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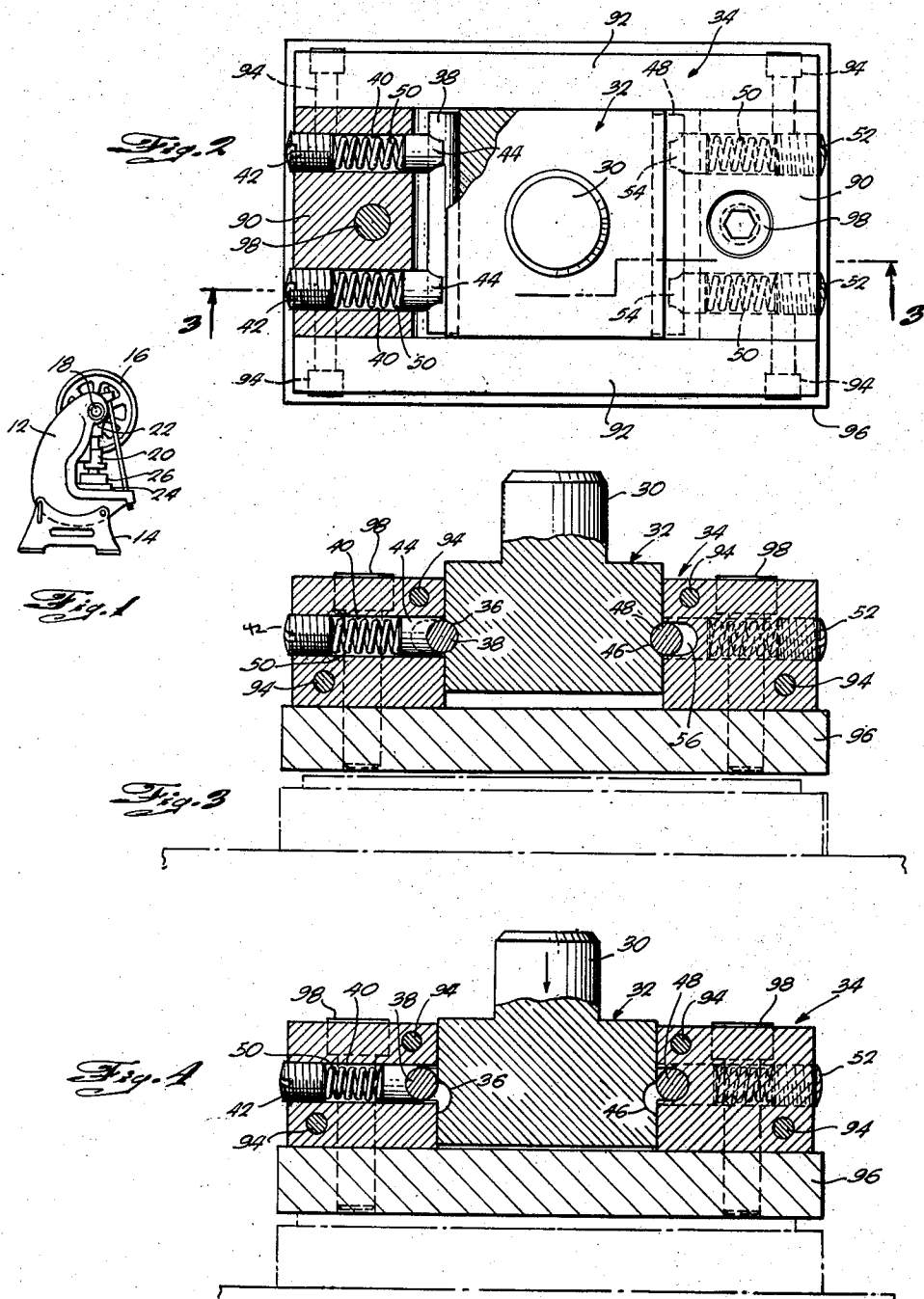
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OVERLOAD-RELEASE MECHANISM FOR PRESS-OPERATED DIE

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OVERLOAD-RELEASE MECHANISM FOR PRESS-OPERATED DIE

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3 Claims. (Cl. 164—47)

This invention relates to press-operated dies, and more particularly to an overload-release mechanism for the same.

It is common to use a power driven press to operate a die or tool to cut, pierce or form metal or other materials. The die or tool may be injured if it is placed under excessive load. For example, the die may be designed to operate on single pieces of sheet metal fed to it one after another, but by accident two superposed sheets may be fed to the die instead of one. In other cases a particular piece of material reaching the die may be unexpectedly hard, compared to the normal run of material being used. The general object of the present invention is to prevent such injury by introducing an overload release mechanism between the press and the die.

This idea in broad outline has already been proposed. It has been suggested that the coupling between the press and the die include an hydraulic piston and cylinder. Another suggestion has been to use a very large and heavy or stiff spring interposed directly between the press and the die or dieholder. Neither of these suggestions has proved to be satisfactory in practice, and accordingly a primary object of the present invention is to provide an improved overload release mechanism for a press-operated die. More specific objects are to provide an overload release mechanism which is inexpensive to make; the release pressure of which is adjustable; and which employs springs of small size relative to the main operating force imparted to the die by the press.

To accomplish the foregoing general objects, and other objects which will hereinafter appear, my invention resides in the overload release mechanism, and the elements thereof, as are more particularly described in the following specification. The specification is accompanied by drawings, in which:

Fig. 1 shows a typical power driven press;

Fig. 2 is a partially sectioned plan view of a die set having overload release mechanism embodying features of my invention;

Figure 3 is a vertical section taken approximately in the plane of the line 3—3 of Fig. 2;

Fig. 4 is a similar view showing the relation of the parts when the die is subjected to overload;

Fig. 5 is a partially sectioned plan view of a modified die set embodying features of my invention;

Fig. 6 is a vertical section taken approximately in the plane of the line 6—6 of Fig. 5;

Fig. 7 is a transverse section taken approximately in the plane of the line 7—7 of Fig. 6; and

Fig. 8 is a view similar to Fig. 7 but showing the

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relation of the parts when the die is subjected to overload.

Referring to the drawing, and more particularly to Fig. 1, the press there shown comprises a typical C-frame 12, mounted on a base 14, and carrying a flywheel 16 and shaft 18. The said shaft operates on a ram 20, slidable on suitable ways or tracks, and connected to a crank or eccentric on the shaft by means of a connecting rod 22. The upper and lower halves of a die are carried by the upper and lower parts of a die set, the lower part 24 being mounted on the bed of the machine, and the upper part 26 being secured to the ram 20 by means of a suitable shank.

Although the C-frame of the press is shown upright, it will be understood that it is adjustable on the base 14 so that it can be tilted at a substantial angle, and indeed it is common to operate such a press at an angle for gravitational discharge of the finished pieces rearward and downward out of the press. However, for convenience of reference the ram is here referred to as reciprocating vertically.

Referring now to Figs. 2, 3 and 4 of the drawing, the shank 30 may be a conventional vertical shank, but its lower end is formed with and acts as the driving part 32 of the overload release mechanism. This driving part 32 is received in a driven part 34, and together they act as the upper or movable part of a die set. One of the parts, in this case the driving part 32, has a rounded recess 36 formed therein, while the other part, in this case the driven part 34, carries a rounded element 38, a part of which is received in the recess 36.

In the case here shown the rounded recess is a horizontal channel, and in simplest form it is a somewhat less than semi-cylindrical channel. The rounded element 38 is cylindrical, and somewhat less than half of it is received in the channel 36. The element is urged into the channel by resilient means, in this case a pair of compression springs 40. Under excessive load the element 38 will back up, thereby affording movement of the driving part 32 relative to the driven part 34. This is indicated by the change from Fig. 3 to Fig. 4 of the drawing. The overload force required to displace the parts as shown in Fig. 4 may be adjusted by means of a pair of adjusting screws 42, which bear against and determine the tension of the springs 40. The adjustment may be locked by any known means, not shown, such as a jam nut, a set screw, a split wall with a clamp screw, etc.

It will be seen from the drawing that the arrangement is preferably symmetrical, there being a channel 46, a cylindrical element 48, springs 50, and adjusting screws 52, all corresponding in construction, dimension and function, to the parts 36—42 already described. It will also be understood that the springs 40 and 50 may be small in dimension, relative to the main force transmitted by the press, or differently expressed, relative to the magnitude of the spring or springs that would be required if one or more springs were disposed vertically and interposed directly between the driving and driven parts.

It is preferred not to have the springs 40 and 50 bear directly against the cylindrical elements 38 and 48. Instead the springs 40 bear against shoes 44 which are shaped on their inner ends to mate with the cylindrical element 38, and which are shaped on their outer ends to receive the springs 40. Similarly the springs 50 bear

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against the shoes 54. In Fig. 3 the righthand part of the section, unlike the lefthand part, is not taken through a shoe, and thus clearly shows the ample clearance 56 formed in the main driven part 34 to permit outward movement of the cylindrical element 48. In Fig. 4 the cylindrical elements have moved out into the said clearance.

If desired, resiliently pressed rounded elements may be used on all four sides of the overload release mechanism, and such an arrangement is shown in Figs. 5 through 8 of the drawing. Referring to those figures it will be seen that, as before, there is a shank 60 formed integrally with a rectangular driving part 62, which is vertically slidable in a mating rectangular passage in a driven part 64. The two end walls of the driving part have rounded channels disposed horizontally therein, these preferably being somewhat less than semi-cylindrical, as shown at 66. The driven part carries cylindrical elements 68 parts of which are matingly received in the channels 66. The cylindrical elements are urged inward by means of four compression springs 70, each backed up by an adjusting screw 72. As before, appropriately shaped shoes 74 may be interposed between the springs 70 and the cylindrical elements 68.

The two longer sides of the rectangle are also provided with rounded channels and elements. Specifically, the driven part 64 is provided with somewhat less than semi-cylindrical channels 76, best shown in Figs. 7 and 8. The driving part 62 carries mating cylindrical elements 78. These elements are urged outward toward the channels 76 by resilient means 80. In the present case there are two compression springs which are disposed between the cylindrical elements. They may bear against shoes 81.

Reverting now to Fig. 5 of the drawing, the channels 76 are most easily formed by machining them for the entire length of the side pieces 82. To hold the cylindrical elements 78 against axial movement they may be confined by inserting a small pin or dowel 84 at each end. The other cylindrical elements 68 are preferably made somewhat longer than the dimension of the driving element 62, with hemispherically rounded ends, and may be held against axial movement by the channels 76, as shown. The ends remain in channels 76 in either driving or releasing position.

The driving part 62 is preferably a single block of material through which appropriate passages may be drilled, and along the outside face of which appropriate channels may be milled. The driven part is most simply made up by assembling four pieces, one for each side. Thus in Fig. 2 the driving part 32 is a single block of material, and the driven part 34 is made up of two ends 90, secured between two sides 92, as by means of screws 94. The part 96 is secured to the driven part by means of appropriate mounting screws 98.

In the form of the invention shown in Fig. 5 the driven part 64 similarly is made up of two ends and two sides, but in this case the ends 100 are stepped to receive the sides 102. The parts are secured together by appropriate screws 104 which pass through the ends 100 and into the sides 102. The driving part 62 is preferably a single piece of material, as before. The part 106 is secured to the driven part 64 by mounting screws 108.

In comparing Figs. 7 and 8 it will be noted that there is a substantial space or clearance beneath the driving member 62 in order to permit the movement relative to driven member 64 shown in Fig. 8. Similarly, a comparison of Figs. 3 and 4 will show the necessary provision of a substantial clearance beneath the driving part 32 in order to afford its movement relative to the driven part 34 shown in Fig. 4.

It will be understood that either the driving or driven part may carry a microswitch so positioned as to respond to a relative movement of the driving and driven parts, thereby controlling a suitable relay to shut off the driving

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motor of the press, or more simply, controlling a signal such as a bell or a red lamp or both, thereby warning the operator about the overload condition into which the die has been put.

It is believed that the construction and operation of my improved overload release mechanism, as well as the advantages thereof, will be apparent from the foregoing detailed description. It will be understood that while I have shown an arrangement having four cylindrical elements on four sides, a still greater number may be used, and may be put in appropriate polygonal formation. The cylindrical elements may be shortened, and in one ultimate form the rounded elements may be balls, and a large number of such balls may be disposed in a horizontal plane in the form of a circle, each ball having its own radially directed compression spring. It will also be understood that balls may be used instead of rods without necessarily disposing the balls in a circle, as they may be disposed for example along two sides, or along four sides, of a rectangle. Various arrangements may be used, although for obvious reasons the rounded elements are preferably disposed symmetrically about the axis of the driving part.

It will therefore be apparent that while I have shown and described my invention in several preferred forms, changes may be made in the structures shown, without departing from the scope of the invention, as sought to be defined in the following claims. In the claims I have, for convenience, referred to the shank as being vertical, and the rounded channels and elements, and the springs bearing against said elements, as being horizontal, but it will be understood that these terms are used for convenience and in a relative sense, and that the press may reciprocate in a direction other than vertical.

I claim:

1. Overload release mechanism for use with a die in a press, said mechanism comprising a vertically reciprocating rectangular driving part slidably received in a companion passage through a driven part which carries the die, two opposite sides of one of said parts having a rounded channel disposed horizontally, the adjacent sides of the other part carrying cylindrical elements parts of which are received in said channels, the load applied to the die being transmitted through said cylindrical elements, and a plurality of compression springs disposed horizontally at right angles to said elements and urging said elements into said channels, whereby under excessive load said elements back up and afford movement of the driving part relative to the driven part.

2. Overload release mechanism for use with a die in a press, said mechanism comprising a vertical shank having a vertical motion and formed at its lower end with a rectangular driving part slidably received in a rectangular passage through a driven part which carries the die, the slidably related surfaces between said driving and driven parts being vertical, two opposite sides of one of said parts having a somewhat less than semi-cylindrical channel disposed horizontally, the adjacent sides of the other part carrying cylindrical elements parts of which are received in said channels, the load applied to the die being transmitted through said cylindrical elements, a plurality of compression springs disposed horizontally at right angles to said cylindrical elements and urging said elements into said channels, and adjusting screws bearing against said springs to adjust the tension thereof, whereby under excessive load said elements back up and afford movement of the driving part relative to the driven part.

3. Overload release mechanism for use with a die in a press, said mechanism comprising a vertical shank having a vertical motion and formed at its lower end with a rectangular driving part slidably received in a rectangular passage through a driven part which carries the die, two opposite sides of said driving part having somewhat less than semi-cylindrical channels disposed horizontally, the adjacent sides of said driven part carrying cylindrical elements parts of which are received in said channels, the

other two opposite sides of said driven part having somewhat less than semi-cylindrical channels disposed horizontally the adjacent sides of the driving part having cylindrical elements parts of which are received in said channels, resilient means in said driving part urging the latter cylindrical elements outwardly, resilient means in said driven part urging the first-named cylindrical elements inwardly, and the latter resilient means having adjusting screws to adjust the tension thereof, whereby under excessive load said elements back up and afford movement of the driving part relative to the driven part.

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References Cited in the file of this patent

UNITED STATES PATENTS

627,936	Kuhlewind -----	June 27, 1899
1,131,161	Root -----	Mar. 9, 1915
1,133,025	Hawkins -----	Mar. 23, 1915
2,048,883	Murray -----	July 28, 1936
2,327,946	Ward -----	Aug. 24, 1943
2,401,992	Waller -----	June 11, 1946
2,435,444	Johnson -----	Feb. 3, 1948
2,466,372	Byrd -----	Apr. 5, 1949
2,629,615	Marsilius -----	Feb. 24, 1953