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[54] **DUAL CONTROL ADAPTER FOR PRESS**

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[52] **U.S. Cl.** ..... **192/22,** 192/131 R

[51] **Int. Cl.** **F16p 3/18**

[58] **Field of Search** ..... 192/22, 131 R, 24

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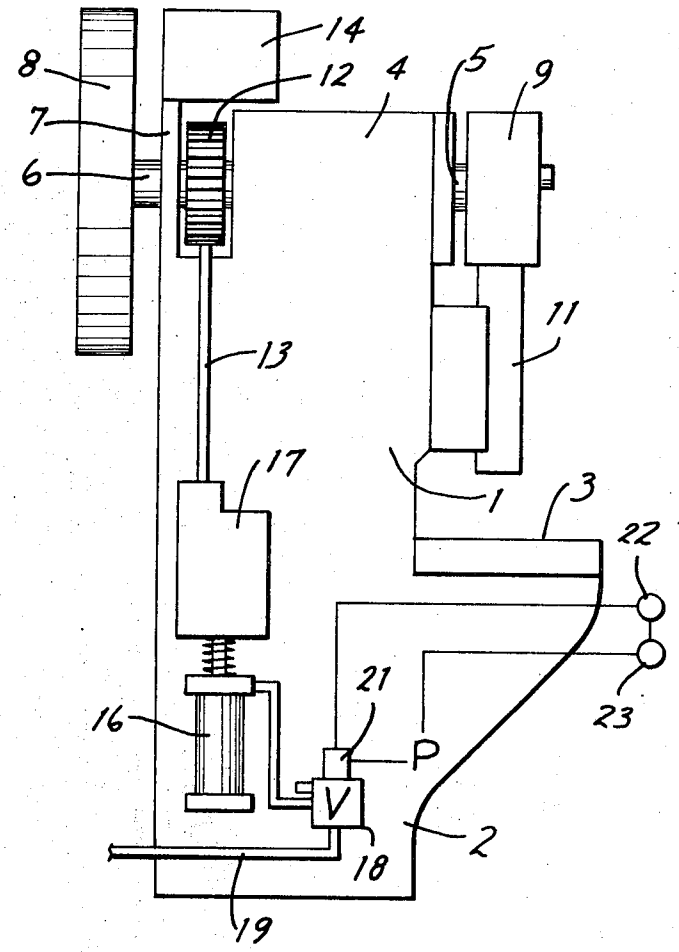
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[57] **ABSTRACT**

Safety actuating device for a press. In a press, as a punch press, having a one-way clutch and a rod responsive to actuating means for operating said clutch to control the press, there is provided means interposed between actuating means and said rod to insure that the press will operate only in response to a force occurring in a predetermined manner and place. The rod is connected to a pivotally mounted lever whose operation is first resisted and then effected by successive operation of two linkages responding to energizing of a pressure cylinder. One linkage first, and normally, provides support means under said lever for positively preventing it from effecting movement of said rod. A pair of hand switches are each connected to a valve for energizing the cylinder when both of the operator's hands are on the respective switches. With the device of the invention in place and the actuating cylinder energized, the first operation is to pull the support means out of locking position and thereby to permit downward movement of said lever. This is followed immediately by engagement of said lever by said second linkage which draws the ever downward sufficiently to effect such movement of said pull rod as to energize the clutch and initiate one operation of the press.

7 Claims, 2 Drawing Figures



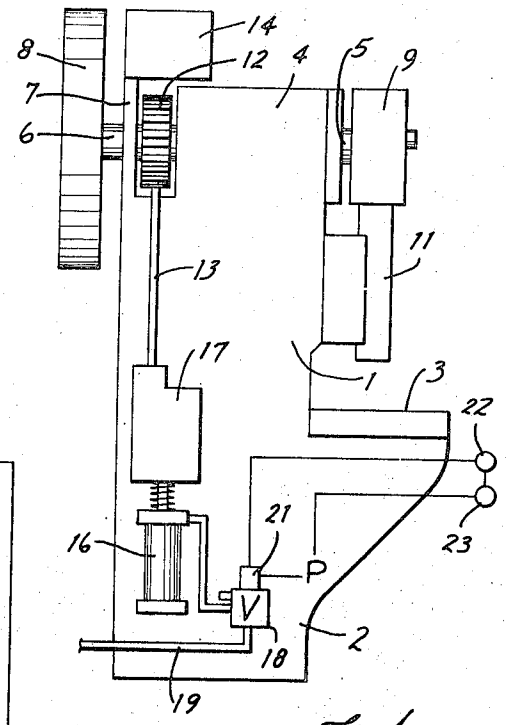

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Fig. 1

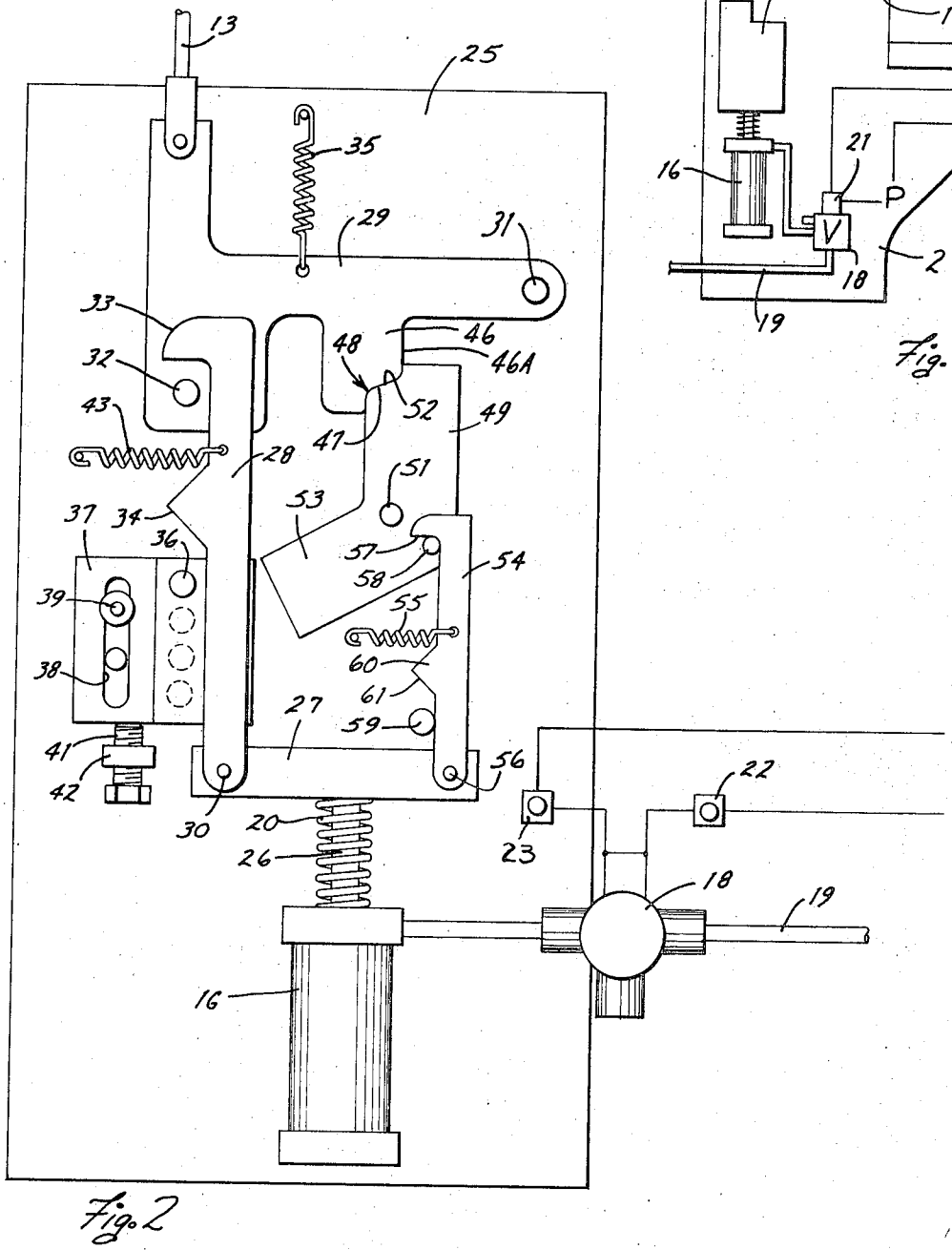

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Fig. 2

DUAL CONTROL ADAPTER FOR PRESS

FIELD OF THE INVENTION

The invention relates to safety actuators for presses and particularly to a type thereof which positively prevents actuation of the press starting mechanism until both of the operator's hands are on actuating switches. When so energized the mechanism first withdraws a locking mechanism and then applies a suitable force to the operating rod.

BACKGROUND OF THE INVENTION

IN the operation of punch, and similar, presses, it has long been customary to utilize a continuously operating, inertia storage, element such as a large flywheel which is then by suitable means, such as a single-revolution clutch, connected to the crank or other mechanism by which the press is caused to operate. In connection therewith, it has long been customary to provide dual hand controls to insure that both of the operator's hands are in a safe location prior to energization of the press to bring the dies thereof together. However, in spite of the long time during which this problem has been recognized and the many devices which have been offered to improve the level of safety encountered in connection with such presses, there has still remained the problem of positively insuring that the actuating mechanism of the press will not move unless and until it is appropriately energized. Particularly, in certain devices known in the past there is provided merely an adjustable hook which upon actuation moves to engage means connected to a pull rod for closing said clutch.

However, if in some manner this hook is accidentally caused to engage and operate the pull rod the machine will start. Thus, the press is subject to accidental starts and it is desirable to prevent this from happening.

Accordingly, the objects of the invention include:

1. To provide a safety press control which positively prevents actuation of the press until the actuation means are deliberately energized.

2. To provide a safety press control, as aforesaid, which will be compatible with press operating means now in existence on presently known machines.

3. To provide a safety press control, as aforesaid, which will be positive acting and hence fully reliable.

4. To provide a safety press control, as aforesaid, which will be simple and inexpensive to manufacture, install and maintain in good operating condition.

5. To provide a safety press control, as aforesaid, which will be highly versatile and readily adaptable to use on and with presses and press control means of a wide range of specific designs.

Other objects and purposes of the invention will be apparent to persons acquainted with apparatus of this general type upon reading the following specification and inspection of the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

In the drawing:

FIG. 1 is a somewhat schematic side view of a typical punch press showing the location and arrangement with respect to the press of the safety control device.

FIG. 2 is an elevation, partly schematic view, of a safety control device embodying the invention.

DETAILED DESCRIPTION

Referring first to FIG. 1, there is shown in side elevation a conventional punch press of the type for which the apparatus of the invention is particularly, though not exclusively, adapted and to which reference is made to illustrate the details and application of the invention.

The press shown in FIG. 1 comprises an upright frame 1 mounted in any convenient manner on a pedestal 2 and supporting a work table 3. Said frame 1 carries bearing structure 4 for rotatably supporting a shaft 5 to be driven in any convenient manner from one, here the leftward, end thereof and crank means such as an eccentric 9 is carried on the other, here the rightward, end thereof for vertically reciprocating the ram 11 by which in a conventional manner a suitable die, nOt shown, is caused to act on work held on the work table 3.

In the press shown, a shaft 6 is supported in a suitable bearing 7 and carries at one, here the leftward, end thereof an inertia device 8, as a conventional flywheel.

A one revolution clutch 12 connects the shafts 5 and 6 upon appropriate mechanical actuation thereof by suitable trip means, as by the trip rod 13. Power means such as an electric motor schematically indicated at 14 is provided in any convenient manner for driving the shaft 6 at a continuous and substantially uniform rate in any conventional manner.

A power means in the form of a pressure fluid cylinder 16 is provided to operate appropriate mechanism in a translating device 17 through which actuation of the pressure cylinder 16 effects vertical actuation of the rod 13 and connecting of the clutch 12. The cylinder 16 is energized by opening of the valve 18 which connects the cylinder 16 with a pressure line 19. The valve 18 is in many conventional embodiments, and here, operated by a solenoid 21 which is in turn energized by a pair of serially connected hand switches 22 and 23 through which the solenoid 21 is connected to a power source P.

Thus, actuation of both switches 22 and 23 will energize the solenoid 21 by which the valve 18 is opened and the cylinder 16 energized. Energizing of said cylinder acts through the translating device 17 to actuate the rod 13 by which the clutch 12 is closed and the shaft 6 connected to the shaft 5. Energy stored in the inertia device 8 drives the shaft 5 and thereby the eccentric 9 to operate the punch in the usual manner.

Release of one or both of the hand switches 22 and 23 de-energizes the solenoid 21 and, also in a conventional manner, reverses the valve 18 by which to depressurize the cylinder 16. Means are provided for returning the plunger 26 again upwardly when the air pressure has ceased to operate. In the present embodiment same is indicated by a coil spring 20 positioned between the cross head 27 and the cylinder 16 but other means may be provided as desired such as the reversal of the air pressure on the cylinder 16 when the solenoid 21 is de-energized. The apparatus is now returned to the beginning condition and is ready for another cycle.

All of the foregoing is conventional and well known to the industry. Hence, further description thereof is believed unnecessary.

Turning now to the details of the present invention, same are illustrated in FIG. 2 and comprise the con-

tents of the translating device **17**. The cylinder **16** carries and actuates a rod **26** and said latter has rigidly mounted on its free end the connector or cross arm **27**. At one end of said cross arm, near the leftward end, there extends upwardly and pivotally connected thereto a link **28**. Immediately above said link and related thereto in a manner to be described hereinafter is a power transmittal member, here a lever **29**, which is pivoted at one end **31** to frame means, as a plate **25**, and connected at its other end to the above-mentioned rod **13**. A pin **32** projects outwardly from said lever **29** and is positioned for engagement by a hook portion **33** which latter is located at the upper end of the link **28**. In the starting position shown, pin **32** is spaced a short distance below hook **33** to provide a lost motion relationship as further dealt with below. The lower part of said hook member is positioned substantially perpendicular to the longitudinal extent of the link **28**. Thus, for reasons further appearIng hereinafter, the hook **33** will restrain upward movement of the pin **32** but the pin **32** Will not restrain clockwise movement of the link **28** around the pivot point **30**. Suitable means, as a spring **35**, are provided to constantly urge a clockwise rotation of the lever **29** around its pivot point **31**, the force thereof, however, being little if any more than merely enough to balance the weight of said lever.

Midway between the ends of the link **28** there is provided a cam **34** for cooperation with a pin **36**. Said pin **36** is mounted on a vertically adjustable plate **37**. Said plate **37** is mounted in any convenient manner for vertical adjustment as desired, in this embodiment same being provided by the slot **38** in said plate receiving a screw and washer guide device **39** and vertically adjusted by means of a screw **41** threadedly mounted on a suitable lug **42** which is in turn mounted on the frame plate **25**. Suitable means, as a spring **43**, constantly urges the link **28** in a leftward direction around its pivot point **30** for reasons appearing hereinafter.

A downwardly projecting lug **46** is also provided on the lever **29** and has a generally flat surface **47**, preferably provided in the form of a portion of a step **48** in the lower part of said lug **46**. A latch **49**, here of bellcrank shape, is pivotally affixed at **51** to the frame plate **25** and has a notched portion **52** at its upper end shaped to mate with the step **48**. Means are provided for normally urging said arm **49** counterclockwise around the pivot **51**, in this case such means being the counterweight provided by the arm **53**.

A latch release link **54** is pivotally affixed at a point **56** to the rightward end of the cross arm **27** and is provided with a hook **57** arranged for normally engaging a pin **58** positioned on the bell crank in such position as to limit the above-mentioned counterclockwise pivotal movement of the arm **49**. The lower edge, however, of said hook **57** is of such contour that while it restrains upward movement of said pin **58** it will not restrain clockwise movement of the lever **54** around said pivot **56**. There is further provided on said lever **54** a projection **60** defining a cam surface **61**. A pin **59** is mounted on the frame plate **25** and projects therefrom in a position to engage the cam surface **61** upon downward movement of the link **54** which engagement will cause clockwise rotation of said lever **54** about its pivot point **56**.

OPERATION

At the beginning of a cycle of operation, the motor **14** is, of course, energized and the shaft **6** rotates. A downward stroke of the rod **13** will close the clutch **12** and effect a single revolution of the shaft **5** and consequently a single operation of the punch. The objective of the mechanism of the invention is, therefore, to effect a downward movement of the rod **13** when and as desired to actuate the punch but to positively prevent such downward movement at any time other than during the operational cycle.

In this condition of the apparatus the upper end of the lever **49** and particularly its surface **52** is received into the step **48** and thus positively prevents the downward movement of the lever **29**. This positively prevents downward movement of the rod **13** and hence prevents an accidental engagement of the clutch **12**.

When the operator places both hands on the switches **22** and **23**, which are, of course, placed on the machine at suitable points according to known practice, they energize the solenoid **21** to open the valve **18** and thereby supply pressure fluid to the upper end of the cylinder **16**. This pulls the cylinder rod **26** downwardly against the spring **20** and thereby moves downwardly the cross head **27**. Since the hook **57** is in contact with the pin **58** and the hook **33** is spaced from the pin **32**, the first operation will be to pull said pin **58** downwardly and thereby effect a clockwise rotation of the lever **49** which will remove the upper end of same out from under the step **48**. Immediately after this occurs, the hook **33** moves downwardly sufficiently to engage the pin **32** and pull same downwardly, thus pulling the rod **13** and closing the clutch **12**. This effects an operation of the punch in the normal manner.

It will be apparent that the lost motion space between the pin **32** and the hook **33** is preferably as small as possible but it must be sufficient to insure full retraction of the latch **49** from under the transmittal lever **29** before the hook **33** engages the pin **32**.

In the meantime, the pin **59** acts against the cam **61** to move the upper end of the link **54** rightwardly and thereby release the pin **58**. This permits the latch **49** to response to the counterwieght **53** and rotate counterclockwise until it bears against the leftward side **46a** of the lug **46**.

As the downward stroke continues, the pin **36** will bear against the cam **34** to move the upper end of the link **28** rightwardly to release the pin **32** and thereby permit the spring **35** to return the lever **29** upwardly. This will open the clutch **12** and make same ready for the next cycle of operation.

When the piston rod **26** reaches the bottom of its stroke, the air in the cylinder **16** may be automatically exhausted if desired but in the embodiment shown same will be exhausted only when the operator releases one or both of the switches **22** and **23** to de-energize the solenoid **21**. In whatever manner this exhaust is effected, the air is exhausted at an appropriate point and the spring **20** returns the piston rod **26** and thereby the cross arm **27** upwardly. As this occurs, the cam **34** is released from the pin **36** and the lever **28** responds to the spring **43** to return to the position shown in FIG. **2** so as to be ready for the next cycle. At the same time, the cam **61** is released from the pin **59** and the lever **54** responds to the spring **55** to return to the position shown in FIG. **2**. Virtually simultaneously with this movement the surface **52** at the upper end of the latch **49** clears the corner between the surface **47** of the step **48** and the surface **46a** so as to permit the upper end

of said latch to swing leftwardly to re-engage said surface **52** with the step **48** as shown.

The parts are now all back into the original condition and ready for the next cycle which may be repeated in the same manner as that above described.

It will be recognized that a number of changes may be made from the specific apparatus herein shown to illustrate the invention, which changes will all be well within the scope of the invention. As examples of some of such changes the lever **29** may be arranged for vertical sliding motion rather than pivotal motion as shown and the latch **49** may be caused to return to its latched position by the presence of a spring rather than by the counterweight shown. The entire latch structure including particularly the latch **49,** link **54,** and parts associated therewith, may be placed on the opposite side of the pull link **28** from where it is shown in the drawing and the pin **58** may be spaced horizontally a greater distance than shown from the pivot point **51** if desired to provide a more positive withdrawal of the latch from under the lug **46.** Further, the apparatus may be narrowed somewhat by moving the lug **46,** latch **49** and lever **54** all leftwardly closer to the pull link **28** eliminating the counterweight **53** and replacing its function by a compression spring acting leftwardly against the upper end of the latch lever **49.**

Other modifications and variations will be apparent to persons acquainted with apparatus of this general type but will be within the scope of the hereinafter appended claims excepting as said claims by their own terms clearly require otherwise.

The embodiments of the invention in which exclusive property or privilege is claimed are defined as follows:

1. Operating means for a press utilizing a clutch operable by substantially rectilinear motion of a trip means, the combination comprising:

power means actuated by an operator for generating mechanical rectilinear motion, said power means including a head member movable in a direction parallel to said direction of movement of said trip means in response to actuation of said power means;

translating means adapted to receive said rectilinear motion from said power means and apply same to said trip means, said translating means being normally held in a first position corresponding to the inoperative position of said clutch and movable by said power means to a second position corresponding to the operative position of said clutch;

said translating means including a power transmitting member and means mounting same for movement with a substantial component thereof in a direction parallel to the direction of movement of said trip means as same moves to operate said clutch;

first link means operatively responsive to movement of said head member and having a lost motion connection with said transmitting member;

latch means engaging at least a portion of said translating means and normally in a blocking position to positively hold said translating means in said first position, said latch means including a latch and means normally holding same in position for blocking movement of said power transmitting member in a direction corresponding to closure of said clutch; and

release means actuated by said power means and effective to withdraw said latch means from said blocking position immediately prior to application of force by said power means to said translating means;

said release means including second link means responsive to movement of said head member and connected for retracting said latch from said blocking position in response to movement in said direction by said head member, the lost motion relationship of said first link means being sufficient to permit said latch to be retracted prior to connection of said first link means to said transmitting member in power transmitting relationship;

whereby upon the appearance of a force output by said power means said latch means will be withdrawn from said blocking position and force applied by said power means to said translating means will be effectively applied to said trip means for actuation thereof.

2. The device of claim **1** wherein said power transmitting member comprises a power transmittal arm pivotally mounted with respect to the frame of said press and arranged for movement having a substantial component in a direction parallel to the direction of movement of said trip means as same moves to operate said clutch;

said head member comprising a cross head arranged in a position substantially perpendicular to said direction and arranged for movement in said direction in response to energization of said power means;

said first link meanS including a first link pivoted to one portion of said cross head and having a lost motion relationship with a first portion of said power transmittal arm at a location spaced from the point of pivoting thereof; and

said second link means including lost motion means for connecting said cross head to said latch for moving same from said blocking position to a released position on movement of said cross head in the clutch closing direction.

3. The device of claim **2** wherein said second link means is connected by a hook and pin arrangement to said latch and including also cam means for disconnecting said hook and pin upon movement of said cross head through a selected distance in the clutch closing direction whereby said latch will be free to return to its blocking position immediately upon return by said power transmittal arm to its first position and regardless of whether said cross head has yet returned to the position occupied by same at the beginning of the cycle.

4. In a power translation device for imposing a rectilinear operating motion onto trip means adapted to operate the clutch of a punch press in response to power means actuated by an operator and including a power transmitting member arranged for rectilinear movement with at least a substantial component thereof parallel to the direction of movement of said trip means, and drive means responsive to actuation by said power means for actuating said clutch in response to output by said power means, the improvement in safety means therefor comprising:

a latch means normally positioned for blocking movement of said power transmitting member from a first position corresponding to the open condition of said clutch to a second position corresponding to the closed condition of said clutch;

means constantly urging said latch means toward a blocking position;

link means responsive to movement of said power means for movement of said latch means out of said blocking position; and

said drive means including lost motion linkage means connecting same to said power transmitting member, whereby energization of said power means effects movement first of said latch means out of said blocking position followed by, upon run-out of said lost motion, movement of said power transmitting member for effecting motion of said trip means in the clutch closing direction.

5. The device of claim **4** wherein said latch means includes a pivoted bell crank latch member wherein one arm thereof constitutes a counter-weight normally urging the other arm thereof into said blocking position.

6. Operating means for a press utilizing a clutch operable by substantially rectilinear motion of a trip means, the combination comprising:

power means for generating mechanical rectilinear motion;

a pair of manually actuated switch means connected in series with one another and operably connected to said power means for permitting energization thereof only when both of said switch means are closed, said pair of switch means being sufficiently spaced apart so as to require an operator to utilize both hands so as to permit simultaneous manual actuation of both of said switch means;

translating means adapted to receive said rectilinear motion from said power means and apply same to said trip means, said translating means being normally held in a first position corresponding in the inoperative position of said clutch and movable by said power means to a second position corresponding to the operative position of said clutch;

linkage means operatively coacting between said power means and said translating means for transmitting the rectilinear motion of said power means to said translating means, said linkage means including a lost-motion connection for permitting a preselected amount of rectilinear movement of said power means without causing a corresponding movement of said translating means;

latch means engaging at least a portion of the translating means and normally maintained same in a blocking position to positively hold said translating means in said first position; and

release means coacting between said power means and said latch means and actuated during said selected amount of rectilinear motion for withdrawing said latch means from said blocking position as said power means moves through said preselected amount of rectilinear movement prior to movement of said translating means by said linkage means;

whereby upon the appearance of a force output by said power means, said latch means will be initially withdrawn from said blocking position prior to the application of force to said translating means by said power means, whereupon said power means will then apply force to said translating means for moving said trip means to thereby actuate said clutch.

7. Operating means according to claim **6,** wherein said latch means includes a latch member mounted for pivotal movement and normally urged into blocking engagement with said translating means, and said release means including a release member connected to said power means and movable therewith, said release member being pivotal and having a portion thereof releasably engageable with said latch member.

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