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CONTROLLER FOR POWER OPERATED MACHINES

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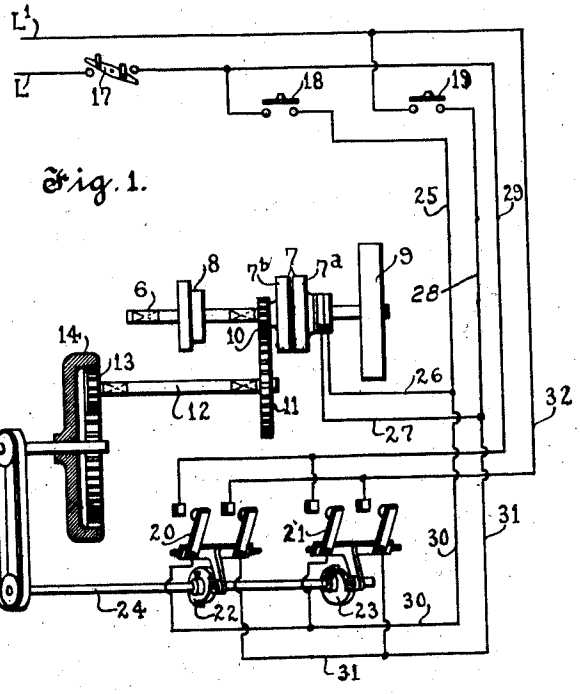
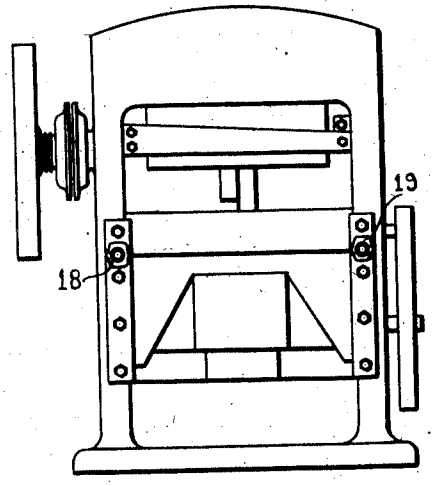


Fig. 1.

Fig. 2.



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CONTROLLER FOR POWER-OPERATED MACHINES.

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This invention relates to controllers for power operated machines and more particularly to safety controllers for machine tools.

Certain types of machines are driven through the medium of a clutch controlled by the operator and are sometimes provided with safety controllers including an electro-magnetic latching device for locking the clutch in its released position and a pair of manually controlled switches for controlling the energizing circuit of said device. Such switches are connected in series in the energizing circuit of said device and are located out of proximity to the moving parts of the machine whereby it is impossible for the operator to start the machine while either of his hands are in a dangerous position.

However, such safety controllers do not prevent the operator from removing his hands from the control switches and keeping the machine in continuous operation, and the present invention has among its objects to provide a safety controller which is adapted upon release of either control switch to effect automatic stopping of the machine after a given cycle of operation thereof.

Another object is to provide a safety controller of the character above stated including an electro-magnetic clutch which is manually controlled to effect starting of the machine and is automatically controlled to effect stopping of the machine after a given cycle of operation thereof.

Various objects and advantages of the invention will hereinafter appear.

The accompanying drawing illustrates an embodiment of the invention which will now be described, it being understood that the embodiment illustrated is susceptible of modification and can also be applied to other types of machines than that illustrated in the drawing.

In the drawing,

Figure 1 is a schematic view of a controller embodying the invention, the same being shown in connection with a conventional type of toggle press;

Fig. 2 is a front elevational view of a mechanical embodiment of the toggle press with certain of the control parts in Fig. 1 mounted thereon.

Referring to Fig. 1 the toggle press illustrated therein includes a stationary head 1 and a co-operating platen 2 reciprocable by a cam 3 through the medium of a toggle 4. Cam 3 is fixed to a shaft 5 which is driven from a shaft 6 through the medium of a clutch 7. Shaft 6 has the usual cone pulley 8 fixed thereto for driving the same and is also provided with the usual fly wheel 9. Field member 7^a of clutch 7 is keyed to shaft 6 while the armature member 7^b of said clutch is rotatably mounted on said shaft and has a pinion 10 fixed thereto. Pinion 10 meshes with a gear 11 fixed to a countershaft 12 and said countershaft has a pinion 13 fixed thereto which meshes with an internal gear 14 fixed to shaft 5.

The control means for the aforedescribed toggle press includes a snap switch 17, a pair of push button switches 18 and 19 and a pair of double-pole switches 20 and 21. As shown in Fig. 2 push button switches 18 and 19 are mounted in front of the press and upon opposite sides thereof and as hereinafter set forth the same when simultaneously depressed serve to establish an energizing circuit for clutch 7. Switches 20 and 21 are provided with cam actuating members 22 and 23 respectively and as hereinafter set forth, each of said switches is adapted to establish a maintaining circuit for clutch 7 independently of push buttons 18 and 19. Cams 22 and 23 are mounted for angular adjustment upon a shaft 24 said shaft being driven at a speed corresponding to the speed of shaft 5 through the medium of a driving connection 25.

The function and operation of the aforedescribed controller together with the circuit connections thereof will now be more fully described. Assuming that switch 17 is closed and that it is desired to start the press, push buttons 18 and 19 are simultaneously depressed to establish an energizing circuit for clutch 7. Such energizing circuit extends from line L through switches 17 and 18 by conductors 25 and 26 to and through the winding of clutch 7 by conductors 27 and 28 to and through switch 19 to line L′. Upon engagement of clutch 7 cam 3 is driven in a clockwise direction and during each revolution of said cam, platen 2 is raised and lowered and each of the cams 22 and 23 makes one complete revolution. Cam 22 is arranged so that during upward movement of platen 2 the same closes switch 20

while cam 23 is arranged to close switch 21 following closure of switch 20. Upon closure of switch 21 cam 22 permits opening of switch 20 and upon completion of the cycle of operation of platen 2 cam 23 permits opening of switch 21. Either of the switches 20 and 21 when closed establishes an energizing circuit for clutch 7 extending from line L through the left hand pole of said switches by conductors 30 and 26 to and through the winding of clutch 7 by conductors 27 and 31 through the right hand pole of said switches to line L'. By enabling rotary angular adjustment of one or both of cams 22 and 23 with respect to shaft 24, in the manner aforeindicated, the duration of automatic control of the clutch energization within each cycle of operation of the device may be increased or decreased as desired.

From the foregoing it is apparent that after a given upward movement of platen 2 the operator is free to remove his hands from push buttons 18 and 19 to prepare the material for the next operation of the press. As soon as the press starts on its downward stroke the operator removes the finished part and inserts raw material for the next operation. If the operator finishes this work before the platen is in position to again begin the upward movement he simply holds push buttons 18 and 19 depressed until switch 20 establishes the maintaining circuit for clutch 7. Should the operator for some reason fail to complete the work upon completion of the downward stroke of platen 2, switch 21 interrupts the maintaining circuit of clutch 7 to effect automatic stopping of the press.

What I claim is new and desire to secure by Letters Patent is:

1. In a safety device, the combination with a press having a reciprocating member, an electromagnetic clutch for transmitting power thereto, right and left hand switches on said press biased to open position and adapted while simultaneously held closed to maintain an energizing circuit for said clutch, a plurality of switches actuated by said press and adapted to close successively and open successively after closure of said first-mentioned switches to maintain an energizing circuit for said clutch throughout the remaining part of a cycle of operation of said press, and means for varying the time of closure of certain of said last-mentioned switches with respect to said cycle of operation.

2. In a safety device, the combination with a driven machine, of an electromagnetic clutch for transmitting power thereto, manually controlled switches adapted while closed simultaneously to establish and maintain an energizing circuit for said clutch, and adjustable means associated with said machine for establishing a maintaining circuit for said clutch following initiation of the cycle of operation of said machine, said means being adapted to interrupt said maintaining circuit only upon completion of said cycle.

3. The combination with a machine of an electro-magnetic clutch for transmitting power thereto, safety control means for said clutch including a plurality of manually controlled switches adapted while closed simultaneously to establish and maintain an energizing circuit for said clutch, and a plurality of switches operated by said machine for establishing a maintaining circuit for said clutch during a given part of the cycle of operation of said machine, and means for varying the time of establishment of said maintaining circuit with respect to said cycle of operation.

4. The combination with a driven machine, of an electromagnetic clutch for transmitting power thereto, safety control means for said machine including a plurality of manually controlled switches biased to open position and adapted while closed simultaneously to establish and maintain an energizing circuit for said clutch, means actuated by said machine for establishing an energizing circuit for said clutch independently of said switches, said means being adapted to establish said independent circuit following initiation of the cycle of operation of said machine and to interrupt the same upon completion of said cycle, and means for varying the time of establishment of said independent energizing circuit with respect to said cycle of operation.

5. The combination with a machine, of an electromagnetic clutch for transmitting power thereto and safety control means for said machine including a plurality of spaced manually operated switches biased to open position adapted while held closed to maintain an energizing circuit for said clutch, a pair of switches actuated by said machine, said latter switches being adapted to establish a maintaining circuit for said clutch independently of said former switches and being adapted to close successively and open successively, and means for varying the time of closure of said latter switches with respect to each other.

6. The combination with a driven machine, of an electro-magnetic clutch for transmitting power thereto, a plurality of normally open push buttons adapted while simultaneously depressed to maintain an energizing circuit for said clutch, a plurality of switches actuated by said machine, said switches being adapted to close successively and open successively, whereby one of the same is adapted to establish a maintaining circuit for said clutch following initiation of the cycle of operation of said machine and

the other is adapted to interrupt said maintaining circuit upon completion of the cycle of operation of said machine.

7. In a safety device for presses and the like having a given cycle of operation, the combination with power operated driving and driven elements, an electromagnetic member for effecting connection and disconnection of said elements, a circuit for said member, a plurality of relatively widely spaced manually controlled switches adapted during simultaneous closure thereof to effect uninterrupted energization of said circuit, and means controlled by said driven element to automatically maintain said electromagnetic member energized for a given period to thereby permit temporary release of said manually controlled switches during each cycle of operation.

8. In a safety device for presses and the like having a predetermined cycle of operation, the combination with power operated driving and driven elements, an electromagnetic clutch for connecting and disconnecting said elements, clutch controlling means comprising a circuit and right-hand and left-hand switches adapted while jointly closed to effect and maintain energization of said circuit, and an adjustable limit switch controlled by said driven element and adapted to provide an alternative energizing circuit for said clutch only during a predetermined portion of said cycle of operation to thereby permit temporary release of said right-hand and left-hand switches.

9. In a safety device for presses and the like having a predetermined cycle of operation, the combination with power operated driving and driven elements, an electromagnetic clutch for connecting and disconnecting said elements, clutch controlling means comprising a circuit and right-hand and left-hand switches adapted while jointly closed to initiate and maintain said cycle of operation, a plurality of sequentially closed and sequentially opened limit switches controlled by said driven element and adapted to provide an energizing circuit for said clutch independently of said first mentioned switches during a predetermined portion of said cycle of operation, and means for increasing or decreasing the portion of said cycle of operation subjected to automatic control by said limit switches.

In witness whereof, I have hereunto subscribed my name.

FREDERICK H. OBERSCHMIDT.