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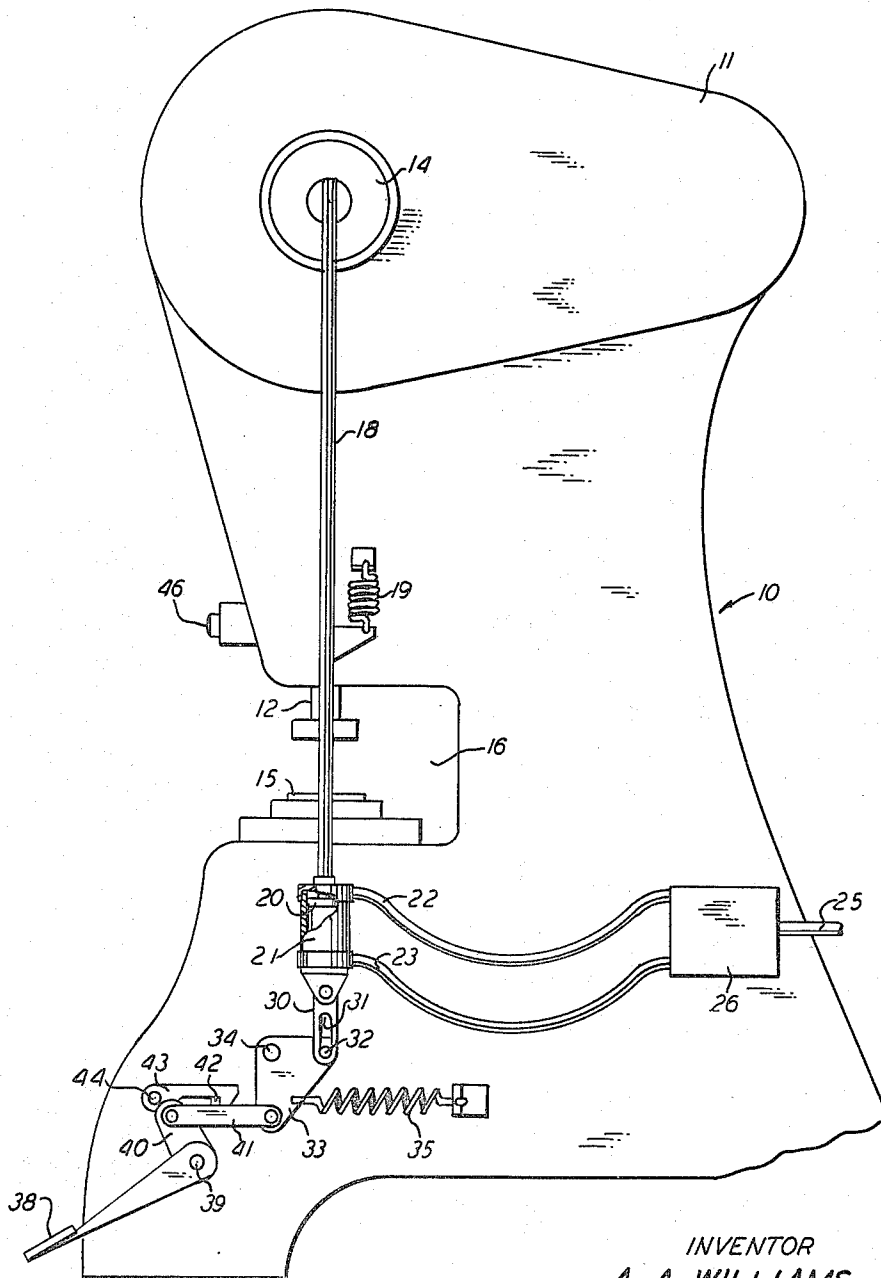
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TRIP MECHANISM FOR PRESSES

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2 Sheets-Sheet 1

FIG. 1



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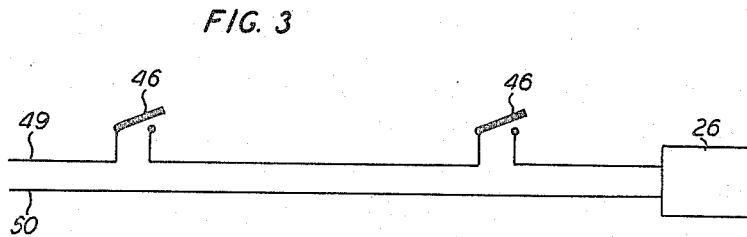
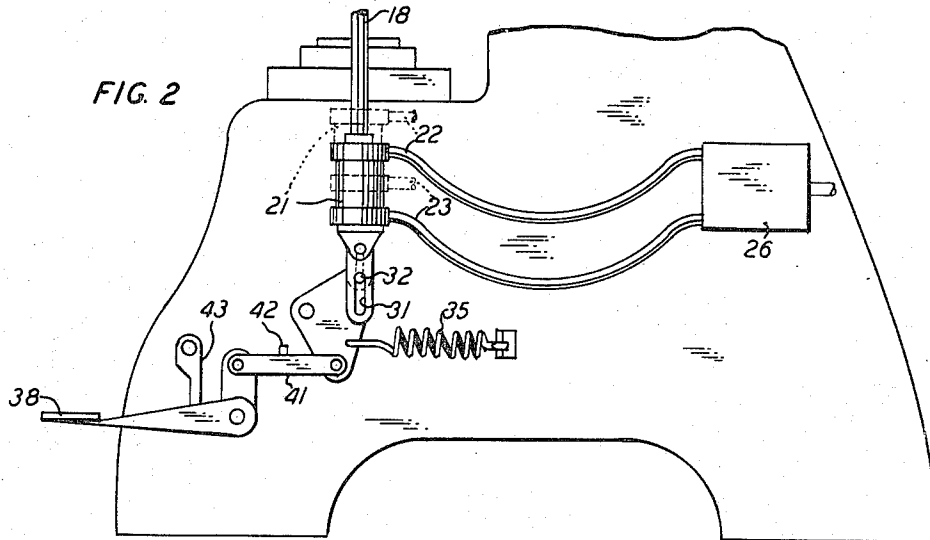
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TRIP MECHANISM FOR PRESSES

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4 Claims. (Cl. 192—131)

This invention relates to trip mechanisms for presses and more particularly to trip mechanisms having safety features assuring the operator against injury.

It is common practice to add guards and other safety mechanisms to presses having the conventional driving means connected to a reciprocable ram, through normally open clutches, closed for continuous or single cycle operations through the actuation of a trip rod. There are times, however, such as during the setting up of the press, when it is necessary for the guards to be removed and for the ram to be "inched down" for mounting and aligning the material working tools such as punches and dies. During these intervals, the person operating the press, according to the conventional methods, is not protected by any of the safety features installed for the protection of the operator.

An object of the invention is to provide a trip mechanism for presses including a safety feature which is effective at all times during the setting up, maintenance and regular operations of the press.

With this and other objects in view, the invention comprises a trip mechanism combining the operating advantages of foot pedal control with the safety feature of trip buttons spaced to require the use of both hands of the operator. The trip pedal is connected to the trip rod through a lost motion linkage and a lost motion take-up device, such as a fluid operated unit. The take-up device can be actuated only by simultaneous operation of the buttons. For normal operation the pedal may be latched down to take up the lost motion and the press is tripped by the hand buttons. When the pedal is left free for inching down the ram it is effective to trip the press only while the take-up device is held actuated by the manual operation of the spaced buttons.

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

Fig. 1 is a side elevational view of a press illustrating the trip mechanism in one position;

Fig. 2 is a fragmentary side elevational view of the press illustrating the trip mechanism in another position; and

Fig. 3 is a schematic wiring diagram illustrating the control circuit for the solenoid valve.

Referring now to the drawings, the press selected to illustrate the invention is indicated generally at 10 including a driving means, not shown, disposed in a housing 11 for reciprocating a ram 12 through a normally open clutch 14 when closed to move the ram with any tool supported thereby relative to a die 15. The ram and die are disposed in the working area 16 of the press which obviously is dangerous to the operator unless means is provided to require the use of both hands during operating cycles of the press.

The trip mechanism for the press includes a trip rod 18 connected in the conventional manner to the clutch 14 and normally urged upwardly by a spring 19 to hold

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the clutch in its open position. The lower end of the rod 18 is connected to a piston 20 of a fluid operated cylinder 21 having fluid lines 22 and 23 connected to the upper and lower portions thereof. In the present embodiment of the invention, the fluid is air under pressure received from a supply line 25 extending into a solenoid operable valve 26 which is adapted to direct the air under pressure through either one of the lines 22 or 23, the other line serving to exhaust the air through the solenoid valve.

A link 30 is pivotally connected to the cylinder 21 at its upper end and is provided with an elongate aperture 31 to receive a pin or projection 32 of a member 33. The member 33 is pivotally supported at 34 and normally urged counter-clockwise by a spring 35. A pedal 38 pivotally supported at 39 is connected to the pivotal member 33 through a lever 40 and a link 41. A lug or projection 42 on the link 41 is positioned to be engaged by a latch 43 pivotally supported at 44 to hold the pedal 38 in its operated position (Fig. 1), its normal position being illustrated in Fig. 2.

Switches 46 are mounted at spaced positions at convenient locations on the press or in front of the press, requiring the positioning of both hands of the operator out of the working area 16 for operation of the switches. The switches 46 are included in one of the main lines 49 and 50 of a circuit including the solenoid valve 26 so that both switches must be closed to energize the solenoid valve.

Considering now the operation of the trip mechanism, attention is first directed to Fig. 1 which illustrates the pedal 38 in its normal position where it is held operated by the latch 43 against the force of the spring 35. It will be apparent that movement of the pedal from the position shown in Fig. 2 to its operated position shown in Fig. 1 will not actuate the trip rod 18 to release the clutch 14 due to the fact that during this movement of the pedal, the pin 32 has merely travelled the full length of the elongate aperture 31 and has not applied force to actuate the trip rod. It is therefore necessary for the operator to close both of the switches 46, these switches being spaced so that it will require both hands of the operator to bring about operation of the press. Closing of the switches 46 completes a circuit through the solenoid valve 26 which is normally positioned to direct air through the line 23 into an exhaust line, but upon energization of the solenoid valve, this action is reversed directing air into the top of the cylinder through line 22 and exhausting air from the bottom of the cylinder through line 23. Therefore, during normal operating cycles of the press the pedal 38 is held operated to remove the normally existing lost motion between the pin 32 and the link 30 and place the operation of the press directly under the control of the switches 46. There are times, however, during setting-up the press and possibly during certain operations thereof when it is desirable to inch the ram downwardly or to stop the ram short of its full stroke, that more accurate control is necessary than is obtainable through the switches 46. At such times the latch 43 is released to render the pedal effective to control the press. This action, when the pedal is released by the latch 43 and moved by the spring 35, returns the pin 32 to the top of the elongate aperture 31 in the link 30. Again there exists the lost motion between the pedal operating means, terminating at the pin 32, and the switch operating means controlling the air cylinder 21 and its apertured link 30. Operation of the switches 46 at this time will cause the cylinder 21 to move from its solid line position in Fig. 2 to the dotted line position shown therein. The switches then serve to remove the existing lost motion in the link 30, moving

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the link upwardly until the lower end of the aperture engages the pin 32. The pedal is then rendered effective to move the trip rod 18 downwardly during desired intervals of time to bring about inching or gradual operation of the press. As long as the switches 46 remain closed, the operation of the press may be repeated through actuation of the pedal 38. Furthermore, should it be necessary for the operator to use his hands in feeding material to the press, the trip mechanism will remain unoperated, even during accidental operation of the pedal, until the switches 46 are again closed.

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. A trip mechanism for a press having a driving means, a normally open clutch therefor and a ram reciprocated by the driving means through the clutch when closed, the trip mechanism comprising a rod actuable to trip the clutch into closed position, a pedal movable between a normal position and an operated position, a fluid operable unit operatively connected to the rod and actuable between a normal and an operated position, a fluid supply line, a normally closed valve to control a fluid from the supply line to the unit, elements connected respectively to the pedal and unit and having a lost motion connection of a given distance therebetween whereby actuation of the pedal into its operated position will cause its element to remove the lost motion between the elements and render the unit effective when actuated to actuate the rod, means to latch the pedal in its operated position, and spaced safety control means operable jointly only to actuate the valve into open position to cause operation of the unit.

2. A trip mechanism for a press having a driving means, a normally open clutch therefor and a ram reciprocated by the driving means through the clutch when closed, the trip mechanism comprising a rod having one end adapted to trip the clutch into closed position when the rod is moved longitudinally, a piston fixedly mounted on the other end of the rod, a fluid operable cylinder disposed on the rod about the piston and movable relative thereto between a normal position and an operated position, a pedal movable between a normal position and an operated position, and elements connected respectively to the pedal and the cylinder and having a lost motion connection of a given distance therebetween whereby actuation of the pedal in advance of operation of the cylinder will remove said lost motion and render the cylinder effective when operated to actuate the rod, and operation of the cylinder in advance of actuation of the pedal will remove said lost motion and render the pedal effective when actuated to actuate the rod.

3. A trip mechanism for a press having a driving means, a normally open clutch therefor and a ram re-

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ciprocated by the driving means through the clutch when closed, the trip mechanism comprising a rod having one end adapted to trip the clutch into closed position when the rod is moved longitudinally, a piston fixedly mounted on the other end of the rod, a fluid operable cylinder disposed on the rod about the piston and movable relative thereto between a normal position and an operated position, a pedal movable between a normal position and an operated position, elements connected respectively to the pedal and the cylinder and having a lost motion connection of a given distance therebetween whereby actuation of the pedal in advance of operation of the cylinder will remove said lost motion and render the cylinder effective when operated to actuate the rod, and operation of the cylinder in advance of actuation of the pedal will remove said lost motion and render the pedal effective when actuated to actuate the rod, spaced hand actuable members, and means under the control thereof to operate the cylinder relative to the piston on the rod.

4. A trip mechanism for a press having a driving means, a normally open clutch therefor and a ram reciprocated by the driving means through the clutch when closed, the trip mechanism comprising a rod having one end adapted to trip the clutch into closed position when the rod is moved longitudinally, a piston fixedly mounted on the other end of the rod, a fluid operable cylinder disposed on the rod about the piston and movable relative thereto between a normal position and an operated position, a pedal movable between a normal position and an operated position, elements connected respectively to the pedal and the cylinder and having a lost motion connection of a given distance therebetween whereby actuation of the pedal in advance of operation of the cylinder will remove said lost motion and render the cylinder effective when operated to actuate the rod, and operation of the cylinder in advance of actuation of the pedal will remove said lost motion and render the pedal effective when actuated to actuate the rod, spaced hand actuable members, means under the control thereof to operate the cylinder relative to the piston on the rod, and means to latch the pedal in its operated position to remove the lost motion between the elements and render the spaced hand actuable members effective to actuate the rod through operation of the cylinder.

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