April 28, 1936. J. F. W. KRUSE ET AL 2,039,090

APPARATUS FOR AND METHOD OF MANUFACTURING TIE PLATES

Filed Oct. 3, 1933 2 Sheets-Sheet 1

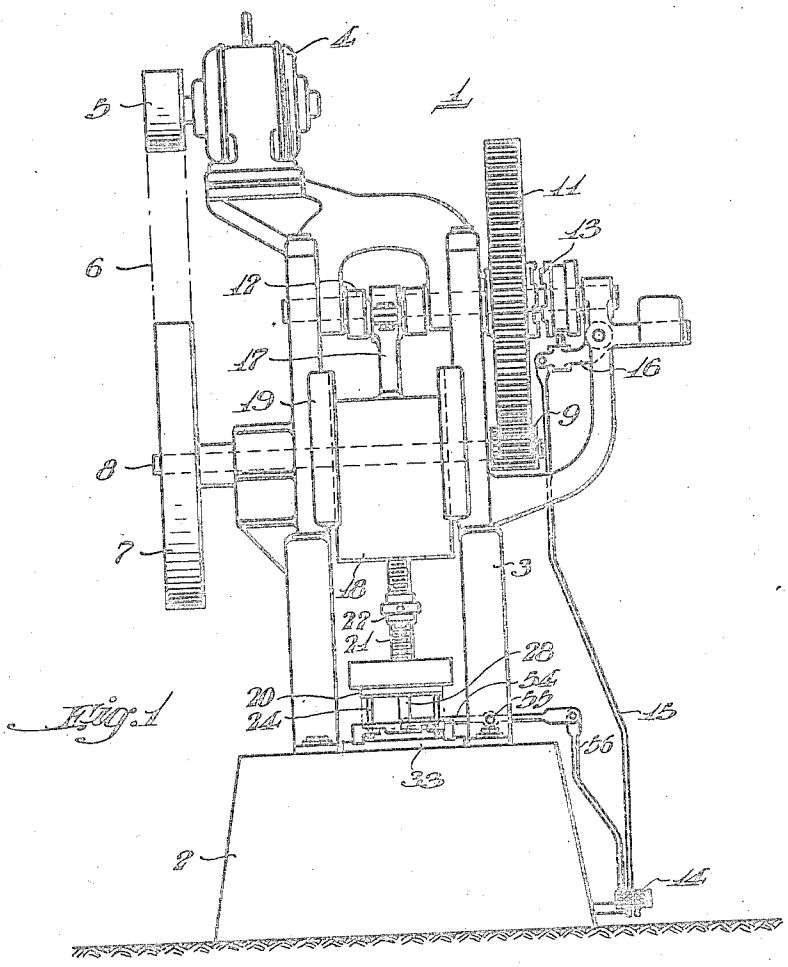


Fig. 1

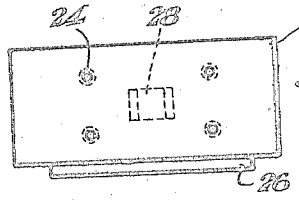


Fig. 2

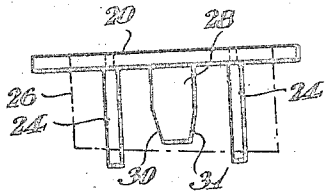


Fig. 3

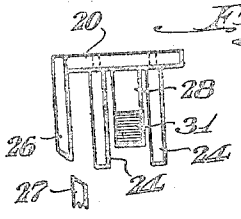


Fig. 4

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APPARATUS FOR AND METHOD OF MANUFACTURING TIE PLATES

Filed Oct. 3, 1933 2 Sheets-Sheet 2

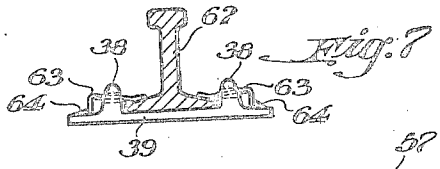


Fig. 7

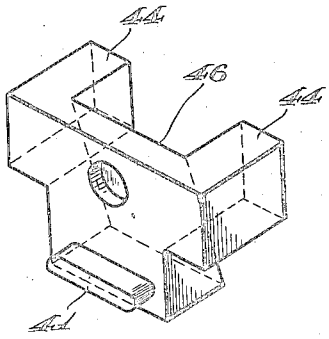


Fig. 5

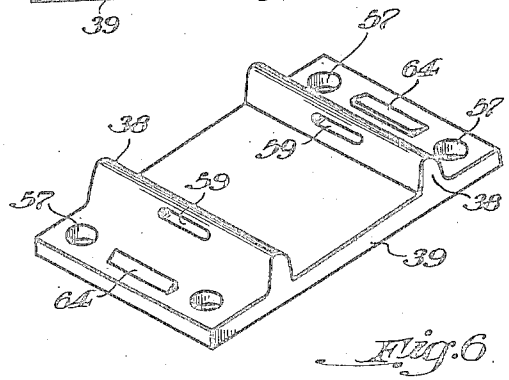
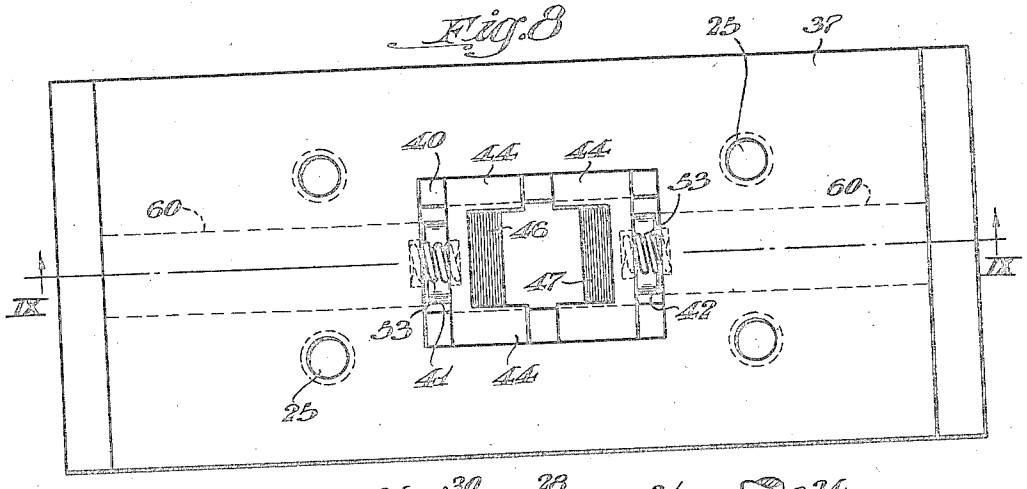


Fig. 6

Fig. 8



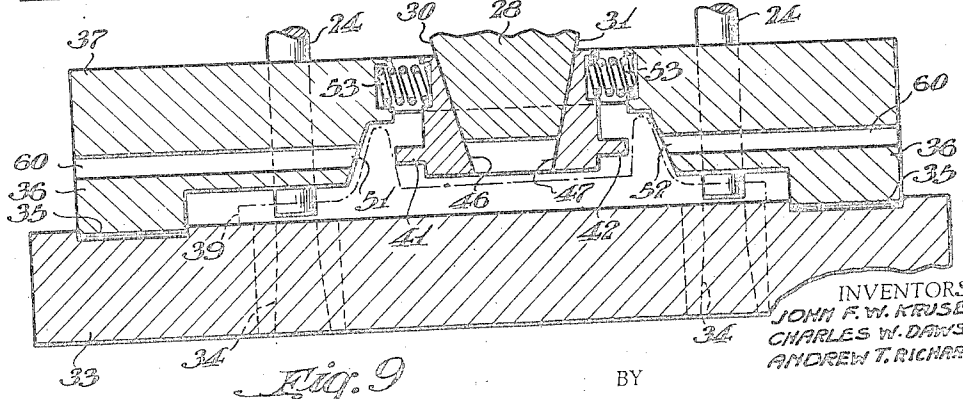


Fig. 9

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2,039,090

APPARATUS FOR AND METHOD OF MANUFACTURING TIE PLATES

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Application October 3, 1933, Serial No. 691,969

7 Claims. (Cl. 164—15)

Our invention relates to apparatus for and a method of forming tie plates for rails and particularly tie plates of the form having ribs constituting shoulders for the base of a rail and having transverse slots therein for the insertion of springs for retaining the rails on the tie plates.

The forming of tie plates of the character referred to above has been accomplished heretofore by apparatus and methods requiring a comparatively large number of independent operations. For example, one operation has been necessary to divide a bar into suitable lengths for tie plates. A second operation has been necessary for providing holes for spikes in the ends of tie plates. Additional operations were also required for forming the slots in the integral ribs constituting shoulders for the rail base. The number of operations, including the handling of the tie plates, has required considerable expense for time and labor and it is an object of the present invention to reduce the number of operations and thereby reduce the cost of manufacture of tie plates.

We have provided apparatus and methods of operation whereby all of the steps of forming tie plates that have been recited above may be accomplished in a single apparatus with a single continuous operation. A press that is constructed and arranged in accordance with our invention punches holes for spikes in the outer ends of the tie plates, cuts a tie-plate length from a bar of suitably rolled material, and then punches slots transversely of the integral ribs of the plate for the insertion of rail-retaining means therethrough.

The mechanism by means of which this single continuous operation may be performed consists generally of a punch press which operates punches for the holes for fastening tie plates to ties, comprises a shear for cutting the stock into suitable lengths for tie plates, and has laterally movable punches that operate to provide transverse slots in the spaced ribs, all of the various parts operating in the order named.

The details of our invention will be described in connection with the accompanying drawings, in which Fig. 1 is a front elevation of a press that is provided with apparatus for practicing the method of our invention. Fig. 2 is a top plan view of the punch holder for the press of Fig. 1. Fig. 3 is a rear elevational view of the punch holder of Fig. 2 and the apparatus carried thereby. Fig. 4 is an end elevation of the apparatus of Fig. 3. Fig. 5 is a perspective view of one of the punches and the mounting block therefor for providing transverse slots in the longitudinal ribs. Fig. 6 is a perspective view of a completed tie plate. Fig. 7 is a view in transverse vertical section of a rail mounted on a tie plate such as shown in Fig. 6. Fig. 8 is a top plan view of a block mounted on the die shoe of the press and which carries the laterally movable punches. Fig. 9 is a vertical sectional view taken on line IX—IX of Fig. 8.

Referring to the drawings, the apparatus of our invention is adapted to be employed with a suitable press such as the press 1 of Fig. 1, which may be of any of the well known types, such as a Bliss press. The press comprises a base 2 on which is mounted a framework 3 having at the top thereof a driving motor 4. The motor 4 drives a pulley 5 that is connected, as by a belt 6, to a larger pulley 7 which is connected by a shaft 8 to a pinion 9.

The pinion 9 drives a gear 11 rotatably mounted on a crank shaft 12 and to which it is adapted to be connected by means of a clutch 13, the operation of which is controlled by a foot pedal 14 connected thereto by a link 15 and a pivoted lever 16. The crank shaft 12 when rotated by the driving mechanism operates a connecting rod 17 for reciprocating a crosshead 18 mounted in vertical guideways 19. The crosshead 18 is connected to and adjustably spaced from a punch holder 20 by means of a screw 21 and an adjusting collar 22 thereon.

The punch holder 20, Figs. 1 to 4, carries four punches 24 that correspond in number and spacing to an aperture 25 shown in Fig. 8. The punch holder 20 also carries a vertical shear member 26 which cooperates with a stationary shear member 27, Fig. 4, and is provided with a vertically disposed cam 28 having inclined surfaces 30 and 31 on opposite sides thereof for a purpose to be hereinafter described.

Mounted upon the base 2 of the press is a die shoe 33 carrying four dies 34 for cooperating respectively with the punches 24. The die shoe 33 is provided on its upper surface with transverse grooves 35 for receiving the lower ends of vertical flanges 36 of a block 37.

As best shown in Figs. 8 and 9, the block 37 is recessed at the central portion of its lower side to permit the insertion of a blank which may be, for example, the end of a suitably rolled bar having a flat bottom portion and two upwardly projecting flanges or ribs 38 that are spaced to provide shoulders for the outer edges of a base of a rail when seated thereon. Tie plate 39 of Fig. 6,

and the dot-and-dash lines of Fig. 9, illustrate the section of the bar.

The block 37 is provided at its central portion with guideways 40 within which are mounted for horizontal movement two punches 41 and 42 that are identical in shape but are mounted for movement in opposite directions from their initial or innermost positions.

Each of the punches 41 and 42 as shown in Figs. 5, 8 and 9 has integral therewith outwardly extending bearing portions 44 for resting upon the guideways 40. At the rear of each of the movable punch members 41 and 42 they are recessed and provided with inclined surfaces 46 and 47 that are adapted to be engaged by the cam surfaces 30 and 31 respectively of the cam 28. Mounted on the block 37 and adjacent the outer sides of the ribs or flanges 38 of the tie plate are dies 51 and 52 that are in alignment with the punches 41 and 42. Each of the movable punches 41 and 42 is normally retained in its innermost position by means of a spring 53.

In the operation of the apparatus of our invention it may be assumed that a bar of steel having a cross-section approximately that shown in dot-and-dash lines in Fig. 9, or corresponding to that of the tie plate 39 of Fig. 6 before holes for spikes and slots are provided therein, is inserted above the die shoe 33 in substantially the position indicated. The extent to which the bar is inserted in the press is fixed by a stop member such, for example, as the rod 54, Fig. 1, having a pivotal support at 55 and controlled by a link 56 secured to the foot pedal 14. This stop mechanism is shown by way of example only and any other suitable arrangement may be employed to insure that the tie plates are of desired length.

When the bar is in position the pedal 14 is depressed by the operator to cause the clutch 13 to connect the gear 11 to the crank shaft 12 whereupon the press will operate through one revolution of the crank shaft 12 to cause the punch holder 20 to descend whereupon the punches 24 pass through the apertures 25 and punch holes 57 in the end of the bar constituting the blank for the tie plate. As the punch holder 20 descends further the vertical shear member 26 cuts a length from the bar suitable for a tie plate, the punches 24 remaining in the holes 57 during this operation.

Further downward movement of the punch holder 20 causes the cam 28 to engage the cam surfaces 46 and 47 to actuate the punches 41 and 42 outwardly in opposite directions against the forces of the springs 53 to punch transverse slots through a central intermediate portion of each of the ribs 38. These slots are shown at 59 in Fig. 6. It will be noted that the slot is relatively long and narrow. The punched-out portions are forced along tubular openings 60 in the dies 51 and 52.

When the punching operation last described has been completed, the punch holder 20 is returned upwardly by the crank shaft 12, to permit the punches 41 and 42 to be returned to their innermost positions by the respective springs 53, and the shear member 26 and the punches 24 are simultaneously withdrawn upwardly to their inoperative positions. The completed tie plate 39 which is now in substantially the form shown in Fig. 6 is removed and the bar is advanced against the stop 54 for a succeeding operation that is substantially identical in all respects to that described above.

While the operation has been described in connection with a bar of steel of desired cross-section which may be sheared into suitable lengths for tie plates as a part of the forming operation, it will be appreciated that the previously rolled bar may be cut into suitable lengths before the tie plates are formed in the manner described above in which case the shear members 26 and 27 may be omitted from the press 1.

It will also be appreciated that suitable blanks for forming the tie plates may be formed by drop forging, or by other suitable means, in which case the operations will be as described above except that it will be unnecessary to provide the press with a vertical shear for determining the length of the tie plate.

As illustrated in Fig. 7 a rail 62 may be seated on the tie plate 39 with the base between the shoulders or flanges 38 and may be secured in position thereon by means of suitable springs 63 of angle form each having a vertical portion for engaging a shoulder 64, and a substantially horizontal portion for extending through the slot 59 above a flange of the rail base.

By means of the apparatus described above and the method employed in forming the tie plates, a comparatively large number of operations that have hitherto required separate operations and repeated handling of the tie plates have been combined into a single continuous operation for forming finished tie plates from bars contituting suitable stock therefor.

We claim:

1. Apparatus for forming tie plates from blanks having two spaced ribs on one side thereof, comprising a die shoe for supporting a blank and having dies therein, a punch holder carrying punches for cooperating with said dies for making holes in said blanks, a block above said die shoe having recessed portions for receiving a blank therein and having apertures for permitting said punches to pass to said dies, two punches carried by said block between said ribs, dies on the outer sides of said ribs, cam surfaces movable with said punch holder for actuating said two punches simultaneously outwardly to provide slots in said ribs, and means for actuating said punch holder.

2. Apparatus for forming tie plates from blanks having two spaced ribs on one side thereof comprising a die shoe for supporting a blank and having dies therein, a punch holder adapted to be actuated by a press and carrying punches for cooperating with said dies for making holes in said blanks, a block above said die shoe having recessed portions for receiving a blank therein and having apertures for permitting said punches to pass to said dies, two punches carried by said block between said ribs, dies on the outer sides of said ribs, cam surfaces movable with said punch holder for actuating said two punches simultaneously outwardly to provide slots in said ribs, and springs for returning said two punches to their initial positions.

3. Apparatus for forming tie plates from a member having two spaced parallel flanges for constituting shoulders for a rail base, comprising punches for punching a slot outwardly in each of said flanges extending substantially parallel to the adjacent side of said member, a plurality of punches for punching holes through the base of said member, a holder for said base punches, means connected to said holder for actuating the flange punches outwardly, and means for actuating said holder.

4. Apparatus for forming tie plates from a

member having two spaced parallel flanges for constituting shoulders for a rail base, comprising two oppositely disposed punches for punching a slot outwardly in each of said flanges extending substantially parallel to the adjacent side of said member, a plurality of punches for punching holes through the base of said member, a holder for said base punches, cam means mounted on said holder for moving the flange punches outwardly in opposite directions, and means for actuating said holder.

5. Apparatus for forming tie plates from an elongate member having two spaced parallel flanges for constituting shoulders for a rail base, comprising two oppositely disposed punches for punching slots outwardly in said flanges extending substantially parallel to the adjacent side of said member, means for moving the punches in opposite directions, a plurality of punches for punching holes through the base of the member, a holder for said base punches, a shear for cutting the elongate member into tie plate lengths, and means for actuating said holder and shear and punch-moving means at the same time.

6. Apparatus for forming tie plates from an elongate member having two spaced parallel flanges for constituting shoulders for a rail base, comprising two oppositely disposed punches for punching slots outwardly in said flanges extending substantially parallel to the adjacent side of said member, a plurality of punches for punching holes in the base of said member, a holder for said punches, a shear mounted on said holder for cutting the elongate member into tie plate lengths, cam means mounted on said holder for moving said flange punches outwardly in opposite directions, and means for actuating said holder.

7. Apparatus for forming tie plates from an elongate member having two spaced parallel flanges for constituting shoulders for a rail base, comprising two oppositely disposed punches for punching slots outwardly in said flanges extending substantially parallel to the adjacent side of said member, a plurality of punches for punching holes in the base of said member, a holder for said punches, a shear mounted on said holder for cutting the elongate member into tie plate lengths, cam means mounted on said holder for moving said flange punches outwardly in opposite directions, means for actuating said holder, and resilient means for moving said flange punches inwardly.

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