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2,790,499

COMPOUND PUNCH AND DIE

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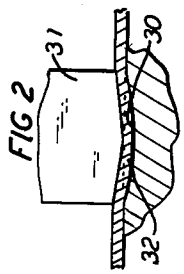

FIG 2

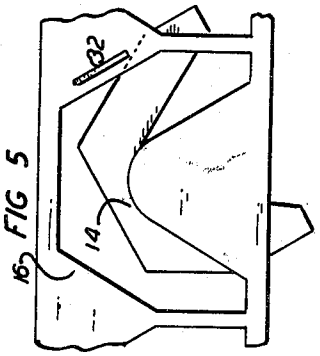

FIG 5

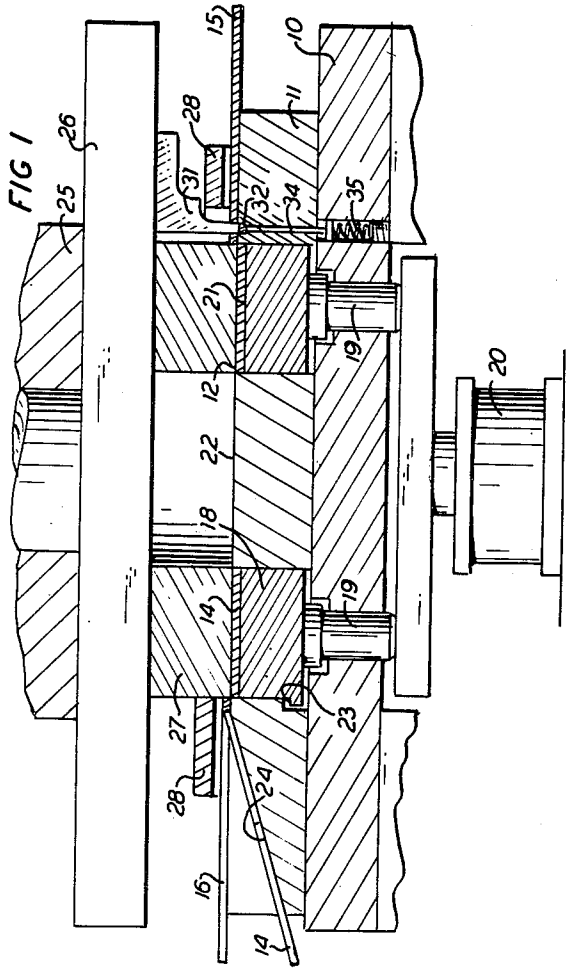

FIG 1

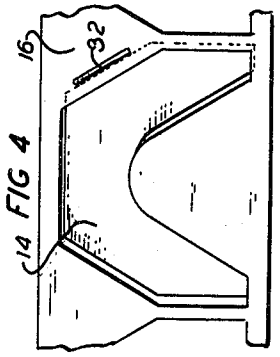

FIG 4

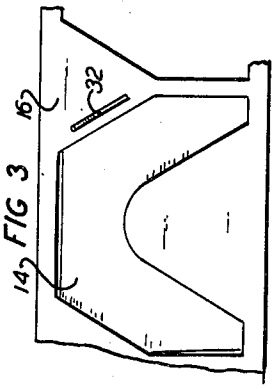

FIG 3

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COMPOUND PUNCH AND DIE

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6 Claims. (Cl. 164—118)

This invention relates to punch presses, particularly to part ejecting means therefor.

When parts of predetermined contours are blanked from sheet stock moved intermittently to the press between the conventional fixed die and reciprocating punch, the parts, as a rule, are pushed through the die and a suitable aperture in the bed of the press. This process of removing the punched or blanked parts from the press is very satisfactory for parts which are small in size and light in weight but for large and heavy parts it has been found that occasionally damage may occur to the parts in their travel from the press.

The object of the invention is a punch press wherein the punched parts are caused to be removed from the press with the scrap.

With this and other objects in view, the invention comprises companion elements mounted for relative movement with a punch and die in a punch press to form a protrusion in the scrap resulting from the punching of successive parts from sheet stock whereby the protrusion will push its respective part from the punch and die.

In the present embodiment of the invention, an auxiliary die is formed in the main die of the press and cooperates with an auxiliary punch reciprocable with the main punch to force a portion of the scrap downwardly, back of each punched part, so that each part, when returned to a position above the die during each opening of the press, will be pushed thereby with the scrap during intermittent advancement of the sheet stock and scrap. In this manner, each part is provided with its own pusher or ejector in the scrap to move it out of the press.

Other objects and advantages will be apparent from the following detailed description when considered in conjunction with the accompanying drawing, wherein:

Fig. 1 is a fragmentary vertical sectional view of a press embodying the invention;

Fig. 2 is a vertical sectional view of the auxiliary die shown in cooperation with a fragmentary portion of the auxiliary punch;

Fig. 3 illustrates one of the punched parts, and adjacent scrap after the part is returned to a position above the upper surface of the main die;

Fig. 4 illustrates the position of the punched part while it is being pushed by the protrusion in the scrap from the press, and

Fig. 5 illustrates the part falling away from the scrap after having been pushed from the press.

Considering now the drawing, attention is first directed to Fig. 1 which illustrates a press, having a bed 10 upon which a main die 11 is mounted. The main die has a die cavity 12 of a contour for the punching or blanking of parts 14 from sheet stock 15, leaving scrap 16. The reference numeral 15 is to identify the main body of sheet stock but not the portions thereof which remain attached thereto after each punching operation, as these portions are identified as the scrap 16. A pressure pad 18, conforming to the contour of the die cavity 12 and

the article 14, is movably disposed in the die cavity, supported by spaced pins 19 and normally urged upwardly by a fluid pressure unit 20 to return each punched part 14 to a position above the main die so that it may be moved laterally therefrom. The alignment of the upper surface 21 of the pressure pad with the upper surface 22 of the main die is assured through the shoulder 23 of the pressure pad engaging a shoulder adjacent thereto of the main die. The upper surface 22 of the main die 11 supports the sheet stock 15 and the scrap 16 and is provided with a diagonally extending ramp or surface 24 down which the punched parts 14 may travel as they are ejected successively from the press.

The press is provided with the conventional reciprocating ram 25, adapted to support a tool or punch holder 26. A main punch 27 conforming to the die opening 12 is mounted on the punch holder 26 and adapted to move through its successive reciprocable cycles. The conventional guides are provided for the stock 15 and scrap 16 assuring movement thereof accurately predetermined distances during each cycle of operation of the press, that is, during the intervals when the punch with the ram is in its open position. Also a stripper plate 28 is provided for the main and auxiliary punches.

An auxiliary die 30 is formed in the main die 11, as illustrated in Figs. 1 and 2, and cooperates with an auxiliary punch 31 to form a protrusion 32 in the scrap 16 back of each part 14. An ejecting plunger 34, backed by a spring 35 mounted, as illustrated in Fig. 1, in the main die 11 and the bed 10, assures ejection of the protrusion 32 when the press opens, removing the auxiliary punch from the scrap.

Considering now the operation of the press embodying the invention, let it be assumed that the press is equipped with the conventional stop and stock moving means whereby the stock 15 with the scrap 16 may be fed known distances intermittently during each open period of each cycle of operation of the press. When the press is moved into the closed position shown, a part 14 is punched from the stock 15, reducing the adjacent surrounding area of the stock to scrap 16 and, at the same time, the auxiliary punch 31 and die 30 will operate to form the protrusion 32 in the scrap 16 immediately back of the part 14 punched during this operation. While the ram 25 moves upwardly with the main punch 27 and the auxiliary punch 31 from the scrap 16, the two ejecting or pressure units 18 and 34 respectively move the punched part 14 out of the main die 12 and the protrusion 32 out of the auxiliary die cavity 30. The ejecting means will be effective to hold the part and the protrusion free of their respective dies until the stock 15 receives its next feeding movement. The part 14, on being moved out of the die, cannot return to the aperture in the scrap from which it was punched and, for this reason, the part will lie beneath the scrap on the surface 21 of the pressure pad until the protrusion 32 engages the adjacent edge of the part and moves it out of the press, free of the main punch and die, as illustrated in Figs. 1, 4 and 5, where it will drop onto the ramp 24 and slide into a suitable receptacle (not shown). Therefore, during each punching operation to produce a part 14 of a given contour from sheet stock 15, producing new scrap 16 integral with the sheet stock, a protrusion 32 is punched from the scrap immediately in back of each part to effectively push their respective parts from the punch and die and out of the press during each intermittent advancement of the stock and integral scrap.

It is to be understood that the above described arrangements are simply illustrative of the application of the principles of the invention. Numerous other arrangements may be readily devised by those skilled in the

art which will embody the principles of the invention and fall within the spirit and scope thereof.

What is claimed is:

1. In a punch press having relatively movable main punch and die to punch parts successively from sheet stock moved intermittently in a given direction to the punch and die leaving scrap integral with the stock and movable therewith away from the punch and die, a pressure pad in the die for forcing the parts out of the die and against the under face of the scrap, and companion elements mounted with respect to and for relative movement with the punch and die to form a downwardly extending protrusion in the scrap back of each part and in alignment therewith for pushing the part free of the scrap out of the press.

2. In a punch press having relatively movable main punch and die to punch parts successively from sheet stock moved intermittently in a given direction to the punch and die leaving scrap integral with the stock and movable therewith away from the punch and die, a pressure pad in the die for forcing the parts out of the die and against the under face of the scrap, and auxiliary punch and die elements mounted with respect to and for relative movement with the main punch and die to form a downwardly extending protrusion in the scrap back of each part and in alignment therewith for pushing the part free of the scrap out of the press during each movement of the stock and scrap.

3. In a punch press having relatively movable main punch and die to punch parts successively from sheet stock moved intermittently in a given direction to the punch and die leaving scrap integral with the stock and movable therewith away from the punch and die, a pressure pad in the die for forcing the parts out of the die and against the under face of the scrap, auxiliary punch and die elements mounted with respect to and for relative movement with the main punch and die to form a downwardly extending protrusion in the scrap back of each part and in alignment therewith to push their respective parts out of the press free of the scrap during each movement of the stock and scrap, and a ramp to guide the parts away from the scrap while being pushed by their protrusions.

4. In a punch press having relatively movable main punch and die to punch parts successively from sheet stock moved intermittently in a given direction to the punch and die leaving scrap integral with the stock and movable therewith away from the punch and die, a pressure pad in the die for forcing the parts out of the die and against the under face of the scrap, auxiliary

punch and die elements mounted with respect to and for relative movement with the main punch and die to form a downwardly extending protrusion in the scrap back of each part and in alignment therewith for pushing the part free of the scrap out of the press during each movement of the stock and scrap, and means to move the protrusions successively from the auxiliary die element prior to each movement of the stock and scrap.

5. In a punch press, for punching successive parts from sheet stock leaving scrap moved intermittently in a given direction relative to the press, having a main die with a top surface lying in a given plane over which the stock and scrap are moved, a pressure pad in the die for forcing the punched parts successively out of the die to a position above the plane and against the under face of the scrap, the press having a reciprocable ram supporting a main punch cooperating with the main die to punch the parts from the stock, an auxiliary die disposed adjacent and in alignment with the main die, and an auxiliary punch supported by the ram and movable therewith to cooperate with the auxiliary die to form a downwardly extending protrusion in the scrap back of each part and in alignment therewith to push their respective parts out of the press free of the scrap.

6. In a punch press, for punching successive parts from sheet stock leaving scrap moved intermittently in a given direction relative to the press, having a main die with a top surface lying in a given plane over which the stock and scrap are moved, a pressure pad in the die for forcing the punched parts successively out of the die to a position above the plane and against the under face of the scrap, and a reciprocable ram supporting a main punch cooperating with the main die to punch the parts from the stock, an auxiliary die disposed adjacent and in alignment with the main die, an auxiliary punch supported by the ram and movable therewith to cooperate with the auxiliary die to form a downwardly extending protrusion in the scrap back of each part and in alignment therewith to push their respective parts from the press free of the scrap, and means to move the protrusion free of the auxiliary die prior to each movement of the stock and scrap.

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