

April 27, 1937.

V. A. BOKER
PUNCH PRESS MECHANISM

2,078,706

Filed May 18, 1935

2 Sheets-Sheet 1

Fig. 1

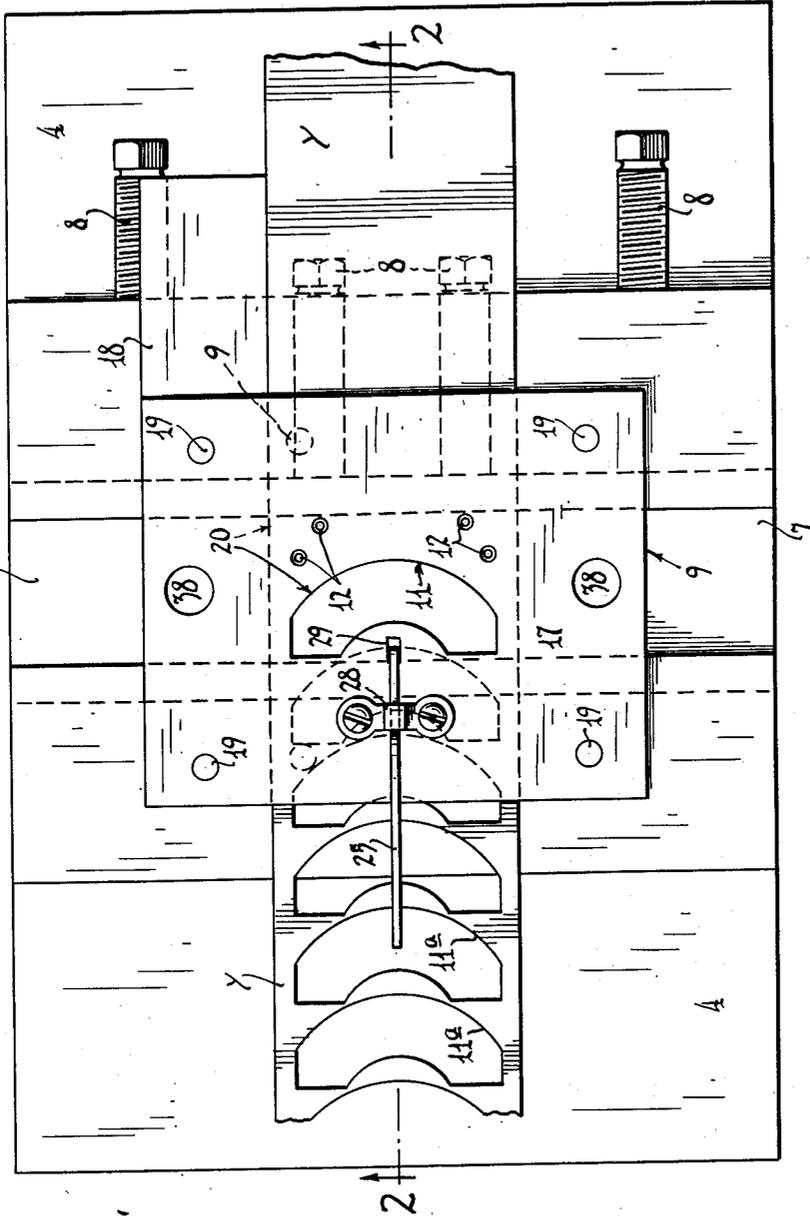
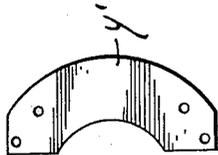


Fig. 4



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2 Sheets-Sheet 2

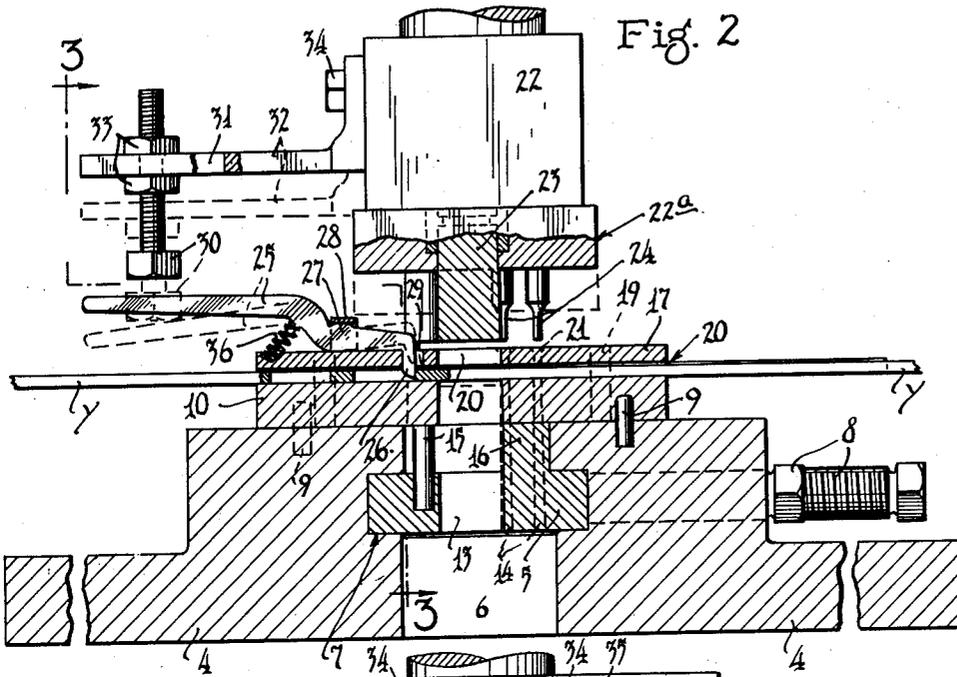
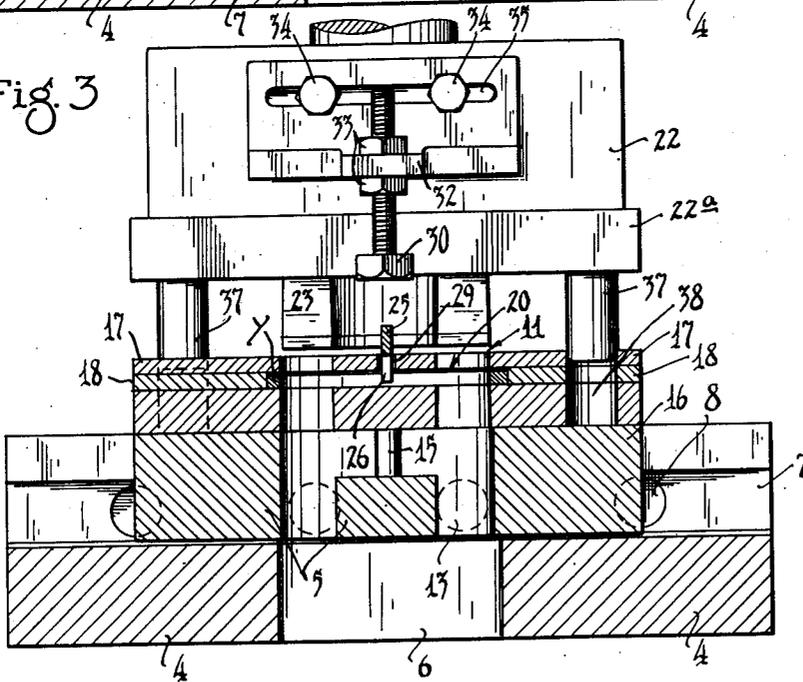


Fig. 2

Fig. 3



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PUNCH PRESS MECHANISM

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Application May 18, 1935, Serial No. 22,239

1 Claim. (Cl. 164—59)

My present invention relates to punch presses and, generally stated, consists of the novel devices, combinations of devices and arrangement of parts hereinafter described and defined in the claim.

5 Primarily, the invention is directed to the provision of an extremely simple and highly efficient stop gauge for such presses. This device is operated automatically under the press action and serves to intercept and stop the movement of the stockstrip after each punching action, and to accurately gauge the step by step forward movement of the stock strip. The invention further provides certain other important features of construction relating to the manner of mounting and supporting the die plate on its "die set".

10 In the accompanying drawings, which illustrate a commercial form of the invention and wherein like characters indicate like parts throughout the several views:

15 Fig. 1 is a plan view showing the die plate, die set and stock strip;

20 Fig. 2 is a view partly in elevation but chiefly in section taken on the line 2—2 of Fig. 1, showing also the punch head and parts carried thereby;

25 Fig. 3 is a view partly in elevation and partly in transverse section taken on the line 3—3 of Fig. 2; and

30 Fig. 4 is a plan view showing the stamped blank.

The die set here illustrated is made up of a shoe or main die support 4, and a supplemental die support 5. The shoe 4 is formed with a large vertical passage 6 and with an undercut longitudinal guide-way 7 through the intermediate portion of which the vertical passage 6 extends. The supplemental support 5 is flanged to slide in the guide-way 7 and is adapted to be securely anchored therein by the use of one or more set screws 8 that work with threaded engagement through one side of the shoe 4. Further features of construction of the support 5 will be later noted.

40 Detachably seated on the shoe 4 and accurately positioned thereon, preferably by dowel pins 9, is a die plate or die proper 10. The pattern to be cut from the stock strip in different instances will vary to suit the circumstances of the case, but in the illustration, the blank y' to be cut from the stock strip is a sort of truncated crescent and hence the die plate is provided with a main pattern-forming passage 11, as best shown in Fig. 1. Inasmuch as the die illustrated is of the progressive character, the die plate is provided with small perforations 12 located also as best shown in Fig. 1. To adapt the arrangement to the particular form of pattern-punching die, above described,

the support 5 is formed with a passage 13 that corresponds to but is larger than the die passage 11, and it is further provided with punch discharge passages 14 that register with the punch passages 12. Also as shown, the member 5 is provided with an upwardly projecting bearing pin 15 and with a raised portion 16 that reinforce and assist in supporting that portion of the die plate 10 that is extended over the vertical passage 6.

5 The stock strip from which the blanks are to be punched, is indicated by the character y . This strip is adapted to be fed longitudinally through a guide passage formed by the die plate 10, a stripper plate 17, and spacing strips 18, which parts 10, 17 and 18 are rigidly secured together by rivets 19 or the like. The stripper plate 17 is formed with a passage 20 that registers with but is slightly larger than the pattern-forming die passage 11, and it is also provided with perforations 21 that register with but are preferably slightly larger than the upper extremities of the passages 12, which latter and the registering passages 16 are preferably tapered so that they increase in diameter toward their lower ends.

15 In practice, the shoe 4 will be clamped or otherwise rigidly secured to the bed of the press. Also the die plate 10 may be further secured to and clamped down upon the shoe by any suitable means such as clamps or screws, not shown.

20 The vertically reciprocating punch head 22 in the arrangement illustrated, carries a blanking or pattern-forming punch 23 and piercing punches 24. The pattern-forming punch 23 corresponds in horizontal cross-section to the punch passage 11 of the die plate with which it is, of course, truly aligned. The piercing punches 24 are aligned with the corresponding passages 21 of the stripper plate 17 and passages 12 of the die plate 10. In the construction illustrated, the punches 23 and 24 are directly mounted in a punch plate 22a which, in turn, is rigidly but detachably secured to the head 22 by screws or other means, not shown.

25 Under successive punching actions and progressive step by step movements of the stock strip y , there will be formed in the stock strip large passages 11a that correspond to the die passage 11 and also the stock strip will be perforated by the punches 24. The blanks cut from the stock at 11a are the parts used either in their stamped form or in modified form for the making of various useful devices. Here it will be noted that the punches 24 act to puncture the strip in advance of cutting of the blanks from the strip, but at such positions that the perforations will appear in the punched blanks;

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this being in accordance with what is known as progressive punching.

We now come to the most important feature of the present invention, to wit: the stop gauge. This device involves a simple lever 25 which is adapted to be integrally stamped from sheet metal. This lever, at its inner end, is provided with a down-turned stop finger or projection 26 and at its intermediate portion relatively near to its stop finger 26 is slidably fulcrumed to the stripper plate 17, this, as shown, being accomplished by a rounded portion 27 that bears on the stripper plate and works under a yoke-like keeper strap 28 which, in the structure illustrated, is anchored to said stripper plate and said lever is slidably fulcrumed indirectly to the die plate 10. The stop finger 26 works downwardly through a perforation 29 in the stripper plate and the free outer end of said lever projects in the direction in which the stock strip *y* is fed and is positioned to be engaged by a tappet carried by the punch head 22.

The perforation 29 through which the stop finger 26 works is in the form of an oblong slot and allows limited sliding action of lever 25. The outer end of the slot definitely checks the travel of the finger 26 when in contact with the stock. The opposite end of the slot serves to check the sliding action of the lever 25, due to the action of the obliquely disposed compression spring 36.

The tappet illustrated is formed by the head of a screw bolt 30, the stem of which works through a slot 31 of a bracket 32 to which it is held by nuts 33. The bracket 32, in turn, is rigidly secured to the head 22 by screws 34 that work through a slot 35 in the base of said bracket and are screwed into the head 22. By means of the adjustment permitted by the screw 30 and by the slots 31 and 35, the tappet head can be adjusted to any desired altitude, to any desired distance from the head, and may also be given lateral adjustments so that it will properly engage the free end of stop lever 25. The stop lever 25 is subject to a compression spring 36, see particularly Fig. 2, that is obliquely disposed between said lever and the stripper plate 17, so that it exerts not only an upward force on the projecting end of the lever (tending to move the finger 26 downward into operative position shown in Fig. 2), but also puts said lever under strain to move inward and position the stop finger 26 against the inner extremity of slots 29. This arrangement and operation is highly important as will appear from the description of the operation.

As a further feature of the invention, the die plate 10 is accurately held with the punches 23 and 24 properly aligned with the die passages, by means of dowel pins 37. These dowel pins 37 in the structure illustrated, are directly secured to the punch plate 22a and maintain engagement with closely engaging guide passages 38 formed through the die plate 10, the spacing strips 18 and the stripper plate 17, see particularly Fig. 3, which shows the punches raised to extreme positions. Hitherto, it has been common practice to provide the punch head or plate with leader pins that work not through the die plate, but through the die-supporting shoe. This old arrangement, while it insures alignment of the punches with the shoe, does not prevent the die plate from getting out of alignment with the punches.

The operation of the stop gauge is as follows:

When the stock is pushed forward against the depending portion of the stop gauge 26, the latter is moved over against the left end of the slot in the stripper plate and makes a positive stock stop which locates the stock in the required position for punching. As soon as the punch engages the stock, the tappet 30 will engage the left end of lever 25, causing the depending portion 26 to raise out of contact with the stock and, by the action of the spring 36, is caused to rest upon the upper surface of that portion of the stock, which is left as scrap between the punchings; so that when the punch ascends and the stock is fed forward, the depending portion 26 of the stop gauge will drop into the punched aperture of the stock and again stop the stock for the next operation of the descending punch.

This simple device has, in practice, been found highly efficient both as a means for intermittently interrupting or stopping the movement of the stock strip and for accurately positioning the same for the successive punching actions with a minimum of space between the punched out openings of the strip and resulting minimum waste of material.

Obviously, the use of this stop gauge makes unnecessary the employment of a skillful operator, renders every punch movement of the head effective, and permits the punch to be run at a maximum of speed. All the operator has to do is to insert the stock strip in the guide passage and manually keep the stock strip under tension to move from the right toward the left in respect to Fig. 2.

From the foregoing, it will be understood that the structure illustrated is capable of modification within the scope of the invention herein disclosed and claimed.

The term "punch press" is herein used in a broad sense to include die mechanisms for punching holes in or making deformed depressions in metal strips, bars or sheets.

Certain of the structure herein disclosed and which does not involve the stop gauge will be made the subject matter of a divisional application.

What I claim is:

In a punch press mechanism, the combination with a co-operating die and punch, said die having a stripper plate overlying the same and spaced therefrom to afford a stock guideway, said stripper plate adjacent the punch passage thereof, having a short stop slot extended in the direction of the feed of the stock, of a stop gauge in the form of an integral lever extended in the direction of the feed of the stock, and mounted on said stripper plate for combined pivotal and endwise sliding movement in the direction of the travel of the stock and provided with a depending, stock-engaging stop finger working through said stop slot and limited in a sliding movement thereby, and a spring obliquely interposed between said stop lever and stripper plate and tending to impart the compound pivotal and sliding movement of said gauge, in further combination with a tappet movable with said punch and engageable with said gauge to release the same from the stock, when said punch is depressed, said stop gauge being slidably and pivotally anchored to said stripper plate by a yoke secured to the latter and freely embracing the former.

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