J. A. VAN HORN.

SAFETY DEVICE FOR PUNCHING PRESSES.

APPLICATION FILED NOV. 24, 1920.

1,405,466. Patented Feb. 7, 1922.

2 SHEETS—SHEET 1.

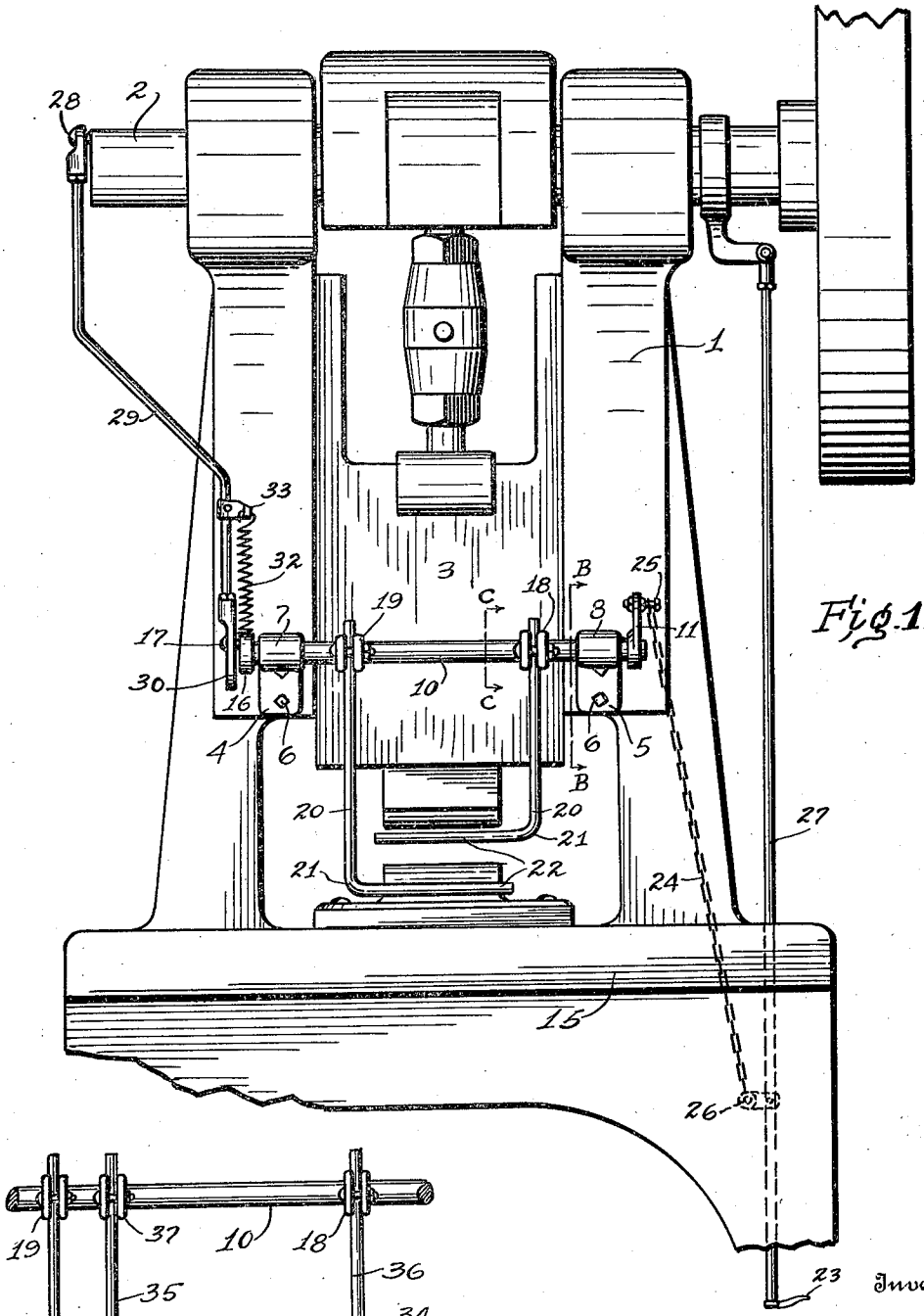


Fig. 1.

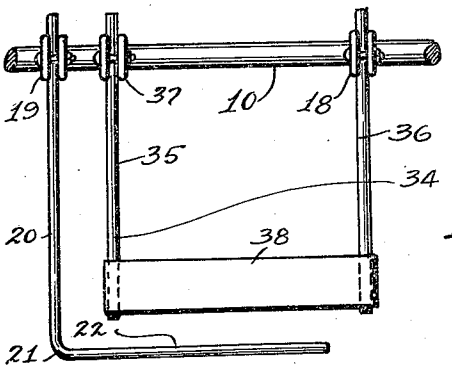


Fig. 2.

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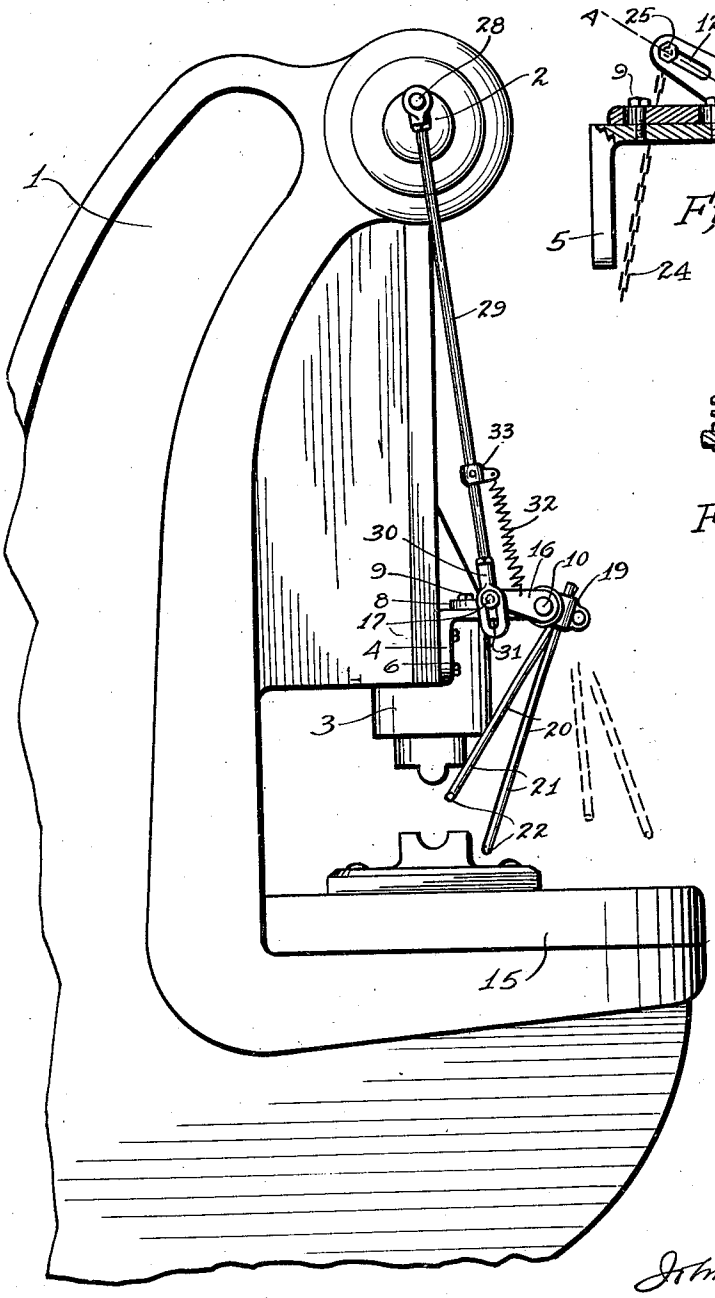


Fig. 3.

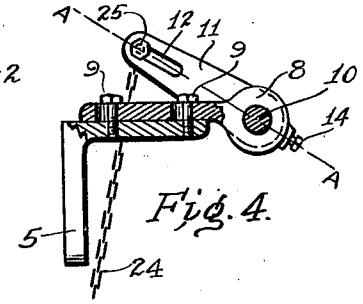


Fig. 4.

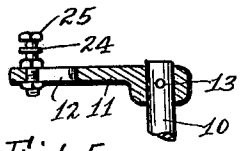


Fig. 5.

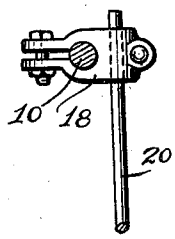


Fig. 6.

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UNITED STATES PATENT OFFICE.

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SAFETY DEVICE FOR PUNCHING PRESSES.

1,405,466. Specification of Letters Patent. Patented Feb. 7, 1922.

Application filed November 24, 1920. Serial No. 426,232.

To all whom it may concern:

Be it known that I, JOHN A. VAN HORN, a citizen of the United States of America, residing at Shelby, in the county of Richland and State of Ohio, have invented certain new and useful Improvements in a Safety Device for Punching Presses, of which the following is a specification.

It is well known to those skilled in the art of operating punching presses, or machines with cooperating pressure elements, one or both being movable toward the other, that in placing or feeding the work between the pressure elements that the operator is in danger of being injured by the elements, and also in the event of the operator not removing the hands, fingers or other part of the body from between the pressure elements before the pressure elements are in such close proximity to each other as to injure the operator.

The machines to which the present invention is applied are constructed and adapted to be put in operation by the actuation of a treadle or the like, but are often inadvertently operated without warning or any act of the operator.

The primary object, therefore, of the present invention is to provide means for swinging safety arms or equivalent members from and to a position between the pressure elements and an arm or the like from and to a position in close proximity thereto, at a predetermined time after the treadle or the like is actuated to operate the machine and further to provide automatic means for swinging said safety arms or equivalent members in a similar manner in the event of the machine being inadvertently operated without the act of the operator.

A further object is to provide means for supporting, adjusting and spacing a plurality of safety arms or like members in such a manner with respect to each other so as to provide a guide for the operator in feeding the work between or removing it from between the pressure elements thereby forcing the operator to place his hands between the element in the same position at all times.

A further object is to provide means of varying the throw or swing of the arms or equivalent members.

The preferable means employed in applying the invention consists in swinging safety arms or the like in and out the path of and adjacent to the cooperating pressure elements at a predetermined time when the machine is in operation, said safety members or arms being adapted to contact with and eject the fingers, hands or other foreign obstruction from between the elements, and forcing and pushing the fingers or other obstruction beyond the danger zone.

These and other objects are attained by the construction shown in the accompanying drawing in which:—

Fig. 1, is a front elevation of a conventional type of press showing the invention applied thereto.

Fig. 2, is a detail view of one of the safety arms and a cooperating modified safety member.

Fig. 3, is a side elevation of Fig. 1.

Fig. 4, is a side view partly in section of the device taken on the line B—B of Fig. 1.

Fig. 5, is a sectional plan view of Fig. 4 taken on the line A—A.

Fig. 6, is a detail sectional side elevation of the device taken on the line C—C of Fig. 1.

In the drawings reference numerals 1—1 represent the frame-work of conventional type of punching press or the like to which the invention is preferably applied to show its construction and operation, 2 the eccentric shaft and 3 the reciprocating head of the press.

Supporting brackets 4 and 5 are secured to the frame-work in spaced apart relation by the cap screws 6. Bearing members 7 and 8 are mounted upon the brackets 4 and 5 and adjustably held and secured thereto by the cap screws 9 as shown clearly in Fig. 4. A shaft 10 is journaled for rotation in suitable bearings formed in the members 7 and 8. The shaft 10 is journaled in the bearings so as to leave both ends thereof projecting beyond the bearings 7 and 8. A crank 11 which is provided with a slot 12 is secured by a pin 13 or a set screw 14 on the projecting end of the shaft, that extends beyond the bearing 8. The crank 11 is positioned upon the shaft so as to extend inwardly or toward the front of the press at any pre-determined angle desired with respect to the plane of the bed 15 of the press. A crank 16 similar to the crank 11 is rigidly secured to the end of the shaft 10 that projects beyond the bearing member 7. The crank 16 is provided with a crank pin 17.

The preferred construction and form of

safety arms or members are shown in the application of the device to Fig. 1. and consists in mounting two movable split sleeve frictional clamps designated by numerals 18—19 which are provided with clamping means arranged at right angular relations to each other, so as to provide means of adjustably clamping the clamps to the horizontally arranged shaft 10 and to adjustably clamp and support the vertical portions 20 of safety arms 21.

The horizontal portions 22 of the safety arms are preferably positioned and spaced apart from each other as shown in Fig. 2, to guide the operator in feeding the work to and from between the die and punch or pressure elements and to force the hands and fingers of the operator in feeding the work to and from the die to assume positions that will force the safety arms to strike, the bottom and top of the hands or fingers of the operator, thereby doubly insuring the ejection or removal of the hands and fingers from the danger zone.

To provide for the operation of the safety arms or the like simultaneously with operation of the treadle 23 of the treadle mechanism, a chain 24 is pivotally connected to a stud bolt crank pin 25 which is adjustable in the slot 12, and the opposite end of the chain is pivotally connected to and adjustable on the treadle connecting rod 27.

The manual operation of the safety device is as follows:—The operator imparts, a downward movement to the treadle forcing the chain to exert a downward pull upon the crank 11 rotating the shaft 10 in the bearings 7 and 8 to the extent of the throw of the crank 11. The throw of the crank 11 imparts a movement to the safety arms or the like 21, one of which is preferably arranged to normally extend between the pressure elements and adjacent to the die or work and the other positioned in a plane below the die and spaced apart from the first mentioned arm. One of the arms is preferably positioned in close proximity to the front of the die. The actuation of the treadle forces the safety arms or the like to oscillate or swing to the dotted line positions shown in Fig. 3, thereby striking, pushing and ejecting any obstruction from between the pressure elements or in the path of travel or throw of the safety arms i. e., the fingers or hands of the operator. The safety means can be adjusted through the medium of the crank connection and safety arms with respect to their preferred normal idling positions.

To provide against the liability of injury to the operator on account of the rotation of the eccentric shaft and downward stroke of the head attached thereto when such shaft operates without any act or manipulation of the treadle mechanism or otherwise by the operator, automatic means to operate the safety device is provided and constructed as follows:—

A crank pin 28 is secured to the eccentric shaft and a connecting rod 29 is pivotally connected thereto. The opposite end of the connecting rod 29 is provided with an adjustable member 30 having a slot 31 formed therein adjacent to its end to receive the crank pin 17.

The crank 16 is positioned on the shaft 10 so as to permit the crank 17 to contact with the upper wall of the slot, when the eccentric shaft 2 is in its normal idling position as shown in Figs. 1 and 3. The crank pin 17 is held, maintained and supported under tension against the upper wall of the slot 31 by the expansible spring 32 which is attached to the crank 16 and the clamp 33 which is adjustably secured to the connecting rod 29. If for any reason the eccentric shaft is rotated the upper wall of the slot will be automatically forced by the mechanism connected to the eccentric shaft to exert a pressure upon the crank pin 17 and crank 16 which will partially rotate the shaft 10, which in turn moves or swings the safety arms or the like to the dotted line positions shown in Fig. 3, in the same manner as when actuated by the operation of the treadle mechanism.

If the operator prefers to use a different or modified type of safety member or arms with or without either or both of the arms hereinbefore described, a yoke shaped member 34 can be used which consists of the bars 35 and 36. An additional frictional clamp 37 is used with the modified form of safety member. A soft yielding material 38 forms the end portion of the yoke 34. The advantage of using soft material for the end portion of yoke 34 instead of another metallic arm, consists in preventing injury to the die or punch, in the event that the operator has not properly adjusted and timed the swing of the arms to swing out of the path of the movable pressure elements at a pre-determined time.

It will be observed that in the event of wrong timing of the parts no injury would be done to the die or punch, even though the part 38 should be subjected to the pressure of the elements as the material 38 is made of soft and pliable material.

Attention is called to the fact that the safety arms can be adjusted and spaced apart vertically, laterally and angularly with respect to each other which in connection with the means for changing the swing or throw of the arms provides facilities for the use of the device with different kinds of dies or punches and affords facilities for adjustment to meet the requirements of different sizes of operator's hands.

It will be noted that the same safety mechanism is operated automatically without any act of the operator that is operated

by the manual act of the operator when the treadle is operated.

Material changes and alterations can be made without departing from the principle of the invention herein described; hence it is not intended to limit same to the specific structure shown and described.

I claim:

1. In a safety device for presses, a rotatable shaft mounted on the frame of the press, guards mounted upon the rotatable shaft which are adjustable vertically, horizontally and radially with respect to each other, and means to impart a to and fro movement to the guards toward the operator when actuated by the treadle.

2. A safety device for presses, including a guard member normally positioned between the pressure members of the press, a second guard member normally positioned in front of one of said pressure members, and means for simultaneously operating said guard members.

3. A safety device for presses, including two independent guard members arranged to define the space through which articles may be fed to the press, whereby the hand in feeding such articles must be introduced between such guard members, and means for operating said members.

4. A safety device for presses, including independent guard members having distinctive protective areas, an operating member, and means for independently and adjustably connecting the guard members to said operating member.

In testimony whereof I affix my signature.

JOHN A. VAN HORN.