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V. G. ROSS

AUTOMATIC STOP MECHANISM

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Fig. 1

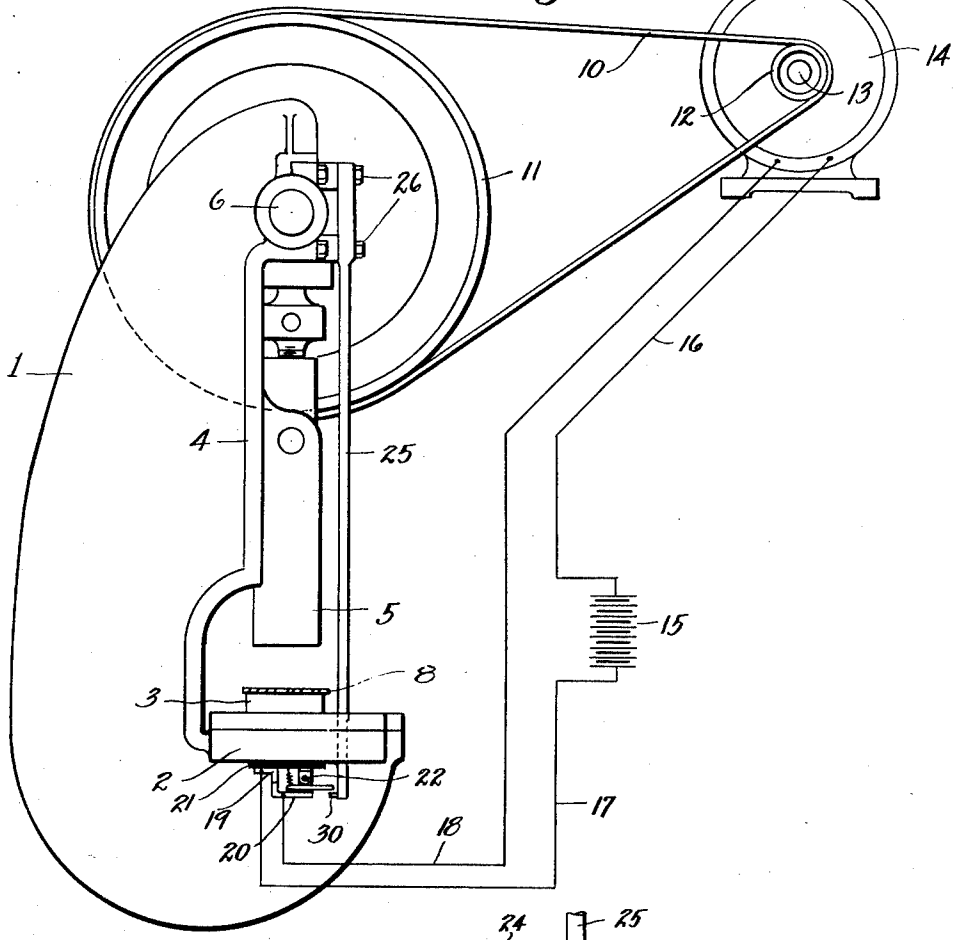


Fig. 2

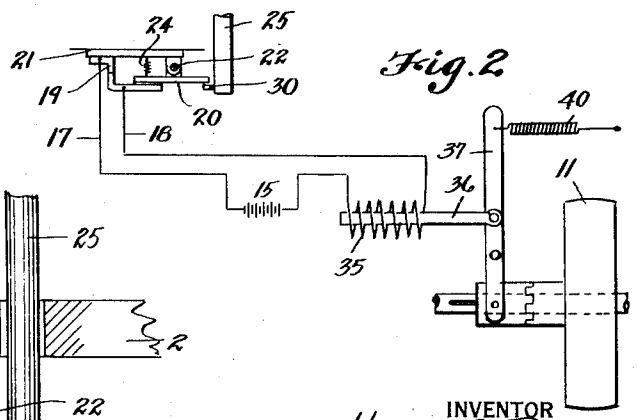
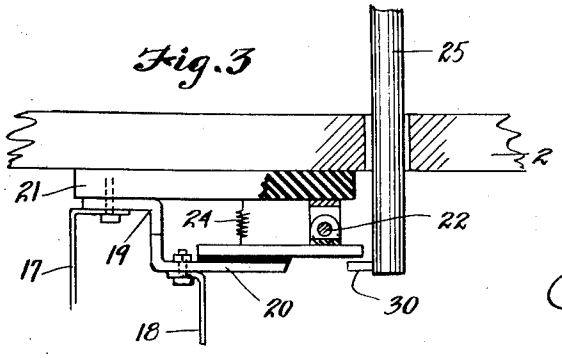


Fig. 3



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UNITED STATES PATENT OFFICE.

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AUTOMATIC STOP MECHANISM.

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This invention relates to automatic stop mechanism for power driven machines and particularly to the adaptation of mechanism to machines of the punch press type for stopping the operation of the machine in the event of any irregularity in the feeding of the blanks or pieces into the punch mechanism.

In order to impart a better understanding of the invention, I will state that in machines of the punch press type, particularly machines of that character herein illustrated, there is a certain amount of resiliency in the frame structure and when pressure is exerted against the die by the action of the punch, the mounting portions of these members are caused to spread apart an appreciable distance. The machine with which the stop mechanism has been illustrated is of that type used in the making of cans and is for the purpose of stamping out the ends. It is intended that the machine shall operate only on one sheet of material at a time and it has been noted by experiments made, that when more than one sheet of material is advanced and operated on at a time, the frame structure will yield considerably more than when but one sheet is advanced.

In view of the above, the object of this invention resides in the provision of means whereby the spreading of the frame structure of the machine, when under abnormal conditions of operation such as would be brought about by the insertion of more than the usual number of pieces between the punch and die members, operates to stop the machine either by throwing it out of gear, or in the event that it is electrically driven, by disconnecting the machine from the source of electricity directly or indirectly.

Heretofore various methods have been employed for automatically stopping machines of this character by the use of trip levers, stops and other devices and by using abnormal vibration or jar on the machine, but to my knowledge no one has accomplished this result by taking advantage of the resiliency of a frame structure.

In accomplishing the objects of the invention, I have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawings, wherein—

Figure 1 is a side elevation of a part of a punch press machine, equipped with automatic stop mechanism in accordance with the present invention.

Figure 2 is a diagrammatic illustration of means for utilizing a solenoid for shifting a lever whereby a driving clutch may be thrown into or out of gear for the purpose of controlling the operation of the machine.

Figure 3 is a detail view of the switch mechanism used in connection with the present invention.

Referring more in detail to the drawings—

1 designates what may be the frame structure or a structural member of a punch press of a type to which the present invention is especially adapted, and which forms a support for a base member 2 on which a die 3 is mounted and also forms a guideway 4 in which a punch 5 is reciprocally contained and adapted to be actuated from and against the die by rotative movement of a shaft 6 mounted in the upper portion of the frame structure.

The function of the present machine is to stamp out blanks from sheets of material, as designated at 8, that are inserted between the die and lower end of the punch. As before explained during a normal punching operation there is a spreading apart movement of the frame between the base plate and the mounting of shaft 6 of a few thousandths of an inch and this is increased should more than one sheet of material be inserted.

In Figure 1 of the drawing the machine is shown to be driven by means of a belt 10 operating about a pulley 11 on the shaft 6 and a pulley 12 on the driving shaft 13 of an electrically operated motor 14; the latter being connected with a source of electricity, designated at 15, by means of circuit wires 16, 17 and 18; the two latter wires being connected through the intermediacy of a switch comprising fixed and movable members 19 and 20, respectively, that are mounted on an insulating block 21 secured to the under side of the base plate 2.

The switch member 19 is electrically connected to the circuit wire 17 and switch member 20 is electrically connected to the wire 18 and is pivotally mounted on a hinge pin 22 for movement from and against the member 19. Normally the two switch members are held in circuit closing contact by

means of a spring 24 that is fixed to the insulated block and to the switch member 20. So long as the circuit is closed through the motor, the machine will continue to operate but when it is opened operation will stop

As a means of automatically opening the circuit, I have provided a bar 25 that is rigidly fixed at one end by means of bolts 26 to the upper end of the frame structure adjacent the bearings within which the shaft 6 is contained. The bar extends downwardly substantially parallel with the direction of movement of the punch with its lower end left free and disposed adjacent to an extended end portion of the pivotally mounted switch member 20. In the free lower end of this bar is a laterally extended pin 30 which is adapted, when the bar is lifted, due to any abnormal springing or spreading apart of the frame structure, to engage with the switch member 20 to move it pivotally so that it will disengage the member 19 and in this way open the motor circuit so that the machine will stop.

In Figure 2 is illustrated an alternative method wherein the circuit wires 17 and 18, instead of being connected with the motor, are extended to a solenoid 35 having a sliding core bar 36 operatively connected to actuate a lever 37 to shift a clutch into or out of gear with a driving member. In this construction, so long as the switch members 19 and 20 are engaged and the solenoid is energized the machine will be in gear but when the circuit is broken, the lever 37 will be shifted by spring 40 to throw the machine out of gear.

While I have illustrated only these two methods of construction, it is to be understood and it is readily apparent that there are various ways in which the same result could be obtained and that the particular method to be used would depend, to a great extent, upon the character of the machine and the method in which it is driven.

It is further to be understood that, while no specific means is herein illustrated, mechanism could be arranged whereby movement of the bar 25 could directly actuate a controlling clutch mechanism to release the driving connection with the machine and in view of the fact that various types of machines would require different mechanism, I do not wish to be confined only to the means herein illustrated.

Having thus described my invention, what I claim as new therein and desire to secure by Letters-Patent, is:

1. The combination with a machine and a control member for a source of power, said machine comprising a frame structure that is yieldable when placed under excess working strain, of means operable by said yieldable movement to actuate the control member.

2. The combination with a machine having a frame structure that will yield when placed under excess working strain, a driving means for the machine and an electric circuit for controlling the driving means, of a circuit control device operable under the influence of said yielding movement of the frame to open the circuit.

3. The combination with a machine of the character described, comprising a frame structure in which parts are relatively movable due to the springing of the same when subjected to excess working strain and a normally closed electric circuit for controlling the operation of the machine, of means operable by said relative movement of the frame parts for opening the circuit.

4. The combination with a machine of the character described, comprising a frame structure in which parts are relatively movable due to the springing of the same when subjected to excess working strain and a normally closed electric circuit for controlling the operation of the machine, of a switch for controlling the electric circuit mounted on one part of the frame and a bar attached to another part of the frame that will move when the frame is subjected to excess working strain to open the switch.

5. In a punch press machine, comprising a die supporting member and a punch actuating member and a frame structure mounting said members that will yield when excessive pressure is exerted on said members, and an electric circuit and means under the control of said circuit for operating the machine of a switch in said circuit mounted on the die supporting member and a bar fixed to the punch supporting member having operative connection whereby the switch will be opened when the frame is spread by the insertion of more than the normal number of pieces between the die and punch.

6. The combination with a machine having a frame structure, and a source of power, of a control for the source of power adapted to be actuated by the yielding or springing of the frame occasioned by its being subjected to excess working strain.

Signed at Seattle, King County, Washington, this 24th day of November, 1924.

VICTOR G. ROSS.