

April 9, 1935.

V. A. BOKER

1,997,292

PUNCH PRESS

Filed July 22, 1933

2 Sheets-Sheet 1

Fig. 1

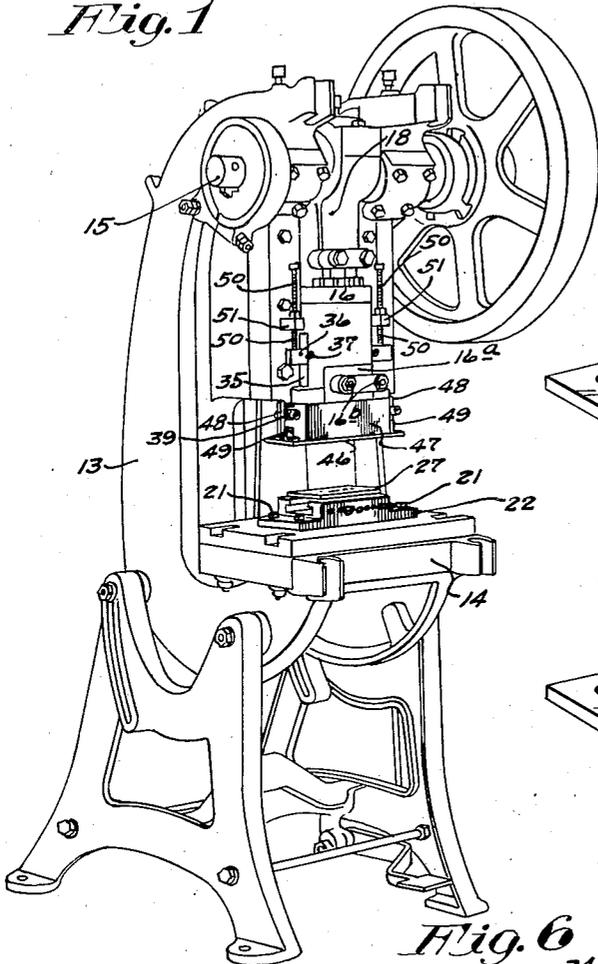


Fig. 2

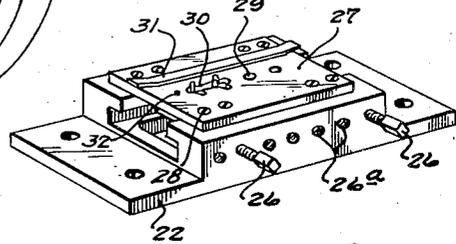


Fig. 8

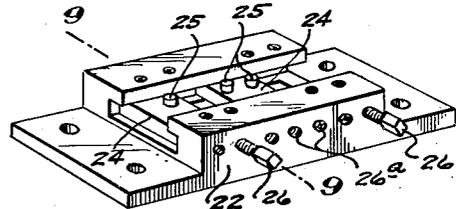


Fig. 9

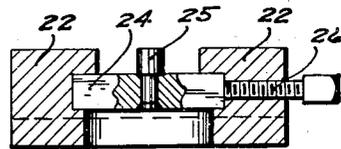


Fig. 10

Fig. 6

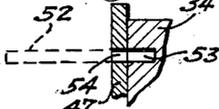


Fig. 5

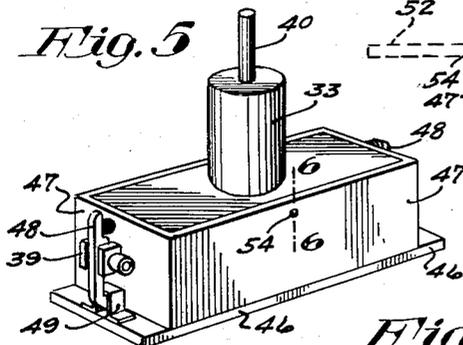


Fig. 11

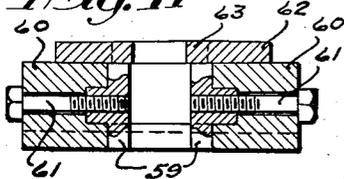
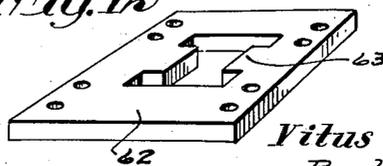


Fig. 12



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2 Sheets-Sheet 2

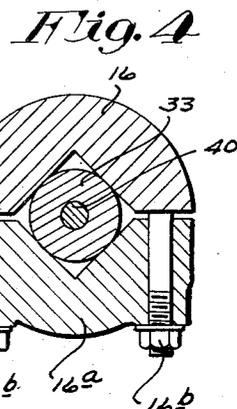
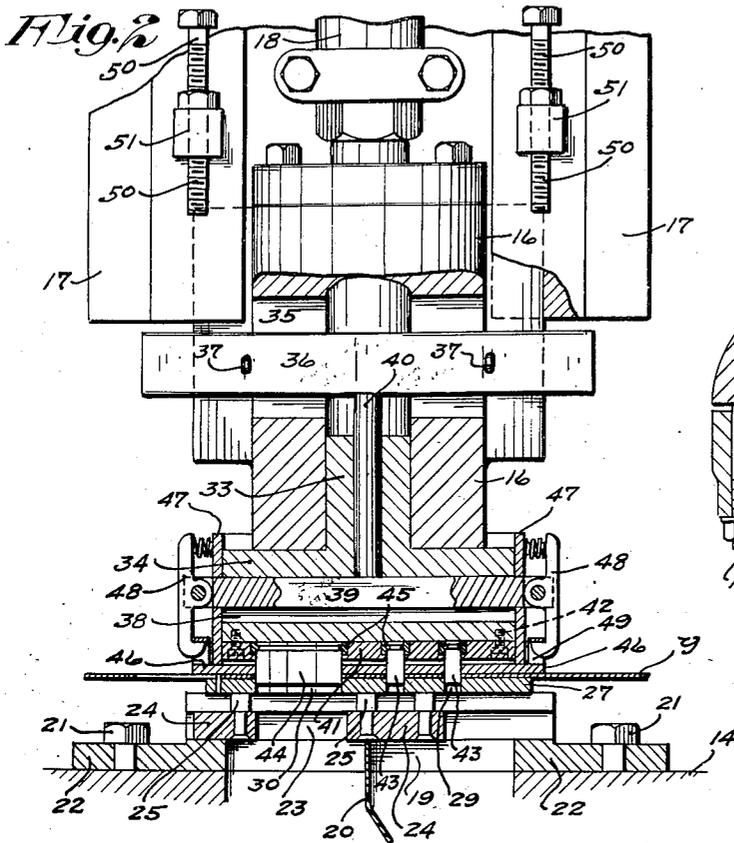
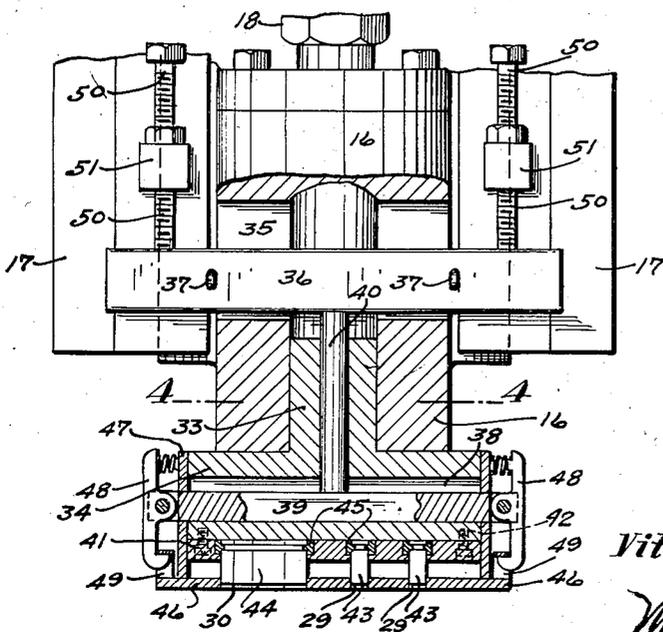


Fig. 3



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# UNITED STATES PATENT OFFICE

1,997,292

## PUNCH PRESS

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Application July 22, 1933, Serial No. 681,727

6 Claims. (Cl. 164—110)

My present invention relates to punch presses, and provides certain highly important improvements therein, to wit: an improved self-stripping die set; and an improved means for supporting die plates, all as will hereinafter more fully appear.

Generally stated, the invention consists of the novel devices, combinations of devices and arrangement of parts hereinafter described and defined in the claims.

The invention is here illustrated in connection with a punch press of standard construction of the type wherein movement of the power-actuated ram is controlled by a foot treadle, but the invention, of course, may be applied to any suitable type of press.

Referring to the drawings, wherein like characters indicate like parts throughout the several views:

Fig. 1 is a perspective showing the press equipped in accordance with my invention;

Fig. 2 is a fragmentary view on a larger scale than Fig. 1, showing partly in front elevation and partly in section the principal parts of the press, to wit: the ram, the punch holder, punch pad, stripper plate, die plate, shoe and bed of the press;

Fig. 3 is a view corresponding to Fig. 2, but with different positions of the parts and with the shoe, die plate and bed omitted;

Fig. 4 is a horizontal section taken on the line 4—4 of Fig. 3;

Fig. 5 is a perspective showing the punch holder and stripper plate removed from the ram;

Fig. 6 is a fragmentary section taken on the line 6—6 of Fig. 5;

Fig. 7 is a perspective showing the shoe of the press with the die plate applied thereto;

Fig. 8 is a perspective showing the shoe with the die plate removed therefrom;

Fig. 9 is a section taken on the line 9—9 of Fig. 8;

Fig. 10 is a transverse section illustrating a modified form of the shoe;

Fig. 11 is a transverse section illustrating a shoe with modified form of die plate support; and

Fig. 12 is a perspective showing the die plate of Fig. 11 removed from the shoe.

The preferred structure illustrated in Figs. 1 to 9, inclusive, will first be described. Of the principal parts of the press illustrated, the numeral 13 indicates the framework; the numeral 14, the bedplate; 15, the power-driven crank shaft; 16, the ram mounted for vertical

movements in vertical guides 17 of said frame; and the numeral 18, the connecting rod that connects the eccentric of the crank shaft 15 to said ram 16. The bedplate 14 is provided with one or more suitable slug passages 19, which, in the particular arrangement illustrated in Fig. 2, is divided into two channels by a partition 20, which latter feature, however, constitutes no part of the present invention.

Rigidly secured on the bedplate 14, by means of machine screws 21 or the like, is a plate supporting shoe 22 that spans the opening 19 and is provided with a slug passage or opening 23 that will permit the dropping of slugs through the openings 19. The shoe 22 has a raised portion that is formed with longitudinal dove-tailed channel that receives and slidably holds one or more supplemental die supports in the form of rectangular metallic blocks 24 having projecting studs or knobs 25. These blocks 24 slide frictionally in the channel of the shoe and when properly positioned, are adapted to be rigidly held where set by set screws 26 applied through the proper threaded perforations 26<sup>a</sup> of the shoe, as best shown in Figs. 7, 8 and 9. The important purpose of these supplemental die supports will appear in the description of the operation and use of the invention.

The die, which usually is in the form of a flat tempered steel plate 27, is rigidly secured on the top of the shoe by means of screws 28 or the like and spans the channel of the shoe. This die plate is shown as provided with die openings 29 and 30 with a stock guide 31, and a stop pin 32, but, of course, said plate may take different forms, as required for punching out work of different designs.

The vertically movable ram 16 above noted, at its lower end, has an axial bore adapting it to receive the tubular shank 33 of a punch holder or head 34. To firmly clamp the shank 33, said ram at its lower end is split and provided with a clamping segment 16<sup>a</sup> clamped thereto by nut-equipped studs 16<sup>b</sup>, as best shown in Fig. 4. Above the clamp 16, the ram is formed with diametrically offset vertically extended slots 35 through which is extended a knock-out bar 36 that is capable of limited vertical movements in said slot, but is held against endwise displacement by suitable devices such as split keys or cotters 37, see particularly Figs. 2 and 3. The punch holder 34 is formed with a transverse longitudinal slot 38 through which is extended a stripper bar 39 that is capable of limited vertical movements in said slot. The numeral 40

indicates a knock-out pin that is extended axially through the stem 33 and reacts between the bars 36 and 39, as will hereinafter appear.

A punch pad 41 is rigidly secured to the bottom of the punch holder 34, by means of machine screws 42 or the like. Rigidly seated in this punch pad and depending therefrom are punches 43 and 44. The punches 43 are aligned with and engageable into the die openings 29, and the punches 44 are aligned with and engageable into the die opening 30. The punches 43 and 44 may be anchored in the punch pad in various different ways, but preferably they are so anchored by casting matrix metal or the like (which does not perceptibly expand or contract under varying temperature), indicated at 45, around the same with heads or upper ends of said punches seated directly against said punch pad. Of course, the particular arrangement of the punches in the punch pad and of the die passages in the die plate will vary according to the design of the article to be punched.

The stripper plate 46, which is immediately below the punch pad, has punch passages that correspond to and freely pass the punches 43 and 44. Loosely surrounding and vertically movable on the punch holder or head 34, is a stripper frame 47 through which the ends of the stripper bar 39 projects so that said bar and stripper frame will partake of common vertical movements. This stripper frame 47 is normally locked to the stripper plate 46 by suitable means such as spring-pressed latches 48 shown as pivoted to the projecting end of stripper bar 39 and provided at their depending ends with hooked lugs that engage and interlock with seats on the end of the stripper plate, formed by brackets 49 secured to said stripper plate at the ends thereof, that project beyond the stripper frame, see particularly Figs. 2, 3 and 5.

When the ram and parts carried thereby are raised, as shown in Fig. 3, the projecting ends of the knock-out bar 36 will engage the lower ends of stops afforded by stop screws 50, mounted for vertical adjustments in lugs 51 on the vertical guides 17. From the foregoing, it is evident that the punch pad with its punches may be readily removed from the punch holder and other punch pads with punches properly arranged for co-operation with a substituted die plate may be applied to said punch holder. To effect such substitutions requires that the stripper plate be removed; and this obviously may be very quickly accomplished by releasing the spring latches 48. In making the above substitutions and at certain other times, it is desirable to hold the stripper frame 47 in a raised position, and sometimes this may be desirable even when the stripper plate is left in operative position; and this may be accomplished by inserting a lock pin 52 in coincident holes 53 and 54 formed respectively, in the punch holder and stripper frame, see particularly Figs. 5 and 6.

The sheet of metal from which the articles are to be punched, and which is herein designated as the stock or stock sheet, is indicated by the character *y*.

#### Operation

In setting the punching apparatus for use, the auxiliary die-supporting blocks 24 will be adjusted so that their studs or projections 25 will be engaged with the under side of the die plate at various weak points, such as points between die openings or punch passages. A good adjustment

of said auxiliary die supports is illustrated in Fig. 2.

When the ram is raised, the stripper plate, stripper frame, stripper bar, knock-out pin and knock-out bar will, under the action of gravity, tend to assume lowered positions in which the lower surface of the stripper plate will be slightly below the lower ends of the punches. Under the punching action, the stripper plate will come into contact with the stock strip or sheet, slightly in advance of the punches, and will be gravity-held against the sheet while the punches are positively forced through the sheet. Under upward movement of the ram, the stock sheet will be frictionally held on the punches and carried upward therewith until the knock-out bar 36 comes into engagement with the stop screw 50, and thereupon, under the slightly continued upward movement of the ram, punch holder, punch pad and punches, the punches will be withdrawn upward into the stripper plate and out of the stock sheet, permitting the latter to be dropped by gravity.

In Fig. 10, there is illustrated a scheme for positively preventing lateral spring or spreading of wide shoes. In this structure, the wide shoe is indicated by 55, transversely through the sides of which is extended one or more nut-equipped bolts 56. In this arrangement, the auxiliary die-supporting block 57 is provided with a plurality of die-engaging studs or projections 58.

Fig. 11 illustrates a modified form of auxiliary die support wherein the die-supporting blocks 59 are provided with hubs seated in the sides of the shoe 60 and held in position by machine screw 61. The form of auxiliary die support illustrated in Fig. 11 is especially designed to support inwardly projected lug-like portions of a die plate, such as best shown in Fig. 12 and also in Fig. 11. This die plate 62, it will be noted, is formed with inwardly projecting lug-like portions 63 that are adapted to be supported by underlying locks 59.

From the foregoing, it will be understood that the devices above described are capable of various modifications within the scope of the invention herein disclosed and claimed. The practicability and efficiency of the devices herein disclosed and claimed, as well as the cheapness of manufacture, have been demonstrated in actual practice. A further advantage in making the dies under this system may be found to be a great saving of space in storing.

What I claim is:

1. In a punch press, the combination with the reciprocatory ram thereof and a punch-equipped holder carried by said ram, of a stripper frame having limited sliding movements on said punch holder, a stripper plate detachably attached to said stripper frame and having openings through which the punches work, and means operative under receding movement of said ram to intercept receding movement of said stripper frame and thereby cause said stripper plate to strip the punched stock from the punches.

2. The structure defined in claim 1 in further combination with latches for quickly attaching said stripper plate to and quickly disconnecting the same from said stripper frame.

3. In a punch press, the combination with the reciprocating ram thereof and a punch-equipped holder carried by said ram, of a stripper frame having limited sliding movements on said punch holder, a stripper bar extended through said punch holder and stripper frame and connected

for movements with said frame, a stripper plate having openings through which said punches work, means on the outer ends of said stripper bar for connecting said stripper plate to said stripper frame, stop means relatively fixed on the punch frame, and knock-out elements intermediate said stripper bar and stop means operative under receding movement of said ram to cause said stripper plate to strip the stock strip from the punches.

4. In a punch press, the combination with the reciprocating ram thereof and a punch-equipped holder carried by said ram, of a stripper frame having limited sliding movements on said punch holder, a stripper bar extended through said punch holder and stripper frame and connected for movements with said frame, a stripper plate having openings through which said punches work, means on the outer ends of said stripper bar for connecting said stripper plate to said stripper frame, a knock-out bar extended diametrically through and projected from said ram, a knock-out pin interposed between said knock-out bar and stripper bar, and stop means on the punch frame with which said knock-out bar is engageable under receding movements of the

ram to cause said stripper plate to strip the stock sheet from the punches.

5. The structure defined in claim 3 in which the means on the outer ends of the stripper bar for connecting said stripper plate to the stripper frame are yieldingly held latches.

6. In a punch press, the combination with the reciprocating ram thereof and a punch-equipped holder carried by said ram, of a stripper frame having limited sliding movements on said punch holder, a stripper bar extended through said punch holder and stripper frame and connected for movements with said frame, a stripper plate having openings through which said punches work, means on the outer ends of said stripper bar for connecting said stripper plate to said stripper frame, a knock-out bar extended diametrically through and projected from said ram, a knock-out pin interposed between said knock-out bar and stripper bar, and laterally spaced stop devices on the frame of said press adjacent said ram and against which the projecting ends of said knockout-bar are engageable under extreme receding movements of said ram to cause said stripper plate to strip the stock sheet from the punches.

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