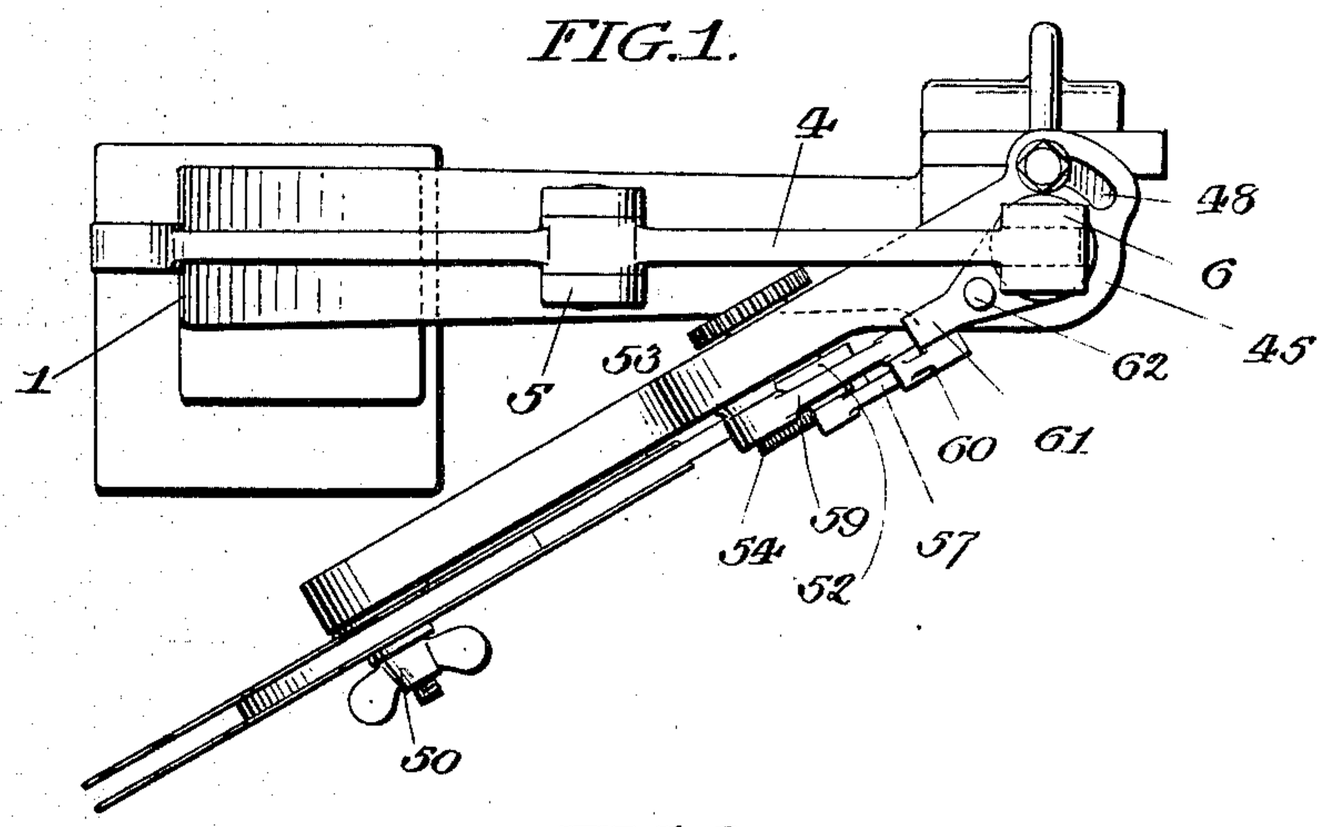
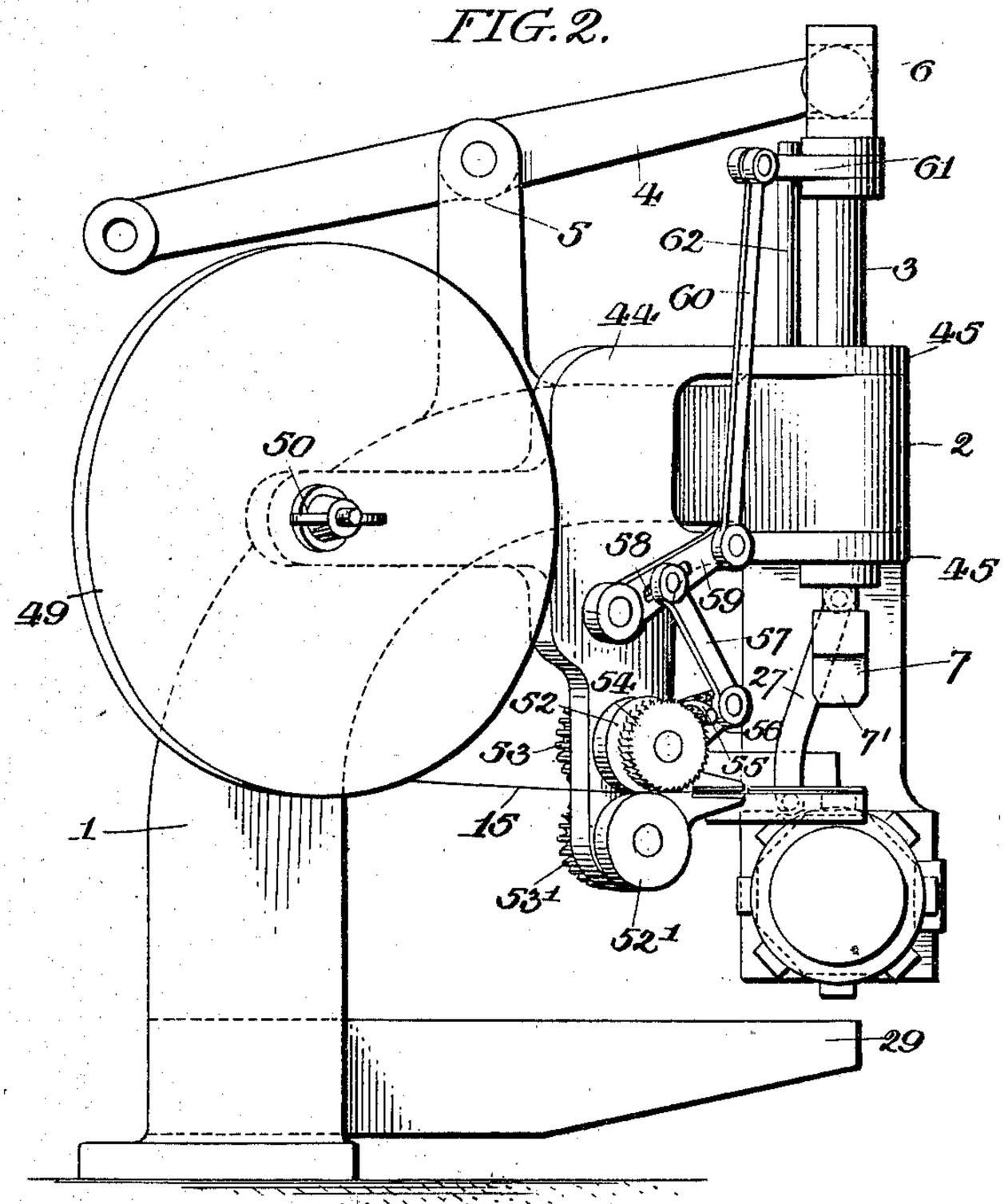


FIG. 2.



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NO MODEL. 2 SHEETS—SHEET 2.

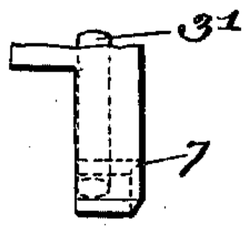


FIG. 8.

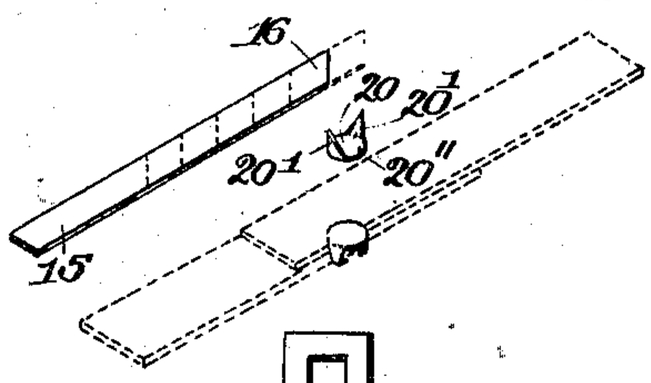
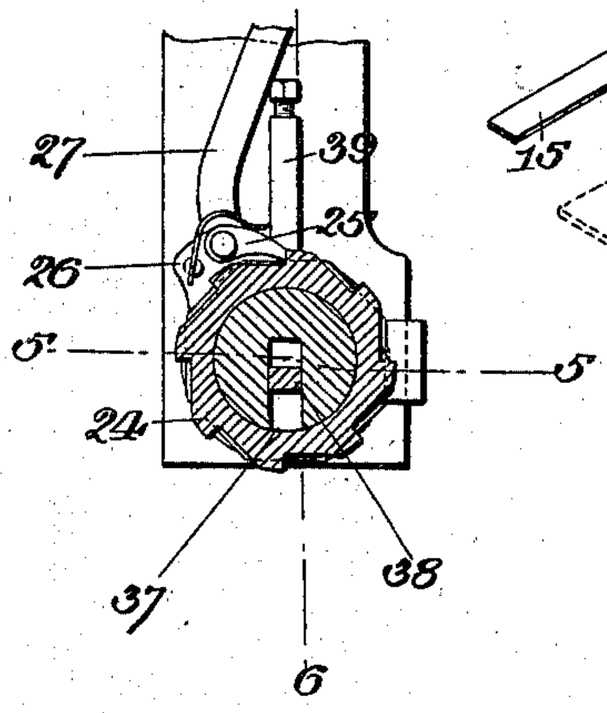


FIG. 4.



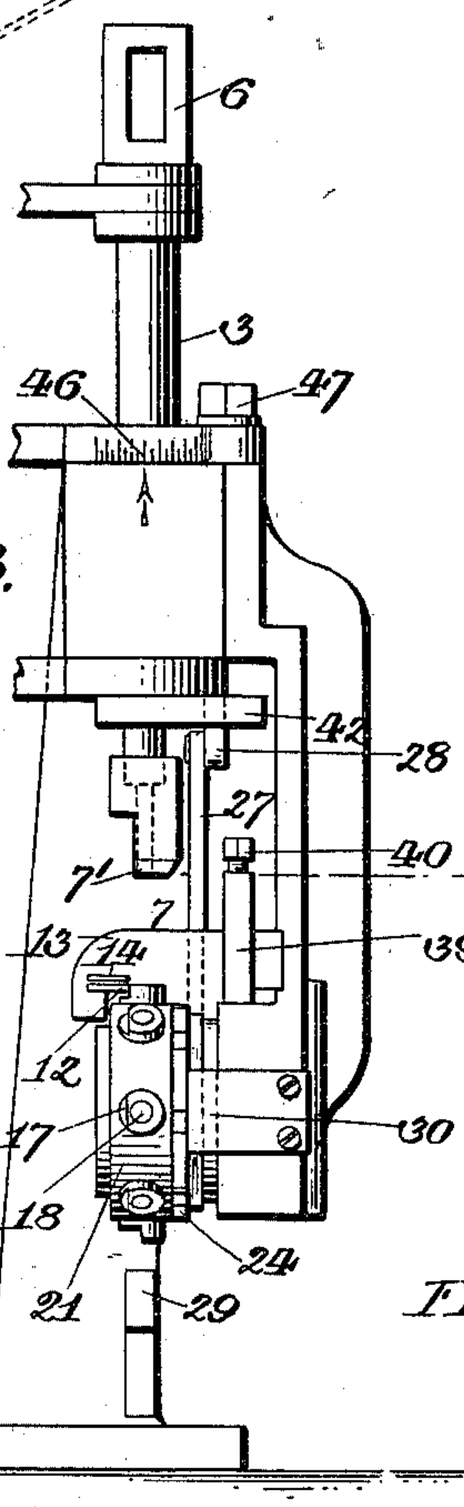


FIG. 3.

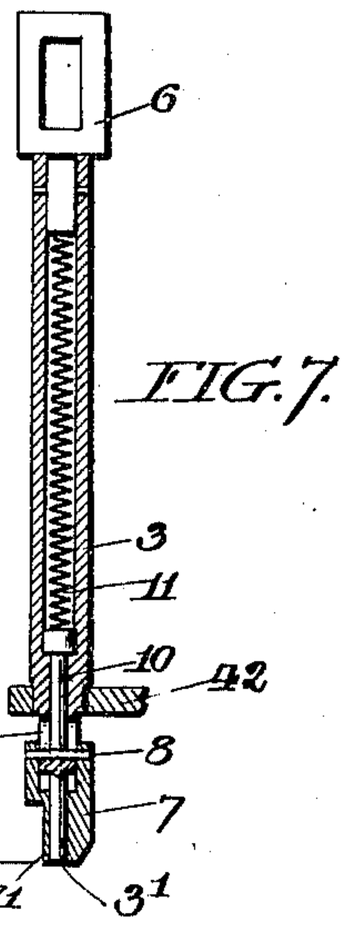
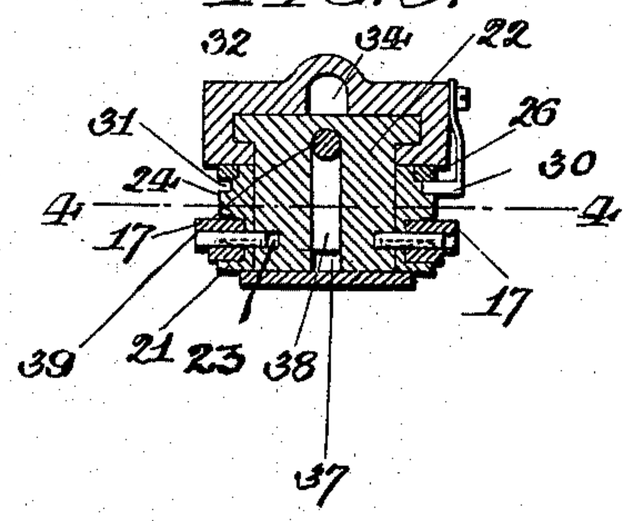


FIG. 7.

FIG. 5.



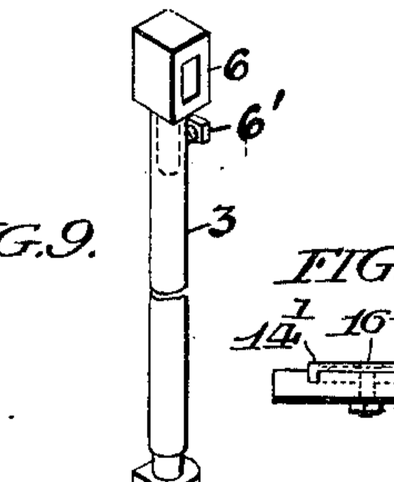


FIG. 9.

FIG. 10.

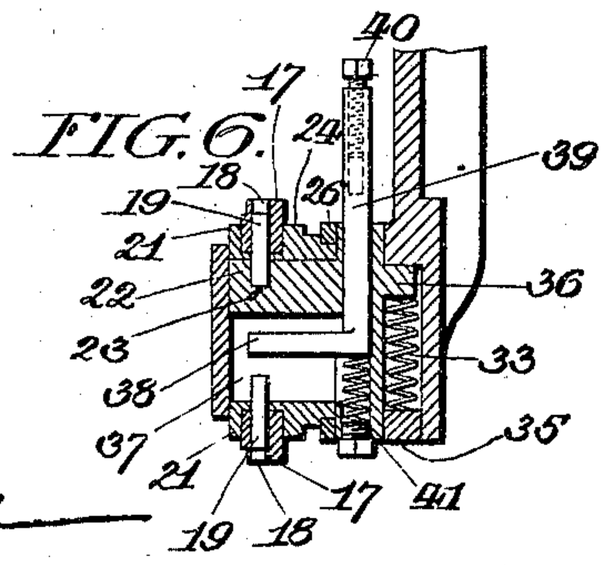


FIG. 6.

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No. 731,630. Patented June 23, 1903.

UNITED STATES PATENT OFFICE.

EDWARD A. SUVERKROP AND ROBERT COATES, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS TO HENRY T. C. WISE, OF PHILADELPHIA, PENNSYLVANIA.

STAPLE-MACHINE.

SPECIFICATION forming part of Letters Patent No. 731,630, dated June 23, 1903.

Application filed March 1, 1902. Serial No. 96,199. (No model.)

To all whom it may concern:

Be it known that we, EDWARD A. SUVERKROP and ROBERT COATES, residing in the city of Philadelphia, county of Philadelphia, and State of Pennsylvania, have jointly invented certain new and useful Improvements in Staple-Machines, of which the following is a specification.

This invention relates to machines for forming and setting staples, as in the manufacture of paper boxes and leather goods, for example. Its chief objects are to provide in a single machine mechanism for cutting variously-shaped blanks, forming staples of various proportions therefrom suitable for various uses and setting the staples so formed all in a continuous operation. The means employed to accomplish these objects permit the use of a metallic ribbon of uniform width, from which staples of various proportions can be formed. No waste of material is entailed, as no scrap is formed, all of the material being incorporated in the staples, which have a peculiar form, lending strength to the attachment which they make. The mechanism can be adjusted so as to vary the proportions of the staples at will.

The further objects and characteristic features of the improvements will more fully appear in the following description, taken in connection with the accompanying drawings in illustration of the invention, of which—

Figure 1 is a top plan view. Fig. 2 is a side elevation. Fig. 3 is a front elevation. Fig. 4 is a sectional view in illustration of the movable head, taken on the line 4 4 of Fig. 5. Fig. 5 is a sectional view taken on the line 5 5 of Fig. 4. Fig. 6 is a sectional view taken on the line 6 6 of Fig. 4. Fig. 7 is a sectional view showing details of the striking mechanism. Fig. 8 is a perspective view showing the striking-die mechanism in relation with the blank and staple as formed and set. Fig. 9 is a perspective view of means for adjusting the cutting mechanism, and Fig. 10 is an elevation in further illustration of the lower knife or shear shown in Fig. 9.

As illustrated in the drawings, the frame 1 has a head 2, which guides a vertically-reciprocating bar 3, operated by a lever 4, the lever being fulcrumed upon the frame-strut 5 and pivotally connected with the bar-head 6. The bar 3 has a die 7 movably connected therewith by means of a pin 8, which is fixed in the die and movably seated in the slot 9 of the bar. A pin 10, pressed down by a spring 11, bears upon the pin 8 and thrusts the die 7 downwardly; but when the die is stopped in the downward movement of the rod 3 the striking or forming pin 3′ has a further movement through the die, which is permitted by the play of the pin 8 in the slot 9 and the compression of the spring 11, caused by stopping the pin 10 in its downward movement with the rod 3. The die 7 has a shearing edge 7′, which coacts with a shear 12, supported by the frame-arm 13, a guide 14 controlling the movement of a ribbon of metal 15, which is fed to the shears and cut thereby into diamond-shaped blanks 16. The blank, which is cut by the descending die 7, is placed thereby upon one of a series of dies 17, each having a perforation 18, into which the striking-pin 3′ is adapted to force a blank against a pin 19, which plays in the perforation. A staple or rivet 20 is formed thereby and has the long points 20′ and the short points 20″, the former penetrating and binding the materials together, while the latter bite the surface and hold the head thereto.

The several dies 17 are fixed in a ring or collar 21, which revolves upon a bearing-head 22, having a peripheral channel 23, in which the inner ends of the several pins 19 move. The collar 21 is rotated by means of ratchet-teeth 24 thereon, which are engaged by a spring-pressed pawl 25, pivoted to a ring 26, loose on the collar, the ring being pivotally connected with a link 27, having a pivotal connection 28 with the reciprocating striking mechanism. By this mechanism the dies 17 are given a step-by-step motion, which carries them successively into registration with the die 7 and pin 3′ and successively over the anvil or work-holder 29, a spring-pressed pawl 30, riding upon the polygonal ring 31 on the collar, centering the dies. The head 22 is adapted to reciprocate in a guideway 32, supported by the frame, a spring 33, seated in the recess

34 and supported on the bearing 35, pressing upward against the lug 36 on the head, by which it is normally held in the position illustrated in Fig. 3. A recess 37, formed in the head and intersecting the channel 23, is occupied by a foot 38 on a vertically-reciprocating shank 39, having an adjustable head 40, the foot being pressed upward by the spring 41, supported by the head and bearing against the foot, and the foot being forced downward by the arm 42, fixed to the rod 3, in the path of which arm the head 40 is located. The downward stroke of the rod 3, by which the die 7 is caused to strike one of the dies 17 and the arm 42 is caused to strike the head 40, forces down the head 22 until the lowermost die 17 strikes the work-support 29 and at the same time forces down the foot 38 and the corresponding pin 19, which drives the staple seated in the perforation 18 through the material held on the anvil. When the rod 3 rises, the respective springs 33 and 41 lift the head 22 and foot 38 to their normal position, while the pawl 25, engaging with a ratchet-tooth 24, brings a succeeding die 17 under the striking-die 7 and a diametrically opposite die 17 over the anvil 29.

The feed mechanism comprises a frame 44, having arms 45, which are revolubly supported on the head 2, the position of the yoke and the angle at which the ribbon shall be fed being accurately determined by means of a gage 46, while the parts are held in the position to which they may be adjusted by means of a set-screw 47, which passes through a slot 48. A reel 49, journaled at 50 upon the frame, carries the metallic ribbon 15, which is fed over the shear 12, beneath the guide 14, by the rollers 52 52′, journaled in the frame, a positive action of the rollers being secured by means of the engaging gear-wheels 53 53′. A ratchet-wheel 54, fixed to the roller 52, is engaged by a pawl 55, which is pivoted on the rocking arm 56. The arm 56 is pivoted to one end of a link 57, the opposite end of which is pivotally connected with a bearing movably fixed in a slot 58 of a lever 59. The lever 59 has one end pivoted on the frame 44 and the opposite end pivoted to a link 60, which has a second pivotal connection with an arm 61, longitudinally fixed but revolubly movable on the rod 3, the arm being guided in its reciprocation by a rod 62 passing through it and fixed to the frame. It will be seen that by this mechanism the angle at which the blank is shorn from the metallic ribbon, and consequently the length of the prongs, may be varied by varying the position of the frame 44, and consequently the angle at which the metallic ribbon is fed to the shears. It will also be seen that by moving the connection of the link 57 with the lever 59 the rate of feed and the proportions of the staple may be varied. The angle at which the staple-blank is cut may also be varied by providing means for changing the position of the die-shear 7′ and the shear 12. This may be done by providing a revoluble connection between the rod 3 and the head 6 and employing a set-screw 6′ for holding the die-shear 7′ in the position to which it may be adjusted, and for correspondingly changing the lower shear a shear 14′, revoluble in a seat 15′, may be employed and fixed in the position to which it may be adjusted by means of a set-screw 16′ passing through the shear-slot 17′ and the seat 15′.

It will now be seen that the oscillation of the lever 4, which reciprocates the rod 3 upon the downward stroke, causes the shears 7′ and 12 to cut from the tape or ribbon 15 the blank 16, and the die 7 with its pin 3′, aided by the die 17 and its pin or plunger 19, to form the staple 20. The downward stroke, which forms the blank and staple in the uppermost die 17, forces down the head 22 until the lowermost die 17 strikes the material on the anvil 29, and the foot 38, driven down by the arm 42, strikes the plunger 19, which sets the staple that is seated in the perforation 18 and rivets it in the work supported by the anvil. Upon the upward stroke the pawl 25, engaging with a tooth 24, advances the ring or collar 21, bringing a succeeding die 17 under the die 7 and a succeeding die 17 over the anvil 29, while the springs 33 and 41 elevate the head 22 and the foot 38, and coincidently with this operation the feeding mechanism connected with the rod 3 causes the feed-rollers 52 52′ to advance the tape sufficiently for the production of a succeeding blank and staple. By adjusting the shears 7′ and 14′ or by adjusting the frame 44 the angle at which the tape or ribbon 15 is shorn may be varied, and by adjusting the connection of the link 57 with the lever 59 the length of ribbon fed at each shearing operation may be varied. Hence the diamond-shaped blank and the staple formed therefrom may readily be varied at will.

Having thus described our invention, we claim—

1. In a machine of the class described, in combination, a swinging frame, ribbon-feeding mechanism carried by said frame, mechanism for shearing blanks from said ribbon, and mechanism for forming staples from said blanks, said frame swinging on its support relatively to said shearing mechanism, substantially as specified.

2. In a machine of the class described, in combination, a swinging frame, ribbon-feeding mechanism carried by said frame, mechanism for shearing blanks from said ribbon, mechanism for forming staples from said blanks, and mechanism for setting and riveting said staples, said frame swinging on its support relatively to said shearing mechanism, substantially as specified.

3. In a machine of the class described, the combination of swinging ribbon-feeding mechanism, with shearing mechanism which

cuts said ribbon diagonally into diamond-shaped blanks, mechanism for forming staples from said blanks, and mechanism for setting and riveting said staples, substantially as specified.

4. In a machine of the class described, the combination of ribbon-feeding mechanism, with revoluble shearing mechanism for cutting blanks of various shapes from said ribbon, mechanism for forming said blanks into staples, and mechanism for setting and riveting said staples, substantially as specified.

5. In a machine of the class described, in combination, a swinging frame, ribbon-feeding mechanism carried by said frame, revoluble shearing mechanism for cutting blanks from said ribbon, and mechanism for forming said blanks into staples, said frame swinging on its support relatively to said shearing mechanism, substantially as described.

6. In a machine of the class described, a frame swinging on its support, in combination with a reel, a pair of feed-rollers, a ratchet-wheel connected with one of said feed-rollers, a reciprocating pawl for operating said ratchet-wheel, a reciprocating rod, and mechanism connecting said reciprocating rod and pawl for operating said feed-rollers, substantially as specified.

7. In a machine of the class described, a reel, a pair of feed-rollers, a ratchet-wheel connected with one of said feed-rollers, a rocking arm, a pawl carried by said rocking arm for operating said ratchet-wheel, a second rocking arm, a link connecting said rocking arms having an adjustable connection with one of said arms for varying the feed, a shear, a reciprocating rod for operating said shear, and mechanism connecting said reciprocating rod with said second rocking arm for operating said feed-rollers, substantially as specified.

8. In a machine of the class described, a pair of feed-rollers, pawl-and-ratchet mechanism for operating said feed-rollers, a rocking arm connected with said pawl-and-ratchet mechanism, a second rocking arm connected with the first rocking arm, a shear, a reciprocating rod for operating said shear, and a link connecting said reciprocating rod and second rocking arm for operating said pawl-and-ratchet mechanism, substantially as specified.

9. In a machine of the class described, a swinging frame, a pair of feed-rollers, pawl-and-ratchet mechanism for operating said feed-rollers, a rocking arm connected with said pawl-and-ratchet mechanism, a shear, a reciprocating rod for operating said shear, a collar revoluble in said reciprocating rod, and a link connecting said collar and rocking arm, said frame swinging on its support relatively to said shear, substantially as specified.

10. In a machine of the class described, shearing mechanism, feeding mechanism adjustable to feed said shearing mechanism at variable angles, in combination with staple forming and setting mechanism comprising a vertically-reciprocating head having a series of revoluble dies each having a reciprocating plunger therein, substantially as specified.

11. In a machine of the class described, a series of revolving and vertically-reciprocating dies each having a reciprocating plunger therein, in combination with a reciprocating die coacting with said revoluble dies and a reciprocating foot coacting with said plungers, substantially as specified.

12. In a machine of the class described, a series of revoluble and vertically-reciprocating dies each having a reciprocating plunger therein, a reciprocating die coacting with said revoluble dies, a reciprocating foot coacting with said reciprocating plungers, and mechanism for operating said reciprocating die connected with mechanism for advancing said revoluble dies step by step, substantially as set forth.

13. In a machine of the class described, a series of revoluble and vertically-reciprocating dies each having a reciprocating plunger therein, a reciprocating rod, die mechanism operated by said rod coacting with said revoluble and vertically-reciprocating dies successively, mechanism operated by said rod for striking said plungers successively, and mechanism for advancing said revoluble dies step by step, substantially as specified.

14. In a machine of the class described, a reciprocating head, a series of dies revoluble on said head, a reciprocating rod, striking mechanism for shearing and forming a blank coacting with said revoluble dies successively, and mechanism operated by said reciprocating rod for advancing said revoluble dies step by step, substantially as specified.

15. In a machine of the class described, an anvil, a series of revoluble and vertically-reciprocating dies each having a reciprocating plunger therein, vertically-reciprocating shearing and forming mechanism coacting with said revoluble dies successively, and mechanism for varying the direction of feed with respect to said shearing and forming mechanism, substantially as specified.

16. In a machine of the class described, mechanism for cutting a diamond-shaped blank from a metallic ribbon, in combination with mechanism for forming said blank into a staple having four prongs of varied lengths, and mechanism for setting said staple, whereby the long prongs thereof are caused to penetrate and rivet and the short prongs to penetrate or grip without riveting, substantially as specified.

In testimony whereof we have hereunto signed our names to this specification in the presence of two subscribing witnesses.

EDWARD A. SUVERKROP.
ROBERT COATES.

Witnesses:
A. FLORENCE YERGER,
G. G. STUART.