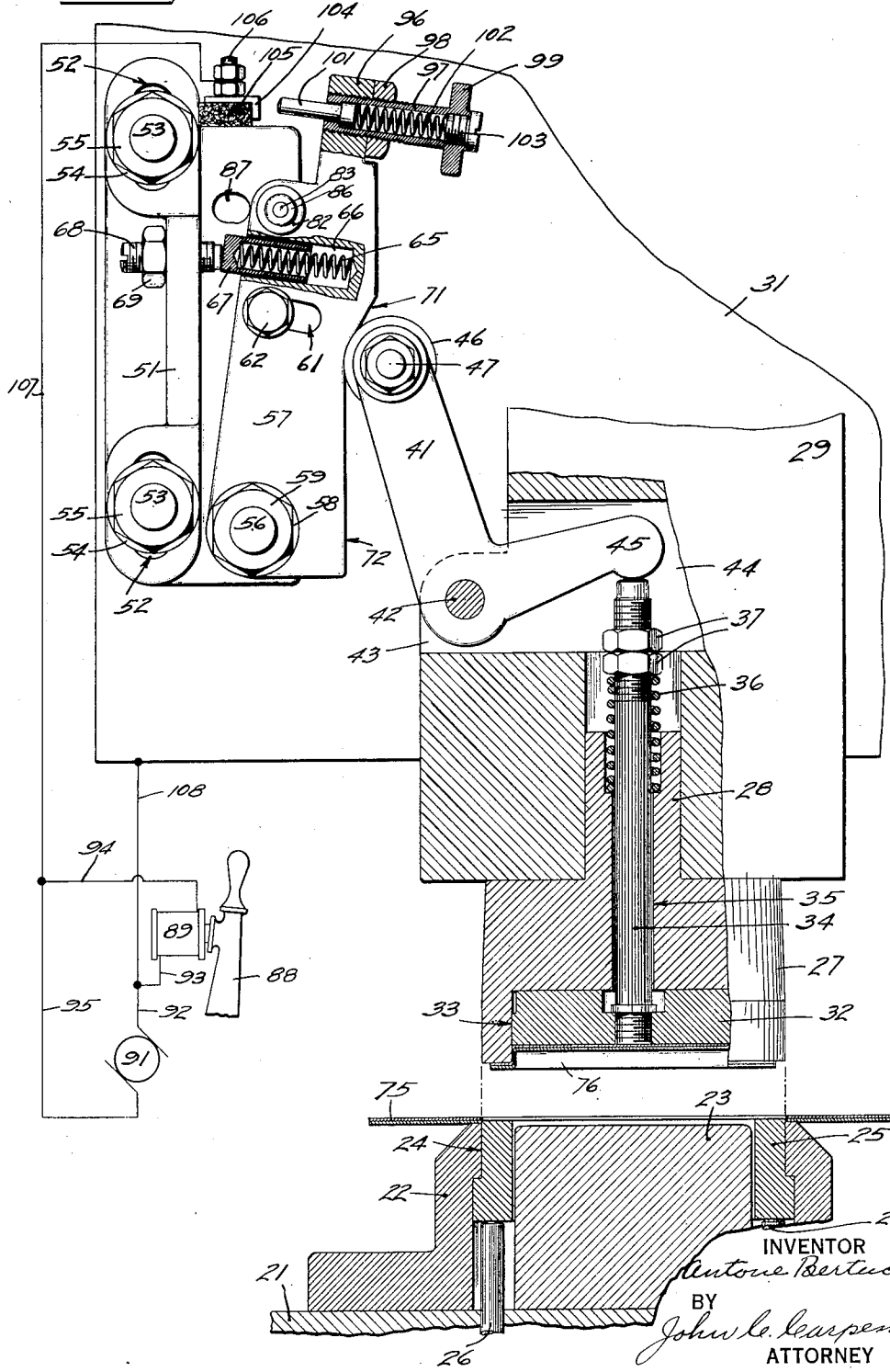
March 6, 1934. A. BERTUCCI 1,949,407

DRAWING PRESS MECHANISM

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Fig. 1



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Fig. 2

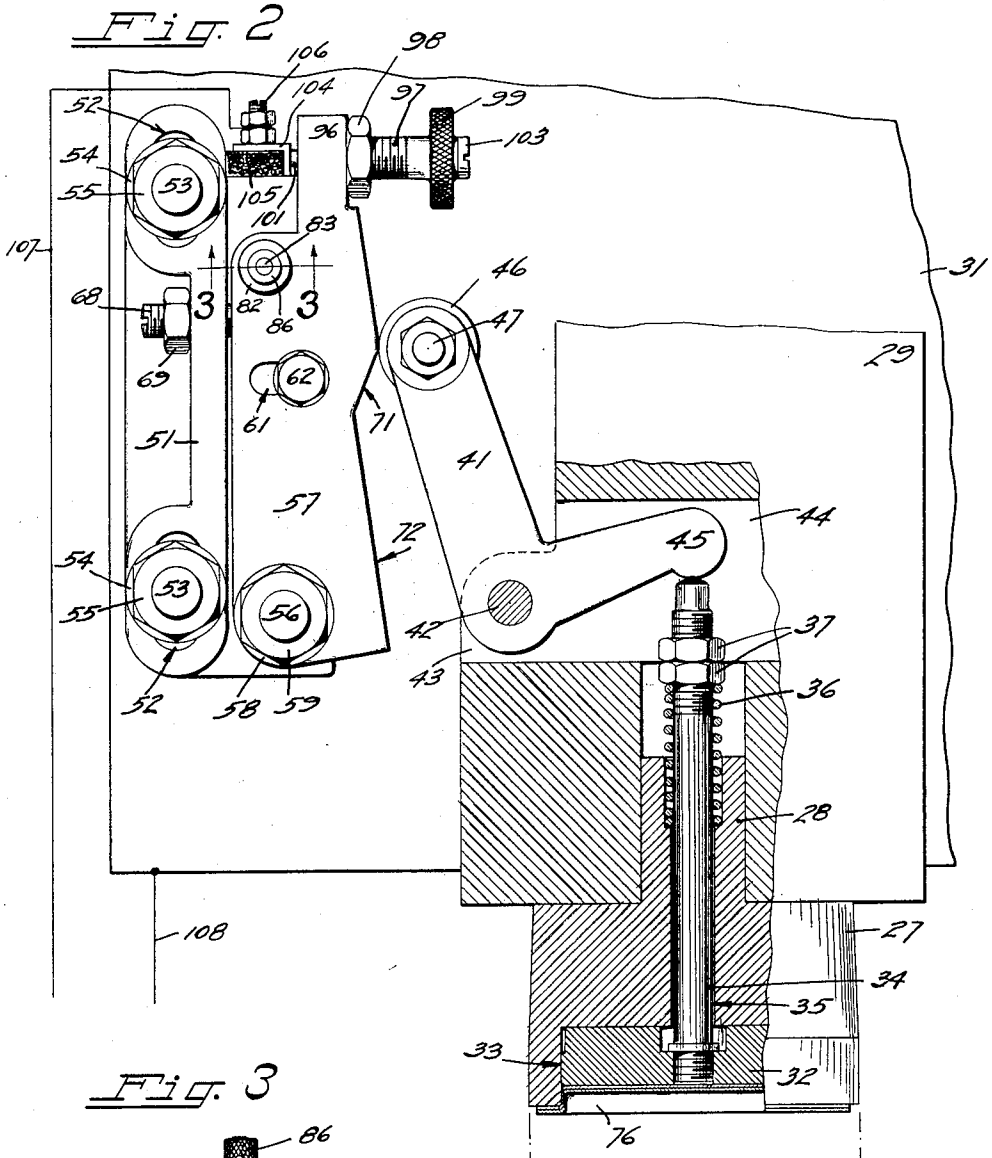
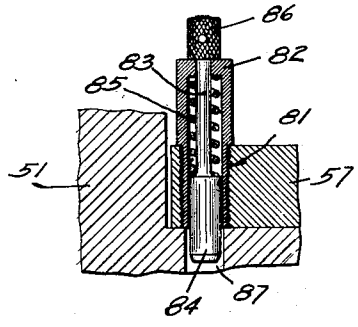
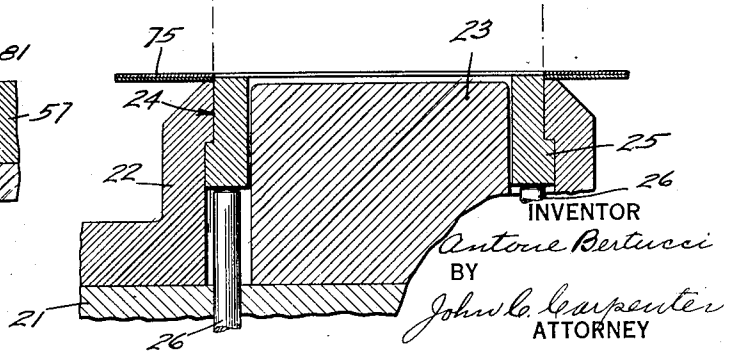


Fig. 3





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UNITED STATES PATENT OFFICE

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DRAWING PRESS MECHANISM

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Application June 25, 1930, Serial No. 463,726

3 Claims. (Cl. 192—125)

The present invention relates to a drawing press mechanism and has particular reference to a safety device therefor.

The principal object of the present invention is the provision of a drawing press mechanism utilizing instrumentalities for removing the drawn work from the dies after the drawing operation, these instrumentalities being actuated in a manner to permit suspension of the knockout operation in the event of abnormal conditions.

An important object of the present invention is the provision of a drawing press mechanism embodying a safety device for protecting the working parts of the press against damage during abnormal drawing conditions,

An important object of the present invention is the provision of a knockout mechanism for a drawing press which is provided with safety devices for altering the knockout operation in the event of abnormal conditions.

An important object of the present invention is the provision of a knockout mechanism for a drawing press which is provided with safety devices for stopping the operation of the press in the presence of abnormal conditions.

The present invention contemplates the use of a safety device embodying actuating devices for knockout instrumentalities which normally move through a given cycle of operation but which change this cycle of operation in the presence of abnormal knockout conditions.

Numerous other objects of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings:—

Figure 1 is a schematic drawing, partly in side elevation and partly in section of parts of a drawing press mechanism embodying the present invention.

Fig. 2 is a view similar to Fig. 1 illustrating the parts in the position assumed during an abnormal condition.

Fig. 3 is a sectional detail of a locking unit for holding the safety device parts in position, the view being taken along the line 3—3 in Fig. 2.

The safety features of the present invention may be applied to the usual form of drawing press mechanism utilizing standard die construction, the operation of the safety feature affecting the work done by the knockout instrumentalities of such a mechanism.

The cooperating die members of the press preferably comprise a die plate 21 supporting parts of the lower or stationary elements of the die members, these including a cutedge member 22 and an anvil 23, both mounted upon the die plate 21. A cutting wall 24 formed in the cutedge member 22 is spaced from and is concentric with the outer face of the anvil 23 and a draw ring 25 is adapted to have sliding movement between the anvil and the cutedge member. This draw ring is or may be supported on the upper ends of pins 26 connected with the usual drawing cushion not shown.

The upper die members include a punch member 27 having a stem 28 clamped in a punch block 29 secured in a usual or a preferred manner to a slide having vertical movement relative to the frame 31 of the press mechanism. A knockout pad 32 is adapted to normally rest within an opening 33 formed in the lower end of the punch member 27 and is carried by a vertical knockout rod 34 extending through a vertical bore 35 formed in the punch member. A spring 36 surrounds the upper end of the rod 34 and is interposed between the upper end of the stem 28 and locknuts 37 threadedly engaging the rod.

Actuating devices for operating the knockout pad through its knockout rod 34 are provided, one element of which is carried bodily by the punch block 29 and, therefore, this element moves up and down with the punch member 27. This element comprises a bellcrank lever 41 pivoted on a horizontal pin 42 mounted in an extension 43 formed in the punch block 29, one arm of the bellcrank lever projecting into a transverse slot 44 cut in the punch block 29, this arm being rounded at 45 for engagement with the upper end of the knockout rod 34. The opposite arm of the bellcrank lever 41 carries a cam roller 46, mounted on a pin 47 held in the arm of the lever.

Other elements of the actuating devices comprises a stationary bracket 51 having slots 52 through which project studs 53 threadedly secured to and projecting from the frame part 31. Suitable washers 54 and locknuts 55 are employed for the purpose of clamping the bracket 51 in adjusted position relative to the frame 31, the nuts 55 being threadedly secured to the studs 53 for this purpose. By this vertical adjustment of the bracket 51 and parts carried thereby, the actuation of the knockout pad 32 is delayed or advanced in time.

The bracket 51 carries a stud 56 on which is pivoted a cam plate 57 held in operating position thereon by means of a washer 58 and a locknut 59. The cam plate 57 is slotted at 61 and a bolt 62 passing through the slot 61 is threadedly se-

cured to the bracket 51, this construction permitting pivotal movement of the plate 57 within the limits permitted by the slot 61.

The cam plate 57 is normally held in the position illustrated in Fig. 1 by means of a spring 65 located in a transverse opening 66 formed in the plate 57, a spring barrel 67 having sliding movement therein and partially enclosing the spring 65. The outer end of the spring barrel 67 is adapted to engage the end of a setscrew 68 having threaded engagement with the wall of the bracket 51 and held in adjusted position by means of a locknut 69.

Under the action of the spring 65, the plate 57 is held in position with one end of the slot 61 engaging the bolt 62, this being the position illustrated in Fig. 1. Adjustment of the screw 68 places more or less compression upon the spring 65 and varies the resistance against pivotal action of the plate on its bracket 51 for a purpose now to be described.

The cam plate 57 is provided with an inclined cam surface 71 which joins a straight cam surface 72 and it is against these surfaces that the roller 46 moves as the press slide carries it up and down. The inclined surface 71 is utilized under normal operation of the press mechanism to oscillate the bell crank lever 41 about its pivot 42 and depress the rod 34 and the knockout pad 32 in a knockout operation. The spring 65 determines the amount of force delivered through the cam roller 46 to oscillate the lever and actuate the knockout instrumentalities. In the event that abnormal resistance is met by the knockout pad 32 where such resistance becomes sufficient to overcome the spring 65, the latter yields and the cam plate 57 thereupon pivots on its stud 56, this moving of the plate preventing actuation of the knockout instrumentalities and avoiding damage to the press mechanism.

The material on which the press mechanism operates to produce a drawn article comprises a strip or sheet 75 which is fed over the lower die members 22, 23 and 24 in any suitable manner. There is illustrated in Figs. 1 and 2 a double thickness of material, this being an abnormal condition obtaining when two sheets or strips 75 have stuck together and have been fed into cutting and drawing position. At such a time the punch member 27 operating upon both sheets cuts and draws two articles 76 which, owing to the increased thicknesses, become tightly jammed in the opening 33 of the punch member 27 beneath the knockout pad 32.

Such a jammed condition offers a resistance against movement of the knockout instrumentalities and it is then that the safety features of the present invention become manifest. Accordingly, when the punch member 27 is raised and the roller 46 moves from the cam surface 72 onto the cam surface 71, the increased resistance against movement of the knockout instrumentalities holds the bellcrank lever 41 against movement on its pivot 42 and as the action of the spring 65 is overcome, the cam plate 57 oscillates on its pivot 56 and moves from the position illustrated in Fig. 1 into the position illustrated in Fig. 2.

This movement of the cam plate 57 prevents undue strain on the knockout instrumentalities and the bellcrank lever and damage to the die parts is thereby prevented. Other very important actions, however, follow as the result of this movement of the cam plate 57.

In order to insure a holding of the cam plate 57 into its new position, there is provided a locking unit illustrated in detail in Fig. 3. The cam plate 57 is provided with a transverse opening 81 in which is positioned a spring barrel 82 threadedly engaged within the opening. A locking pin 83 having an enlarged end 84 is urged inwardly by a spring 85 surrounding the pin 83 and being interposed between the head 84 thereof and a wall of the spring barrel 82. The outer end of the pin 83 carries a knurled head 86 which provides a fingerhold for the pin.

The bracket 51 is provided with a transverse opening 87 (Figs. 1 and 3) and as the plate 57 moves on its pivot 56, the end 84 of the pin 83 is brought into registration with the opening 87 and is forced into it by the spring 85 (Fig. 3). This locks the cam plate 57 in its new position and further actuation of the bellcrank lever 41 can not take place until the abnormal conditions have been removed.

The cam plate 57, in moving to the position show in Fig. 2, electrically influences the press mechanism by automatically stopping further operation. While this can be done in a number of different ways, there is diagrammatically illustrated in Fig. 1 a wiring diagram exemplifying how this may be accomplished.

An operating handle or arm 88 is the usual manual control for starting and stopping the machine and this is held in operating position by an electro-magnet 89. This electro-magnet is normally energized from any suitable source, as for example, a generator 91 supplying current which normally passes by means of a wire 92 and a wire 93, into the electro-magnet 89 and thence by a wire 94 and a wire 95 back to the source of energy 91.

As soon as the cam plate 57 is shifted from its normal outermost position (Fig. 1) into its closed position (Fig. 2) a shunt circuit is established which does not contain the high resistance found in the electro-magnet 89 and this diverts current from the electro-magnet, reducing the magnetic power of the same sufficiently, so that the operating lever 88 thereupon falls from press operating position and stops the press. Mechanically this is done as follows:

The upper end of the cam plate 57 is provided with an extension 96 in which is threadedly secured a sleeve 97 held in adjusted position by a locknut 98 and having a knurled thumb-screw head 99. The sleeve 97 contains a sliding contact pin 101, the head of which is engaged by a spring 102 held within the sleeve by a setscrew 103. This contact pin 101 is electrically in connection with the cam plate 57, the bracket 51 and the frame 31 of the press, these parts constituting an electrical ground path. When in open position, this contact pin 101 is separated from a contact plate 104 which is electrically insulated from the frame of the machine by an insulating block 105. Plate 104 is connected with a binding post 106 to which is attached a wire 107 connected to the wire 95 leading into the generator 91. A second wire 108 is connected between the wire 92 and the frame 31 of the press.

When the cam plate 57 is moved into closed position the contact pin 101 is yieldingly engaged with the plate 104 and the shunt circuit is thereupon established, current at such time passing from the generator 91, through wires 92 and 108, through the frame parts and into the contact pin 101, thence through the contact plate 104 and binding post 106, and through the wires 107 and 95 back to the source of energy 91. The circuit thus established cuts out or shunts the current

normally passing through the electro-magnet 89 and this magnet thereupon becomes deenergized, as previously described, allowing the handle 88 to move into position for stopping the operation of the press.

Inasmuch as the locking pin 83 holds the cam plate 57 in its closed position, the shunt circuit just described will continue to flow and cut out the operating lever holding circuit until such time as the parts are restored to normal position. This is accomplished by withdrawing the pin 83 from its locked position by engagment of the knurled head. Since this is done manually, the abnormal conditions will have been rectified and normal conditions restored prior to again manually starting the operation of the press by movement of the handle 88.

The safety device is quick-operating and prevents pounding of the parts and destruction of the forming dies and the automatic locking feature insures protection until the cause of the trouble is removed.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. In a drawing press mechanism, the combination of cooperating dies for forming sheet material into articles, an anvil for drawing said material into one of said dies, a knockout rod having means for forcing said material out of the die, a bell crank lever for actuating said rod, a movable cam plate for actuating said lever when it is held towards said lever, yielding means for so holding the cam plate, an electric circuit and magnet for keeping the machine in operation, means operated by said cam plate for reducing the energy in said circuit when the cam plate is actuated by said lever, and an automatic lock for the cam plate to maintain it in actuated position if it be released by said lever.

2. In a drawing press mechanism, the combination of cooperating dies for forming sheet material into articles, an anvil for drawing said material into one of said dies, a knockout rod having means for forcing said material out of the die, a bell crank lever for actuating said rod, a movable cam plate for actuating said lever when it is held towards said lever, yielding means for so holding the cam plate, an electric circuit and magnet for keeping the press in operation, and means operated by said cam plate for reducing the energy in said circuit when the cam plate is actuated by said lever.

3. In a drawing press mechanism the combination of cooperating dies for forming sheet material into articles, an anvil for drawing said material into one of said dies, a knockout rod having means for forcing said material out of the die, a bell crank lever for actuating said rod, a movable cam plate for actuating said lever when it is held in the path of said lever, yielding means for so holding the cam plate, an electric circuit and magnet for controlling the actuation of the press, and an electric terminal on said cam plate for controlling said circuit.

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