

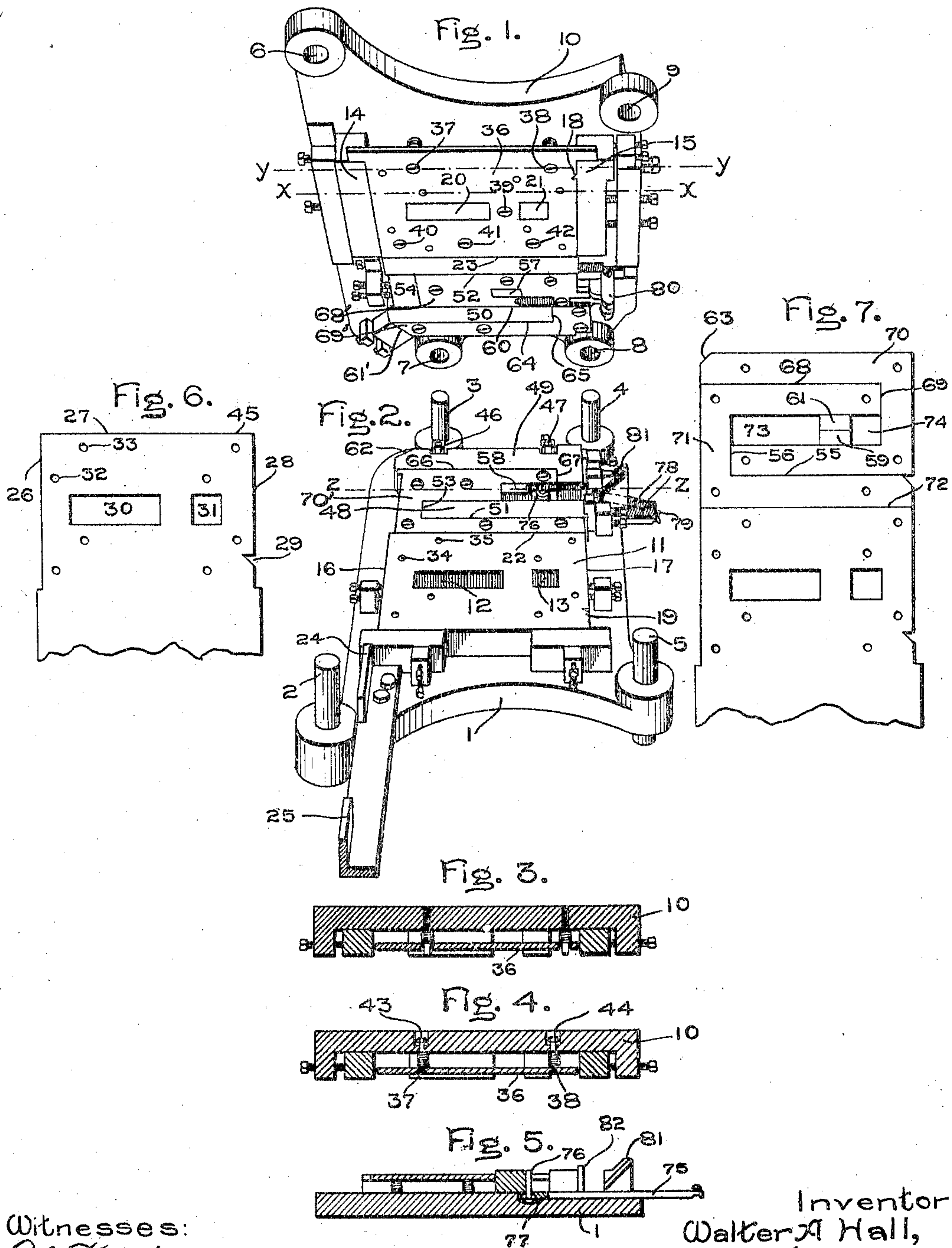
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W. A. HALL.
MECHANISM FOR PUNCHING SHEET METAL.

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NO MODEL.



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UNITED STATES PATENT OFFICE.

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MECHANISM FOR PUNCHING SHEET METAL.

SPECIFICATION forming part of Letters Patent No. 776,511, dated December 6, 1904.

Application filed June 12, 1902. Serial No. 111,272. (No model.)

To all whom it may concern:

Be it known that I, WALTER ATWOOD HALL, a citizen of the United States, residing at Lynn, in the county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Mechanism for Punching Sheet Metal, of which the following is a specification.

My present invention relates to means for punching sheets of metal or other desired material into certain configurations, and although intended more particularly for producing punchings for the cores of transformers it will be evident that many of its novel features are applicable for other purposes as well.

The novel features which I believe characterize my invention I have pointed out with particularity in the appended claims, while in the following description I have set forth my invention in connection with the accompanying drawings, in which—

Figures 1 and 2 represent, respectively, the two members of a punching mechanism built in accordance with my invention; Fig. 3, a sectional view of Fig. 1 along the line X X; Fig. 4, a sectional view of Fig. 1 along the line Y Y; Fig. 5, a sectional view of Fig. 2 along the line Z Z. Figs. 6 and 7 represent the product of the punching mechanism at different stages of its production.

The punching mechanism consists of the two members shown in Figs. 1 and 2, which for convenience may be designated, respectively, as a "punch" and a "die." The die (shown in Fig. 2) is bolted to a platen of a suitable punching-press of any ordinary construction, while the punch (shown in Fig. 1) is keyed to the head of the press and is moved up and down by power applied to the press. The die has its operating members carried by a heavy plate 1, by means of which it is secured to the platen or bed of the punching-press. This bed is provided with four upwardly-projecting pins 2, 3, 4, and 5, which register with corresponding holes or openings 6, 7, 8, and 9 in the heavy plate 10, to which the working parts of the punch are secured. These pins serve as guides for directing the motion of the punch relatively to the die. In the drawings I have

represented the punch in Fig. 1 above the die, Fig. 2, and have shown the punch as inclined upwardly, so as to expose the working parts on the under side of the punch, which cooperate with the working parts on the upper side of the die in Fig. 2. These figures are placed one above the other, so that the cooperative action of the several parts may be more readily understood. The lower member of the punching mechanism is provided with a rectangular die 11, in which are formed two rectangular openings 12 and 13, arranged in line with each other, as indicated. The cooperating member of the punch carries two shearing members 14 and 15, the inner edges of which are adapted to shear along the respective outer edges 16 and 17 of the rectangular die 11. The member 15 is, in addition, provided with a spur or projection 18, adapted to enter a notch 19 in the die 11. The upper member of the punching mechanism also carries two punches 20 and 21, adapted to enter the openings 12 and 13, respectively, of the die 11. The third edge, 22, of the die 11 is arranged to cooperate with a shearing member 23, carried by the upper member of the punching mechanism.

The material to be acted upon by the press is utilized in the form of long sheets of slightly-greater width than the width of the die 11 and is fed to the punching mechanism by placing one end of the sheet against the guides 24 and 25 and feeding it along by hand until the end of the sheet projects slightly beyond the edge 22. When the punch is caused to enter the die, the end of the sheet is punched into the form indicated in Fig. 6, the strip being sheared along the three sides at 26, 27, and 28 and notched on the side 28 at 29, the notch being produced by the passage of the spur 18 of the punch into the notch 19 of the die. At the same time the openings 30 and 31 are punched together, with the eight holes for pins, some of which are designated by reference characters at 32 and 33. These holes are punched by cylindrical punches in the upper member of the punching mechanism entering openings, such as at 34 and 35 in the die 11. Fig. 3 is a sectional view showing

two of the small-hole punches. In order to strip the plate thus punched from the punching mechanism, the punch (shown in Fig. 1) is provided with a stripping-plate or stripper 36. (Shown in perspective view in Fig. 1 and in cross-section in Figs. 3 and 4.) By inspection of the latter figure it will be noted that this plate, which is shaped so as to entirely cover the punched portion of the strip operated upon, is carried by a number of bolts, the heads of which are indicated at 37 to 42, inclusive, the shanks of the bolts passing loosely through the heavy plate 10 and provided at their outer ends with heads contained in countersunk recesses, such as at 43 and 44. Springs are placed about the shanks of the bolts between the stripper-plate and the plate 10 and normally maintain the stripper-plate approximately on a level with the cutting edges of the punch. When the punch enters the die by the operation of the press, the stripper-plate is pushed back against the springs, which when the punch recedes return the stripper to its original position, thereby leaving the punchings on the face of the die. After the operation thus described has been completed the punched strip is pushed forward until its edge 45 is brought up against stops 46 and 47. In this position the punched strip is acted upon at the next operation of the press by parts of the punching mechanism which have not yet been described. Upon the lower member of the punching mechanism will be noted a shearing member 48 and another shearing member, 49. These members cooperate, respectively, with shearing members 23 and 50, carried by the upper member of the press. The edge 51 of the member 48 cooperates with the edge 52 of the member 23, while the edge 53 in a similar manner cooperates with the shearing member 54, carried by the upper member of the press, the operation of these parts acting to shear the plate along the lines 55 and 56 in Fig. 7. The punch 57, carried by the upper member of the press, at the same time passes down into the space between the shearing members 48 and 58, carried by the lower member of the press, thereby shearing away that portion of the plate indicated by the small rectangle 59 in Fig. 7. The opposite shearing edge of the punching member 58 also engages the edge 60 of the punch 50, carried by the upper member of the press, thereby cutting away the other small rectangle, 61. Coincident with the operations thus described the inclined punching edge 61' shears along the inclined edge 62 of the member 49 on the lower member of the punching mechanism, thereby clipping off the corner of the sheet at 63, as shown in Fig. 7. To complete the punching operation, the edges 64 and 65 of the shearing member 50 engage the cooperating shearing edges 66 and 67 on the other member of the press and shear the sheet along

the lines 68 and 69, as in Fig. 7. At the conclusion of the shearing operation strippers 68', 69', and 70' push the punchings off of the punches, leaving them on the surface of the lower member of the press. By the two punching operations described above the sheet which is fed into the punch has its end first punched into the form shown in Fig. 6, and by the second operation the end of the sheet is reduced to two U-shaped sections 70 and 71, separated from the main sheet along the line 72. These U-shaped sheets or sections are utilized, together with the rectangular punching previously cut out of the space 73, to build up the core of an electric transformer. The only waste produced are the three small rectangular pieces (indicated at 59, 61 and by the space 74) previously punched out. After the punching operation is completed the punchings may be automatically removed from the face of the dies, and to this end I make use of an ejector. (Represented in perspective in Figs. 1 and 2 and particularly in section in Fig. 5.) This ejector comprises a slide 75, mounted so as to move laterally of the plate 1 and having at its inner end a loosely-mounted pin 76, adapted when the slide is at the extreme position of its inward movement to drop down into a depression 77 in the plate 1, as indicated in Fig. 5. When in this position, the upper end of the pin is substantially on a level with the shearing member 58, as will be seen more clearly by reference to Fig. 2. The slide 75 is urged inward by means of springs 78, attached to a pin 79 at the outer end of the slide, as indicated, the inner ends of the springs being secured to a portion fixed to the plate 1. As the punch descends the vertical member 81, carried by 75, passes between the projecting fingers 80, the inwardly-projecting edges of 80 engaging with the upper faces of the cleats, which, as shown more clearly in Fig. 5, are affixed to 81. When the punch is at the lowest point of its cycle, the inwardly-projecting portions of member 80 fall below the inclined cleats upon 81, thereby releasing member 81, allowing it to pass between the projecting fingers 80 to its original position by the action of its springs, the inwardly-projecting edges of 80 returning under the cleats instead of sliding along their upper faces. The combined effect of the engagement between the parts carried by the slide 75 and the several punchings on the surface of the die is to shoot the punchings off of the die into some suitable receptacle placed to receive them.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. The combination of two plates, one fixed and the other movable, pins carried by one plate and movable in openings in the other for guiding the motion of the plates relatively to each other, punches and dies carried by the respective plates, and a stripper for each plate.

2. The combination of two relatively movable plates, means for guiding the motion of one plate relatively to the other, punches and dies carried by the plates and adapted by their
5 coöperation to shear sheet metal or other material into a plurality of U-shaped punchings, and a stripper carried by each plate.

3. The combination in a punching-press for operating on strip sheet metal, of two sets of
10 punches and dies adapted for use therein, one of the dies and its corresponding punch having cutting edges to trim the end of the strip, punch rectangular holes in the end and notch one side, and the other set of dies and punches
15 having cutting edges coöperating to act upon part of the strip previously punched and to produce therefrom two U-shaped punchings.

4. In a punching mechanism, the combination of relatively reciprocating parts, coöper-
20 ating punching members and shearing members carried thereby and so arranged as to produce at a single reciprocation a plurality of interlocking punchings, the arrangement be-

ing such that no waste of material between adjacent edges of the punchings takes place. 25

5. In a machine for cutting U-shaped plates from a continuous strip of sheet metal, a punch and a coöperating die for trimming the edges of the stock and punching holes therein, in combination with a punch and die for separat- 30 ing the previously-treated portion of the strip into two U-shaped plates.

6. In a machine for cutting U-shaped plates from a continuous strip of sheet metal, a punch and a coöperating die for trimming the edges 35 of the stock, punching holes therein and notching the edge, in combination with a punch and a die for separating the previously-treated portion of the strip into U-shaped plates.

In witness whereof I have hereunto set my 40 hand this 9th day of June, 1902.

WALTER ATWOOD HALL.

Witnesses:

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JOHN A. McMANUS.