W. W. DEAN.

SAFETY MANIPULATING DEVICE FOR MACHINERY.

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1,170,615.

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Fig. 2.

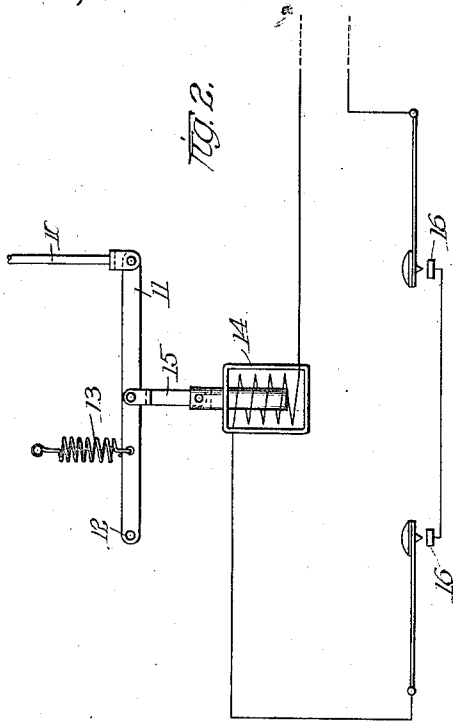


Fig. 3.

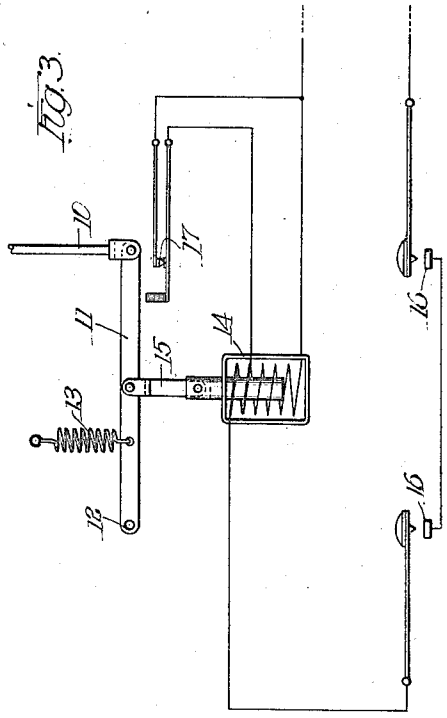
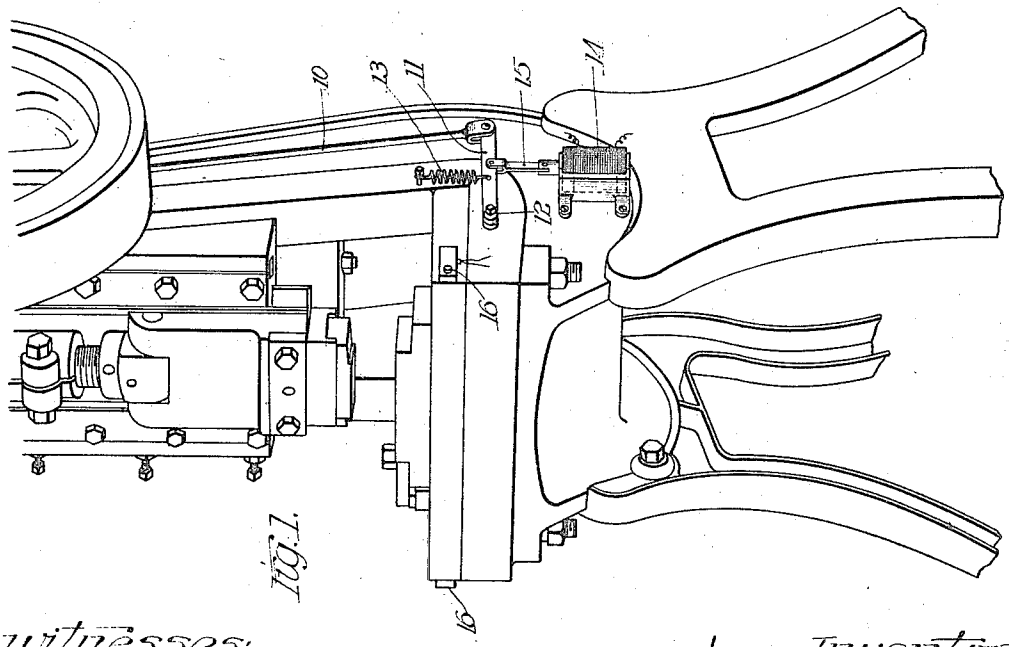


Fig. 1.



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UNITED STATES PATENT OFFICE.

WILLIAM W. DEAN, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO BENJAMIN ELECTRIC MANUFACTURING COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

SAFETY MANIPULATING DEVICE FOR MACHINERY.

1,170,615. Specification of Letters Patent. Patented Feb. 8, 1916.

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To all whom it may concern:

Be it known that I, WILLIAM W. DEAN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Safety Manipulating Devices for Machinery, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

My invention has for its object the provision of a simple and effective tripping mechanism for punch presses and the like whereby complete safety to the operator is assured and the labor ordinarily involved is eliminated. In most machines of this type a considerable effort or pull is required to trip the clutch, and whether this is accomplished by hand levers or foot levers or a combination of both, it becomes a tiresome matter to the operator of the machine in the course of a day's work. These machines are often operated many hundreds of times per day, and even though the treadles or levers be arranged to make the work as light and convenient as possible, the labor involved in a day is considerable. In addition, the operator's attention is divided between the work being done by the press and his own efforts in operating the clutch. As a consequence the operator's efficiency is greatly impaired, he becomes tired and careless, inattentive to the work, with unprotected machines accidents are liable to occur, and in general the result is unsatisfactory to both employer and employee. By my invention, however, the operator is relieved of all tiresome labor, his safety is assured, only the natural movements of the arms and hands in removing the latter from the danger zone are required to cause the operation of the press, and his speed and efficiency are thus materially enhanced.

The accompanying drawing illustrates one embodiment of my invention, in which:

Figure 1 is an elevational view in perspective of a punch press embodying my invention. Fig. 2 is a diagrammatic view of the electric circuit and apparatus involved, and Fig. 3 is a similar view showing a further refinement in the electrical apparatus.

Referring to Fig. 1 the clutch trip rod 10 is pivoted at its lower end to a lever 11, which is fulcrumed to the side of the frame of the machine as at 12. A suitable spring 13 serves to normally raise the lever, trip, rod and other parts attached thereto.

In order to trip the clutch, a suitable solenoid 14 is attached to the side of the machine, the core of which is connected by link 15 to the lever 11 as indicated. When the solenoid is energized it serves to draw in its core and pull down the lever 11 and trip rod 10, thus tripping the clutch and permitting the punch or similar part to be operated by the power driving the press. The solenoid thus does the actual work of tripping the clutch and the operator is not called upon to expend any labor to perform that operation. In order that this solenoid may be conveniently operated by the operator of the press and at the same time guard against any injury to the hands by having them caught by the descending punch, the said solenoid is controlled by two switches, 15, 16 one on either side of the table, bed or platform of the press, which must be operated simultaneously to cause the operation of the solenoid. These switches may be placed on the upper face of the bed, on the side as shown or elsewhere at some distance from the punch and so as to be conveniently reached, one by each hand of the operator, as he stands or sits at the machine.

After placing the work in position, the operator withdraws his hands naturally from the danger zone and rests them conveniently upon the two switches, which may be made to operate by a slight pressure of the fingers or by the weight of the hand, and the clutch is immediately tripped and the punch operated. The operation is then repeated as quickly as desired. The operator's attention is thus mainly devoted to the work in hand and not upon the tripping of the clutch. He is assured of perfect safety since the clutch cannot be operated until both hands are withdrawn. And he is not fatigued by the incessant foot or hand lever work. The work is more quickly done, since the solenoid responds practically instantaneously, and it is not necessary to attentively follow any particular sequence of hand and foot operations as in the case of some safety appliances where clutches or stops are first withdrawn from the path of some other

moving lever or part, thus necessarily retarding the tripping operation both mentally and mechanically.

Fig. 2 illustrates a simple and effective arrangement of the circuits; in which the two switches, 16, 16 are in series with the solenoid 14. The conductors of the circuit, as indicated, lead to any suitable source of current, which may be the light and power circuit of the building where the machine is being used, a convenient manner of connecting therewith being through the medium of an ordinary attachment plug and lamp socket. The source of current may be either alternating or direct, assuming the solenoid to be of suitable construction to operate on either.

Fig. 3 illustrates a method of economizing current and magnet materials, by providing the solenoid with a low resistance winding and high resistance winding, the latter being short circuited during the pulling stroke of the solenoid core. This is accomplished, as shown, through the medium of contacts 17 and connecting conductors and the lever 11. When the solenoid has completed or substantially completed its pulling stroke, the lever 11 strikes against the projection on the lower contact 17, thus separating such contacts and throwing the high resistance coil into the solenoid circuit. It is permissible to so reduce the holding current because less mechanical work is required of the solenoid at this time than at the beginning of the stroke. Besides, the solenoid is magnetically stronger and exerts a greater pull with the core drawn home or nearly so than at the start, particularly if an iron clad solenoid be employed as would likely be the case since the magnetic circuit is then completed or substantially so. Also a quicker release is secured since the current and therefore the magnetization is reduced to that just sufficient to hold the core and there is less liability of the core sticking in its holding position by reason of the residual magnetism. Moreover, a smaller and cheaper solenoid with less copper can be employed without overheating since for the brief interval required for the pulling stroke the coil may be subjected to a heavier current than it would safely carry continuously. This arrangement therefore results not only in an economy of current and materials but in a quicker and more positive acting device. The presence of the high resistance in the circuit at the time of opening the switches 16 also prevents or greatly reduces sparking at the contacts of said switches.

While I have in the foregoing described a specific embodiment or embodiments of my invention it will be understood that this invention may take various forms both in detail and in general form, without departing from the spirit or intended scope thereof, as defined in the appended claims.

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

1. The combination with a press having a clutch trip, of safety actuating means for said trip, said actuating means including a pair of separated switches, an electro-magnet device for directly actuating said trip, said device being arranged to be energized only when said switches are operated simultaneously, whereby the actuation of said clutch trip is solely effected upon the operation of said switches, and means, operated automatically when said clutch is actuated, for reducing the current flowing through said device, for the purposes set forth.

2. The combination with a press having a clutch trip, of safety actuating means for said trip, said actuating means comprising a solenoid for directly actuating said trip, said solenoid having a high resistance winding and a low resistance winding, a pair of separated switches connected in series with said solenoid and with each other, and switching mechanism adapted to be operated when said clutch trip is actuated, to connect said high resistance winding in circuit, for the purposes set forth.

In witness whereof, I have hereunto subscribed my name in the presence of two witnesses.

WILLIAM W. DEAN.

Witnesses:
C. E. KANE,
ANNE SOLOMON.