(No Model.) 5 Sheets—Sheet 1.

J. W. GRANT.

METAL BLANKING AND STUDDING MACHINE.

No. 589,598. Patented Sept. 7, 1897.

Fig. 1

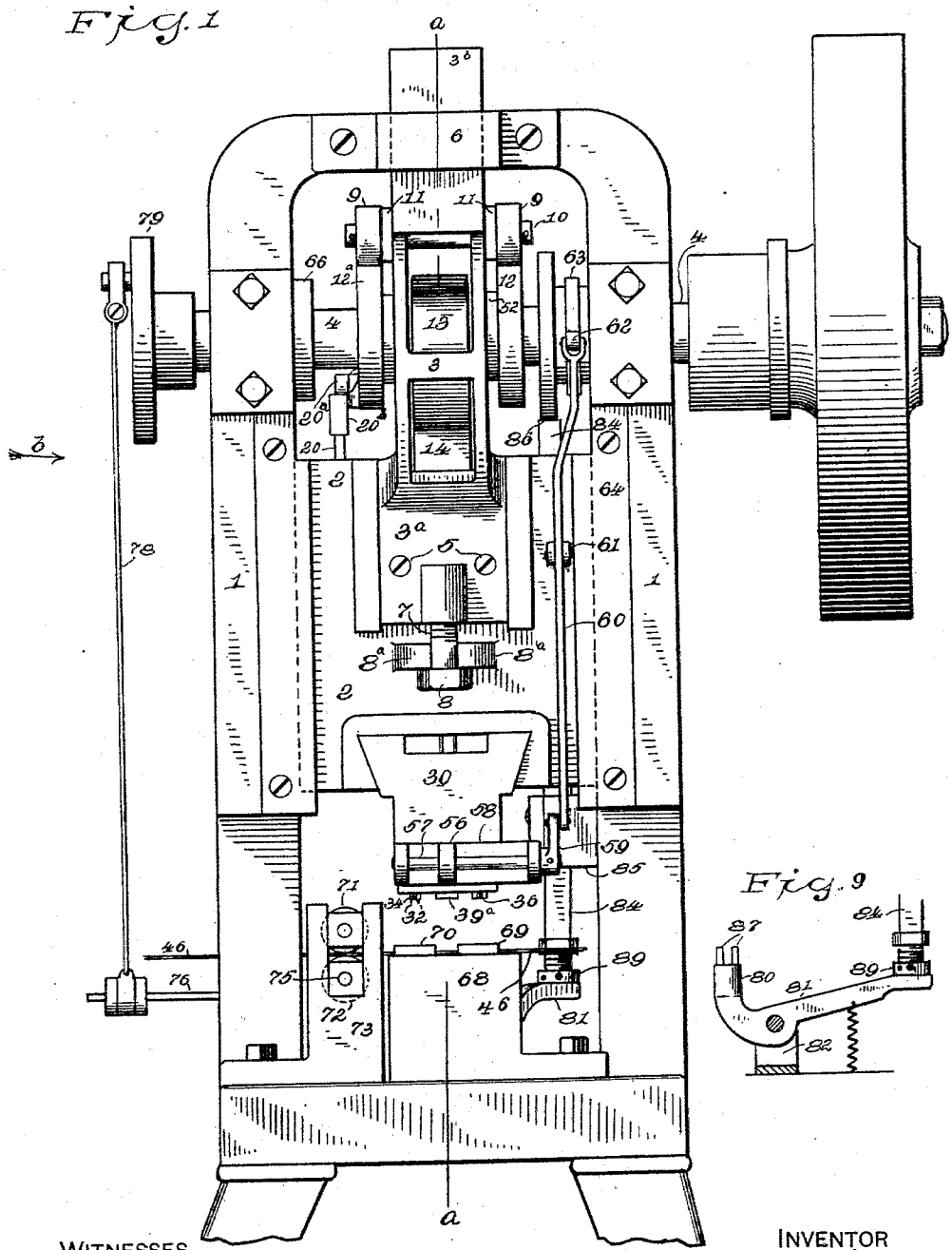


Fig. 9

WITNESSES

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Fig. 2

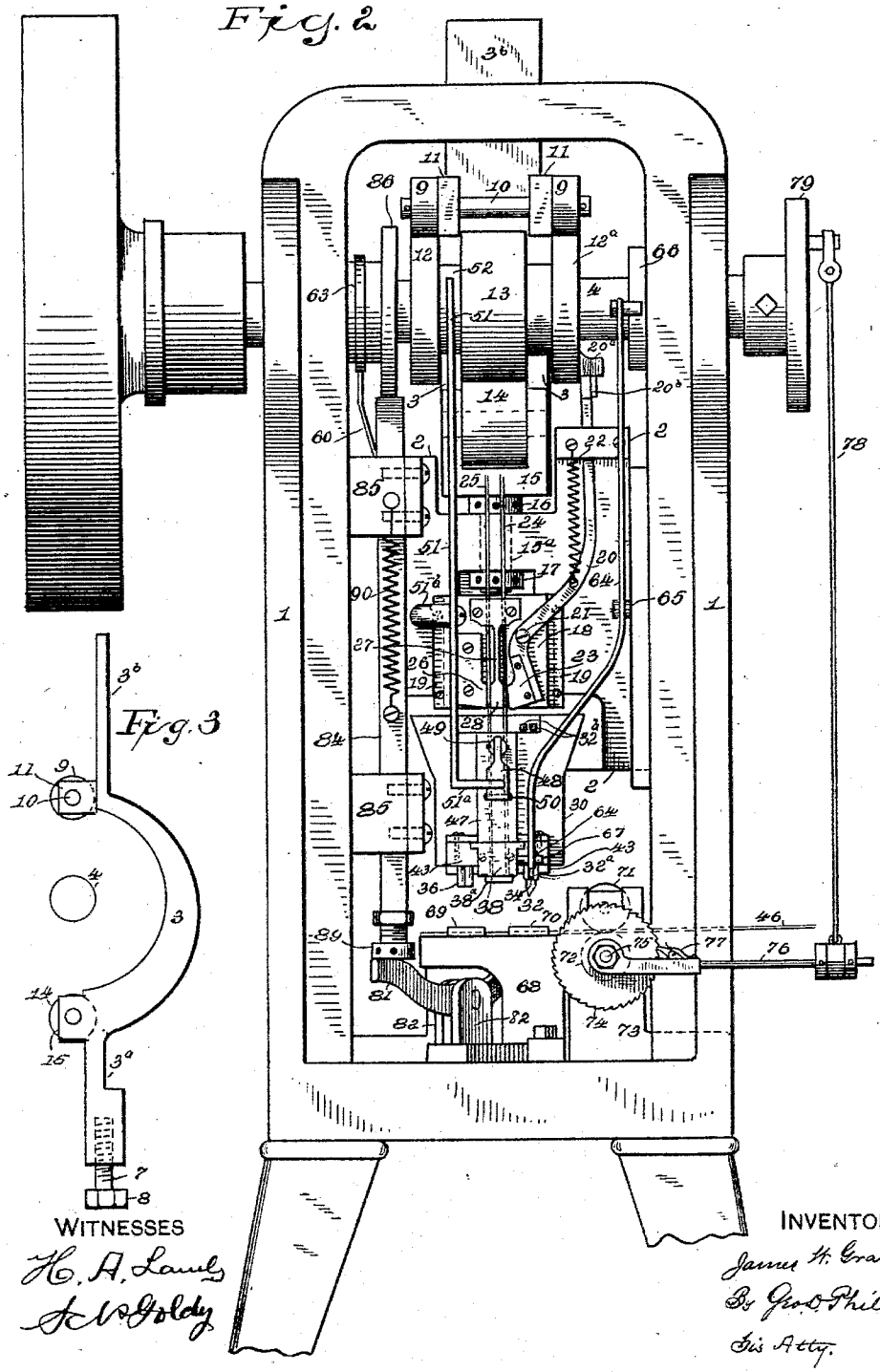


Fig. 3

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Fig. 4

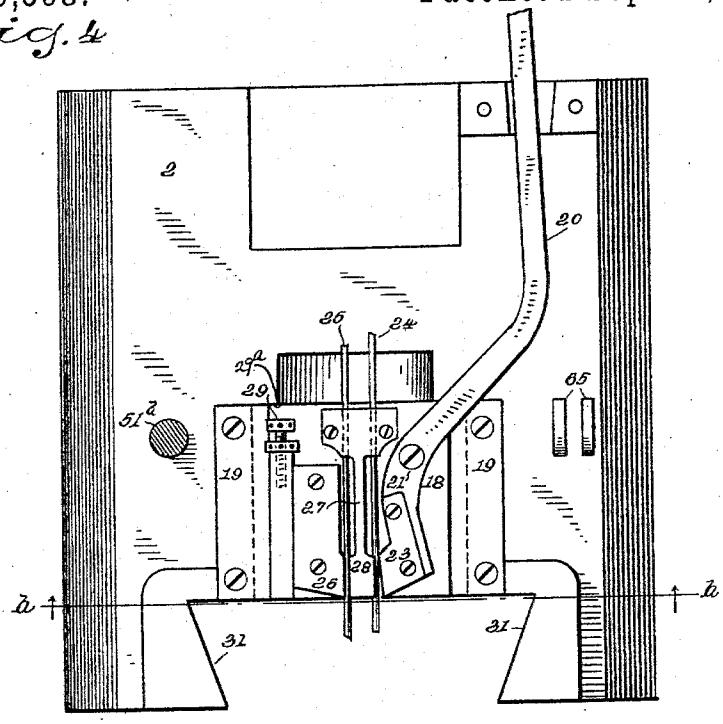


Fig. 5

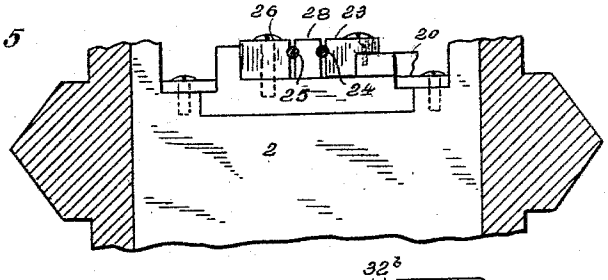
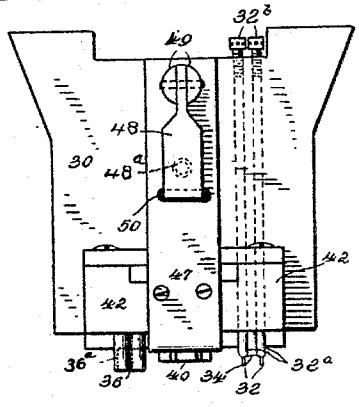


Fig. 6



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METAL BLANKING AND STUDDING MACHINE.

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Fig. 7

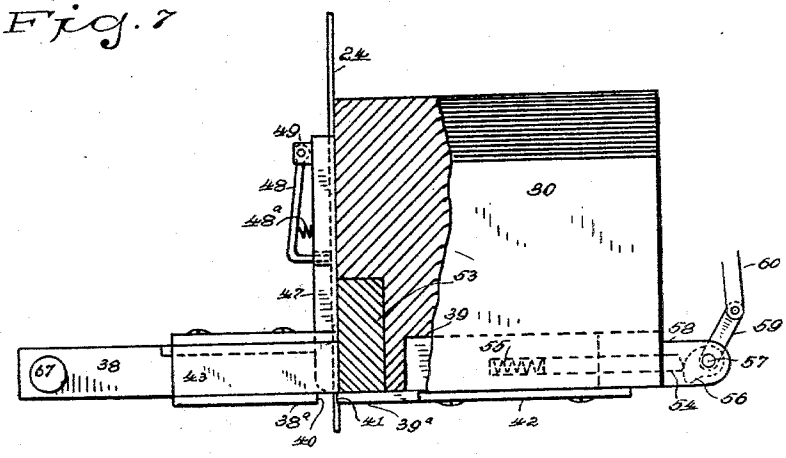


Fig. 8

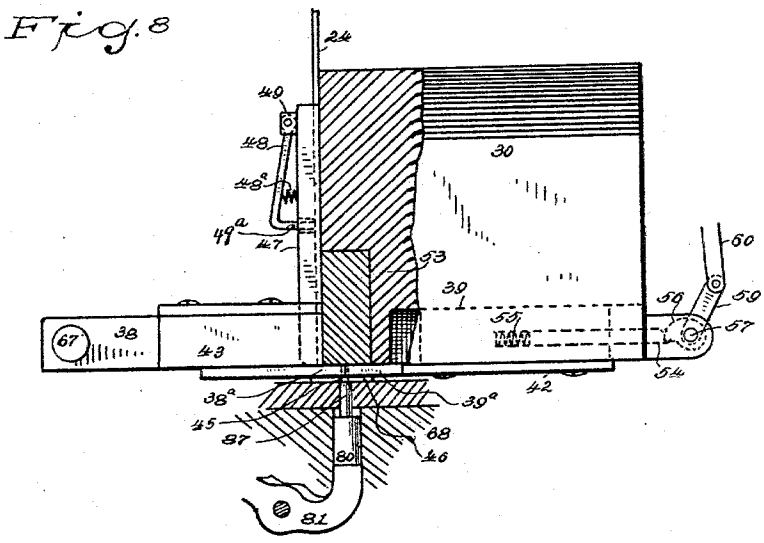


Fig. 10.



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Fig. 11

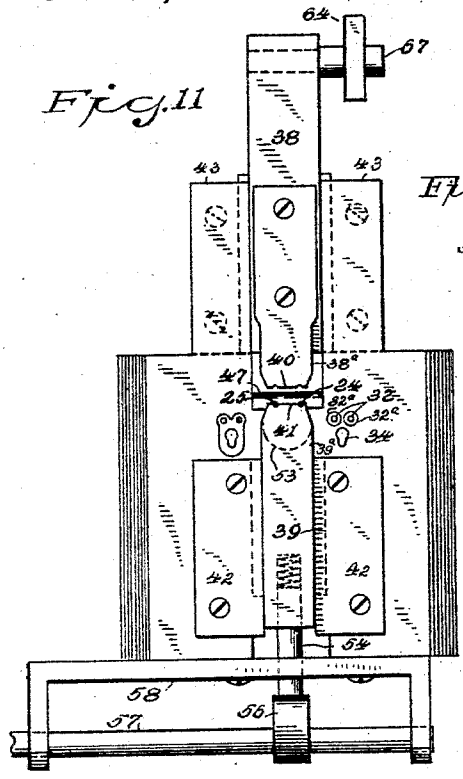


Fig. 12

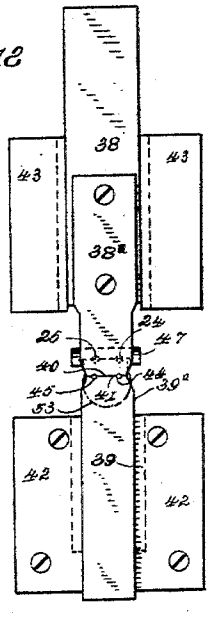


Fig. 13

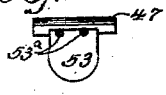


Fig. 14

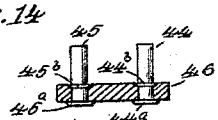


Fig. 15

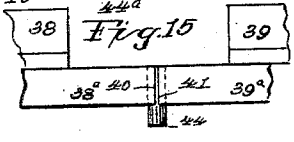


Fig. 16

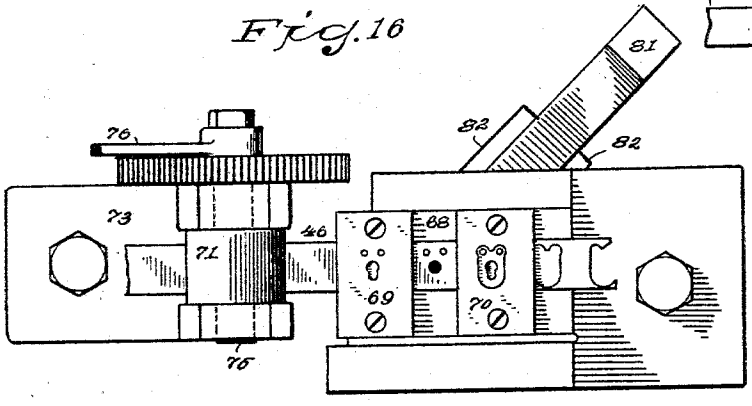
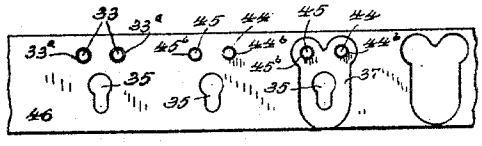


Fig. 17



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UNITED STATES PATENT OFFICE.

JAMES W. GRANT, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO THE WARNER BROTHERS COMPANY, OF SAME PLACE.

METAL BLANKING AND STUDDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 589,598, dated September 7, 1897.

Application filed April 23, 1896. Serial No. 588,761. (No model.)

To all whom it may concern:

Be it known that I, JAMES W. GRANT, a citizen of the United States, and a resident of Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Metal Blanking and Studding Machines, of which the following is a specification.

This invention relates to certain new and useful improvements in metal blanking and studding machines; and it has for its object to simplify and increase the efficiency of such machines as well as to render the operation thereof wholly automatic.

With these objects in view the invention consists in feeding a metal strip or sheet to punching devices whereby holes are formed in said strip, in inserting sections of wire in certain of said holes and securing them therein to form studs, and in cutting out sections of the strip, each having studs secured thereto.

To enable others to fully understand my invention, reference is had to the accompanying drawings, in which—

Figure 1 represents a front elevation of the machine, which, for the particular use to which it is to be applied, is an ordinary power-press, showing the gate in a raised position, and also broken view of the supporting-legs. Fig. 2 is a rear elevation of the machine. Fig. 3 is a detail side elevation of the supporting-yoke slide which connects the gate with the upper frame of the press. Fig. 4 is a detail rear elevation of the press-gate carrying the wire-feeding slide, on which wire-feeding slide are mounted the wire-gripping jaws with sections of wire therein, with the movable jaw in open position, showing also the lever operating such jaw broken at its upper end. Fig. 5 is a broken detail end elevation, partly in section, of the press-gate on line *b* of Fig. 4. Fig. 6 is a detail rear end elevation of the tool-holder carrying the piercing and blanking tools and also the stud-carrying slide, which block is adapted to be fitted to the angular groove at the lower end of the press-gate. Fig. 7 is a detail side elevation, partly in section, of the tool-holder, section of wire therein, showing also such wire fed below the holder in readiness to sever a stud-blank therefrom. Fig. 8 is a detail side elevation, partly in section, of the tool-holder, showing the stud severed from the wire rod and such stud carried by the movable slides, so that one end of the stud is against the anvil of the tool-holder. Also in this view is shown a broken sectional view of the die-holder with a pierced metal strip thereon, into which strip the lower end of such stud is forced, a lower movable anvil or header to engage such projecting end, and a broken section of the operating-lever for such header. Fig. 9 is a detail side elevation of the header and its operating-lever and sectional view of its supporting-standard. Fig. 10 is a detail view of the release-cam for one of the stud-carrying slides of the tool-holder, and broken view of a movable rod connected with such slide with which such cam engages. Fig. 11 is a detail bottom plan view of the tool-holder and broken view of the shaft on which the release-cam is mounted. Fig. 12 is a detail view of the stud-carrying slides gripping two studs and such slides moved back, bringing the ends of such studs in contact with the anvil of the tool-holder. Fig. 13 is a detail end view of the tool-holder anvil and wire-supporting plate. Fig. 14 is a sectional view of the metal strip with two studs riveted therein. Fig. 15 is a detail broken side elevation of the stud-carrying slides with a stud gripped between their fingers. Fig. 16 is a detail upper plan view of the die-bed, operating-lever of the header and its standard beneath such bed, feed-rolls for the metal strip, standard for such rolls, ratchet-wheel and broken view of the operating-rod for such ratchet-wheel, and section of metal strip with which such feed-rolls are engaged, such strip showing thereon the effects of the piercing and blanking tools. Fig. 17 is a broken section of the metal strip, showing the operation of the tools thereon.

Broadly stated, my invention consists in a machine embodying means for feeding a metal strip and for punching holes therein, mechanism for feeding a wire and for severing a section therefrom and inserting the severed section through a hole in the metal strip and securing it to said strip. Various constructions may be employed for effecting these operations, and the coöperating mechanisms may be arranged in various manners

without departing from the scope of the invention.

One embodiment of the invention is illustrated in the accompanying drawings, and in actual practice this construction has proved exceedingly effective.

1 is the frame of an ordinary power-press which, as before stated, is well adapted for blanking and studding small articles, which in the present case is an eye for corset-steels.

2 is the vertically-movable gate. In an ordinary press the gate is operated by a crank-shaft and pitman; but in this instance the gate is necessarily operated in a different manner to effect the result sought to be accomplished.

3, Figs. 1 and 3, is a yoke having a circular central portion or swell that embraces the driving-shaft 4. The lower part 3^a of this yoke is secured to the gate by screws 5, while the upper end 3^b is movably secured by the cap 6 to the upper part of the frame of the press.

7 is a bolt whose threaded portion engages the yoke, while the head of such bolt engages with the forked lug 8^a on the gate 2. This bolt still further secures the yoke to the gate.

9 (see also Fig. 2) are rolls mounted upon the short shaft 10 of the yoke-brackets 11. These rolls engage with the cams 12 12^a, mounted upon the driving-shaft 4. This arrangement of the rolls and cams elevates the gate, while the central cam 13 engages with the roll 14 to depress such gate. This roll 14 is journaled on a pin between the ears 15 of the forked extension integral with said yoke. 15^a is a threaded stud in the gate, having the head 16 and nut 17, whereby the yoke, with the roll attached, is vertically adjusted, which arrangement also adjusts the position of the gate with respect to the die-block, presently to be described.

Various means may be employed for feeding and severing the wires into sections and for securing the severed sections in the strip before cutting out the blank, but that which I will now describe has proved to be a convenient and efficient arrangement and it is preferred on that account.

18 (see also Fig. 4) is the wire-feeding slide vertically operating in the ways 19 on the face of the gate. This slide has an independent movement on such gate through the medium of the lever 20 and vertical face of the cam 12^a on the driving-shaft 4. On the face of the cam is the wedge-shaped step 20^a, that, engaging the head 20^b of lever 20, will both operate to tilt such lever on the pivotal screw 21 and force it vertically downward as well. The retractile spring 22 will return such slide to its normal elevated position.

23 (see also Fig. 5) is a gripping-jaw on the lower end of the lever 20, having a circular groove in its face for the wire 24. In this machine two wires 24 and 25 are fed down, for the purpose presently to be more fully described.

26 is the stationary jaw having a grooved face similar to the face of the movable jaw.

27 is a spring-tongue whose head 28 has grooved faces to embrace the two wires 24 and 25. These wires are delivered from a reel (not shown) and pass between the faces of the jaws 23 and 26 and the head 28 of the said spring-tongue. The first effect of the cam 12^a will be to move the lever 20 laterally, which will close the jaws 23 upon the wire 24, and under this lateral pressure the spring-tongue will be forced toward the stationary jaw 26, thus gripping both wires through the medium of one movable jaw. The next operation performed by the cam 12^a will be to force the slide 18 down, carrying the said wires with it.

29 is an adjusting-screw in the top of the slide 18 to limit its upward movement by such screw striking against the upper wall 29^a of the recess in which such slide operates.

30 (see Figs. 1, 2, 6, and 8) is the tool-holder, which (see also Fig. 4) fits the dovetail opening 31 of the gate.

32 are two small punches for the stud-holes 33, Fig. 17, in the corset-eye, and 34 is the punch for the keyhole-slot 35, while 36 is the blanking-punch which blanks the completed corset-eye 37 from the metal strip.

32^b are screws for adjusting the punches 32.

38 and 39 are the stud-blank-carrying slides operating from the front and rear of such holder toward the center. Semicircular grooves are provided in the meeting faces 40 41 of such slides to embrace the wires 24 and 25. The inner ends or fingers of these slides are (see Figs. 7 and 8) thinner than the body portions, which slide in the ways 42 and 43 of the tool-holder. The thickness of these fingers is equal to the length of the studs 44 and 45, Fig. 14, which project from the metal strip 46, and such fingers are also hardened.

47 is a plate which overlies the wires on the end of the tool-holder, and 48 is a clamp whose upper end is pivotally supported to the bracket 49, while its free end has the right-angle projection 49^a, which projection or finger enters the elongated slot 50 of the plate 47, and such finger is adapted to engage the wires and hold them firmly against the tool-holder when the wire-carrying slide 18 is retreating to grip the wires farther up for another downward feed.

51, Fig. 2, is a lever whose finger 51^a engages the outer face of the clamp 48, while the free end of such lever engages the face of the cam 52, which lever operates to force the said clamp against the wires, and 48^a is a spring interposed between said clamp, shown in an open position, which spring serves to keep such clamp against the finger 51^a.

53, Figs. 7 and 8, is an anvil in the tool-holder, whose purpose will presently be more fully described.

54 is a plunger that enters a hole in the outer end of the stud-blank-carrying slide 39, and 55 is a spring placed at the bottom of

such hole to act against the inner end of such plunger to force it out.

56 is a cam mounted (see Figs. 1, 7, 8, and 11) on the rod 57 of the bracket 58, which bracket is attached to the end of the tool-holder, as shown.

59 is an arm on the outer end of the rod 57, which is pivotally connected to the operating-lever 60, pivoted in the ears 61 of the press-gate. The upper end of this lever carries the roll 62, which engages with the cam 63 on the driving-shaft 4. The cam 56 is designated as the "release-cam," and its purpose will hereinafter be more fully described.

64, Fig. 2, is a lever pivoted between the ears 65 of the press-gate, whose upper end is brought in contact with the cam 66. The lower forked end of the lever embraces the projecting pin 67 of the slide 38 to operate such slide.

68, Figs. 1, 2, and 16, is the die-block having the usual strippers 69 and 70, overlying the dies in said block. 71 and 72 are feed-rolls in the frame 73.

74 is a ratchet-wheel mounted on the outer projecting end of the roller-pin 75, and 76 is a lever also pivotally supported on such pin and which lever carries the pawl 77, which pawl engages with such ratchet-wheel. Rod 78 connects the outer end of this lever with the crank-plate 79, mounted on the outer projecting end of the driving-shaft 4. This arrangement of the said rod, lever, pawl, and crank-plate feed the metal strip forward to the dies.

Any suitable arrangement of devices may be employed for heading the studs upon opposite sides of the metal strip, but preferably it is desired to employ parts upon each side of the strip which may be actuated to either be simultaneously reciprocated toward each other or be actuated to reciprocate simultaneously in the same direction to coöperate and head or upset the stud upon opposite sides of the metal strip. Those heading devices which I have shown are actuated to reciprocate simultaneously toward each other.

80, Figs. 8 and 9, is the header which (see also Figs. 2 and 16) is mounted on the lever 81, which lever is pivotally mounted upon the standard 82. The outer end of this lever is engaged by the vertical rod 84, supported in the bearings 85 of the press-frame. The upper end of this rod engages the cam 86, whereby the lever 81 is tilted. A hole is provided in the die-block for the larger portion or body of the header 80, and also smaller holes to receive the two uprights 87. These uprights are intended to support the ends of the stud-blanks that project through the metal strip and to head the same, in the manner presently to be more fully described.

89 is a nut mounted on the lower threaded end of the rod 84 to adjust the position of the header 80 in the die-block.

90 is a retractile spring to keep the rod 84 against the face of the cam.

Operation: The tools of the press, as shown at Figs. 1 and 2, are in a raised position, and the first movement in the operation of blanking and studding will be to close the movable jaw 20 and firmly grip the wires in the manner before mentioned. Next the wire-feeding slide 18 is moved downward, so as to project the ends of such wires below the lower face of the tool-holder, Figs. 7 and 11, when the gate 2 will move down until such projecting ends of the wires are brought close to the metal strip, whereupon the slide 38 is moved forward to engage such projecting ends, which ends, by reason of the resistance offered by the slide 39, are held firmly between the fingers 38^a and 39^a of such slides, it being understood, but not shown, that two grooves for the wires are formed in the longitudinal face of the anvil 53, thus making a combined anvil and cutting-off die, so that when the slide 38 continues to advance it will cut off two sections of the wire and force the slide 39 back until the severed ends or stud-blanks are carried over and against the end of the anvil 53 and on a line with the holes 33 in the metal strip, which holes, as previously mentioned, were made by the punches 32, whereupon the said slides will halt until the gate 2 descends toward the die-holder, forcing the ends of the stud-blanks that project below the fingers of the slides into the holes 33 of the metal strip and also far enough through such strip to head. In the meantime the projections 87 of the header 80 have been carried up into position close to the under side of the metal strip. The downward pressure of the gate, with the upper end of the stud-blanks resting against the projections 87 of the header and anvil 53 of the tool-holder 30, will not only form the heads 44^a and 45^a, Fig. 14, but will also form the shoulders 44^b and 45^b on the upper side of the metal strip, thus firmly securing the studs both on the upper and the lower side of such strip. It will be understood that to form the heads of the studs the ends of the projections 87 of the header are cupped out sufficient for that purpose, while the side pressure of the hardened fingers 38^a and 39^a of the slides, combined with the downward pressure exerted by the gate, will cause a lateral enlargement of the stock to form the upper shoulders 44^b and 45^b. To make room for these shoulders, so they will be flush with the upper surface of the metal strip, I prefer to make the shoulders 32^a of the punches 32 slightly convex, (see Fig. 6,) so as to form the cup-shaped depressions 33^a, Fig. 17, around the upper edge of the holes 33.

When the operation above mentioned is completed and just before the gate retreats, the cam 56, Fig. 10, is turned so as to present the lowest point to the end of the plunger 54, which will relieve the pressure or grip of the slide-finger 39^a on the studs, so that the slide 39 may return to its normal position with the slide 38, or, in other words, both

slides will return together. It will be understood that at each revolution of the driving-shaft 4 the stud-holes 33, Fig. 17, and keyhole-slot 35 are pierced and the studs are cut off, forced, and riveted in the previously-formed holes in the strip and the corset-eye 37 be blanked from the metal strip. Holes 36ª are provided in the face of the blanking-punch 36 to admit the studs while said punch is operating on such metal strip.

When the wire-feeding slide is about to retreat, the clamp-finger 48 will be brought into engagement with the wires 24 and 25 and hold them firmly in the tool-holder block, so as to prevent a retrograde movement of such wires.

Heretofore it has required several preparatory machines before corset-eyes could be made and attached to the corset-steel. First, the eye was pierced and blanked and the rivets made separately and inserted loosely in such eyes by means of an assembling-machine. This manner of constructing corset-eyes and similar work was not only expensive, by reason of the many operations and hand manipulation, but the loss of the small parts added considerable to the cost.

In my improved machine the eye is completed and the studs securely attached thereto in one machine, so that the matter of riveting such eyes or other like article by means of the studs to the corset-steel is a very simple and inexpensive operation. As before mentioned, this arrangement of elements for blanking and studding corset-eyes can be used for other articles as well, with, if necessary, different tools for the particular work required.

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

1. The combination of mechanism for feeding a metallic strip and for punching a hole therein, of means for feeding a section of wire through the hole in the strip and coöperating devices upon opposite sides of the strip for upsetting the wire section upon both sides thereof, one of said devices comprising gripping-jaws moving in the line of the wire, and the other comprising a reciprocating header, substantially as described.

2. The combination with a die-block having a reciprocating header, of an anvil, and means for reciprocating it toward and away from the die-block, devices for punching an opening in a strip, means for feeding the strip upon the die-block to bring its opening into alinement with the header, and mechanism for feeding a section of wire beneath the anvil and in alinement with the opening in the strip, substantially as described.

3. The combination with a die-block, a reciprocating header and a reciprocating anvil carrying a punch, of means for feeding a strip upon the die-block, wire-feeding mechanism, and devices for severing a section from the wire and for moving said section beneath the reciprocating anvil in alinement with the hole in the strip, substantially as described.

4. The combination with a die-block a punch and strip-feeding mechanism, of a reciprocating gate and an anvil, devices for feeding a wire and severing a section thereof and transferring the severed section beneath the anvil in alinement with the hole in the strip, all carried upon the gate, substantially as described.

5. The combination with mechanism for feeding a metal strip, for punching openings therein, and for cutting blanks therefrom, of devices for feeding wire and for securing sections thereof to the strip before the blanks are cut from said strip, substantially as described.

6. The combination with mechanism for feeding a metallic strip, of punches provided with convex shoulders adapted to punch openings in the strip, means for feeding a section of wire through the opening in the strip and for upsetting the section on opposite sides of the strip and within the depression formed by the punches, the upset portion of the wire section within the depression being flush with the face of the strip, substantially as described.

7. The combination, in a machine for forming studded blanks, of a movable support carrying a wire-feeding device, piercing and blanking tools, transversely-operating tools for severing sections from the wire and carrying them out of the wire-feeding line, said support adapted to move forward, insert, and secure such sections in holes formed in a metal strip, and means, substantially as shown, whereby a partial release is given to one of the section-carrying tools to prevent dragging on the sections when the movable support returns, substantially as described.

8. In a blanking and studding machine of the character described, the combination with a stationary die-block, a movable header therein, of a gate or other like movable support carrying independent wire-feeding mechanism, piercing and blanking punches, cut-off and stud-blank-carrying tools, said cut-off and stud-blank-carrying tools and punches placed between the wire-feeding mechanism and the die-block and header, so that, by the combination and coöperation of the above-named elements holes are pierced in a metal strip, the wires are fed forward, stud-blanks cut therefrom and such blanks transferred in line with said holes and secured therein, and an article embracing such studs blanked out of such metal strip, substantially as set forth.

9. In a blanking and studding machine of the character described, the combination with a stationary die-block having piercing and blanking dies therein, a heading-tool operatively placed intermediate of said piercing and blanking dies, a gate or other like movable support carrying piercing and blanking punches, cutting-off and stud-blank-carrying

tools intermediate of said punches, a wire-feeding device on said movable support, said punches, cutting-off and stud-blank-carrying tools intermediate of the wire-feeding device and the said die-block and header, all combined so as to pierce holes in a metal strip, cut-off sections of the wires to form studs and transfer such sections out of the wire-feeding line and in line with such holes, insert and secure them therein, and blank out a corset-eye or other like article embracing such studs, from the said metal strip, substantially as described.

10. The combination, in a blanking and studding machine, of a wire-feeding device consisting of stationary and movable jaws having an intermediate spring-tongue, a movable gate on which such wire-feeding device has an independent movement, a tool-holder carrying piercing and blanking tools attached to such gate, cut-off and stud-carrying tools in said holder, a clamp having a finger at right angles thereto to engage with and prevent the wire moving back when the wire-feeding device is retreating, for the purpose set forth.

11. The combination, in a blanking and studding machine, of a wire-feeding device, a tool-holder carrying piercing and blanking punches, tools for cutting a projected section of wire and carrying such section out of the wire-feeding line, a die-block and header, such tool-holder, section cutting and carrying tools placed between the wire-feeding device and said die-holder and header, for the purpose described.

12. In a combined blanking and studding machine, a wire-feeding device having an independent movement on a movable support, a tool-holder having piercing and blanking tools for cutting a section (to form a stud) from the projecting end of the wire and carrying such stud out of the feeding-line of such wire and in line with the piercing-tools, a die-block, such tool-holder, and section cutting and carrying tools placed intermediate of the wire-feeding device and the said die-block, a header to engage the projecting end of the wire section or stud, combined with an upper anvil to engage the opposite end of the stud, which, combined with the side pressure of the section-carrying tools, will form a head and shoulder on such stud, for the purpose as set forth.

13. The herein-described machine for blanking and studding, comprising, in combination, a movable gate, a yoke attached to said gate and embracing the driving-shaft, the upper end of such yoke adjustably secured to the machine-frame, rolls on such yoke to engage lifting-cams on such shaft, said gate carrying an adjustable roll to engage a cam on such shaft, a wire-feeding device having an independent movement on such gate, a tool-holder in the lower end of such gate and carrying piercing and blanking punches, transversely-operating tools for cutting a section from the projecting end of the wire and conveying such section, or stud-blank, out of the feeding-line of such wire and in line with the piercing-tools, a die-block and header, all combined so that, when the wire-feed has projected a section of wire, sufficient to form a stud, the cut-off and stud-carrying tools will sever such section and carry it out of the feeding-line of the wire and in line with holes—formed by the piercing-tools—in a metal strip on the die-block, and such stud-blank headed from below and shoulders formed on the stud above the metal strip, for the purpose set forth.

14. In a machine for forming studded blanks, the combination of sheet-metal feeding, piercing and blanking devices, wire feeding, cutting, transferring and upsetting devices, coöperating so as to pierce stud-holes in a metal strip; feed the wires a predetermined length, cut sections therefrom, transfer such sections out of the wire-feeding line and in line parallel with said stud-holes, said strip fed forward so as to bring such holes in vertical alinement with said sections, insert and secure such sections therein to form studs, feed the metal strip containing such studs to the blanking-tools and blank an article embracing such studs therefrom, substantially as set forth.

Signed at Bridgeport, in the county of Fairfield and State of Connecticut, this 20th day of April, A. D. 1896.

JAMES W. GRANT.

Witnesses:
HENRY SCHADT,
LEWIS F. PELTON.