

March 19, 1946.

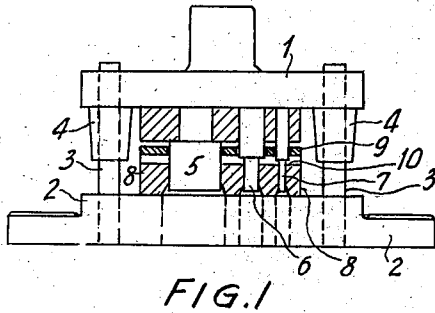
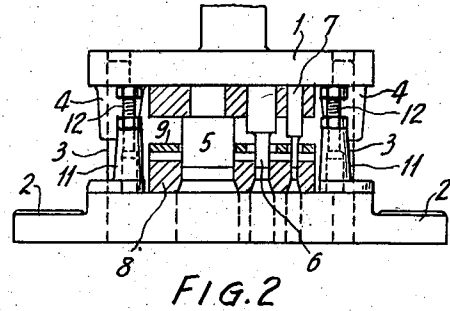
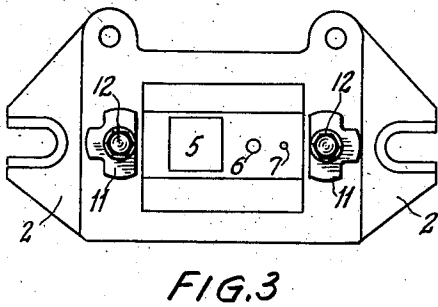
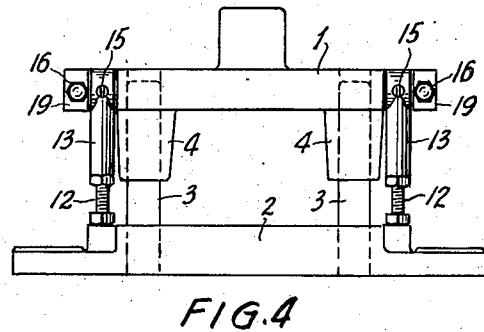
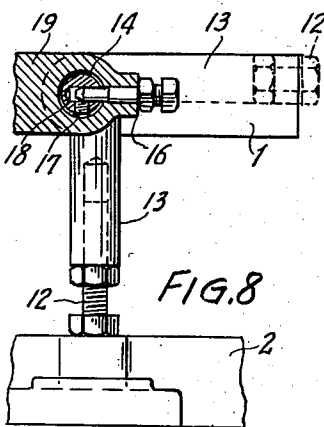
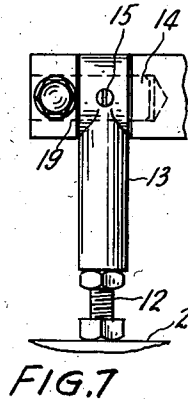
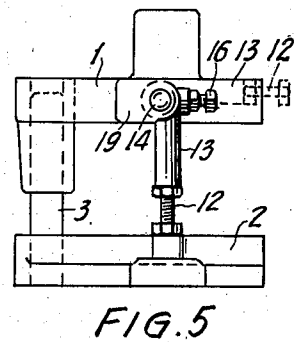
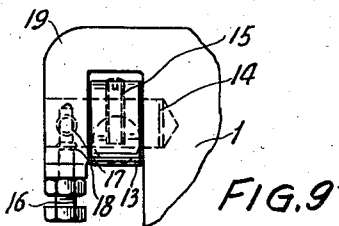
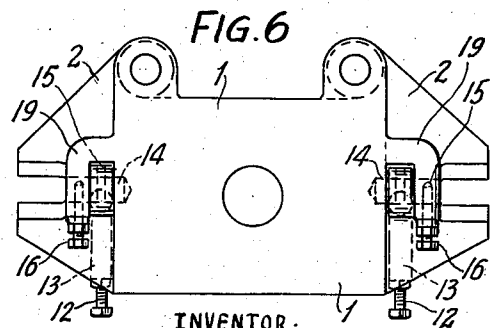
A. BESAG

2,396,814

DEVICE FOR SETTING OF BLANKING AND FORMING DIES IN PRESSES

Filed Feb. 2, 1945

3 Sheets-Sheet 1



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DEVICE FOR SETTING OF BLANKING AND FORMING DIES IN PRESSES

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3 Sheets-Sheet 2

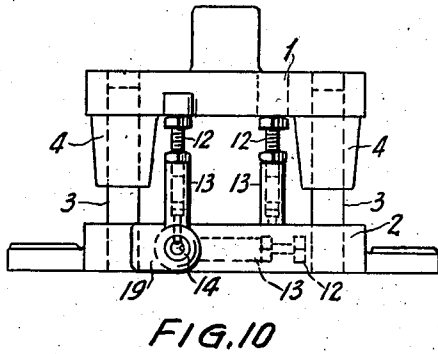
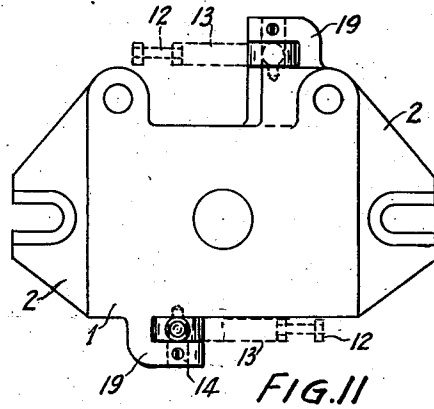
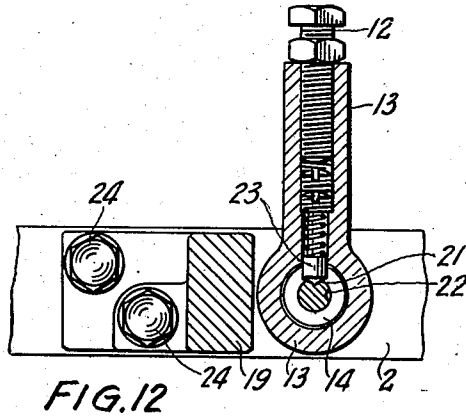
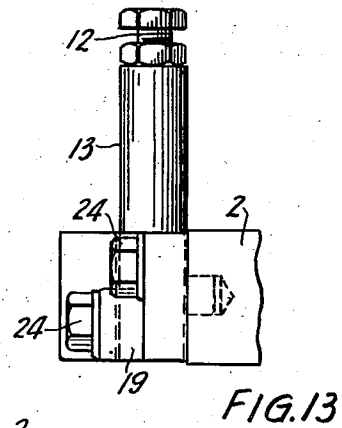
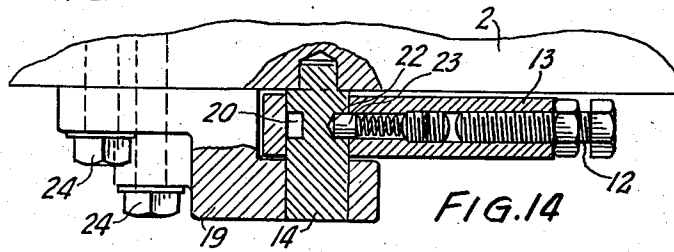
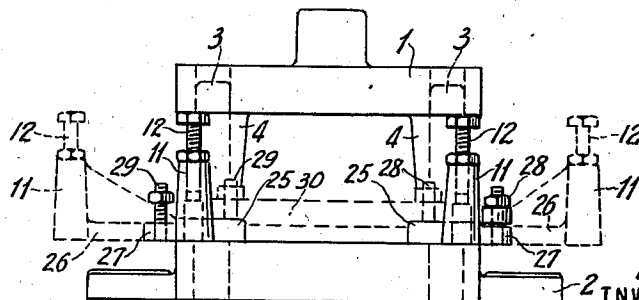


FIG. 15

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DEVICE FOR SETTING OF BLANKING AND FORMING DIES IN PRESSES

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3 Sheets-Sheet 3

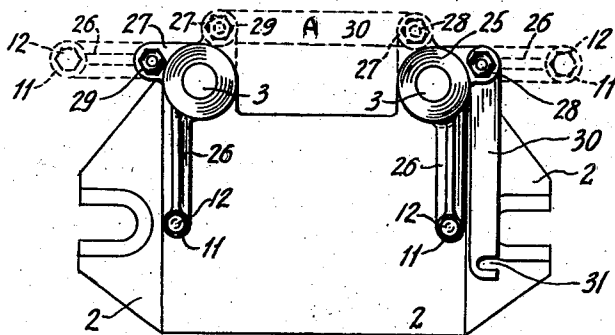


FIG. 16

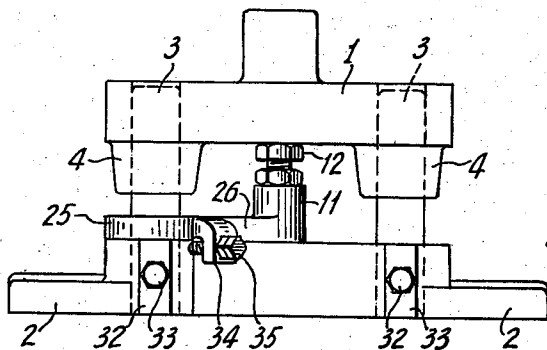


FIG. 17

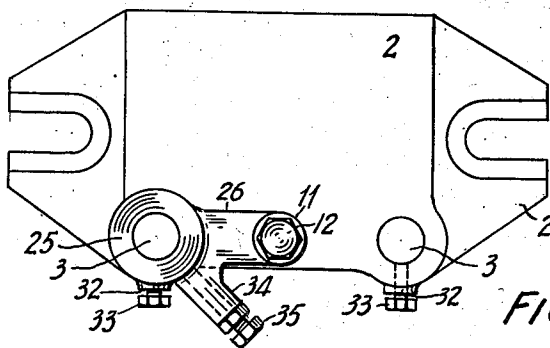


FIG. 18

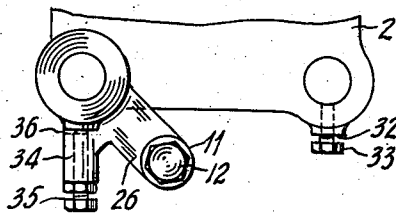


FIG. 19

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UNITED STATES PATENT OFFICE

2,396,814

DEVICE FOR THE SETTING OF BLANKING
AND FORMING DIES IN PRESSES

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Application February 2, 1945, Serial No. 575,844
In Australia December 15, 1943

14 Claims. (Cl. 164—86)

When setting a die for metal stamping in a power operated press it is not only essential that the punch fits accurately in the die, but also that a uniform clearance is provided around the punch. To achieve this desirable fitting there is an increasing tendency in the die making industry to use so-called die sets which by guiding the punch along two vertical pins ensures correct alignment of the punch and die, after the setting by the die maker and during construction of the die; however, in the die sets mentioned no means are provided to maintain the punch in a proper vertical distance with respect to the die. Accordingly each time the die is positioned in the press the correct depth of stroke must be individually adjusted either by trial or error adjustment with test samples until the required product is obtained or by the use of measuring devices which are adjusted according to measurements previously established.

The methods above stated have certain disadvantages amongst which may be mentioned is the waste of time and labour by a skilled operative, and loss in production time and output of the press. Moreover when the die set is removed from the press the punch moves under its own weight upon the vertical guide pins, and in the absence of a stop to maintain the punch at a proper distance from the die, an enlarged portion of the punch finally strikes and comes to rest upon a sharp cutting edge of the die, thereby burring or blunting the said edge of the die.

As a practical expedient wooden blocks have been employed to prevent such damaging engagement between the punch and die, but the danger of splinters or fibres from said blocks entering the die has militated against the efficiency of the blocks, and furthermore the latter are impractical as an accurate means of setting up the die set.

The principal object of the present invention is to avoid or eliminate the above recited disadvantages by the provision of a simple and efficiently operable device for the accurate and convenient mounting and setting up of the die and punch in a press.

With the above stated object in view a device for the setting of blanking and forming dies according to this invention consists of one or more adjustable elements arranged to maintain the punch in pre-set position relatively to the die during setting up in the press and when removed from the latter, said element or elements being removable out of the path of travel of the punch.

The arrangement of the adjustable element or

elements is conceived with the dual objective of locating the punch in set relation to the die so as to obviate damaging contact between the latter and the punch when removed from the press and also to position the punch so that upon the die and punch being assembled in a press said distance is such that the maximum stroke of the punch is achieved without any additional setting operation being required. Accordingly by the use of the invention damage to the punch or die is avoided and the setting is maintained while removed from the press ready for subsequent operative location in the press.

The element or elements are adjustable to determine the depth which the punch is to engage with the die and also provides facilities for adjustment when the die and punch are reset after repair or regrinding.

Various practical arrangements of the invention as applied to a die set are illustrated in the accompanying drawings.

In these drawings—

Fig. 1 is a view in elevation of a standard die set.

Fig. 2 is a view in elevation of a simple device according to the invention in which adjustable elements are formed as separate integers from the die set.

Fig. 3 is a plan view of the die of the die set shown in Fig. 2.

Figs. 4, 5 and 6 illustrate in elevation, side view and plan view respectively a modified arrangement in which the adjustable elements are mounted for radial movement to an inoperative position.

Figs. 7, 8 and 9 illustrate in detail the mounting arrangement of the adjustable elements shown in Figs. 4, 5 and 6.

Figs. 10 and 11 illustrate elevation and plan views respectively of another arrangement of the mounting of the adjustable elements.

Figs. 12, 13 and 14 are detail views of the arrangement illustrated in Figs. 10 and 11.

Figs. 15 and 16 are elevation and plan views respectively of another embodiment in which the adjustable elements are mounted for movement about the vertical pins of the die bolster.

Figs. 17, 18 and 19 are views of a further embodiment in which one adjustable element is shown with the die set.

Referring to Fig. 1 illustrating a standard die set, 1 is the punch head, 2 the die bolster to which the vertical guide pins 3 are fixed and along which the punch head 1 moves by means of the bosses 4. The punches 5, 6 and 7 are fixed on

the punch head 1. The die 8 shows, for example, three apertures corresponding to the punches 5, 6 and 7. A stripper plate 9 is shown above the die.

In Fig. 1 the position of the parts is shown when the die set has been removed from the press. Punch head 1 together with all parts fixed to it has moved down under its own weight until the enlarged curved upper portion of the punch 7 rests on die 8 and by so doing this curved part 10 of punch 7 damages the sharp cutting edge of the corresponding hole in die 8.

Figs. 2 and 3 illustrate how this disadvantage is avoided by one arrangement according to the invention. Fig. 2 shows the position of the punches 5, 6 and 7 in relation to die 8 when the punching operation has just been completed, which corresponds to the deepest point of the stroke, according to which the ram of the press has been adjusted when setting-up the die set in the press. The adjustable elements according to this embodiment consist of blocks 11 arranged on both sides of die 8. Bolts 12 are threaded into the blocks 11 and are adjusted according to the original setting-up of the press. The bolts 12 maintain the setting-up distance of punch to die constant and ensure that during the shelving period the punch cannot damage the die. During the punching operation the blocks 11 and bolts 12 are taken out of the path of the punch. They are, however, inserted again before the die set is taken out of the press.

In the embodiment shown in Figs. 4, 5, 6, 7, 8, 9 the adjustable elements are mounted for radial movement to an inoperative position and comprise pivoted arms 13 and bolts 12 engaging the free end thereof. Figs. 4, 5, 7 and 8 show the position when the arms 13 and bolts 12 maintain the punch and die in setting-up positions, while the dotted lines in Figs. 5, 6 and 8 show the arms 13 moved to an inoperative position during the punching operation. Positioning of the arms 13 with their bolts 12 in either position is controlled by pivots 14 in which two threaded openings 17 and 18 in the pivot 14 are spaced at 90 degrees. The arms 13 are fixed to pivot 14 by means of set screws 15. On the punch head 1 a lug 19 is formed and in which pivot 14 turns. The bolt 16 engages the lug 19 and is in alignment with opening 18 in one position of arm 13 and in alignment with opening 17 in the other position of arm 13.

In the embodiment shown in Figs. 10, 11, 12, 13, 14 the arm 13 is mounted for radial movement around the pivot 14 fixed in lug 19 which is formed in the die bolster 2. The operative position of arms 13 and bolts 12 is shown in Figs. 10, 12, 13 whilst the inoperative position of arms 13 during the punching operation is shown in Figs. 10 and 11 in dotted lines and in Fig. 14 in cross-section. Pivot 14 is provided with an annular groove 20 which is formed with two indentations 21 and 22 spaced at 90 degrees. Into these indentations fits a spring loaded pin 23 arranged within the arm 13. In the operative position of arm 13 pin 23 engages indentation 21, as shown in Fig. 12 and in the inoperative position of arm 13 pin 23 engages indentation 22. Pin 23 may be arranged with its corresponding groove 20 in such a manner that the pin remains within the groove while the arm 13 is being moved, thus preventing any axial movement of the arm along its pivot. In the example shown in Figs. 12, 13 and 14 the

lug 19 is attached to die bolster 2 by means of bolts 24.

In the embodiment shown in Figs. 15 and 16 the blocks 11 carrying bolts 12 are arranged in such a manner that they can be moved horizontally out of the path of travel of the punch by turning around pin 3. The full lines show the position of blocks 11 in the operative position. The dotted lines indicate the inoperative position of stops 11 during the punching period. Each block 11 is connected with a boss 25 by an arm 26. The boss 25 pivots around pin 3 of the die bolster 2. A lug 27 is attached to each boss and on one of the lugs 27 a bolt 28 is arranged which serves as pivot for an arm 30, the purpose of which is to connect together and secure the two blocks 11 in their inoperative position, the secured position being indicated at A in Fig. 16. This is effected by a bolt 29 which is arranged on lug 27 on the left side of Fig. 16. In this position slot 31 of arm 30 fits under the nut of bolt 29 and by tightening both nuts 28 and 29 the blocks 11 and bolts 12 are firmly held in inoperative position during the punching operation. This arrangement is particularly suitable for use in existing die sets because it can be attached without the necessity of drilling holes or cutting threads in the die bolster or punch head. For new die sets the design can be altered in such a way that, for example, boss 25 is provided with a pin adapted to fit in one of two spaced openings in the die bolster. To swing the arm out, boss 25 is lifted, turned and then lowered again into that position at which the pin on boss 25 engages the corresponding hole in the die bolster.

Where space may not be available in the die set for the employment of two or more adjustable blocks 11 one only may be employed and as illustrated in Figures 17, 18 and 19 one block 11 is arranged at the rear of the die. The block 11 is fixed to one end of an arm 26 formed with a boss 25 which engages one of the pins 3 of the die set.

Figs. 17 and 18 show the adjustable block 11 in operative position and Fig. 19 shows the block 11 moved into an inoperative position. In order to secure the block in the latter position the boss 25 is provided with a further L-shaped arm on the depending portion 34 which is provided with a bolt 35.

As the majority of existing die sets have a flat surface as 32 at which part a set screw or bolt is provided to locate the pillar pin 3 in position, the bolt 35 may be adjusted relatively to the flat 32 so that only a narrow space 36 remains between the end of bolt 35 and flat 32 which will prevent any considerable movement of the arm 26 when the block 11 is in the inoperative position shown in Fig. 19.

The space 36 is sufficient to permit raising of boss 25, arm 26 and block 11 until bolt 35 disengages flat 32 when the arm 26 may be radially moved into the operative position shown in Fig. 18. To move the arm 26 into the inoperative position the arm is raised and moved radially and lowered into the position where the inner end of bolt 35 engages the flat 32.

When using the above described arrangements the operative is required to place the adjustable blocks 11 in operative position before the die set is removed from the press. Thus the punch cannot move too deeply into the die. In this position the die set may be shelved and repositioned in the press when a new batch of pressings are to be produced. As the adjustable blocks main-

tained the punch in the same relative position to the die in which it was during making of the previous batch it is only necessary to adjust the ram of the press until the blocks are contacted, and no further setting-up is required.

I claim:

1. In a die-set comprising a removable sub-unit of opposed tools detachable from a ram, for the setting of the opposed tools, a device consisting of one or more adjustable elements arranged to maintain the said tools in pre-set position during the setting up of the ram with respect to its actuating parts, and when the said sub-unit is removed from the ram, the said element or elements being attached to the sub-unit so that the said element or elements are readily movable out of the path of one of the tools to prevent interference with the normal action of said tool.

2. In a press comprising a sub-unit of opposed punch and die attached to a ram, a die set for setting the punch and die, said die set comprising one or more adjustable elements arranged to maintain the punch in pre-set position relatively to the die, said element or elements being movably attached to the sub-unit so that the said element or elements are readily movable out of the path of the travel of the punch to prevent interference with normal punch throw.

3. A device according to claim 1, wherein the adjustable element or elements comprise adjustably extensible members adapted for insertion between and removal from the opposing tool carrying sub-unit.

4. A device according to claim 1 wherein the adjustable element or elements is or are positioned between the component parts of the sub-unit.

5. In a die-set comprising a sub-unit adapted to be connected to a ram, said sub-unit comprising a die carrying bolster and a punch carrying head slidable relatively to the bolster, for setting the punch and die, said die set comprising one or more adjustable elements arranged to maintain the punch in pre-set position relatively to the die, said element or elements being movably attached to the sub-unit so that the said element or elements are readily movable out of the path of the travel of the punch to prevent interference with normal punch throw.

6. A device according to claim 5 wherein the adjustable element or elements is or are mounted for radial movement on either the punch head or die bolster for location in the operative and inoperative positions.

7. A device according to claim 5 wherein the adjustable element or elements is or are mounted for radial movement on either the punch head or die bolster for location in the operative and inoperative positions and means for maintaining the adjustable element or elements in operative or inoperative positions.

8. In a die-set comprising a removable sub-unit of opposed tools detachable from a ram, the said tools being carried in opposed component sub-unit parts, for the setting of the opposed tools, a device consisting of one or more adjustable elements arranged to maintain the said tools in pre-set position during the setting up of the ram with respect to its actuating parts, and when the said sub-unit is removed from the ram, the said element or elements being mounted for radial movement on either of the opposed

tool carrying parts for location in either the operative or inoperative positions.

9. A device according to claim 1 wherein the said element or elements is or are pivotally attached to the sub-unit for location in the operative and inoperative positions.

10. A device according to claim 5 wherein the punch and die carrying parts are relatively slidable on one or more guide pins, and wherein the said adjustable element or elements are mounted for radial movement on the said guide pins.

11. In a press comprising a sub-unit attached to a ram and having a die carrying bolster and a punch carrying head, the said head being slidable upon a pair of guide pins carried in the bolster, a die set for setting the punch and die, said die set comprising a pair of adjustable elements pivotally mounted in the punch head in order that the said elements may be positioned between the die head and bolster for maintaining the punch and die in pre-set position and readily swung out of the path of travel of the punch to prevent interference with normal punch throw.

12. In a press comprising a sub-unit attached to a ram and having a die carrying bolster and a punch carrying head, the said head being slidable upon a pair of guide pins carried in the bolster, a die set for setting the punch and die, said die set comprising a pair of pivot pins carried on oppositely disposed sides of the bolster, said pivot pins each having an annular groove and a pair of radially spaced apart notches opening into the said groove, an arm pivotally mounted on each of said pivot pins, the said arms being movable upon said pivot pins, so that the said arms may be positioned between the die head and bolster for maintaining the punch and die in pre-set position and readily swung out of the path of travel of the punch to prevent interference with normal punch throw, and spring pressed notch engaging pins in the said arms for maintaining same in either of the aforementioned positions.

13. In a press comprising a sub-unit attached to a ram and having a die carrying bolster and a punch carrying head, the said head being slidable upon a pair of guide pins carried in the bolster, a die set for setting the punch and die, said die set comprising an arm pivotally mounted on each of the guide pins, an adjustable element carried by each of the said arms, the said arms being swingable about said guide pins in order that the said elements may be positioned between the die head and bolster for maintaining the punch and die in pre-set position and readily swung out of the path of travel of the punch to prevent interference with normal punch throw, and means for releasably locking the said arms in the last named position.

14. In a press comprising a sub-unit attached to a ram and having a die carrying bolster and a punch carrying head, the said head being slidable upon a pair of guide pins carried in the bolster, a die set for setting the punch and die, said die set comprising an arm movably mounted on one of the said guide pins, in order that the said arm may be positioned between the die head and bolster for maintaining the punch and die in pre-set position and readily swung out of the path of travel of the punch to prevent interference with normal punch throw and means for releasably maintaining said arm in the last named position.

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