(No Model.) 4 Sheets—Sheet 1.

E. L. BUDLONG.

METHOD OF AND MACHINE FOR MAKING SHEET METAL BELT FASTENERS.

No. 503,035. Patented Aug. 8, 1893.

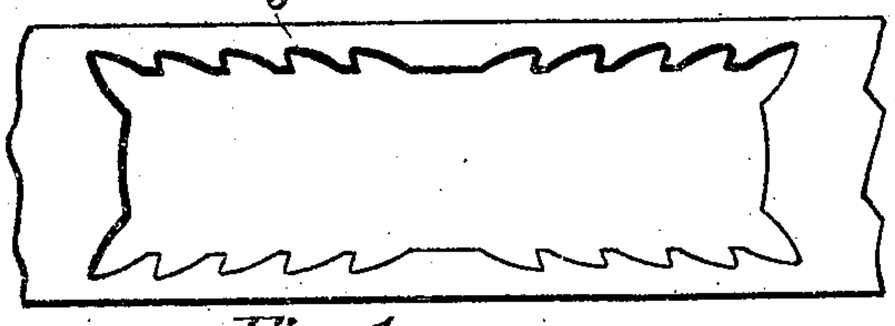


Fig. 1

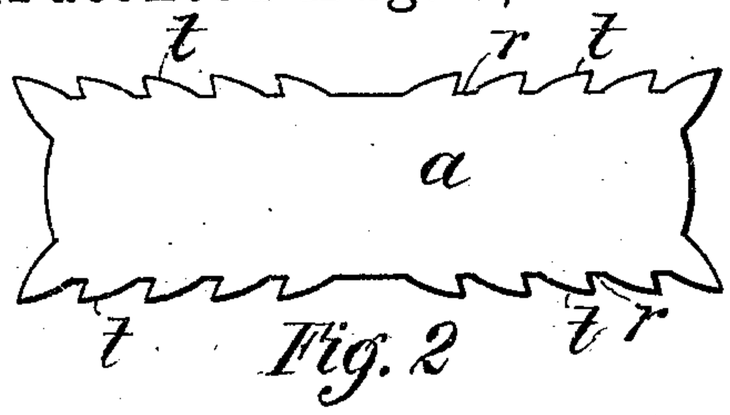


Fig. 2

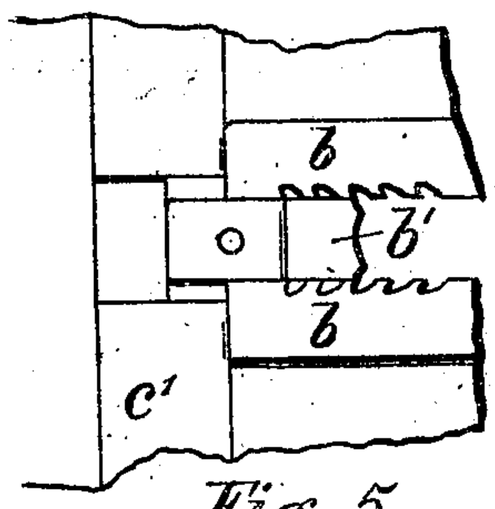
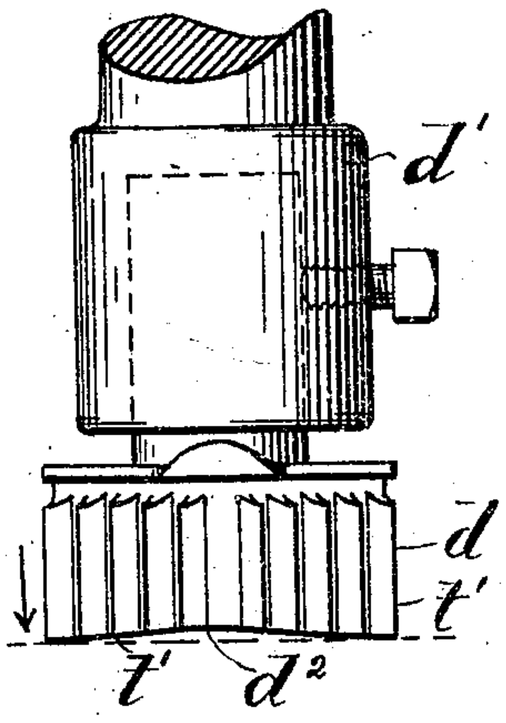


Fig. 5



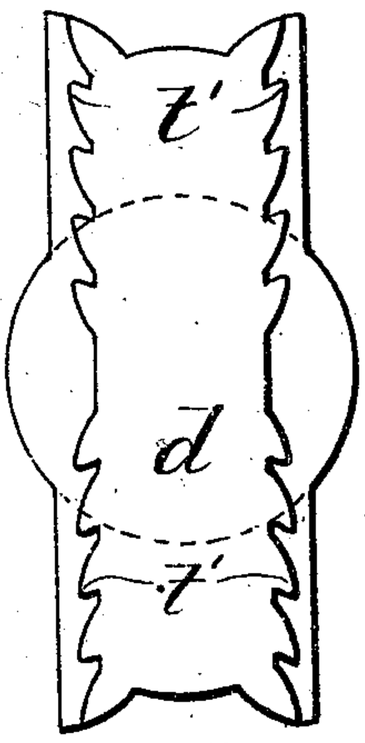


Fig. 6

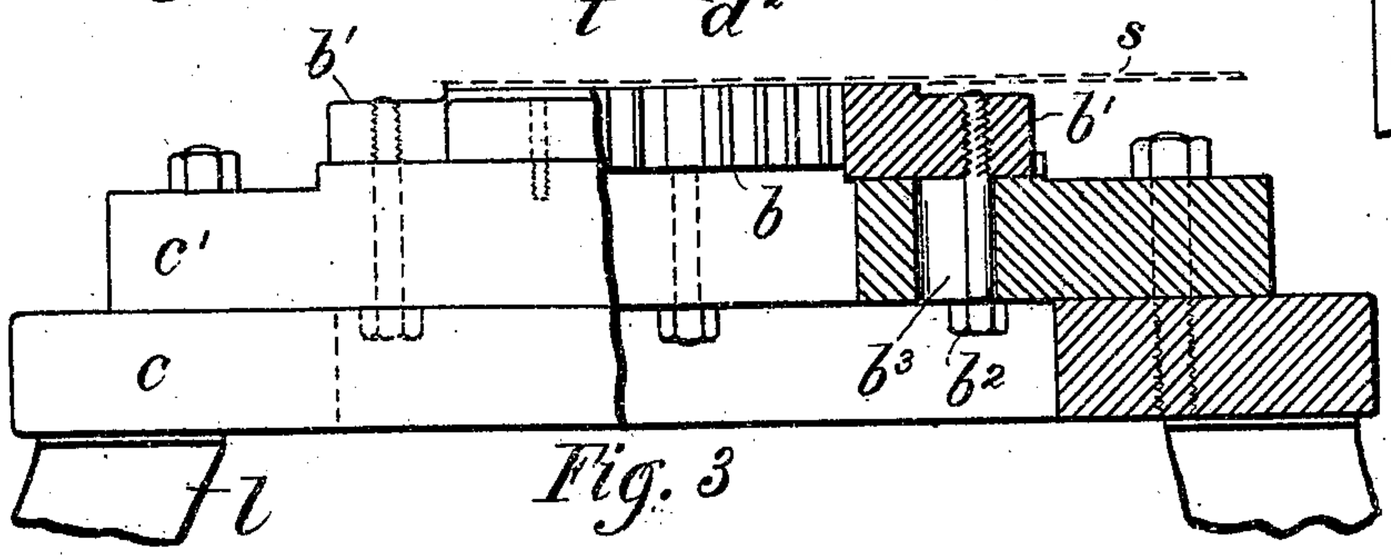


Fig. 3

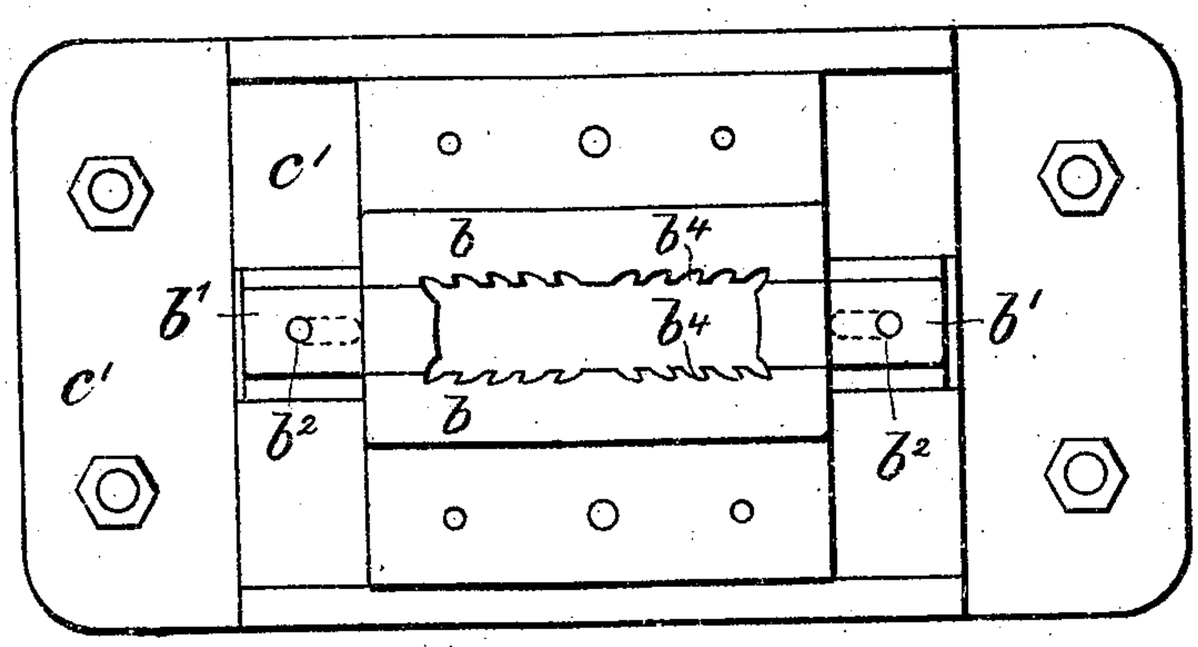
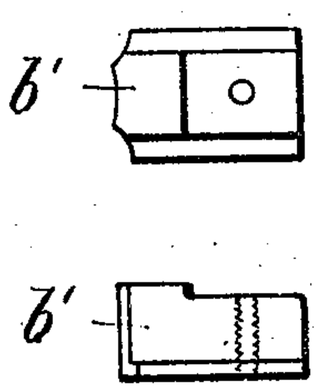


Fig. 4

Fig. 7



WITNESSES

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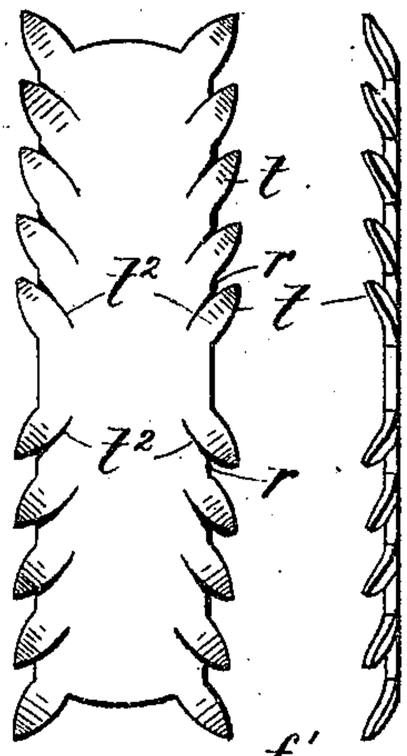
METHOD OF AND MACHINE FOR MAKING SHEET METAL BELT FASTENERS.

No. 503,035. Patented Aug. 8, 1893.

Fig. 13



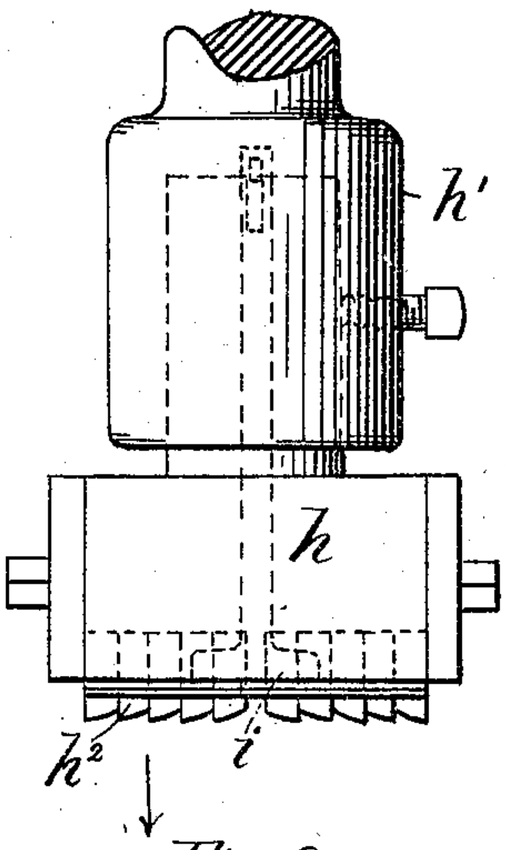


Fig. 8

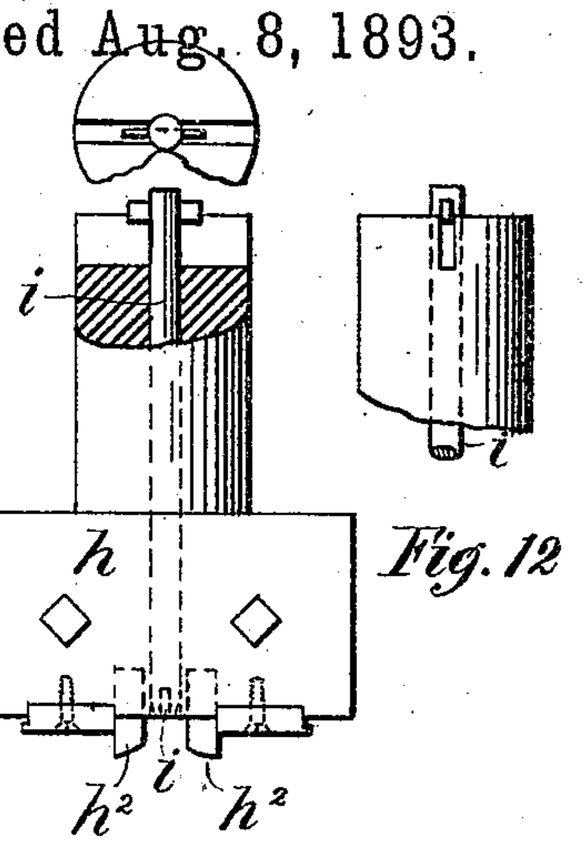
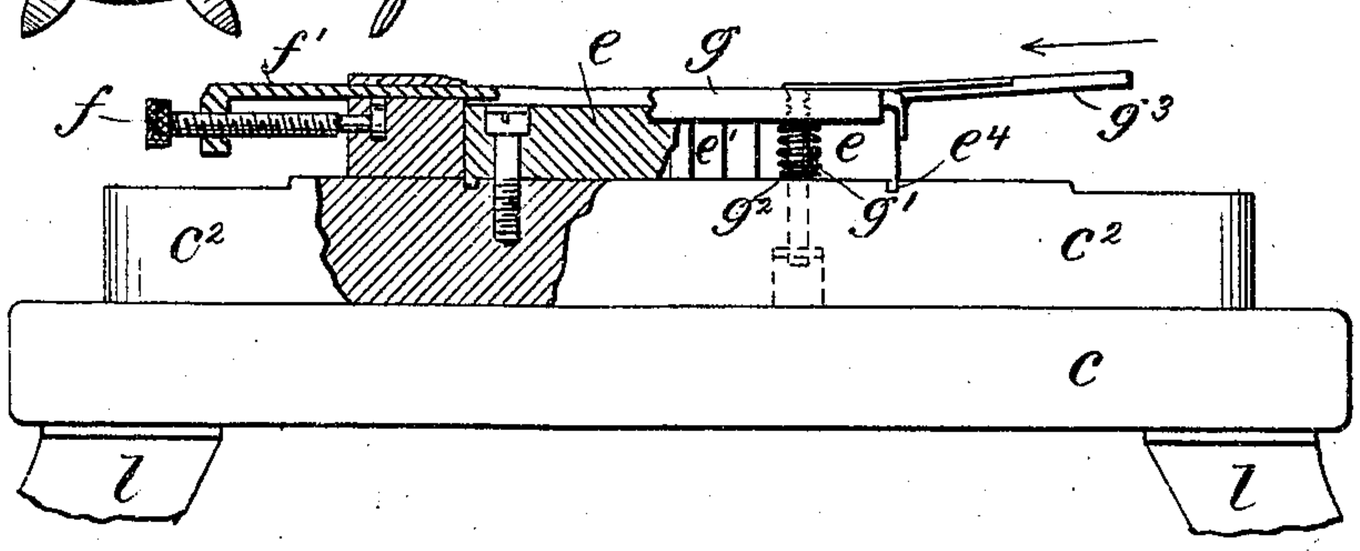


Fig. 12



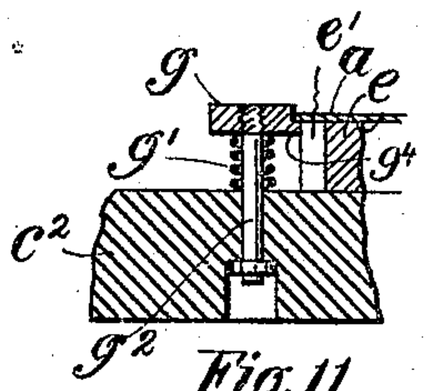


Fig. 11

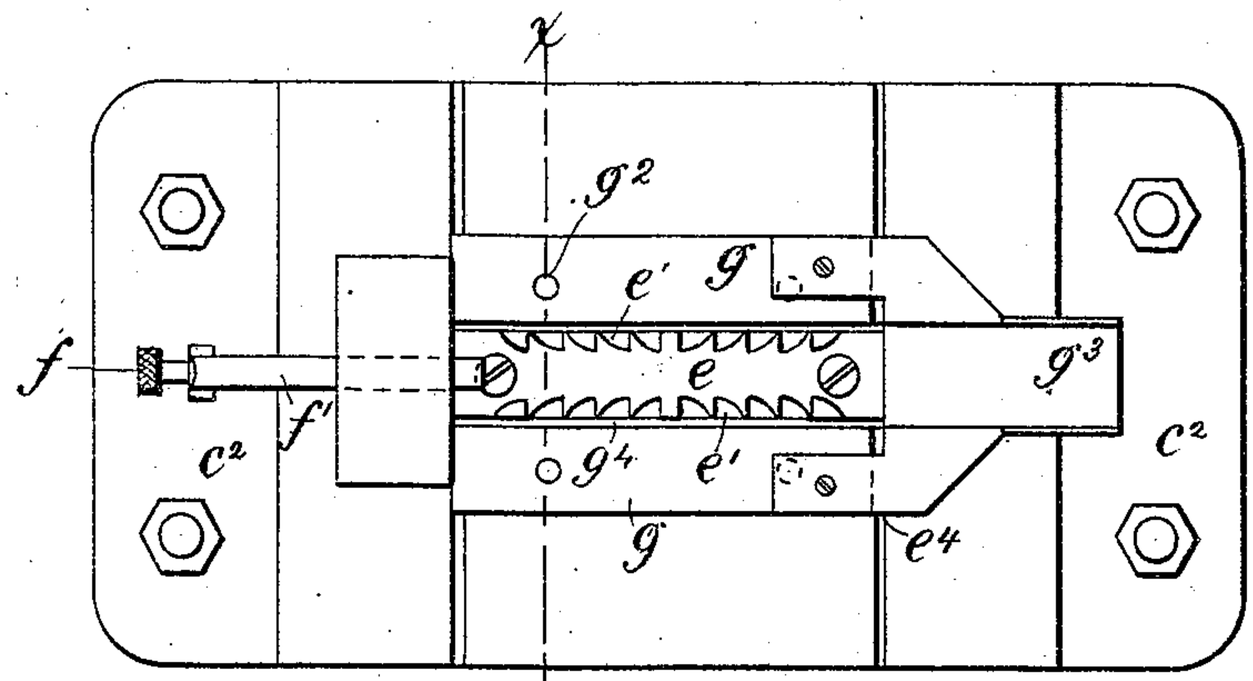


Fig. 9

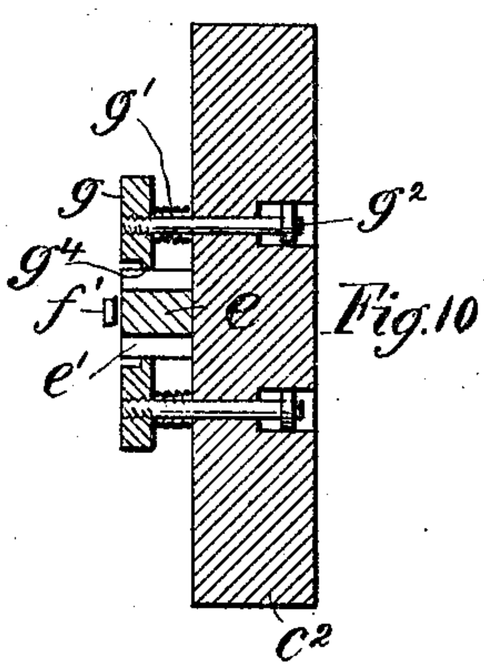


Fig. 10

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(No Model.) 4 Sheets—Sheet 3.

E. L. BUDLONG.

METHOD OF AND MACHINE FOR MAKING SHEET METAL BELT FASTENERS.

No. 503,035. Patented Aug. 8, 1893.

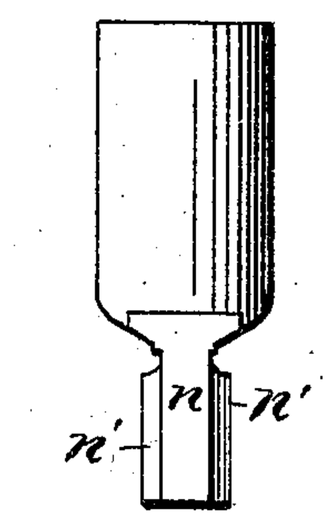
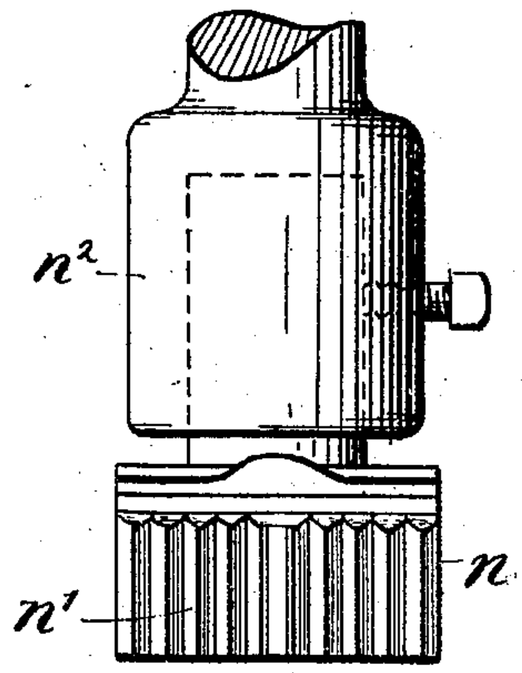


Fig. 17



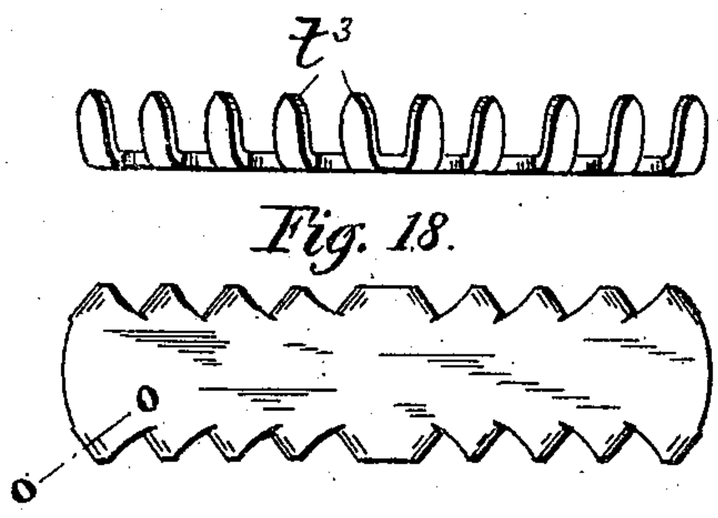


Fig. 18.

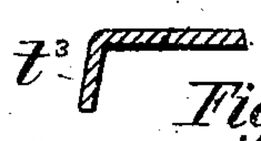


Fig. 19

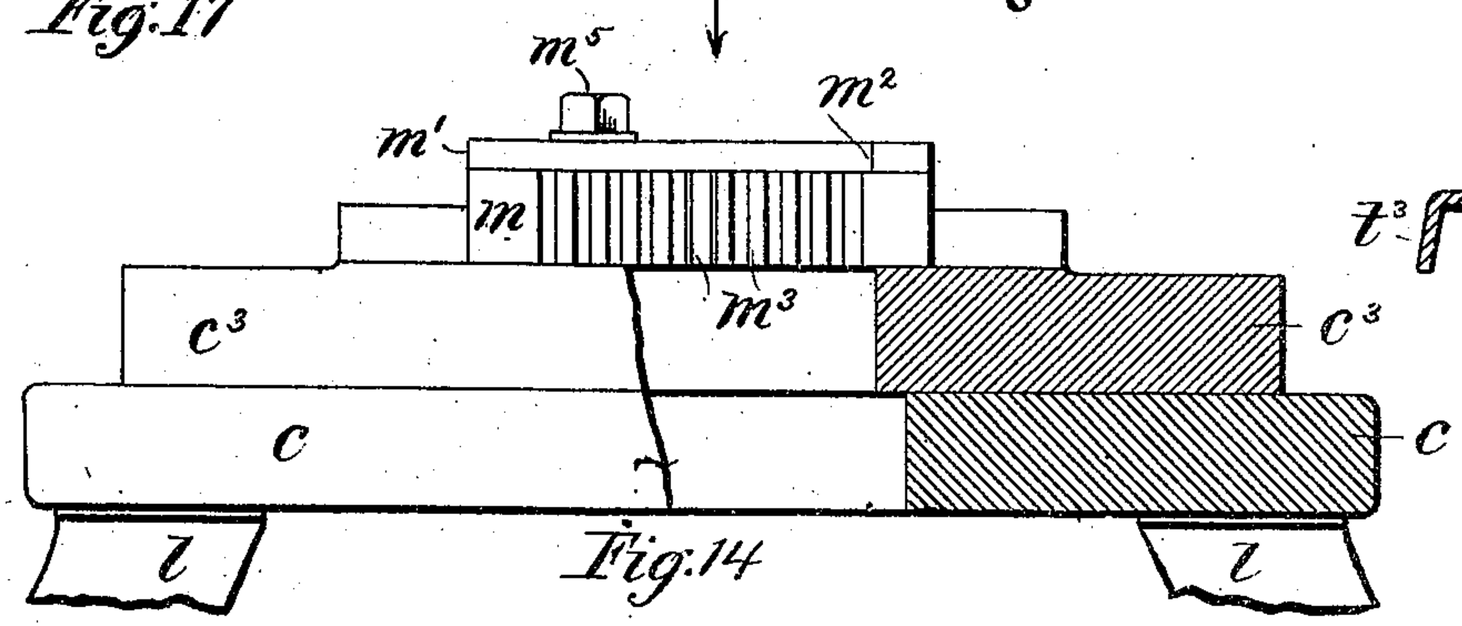


Fig. 14

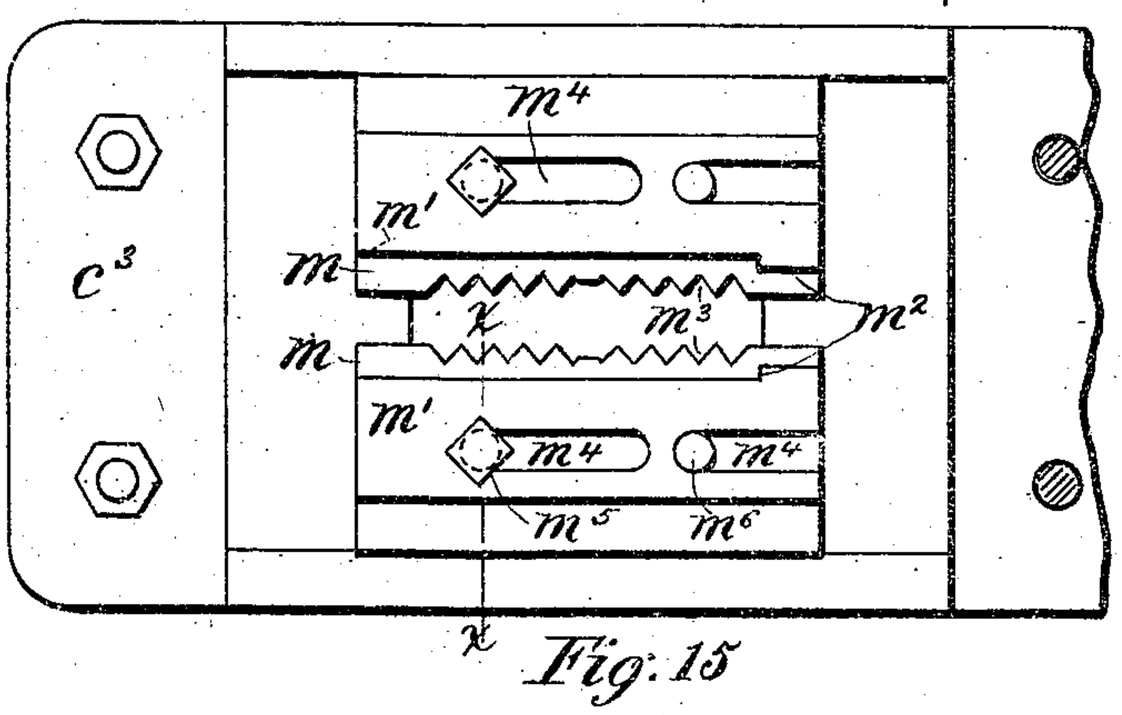


Fig. 15

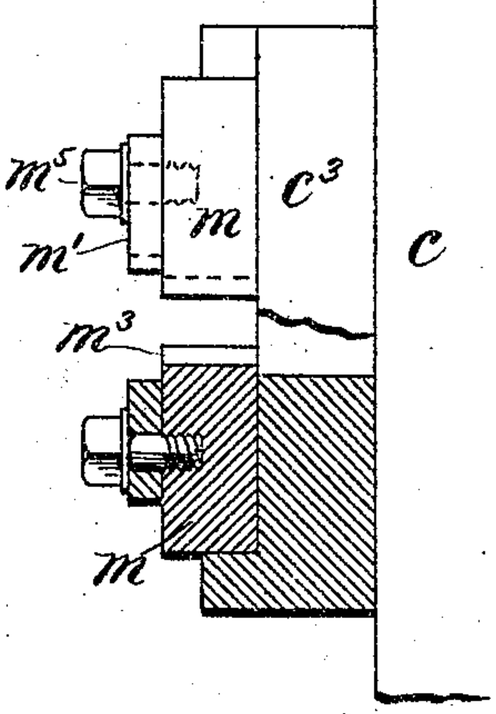


Fig. 16

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(No Model.) 4 Sheets—Sheet 4.

E. L. BUDLONG.

METHOD OF AND MACHINE FOR MAKING SHEET METAL BELT FASTENERS.

No. 503,035. Patented Aug. 8, 1893.

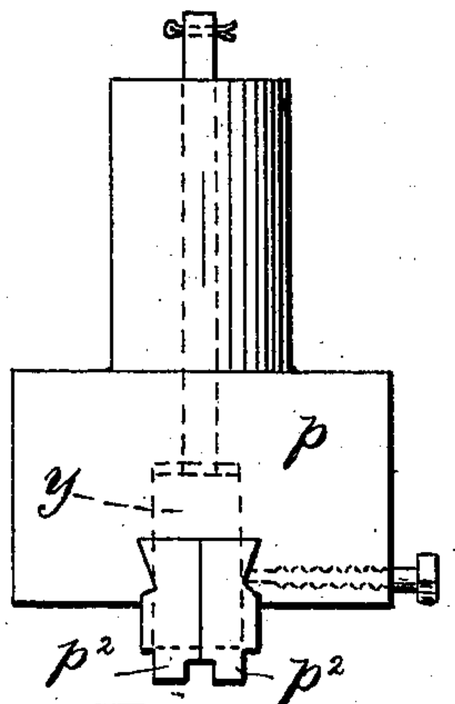


Fig. 23

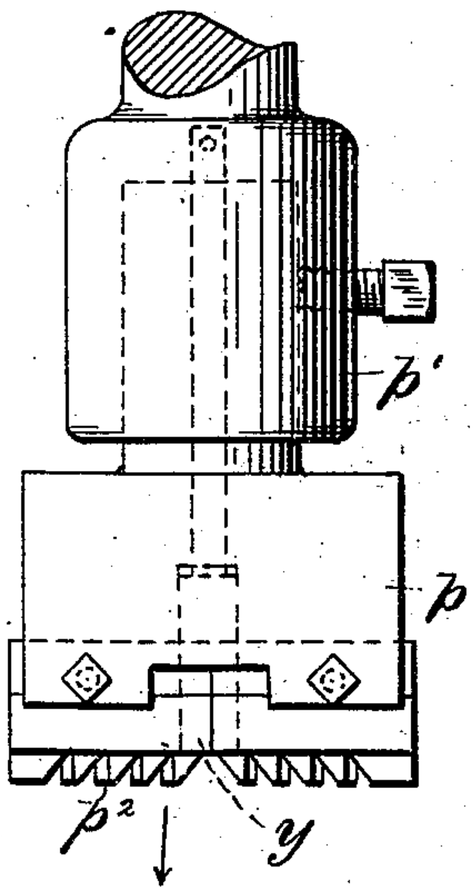


Fig. 20

Fig. 26

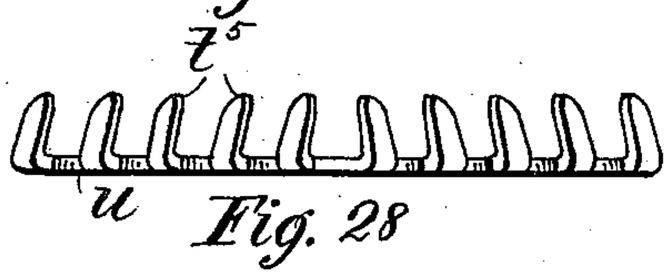


Fig. 28

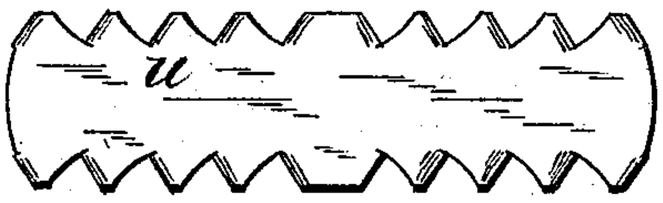


Fig. 27

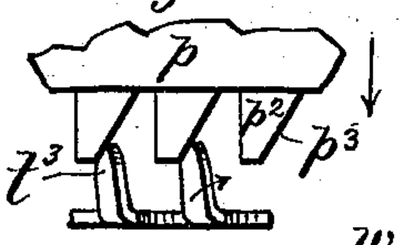
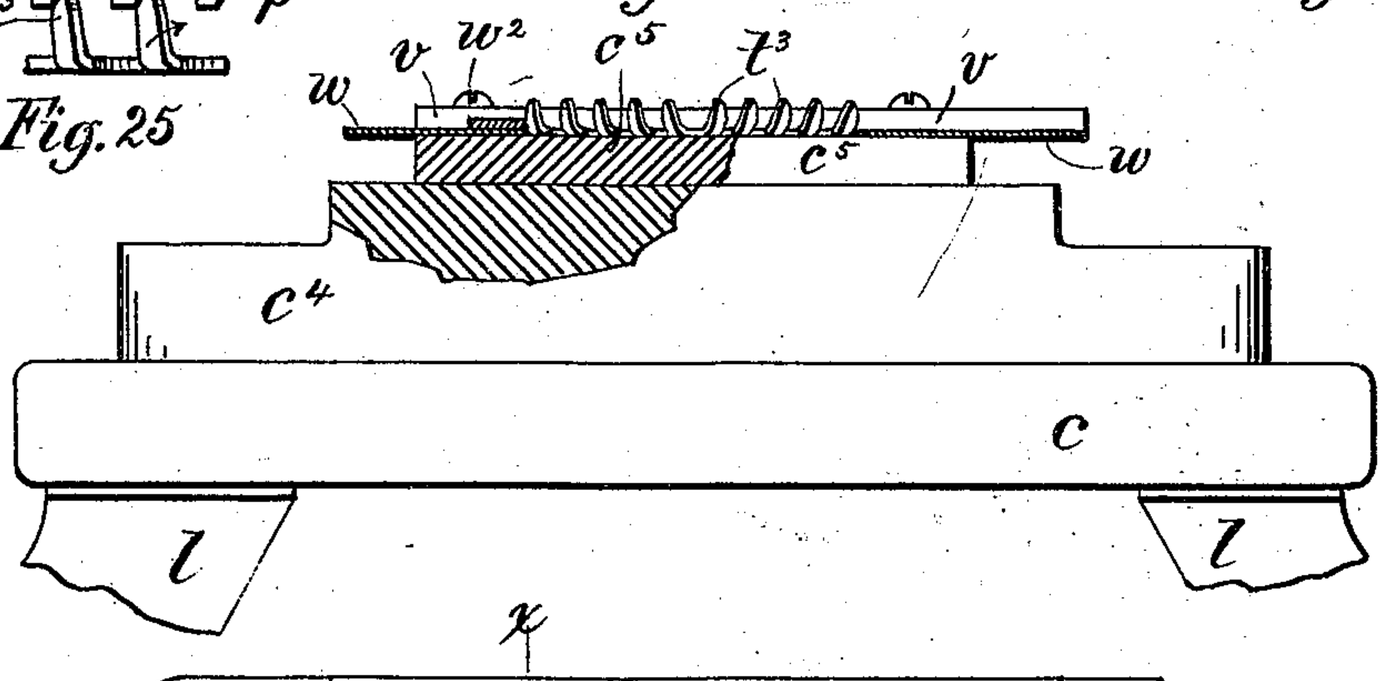


Fig. 25



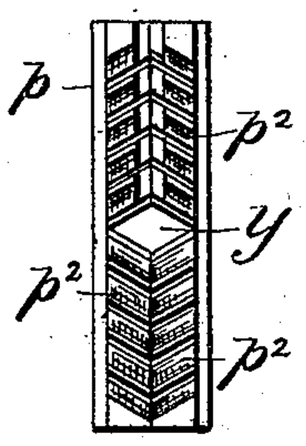


Fig. 24

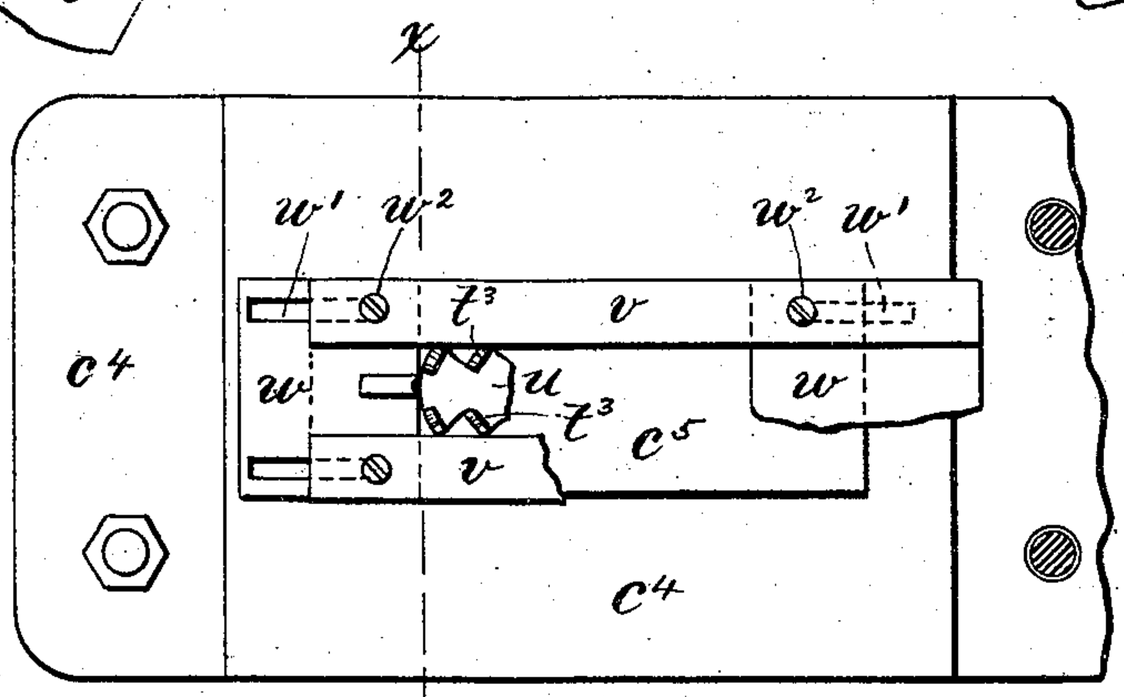


Fig. 21

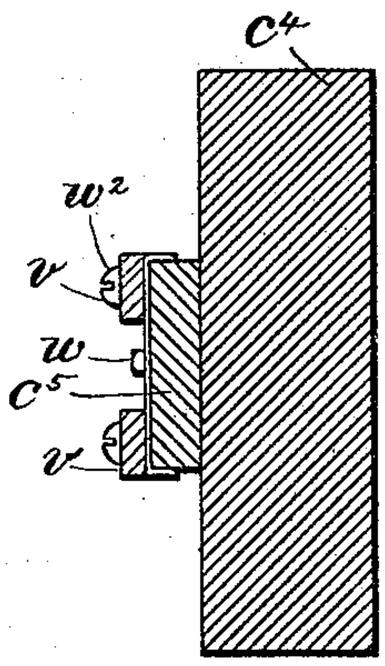


Fig. 22

WITNESSES.

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UNITED STATES PATENT OFFICE.

EDWARD L. BUDLONG, OF CHICAGO, ILLINOIS, ASSIGNOR TO WALTER O. TALCOTT, OF PROVIDENCE, RHODE ISLAND.

METHOD OF AND MACHINE FOR MAKING SHEET-METAL BELT-FASTENERS.

SPECIFICATION forming part of Letters Patent No. 503,035, dated August 8, 1893.

Application filed June 27, 1892. Serial No. 438,103. (No model.)

To all whom it may concern:

Be it known that I, EDWARD L. BUDLONG, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in the Manufacture of and Dies for Making Sheet-Metal Belt-Fasteners; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

In a patent of the United States, granted to me July 1, 1890, No. 431,103, I have described a belt-fastener made from sheet metal.

My present invention relates to the type of belt-fasteners (or belt-hooks as they are commonly called) just referred to, but more particularly to an improvement in the manner of making them and the mechanisms or dies employed in their manufacture; and it consists essentially in first punching a blank having serrated edges from the piece of sheet metal, next, elongating the serrated portions by cutting or slitting the metal obliquely to form teeth and partially bending them, then bending the teeth so as to stand at substantially right angles with the base, and finally inclining them from the plane of the perpendicular.

The invention further consists of a series of dies arranged to be mounted in a suitable press or punching machine, said dies being readily adjustable and adapted to produce belt-fasteners varying both in length and in the number of teeth, all as will be more fully hereinafter set forth and claimed.

In the accompanying four sheets of drawings, illustrating my invention, Figure 1, Sheet 1, is a plan view of a strip of sheet metal from which a belt-fastener blank has been cut. Fig. 2 is a similar view of the blank itself. Fig. 3 is a side elevation, in reduced scale, in partial central section, showing a mounted punch and die in position preparatory to forming the blank. Fig. 4 is a plan view of the die. Fig. 5 is a similar view of a portion of the die, showing the latter adjusted to cut a shorter belt-fastener. Fig. 6 is an inverted plan view of the punch, or male die. Fig. 7 represents plan and side views of the adjustable end portion of the lower die-block. Fig. 8, Sheet 2, is a side elevation in partial central section of the second punch and die arranged to further cut the blank and produce an initial bend in the teeth. Fig. 9 is a corresponding plan view of the die. Fig. 10 is a transverse sectional view, taken on line *x x* of Fig. 9, showing the yielding guide depressed. Fig. 11 is a similar view, taken through one side, showing the guide in its normal or elevated position. Fig. 12 represents plan and side views of the adjustable combined cutting and bending punch, also shown in said Fig. 8. Fig. 13 represents plan and side views, enlarged, of the blank after being operated upon by the second punch and die. Fig. 14, Sheet 3, is a side elevation, in partial central section, of the third punch and die arranged to still further bend the teeth of the fastener after passing from the second die. Fig. 15 is a corresponding plan view of the die. Fig. 16 is an end view of the die, the same being in partial section and taken on line *x x* of Fig. 15. Fig. 17 is a side elevation of the corresponding punch or male die. Fig. 18 represents, in enlarged scale, plan and side views of the belt-fastener after passing through the dies last referred to. Fig. 19 is a partial sectional view of the fastener, taken on line *o o* of Fig. 18. Fig. 20, Sheet 4, is a side elevation, in partial section, of the finishing die and punch. Fig. 21 is a plan view of the die itself. Fig. 22 is a transverse sectional view of the same, taken on line *x x* of Fig. 21. Fig. 23 is a side view of the movable punch or former. Fig. 24 is an inverted end view of the same. Fig. 25 is an enlarged partial side view, showing the forming portion of the punch in the act of completely bending the teeth. Fig. 26 is a similar, although sectional, view, showing the teeth fully bent. Fig. 27 is a plan view of the completed fastener, and Fig. 28 is a side view of the same, the teeth being inclined from the plane of the perpendicular.

The following is a more detailed description of my invention,—*a*, Fig. 2, referring to the drawings, indicates a blank having serrated outer edges longitudinally of its axis;

the projections t, alternating with grooves or recesses r, forming semi-teeth which in the next operation are elongated by slitting the metal at the root of the same. The blank is formed in a suitable press and adapted to punching sheet steel having a thickness equal say to No. 15 gage. The press bed c may be supported on legs l as usual. To the top of the bed is secured the die-holder c' carrying the die b. The ends b' of the latter are movable and are secured in position after adjustment by bolts b^2, the latter passing through slotted openings b^3, as clearly shown in Figs. 3 and 4. Mounted to reciprocate up and down above the bed is the punch or male die d having its sides provided with projections t' which form the counterpart of the serrations b^4 of the die-cavity. The punch is held in a suitable holder d'; the face of the former being slightly concave, as at d^2, thereby insuring a more gradual cutting of the blank; the shearing action commencing at the end portions. In making my improved sheet metal belt-fasteners I usually make them uniform in width but vary them in length. As drawn the maximum length represents ten teeth on each side of the plate; but a fastener having six teeth may be produced by a readjustment of the end pieces b' of the die, as indicated in Fig. 5. Obviously it may be adjusted to blanks having other variations in the number of teeth. In such case it is apparent that a punch having a corresponding number of teeth must be employed.

The blanks A as punched from the strip of sheet metal stock s are next transferred to a die e secured to the holder c^2, Figs. 8 and 9, where they are acted upon by the punch h whose face is provided with a series of combined shearing and bending cutters h^2 whose contour or outline is substantially the counterpart of the groove e' formed in the die e. A yielding blank-supporting frame g extends along the two sides of the upper portion of the die. One end of the die is provided with a movable stop f' for properly centering the blanks before they are acted upon by the punch h; a screw f being employed to effect the adjustment of the stop. The opposite end of the die is provided with an inclined trough or chute g^3 secured to the said guide-frame g. Now, upon sliding a blank a down the chute it is first arrested by the previously adjusted stop f', at the same time being partly supported laterally by the lips g^4 of the frame g, see Fig. 11. The punch h in descending causes the cutters h^2 to engage the blank and to further slit the root of the teeth, as at t^2, and at the same time slightly bend them, as shown in Fig. 13. Fig. 10 shows the corresponding position of the yielding guide g at the termination of the punch's movement. The latter in returning to its normal position permits the springs g' to operate, thereby forcing the bent fastener-blank upwardly from the die e, preparatory to being removed and replaced by another blank a. Owing to the fact that the blanks are liable to adhere to the cutters, I further provide the punch with a well-known form of movable clearer i (shown by dotted lines) which upon being depressed drops below the face of the cutters and forces the fastener or blank from the punch. The several cutters h^2 may be formed from a solid piece of steel in lieu of being separate and insertible. In the latter case, however, the punch h can be adjusted to blanks varying in length.

The thus partially bent blanks are next transferred to a die m, Figs. 14 and 15, for the purpose of further bending the teeth. This die is provided along its opposite sides with V-shaped ribs and grooves m^3 arranged to receive the toothed portions of the fastener. The die is secured to a holder c^3 in turn secured to the bed c. To the face of the die, on each side, are mounted a pin m^6 and bolt m^5. These pass through a slotted or adjustable guide-stop m'; one end of the latter forming a shoulder m^2 against which the end of the blank rests, the bolts m^5 serving to secure the stops in position after adjustment. The punch n, Fig. 14, is provided with vertical V-shaped grooves and ribs n' forming the counterpart of those formed in the die m, and is secured to a suitable holder n^2. Now, upon placing the blank inverted upon the die and forcing the punch or follower downwardly the several teeth (t, Fig. 13) will be bent upwardly at right angles with the base, the fastener at the same time being forced downwardly through the die m by the action of the plunger n. As the thus bent fastener leaves the die the teeth usually spring rearwardly to some extent, owing to the resiliency of the metal, or as indicated in the side elevation, Fig. 18. If the fasteners were used in this form it would be extremely difficult to force the prongs through the belt, owing to the tendency of the teeth to spread apart. Therefore in order to overcome this defect I subject the fasteners to another operation involving the use of dies which bend the teeth so that they stand at an inclination with the plane of the perpendicular.

The means for effecting the result last referred to is illustrated in Sheet 4 of the drawings, wherein c^4 indicates a base having a flat block or platen c^5 secured thereto. To this block are fastened two upper side bars v separated laterally a distance equal to the width of the belt-fastener, and between which the latter is placed and held while it is receiving the final bending. It will be seen that a stop w is interposed at each end between the face of the block and the bars v. These stops are adjusted or separated a distance equal to the length of the fastener through the medium of the slots w' and screws w^2, as clearly indicated in Fig. 21. The punch p or bending-die proper is mounted above the die-block c^5, and is provided on its bottom or working face with a series of obliquely arranged oppositely facing projections or formers p^2 having the

inner or acting face p^3 beveled, as clearly represented. Now upon forcing the bending-head p downwardly (a fastener having previously been placed upon the die-block) it causes the inner faces of the projections p^2 to first engage the outer surface of the fastener teeth t^3, as shown in Fig. 25, thus gradually bending the latter inwardly or until they pass the plane of the perpendicular.

Fig. 26 represents the relation of the parts at the termination of the bending-head's movement, although the degree of inclination of the teeth t^5 of the complete fastener u shown is somewhat exaggerated. By thus inclining the face of the formers p^2 and arranging them obliquely, as shown also in Fig. 24, I am enabled to simultaneously bend the entire series of fastener-teeth in the proper directions; the finished product being indicated in Figs. 27 and 28. This head or punch p is provided with a clearer y which by depression operates to automatically dislodge the fastener from the punch, substantially as before stated with reference to the clearer i.

I claim as my invention—

1. The improvement in the manufacture of sheet metal belt-fasteners, the same consisting first, in punching a fastener-blank from the stock or plate; next, cutting or slitting the blank obliquely along its longitudinal edges to form teeth and partially bending them; then bending the teeth at substantially right angles with the base, and finally inclining the teeth from the plane of the perpendicular, substantially as described.

2. The improvement in the manufacture of sheet metal belt-fasteners, the same consisting in cutting a series of oblique slits in the sides of the blank or piece of sheet metal; then bending said slitted portions so as to form teeth standing at substantially right angles with the plate or base, and then inclining the teeth from the plane of the perpendicular, substantially as described.

3. In a machine or mechanisms for making sheet metal belt-fasteners, the combination of a male and female die for cutting the blank from the stock; a male and female die for obliquely slitting the blank and partly bending the teeth; a male and female die for bending the teeth at substantially right angles with the fastener base, and dies for inclining the thus bent teeth from the plane of the perpendicular, substantially as described.

4. In a machine for making sheet metal belt-fasteners, the combination of a blanking die having adjustable end portions arranged to produce belt-fastener blanks varying in length and in the number of teeth, and a punch or follower forming the counterpart of the die, substantially as described.

5. In a machine for making sheet metal belt-fasteners, the combination of a fixed die arranged to receive a belt-fastener blank, an adjustable stop arranged to engage the blank and hold it in position in the die, and a punch or follower provided with a series of cutters arranged to slit the fastener-blank and partially bend the teeth, substantially as described.

6. In a machine for making sheet metal belt-fasteners, the combination of a bending die provided with adjustable stops arranged to engage the end of the fastener-blank, and a punch or male die having its opposite longitudinal sides provided with a series of V-shaped grooves and ribs parallel with its axis and fitting the bending die, substantially as described.

7. In a machine for making sheet metal belt-fasteners, the combination of an adjustable die or base arranged to receive the belt-fastener inverted, and a follower punch or male die having its face provided with a series of inclined ribs arranged to engage the points of the fastener teeth and gradually incline them from the plane of the perpendicular, substantially as described.

In testimony whereof I have affixed my signature in presence of two witnesses.

EDW. L. BUDLONG.

Witnesses:

JOS. J. BUDLONG,

WILLIAM KELLEY.