July 5, 1932. B. J. VICTOR 1,865,806

SAFETY ATTACHMENT FOR PUNCH PRESSES

Filed Dec. 5, 1930 2 Sheets-Sheet 1

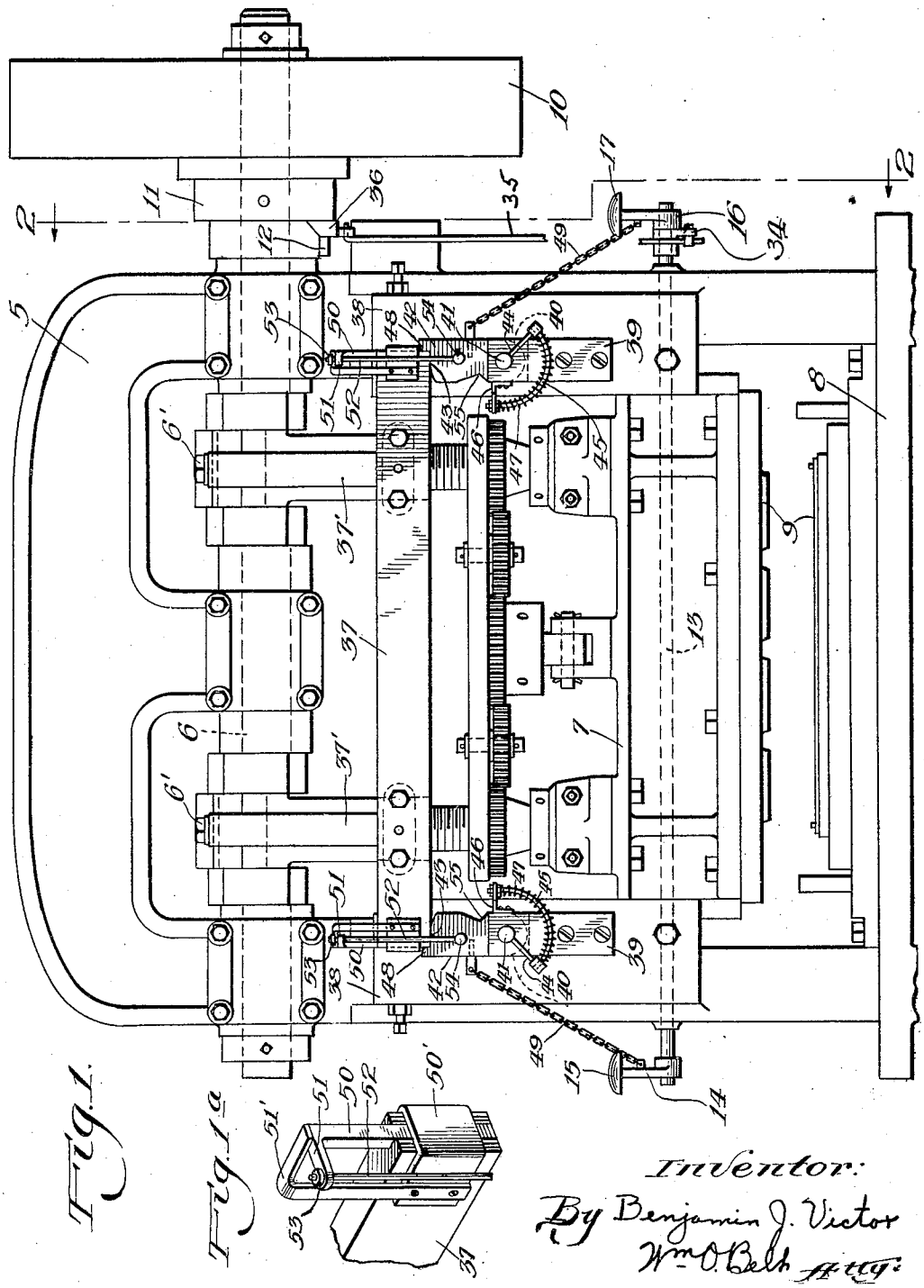


Fig. 1.

Fig. 1a

Inventor:
By Benjamin J. Victor
Wm. O. Belt Atty.

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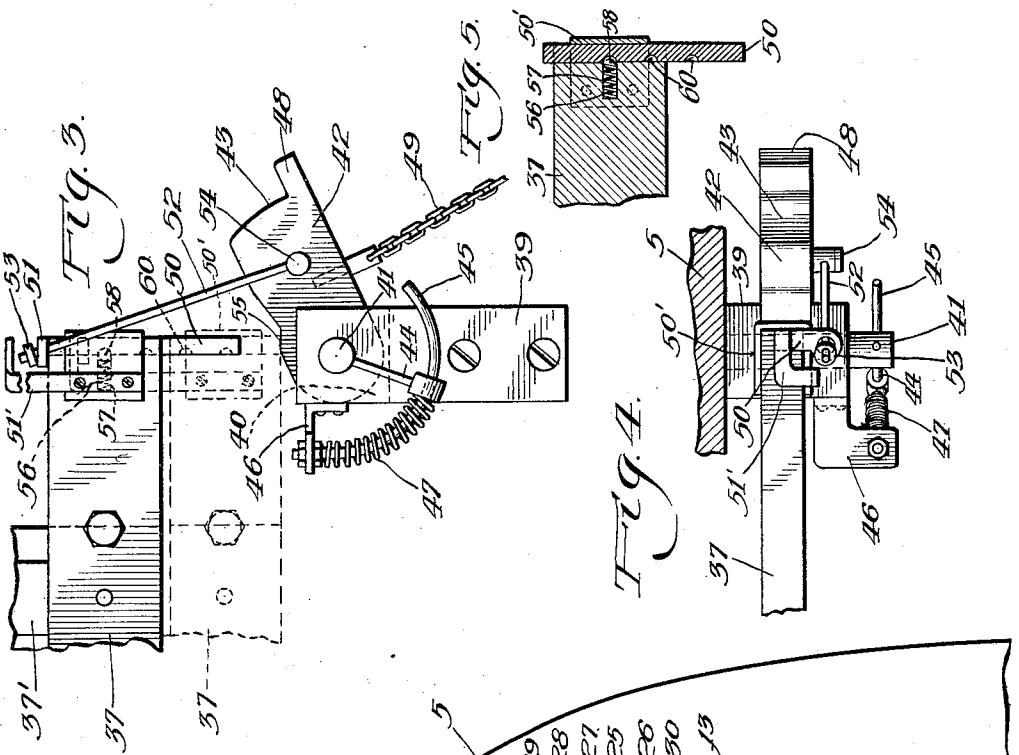


Fig. 3.

Fig. 4.

Fig. 5.

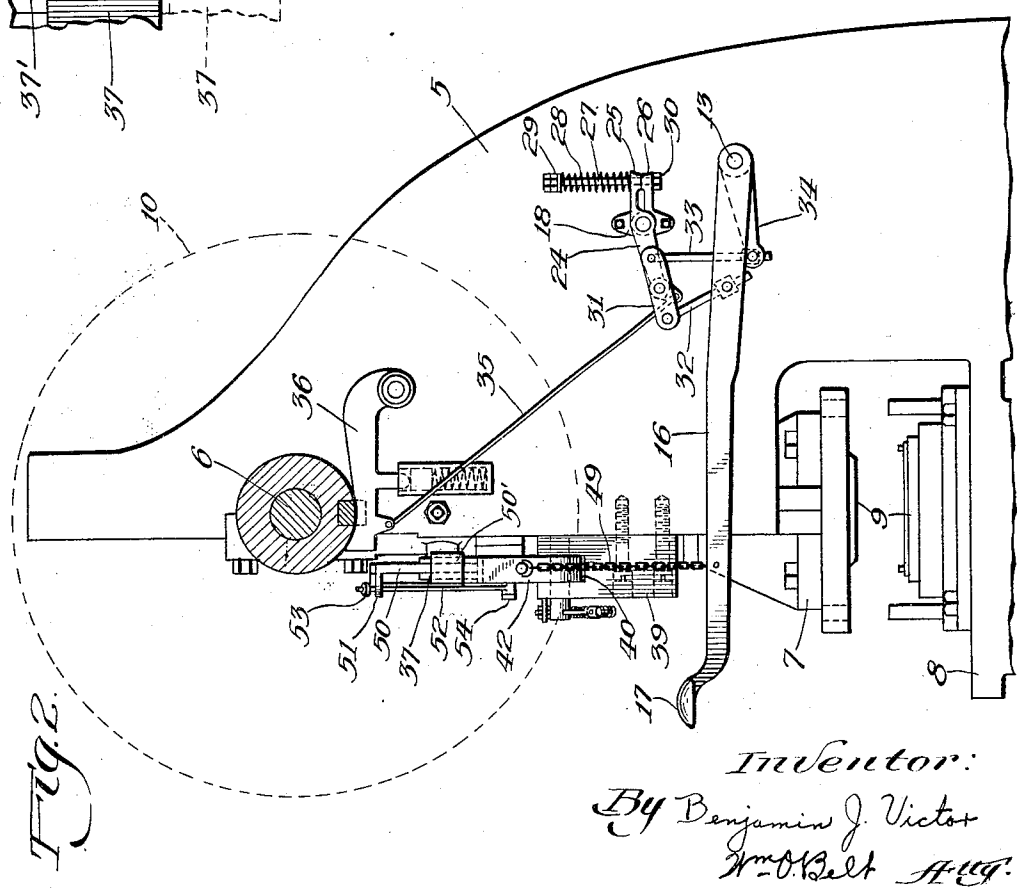


Fig. 2.

Inventor:
By Benjamin J. Victor
Wm. O. Belt Atty.

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UNITED STATES PATENT OFFICE

BENJAMIN J. VICTOR, OF OAK PARK, ILLINOIS, ASSIGNOR TO VICTOR MANUFACTURING & GASKET COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS

SAFETY ATTACHMENT FOR PUNCH PRESSES

Application filed December 5, 1930. Serial No. 500,220.

This invention relates to safety attachments for punch presses and the like and the object broadly is to positively prevent the machine from being operated until both hands of the operator are employed to set the machine in operation.

Another object of the invention is to insure against accidental failure of the safety attachment of a punch press or other machine by positively locking the machine against operation and holding it in this locked position until both hands of the operator are used to set the machine in operation.

Further objects of the invention are to provide locking devices movable from locking position but constantly urged into locking position; to provide locking devices constantly urged into locking position by yieldable members located in plain view of the operator so that he will be readily apprized of breakage thereof; to provide supports for the yieldable members urging the locking dogs into locking position so as to prevent displacement of said yieldable members; to provide locking members which will be held from locking position after movement thereof therefrom until a cycle of operation of the machine has been completed; and to provide locking members that may be connected by flexible members to the operating devices of the machine.

In the selected embodiment of the invention illustrated in the accompanying drawings

Fig. 1 is a fragmentary front elevation of a punch press with which my invention has been associated;

Fig. 1*a* is a perspective detail view of a portion of the device;

Fig. 2 is a vertical sectional view taken substantially on the line 2—2 on Fig. 1;

Fig. 3 is a fragmentary elevational detail view of the locking members, said members being shown in the completely unlocked position thereof in the cycle of operation;

Fig. 4 is a fragmentary plan view of the parts as illustrated in Fig. 3; and

Fig. 5 is a fragmentary sectional detail view.

The invention disclosed in the accompanying drawings is an improvement over that described and claimed in my Patent No. 1,783,817 for punch press safety devices, patented December 2, 1930. In the drawings wherein I have illustrated a selected embodiment of this invention I have shown a punch press embodying a frame 5 having a crank shaft 6 journaled therein to which a ram 7 is connected to be movable thereby toward and away from the bed 8. The ram 7 and the bed 8 carry dies 9 for punching or otherwise operating on material introduced therebetween when the ram 7 moves toward the bed 8. The crank shaft 6 is operated by a pulley flywheel 10 rotatably mounted on the shaft and which may be operatively secured thereto, as required, by a suitable one-revolution clutch. The clutch shown in the drawings comprises a clutch member 11 fast on the crank shaft 6 and provided with a spring-pressed clutch bolt 12 engageable in a recess in the hub of the wheel 10. The machine thus far described is a commercial punch press and it has been provided with an attachment for protecting the operator against injury in the operation of the press that requires both hands of the operator to set the machine in operation. This attachment includes a shaft 13 journaled in and extended across the frame. On one end of this shaft an operating lever 14 is fixed that includes a handle 15. On the other end of the shaft an operating lever 16 is pivotally mounted and this lever includes a handle 17. On the side of the frame 5 a bracket 18 is mounted on which the lever arm 24 is pivotally mounted. The lever arm 24 includes a projecting arm 25 normally arranged above the arm 26 on the bracket 18 and a pin 27 is extended through aligned openings in the arms 25 and 26. A spring 28 is disposed about the pin 27 between the head 29 thereof and the arm 25 and urges the arm into engagement with the projecting arm 26 and also urges the head 30 of the pin into engagement with the opposite side of the arm 26. On the lever arm 24 a balance lever 31 is medially mounted. A link 32 interconnects one end of the lever 31 to the operating lever 16. A link 33 interconnects the other

end of the balance lever 31 and the arm 34 fixed on the shaft 13. The lever arm 24 is connected by a rod 35 with the spring pressed clutch throwout lever 36 that normally holds the clutch bolt 12 in disengaged position. When both the handles 15 and 17 are gripped and moved downwardly simultaneously, movement is transmitted through the links 32 and 33 to both ends of the balance lever 31, and the lever arm 24 is pivoted downwardly against the action of the spring 28 and this movement is transmitted through the rod 35 to the clutch throwout lever 36 which is thus retracted from the position shown in Fig. 2 to permit the clutch bolt 12 to move into engaging position to interconnect the wheel 10 to the shaft 6 and cause operation of the machine. If only the handle 15 is moved the shaft 13 will be motivated and movement will be transmitted through the link 33 and therefore the balance lever 31 will merely pivot on the lever arm 24 and likewise if only the handle 17 is moved movement will be transmitted through the link 32 to again merely pivot the balance lever 31 about its pivotal mounting without imparting movement to the lever arm 24. It is therefore manifest that conjoint movement of the handles 15 and 17 is necessary to bring about operation of the machine. However, the clutch controlling the connection between the flywheel 10 and the shaft 6 may, under certain conditions, fail to disengage or, for another similar cause, another operation of the machine may result. Such additional operation without an intervening operation of the handles 15 and 17 is known as a repeat operation. The operator of the machine expecting that the same will stop after one operation thereof will reach in between the dies 9 to remove the material that has been operated on and if the machine makes a repeat operation it is possible that his hands will be caught between the dies and be crushed thereby. It is the object of my invention to provide locking means independent of and separate from the power means of the machine for positively and solidly locking the ram so that it cannot operate unless and until the operator by the use of both hands operates the levers 14 and 16. To this end a cross bar 37 is secured to the connecting rods of the ram. Substantially L-shaped brackets 37′ are attached to the connecting rods by the cap screws 6′ that secure said connecting rods to the cranks on the shaft 6. The ends of these brackets rest on the upper edge of the cross bar to reenforce the mounting thereof and to further reenforce this mounting dowel pins are passed through the cross bar into the connecting rods. The L-shaped brackets and the dowels aid in dissipating the shearing stress exerted on the bolts securing the cross bar in position when the cross bar acts to interrupt a repeat operation. On the front face of the guides 38, 38 on the frame 5 for the ram 7 I mount blocks 39, 39 having bifurcations 40, 40 in the upper ends thereof extended transversely of the machine. Shafts 41, 41 are extended through these bifurcations and fixed thereon with portions thereof extended into the bifurcations are locking dogs 42, 42 having shoulders 43, 43 thereon which engage opposite ends of the cross bar 37 when the machine is in at rest position. The engagement of the shoulders 43, 43 with the cross bar 37 prevents downward movement of the ram 7 until the locking dogs 42, 42 have been moved from retaining position, shown in Fig. 1. On the forward ends of the shafts 41, 41 are pins 44, 44 having heads thereon through which the arcuate guides 45, 45 are extended, said guides being supported on brackets 46, 46 on the blocks 39, 39. Disposed about the guides 45, 45 are springs 47, 47 which act on the pins 44, 44 and consequently the shafts 41, 41 to urge the locking dogs carried by said shafts into retaining position, this action being limited by the fingers 48, 48 on the locking dogs that engage opposite ends of the cross bar 37. It is therefore manifest that the locking dogs are constantly urged into retaining position. Moreover, the springs which urge these locking dogs into retaining position are disposed at the front of the machine in plain view of the operator. Thus breakage of these springs may be ascertained easily by the operator. Moreover, the springs are mounted on guides which support the same and therefore even if either of the springs should break in a plurality of places some effect thereof will remain since displacement will be prevented and therefore the locking dogs will be urged into locking position. Since the locking dogs act on the cross bar when the machine is in at rest position it is necessary that the locking dogs be moved from retaining position before the machine can be operated. In order to accomplish this, chains 49, 49 are respectively connected to the levers 14 and 16 and to the sides of adjacent of the locking dogs 42. Therefore, when the levers are moved downwardly, as above described, this movement will be transmitted through the chains to the locking dogs to pivot them from retaining position. It is desirable that the operator be required to keep his hands on the handles 15 and 17 for a sufficient period of time to permit the dies to move into close relationship with each other, for this will obviate the likelihood of the operator carelessly placing his hands between the dies during the downward stroke of the ram. Moreover, it is necessary that the locking dogs be held from retaining position until and only until the parts have moved back into at rest position. To accomplish these ends slide bars 50, 50 are mounted in grooves in opposite ends of the cross bar 37. These

slide bars are retained in position by U-shaped brackets 50′ fitted over the ends of the cross bar and secured thereto. The slide bars include projections 51, 51 having openings therein through which corresponding ends of links 52, 52 may be extended, these links having heads 53, 53 thereon that are adapted to engage the projections 51, 51 when the links 52, 52 are moved downwardly. Corresponding ends of the links 52, 52 are respectively pivotally connected to the locking dogs 42, 42 at 54, 54. Therefore, when the locking dogs 42, 42 are pivoted from retaining position, as illustrated in Fig. 1, into the position illustrated in Fig. 3 wherein the dogs are entirely out of locking position. Movement will be transmitted through the links 52, 52 to move the slide bars 50, 50 downwardly and the lower ends of the slide bars will project below the lower edge of the cross bar 37, as illustrated in Fig. 3. Therefore when the operator removes his hands from the handles 15 and 17 the springs 47, 47 will act to pivot the locking dogs back into locking position but the locking dogs will engage the projecting portions of the slides 50, 50 and will be held from movement into locking position during the downward movement of the ram. As soon as the ram starts to move up, the cross bar and the slide bars will move therewith and the slide bars will engage the shoulders 55, 55 on the locking dogs 42, 42 and will be held against movement and as the cross bar continues to move with the ram there will be a relative movement between the slide bars and the cross bar and the slide bars will be repositioned, as shown in Fig. 1, upward movement of the slide bars being limited by engagement thereof with the stops 51′, 51′ carried by the cross bar. When the cross bar 37 moves upwardly with the ram these slide bars will move therewith. In order to insure upward movement of the slide bars 50, 50 with the cross bar 37, an arrangement such as that shown in Fig. 5 is provided. By referring thereto it may be seen that an opening 56 extends inwardly from the end of the cross bar 37 and that a spring 57 is confined therein which acts on a ball 58. The ball 58 therefore is urged toward the slide bar 50 which has spaced sockets 60 therein. When the slide bar is positioned as shown in Fig. 1, the ball 58 is urged into the lowermost of the sockets 60 and therefore the slide bar is releasably connected to the cross bar. When the slide bar is moved downwardly into the position illustrated in Fig. 3 the ball 58 is seated in one of the other sockets 60 and the slide bar is again connected to the cross bar 37. An arrangement such as this is provided for both of the slide bars and therefore proper movement thereof with the cross bar is assured. There is sufficient clearance between the heads 53 and the projections 51 to insure that the operator will move the handles 15 and 17 downwardly in an appreciable amount before the slide bars will move into position to withhold the locking dogs and therefore premature or careless operation is prevented. The levers 14 and 16 are repositioned through the chains 49, 49 by the action of the springs 47, 47 on the locking dogs 42, 42. The controlling chains 49, 49 are properly fitted and adjusted to insure that the machine will not be tripped until the dogs 42, 42 are clear of the cross bar 37. The dogs are pivoted and counter-balanced by the springs 45, 45 and may be operated with minimum effort.

It is manifest from the foregoing description that I have provided a safety attachment which will effectively prevent a repeat operation of a punch press. This device is so arranged that conjoint operation of levers by the use of both of the operator's hands is required. Furthermore, the locking members are effectively urged into locking position by devices effectively prevented from displacement and also these members are located in plain view of the operator so that he may readily ascertain any breakage thereof. Furthermore, the locking dogs are effectively held in unlocked position until the device has moved into at rest position at which time the locking dogs will freely move into locking position to thereby obviate any repeat operation of the machine.

In the foregoing description I have set forth a selected embodiment of my invention as used on a punch press but it is to be understood that this device might be used on other machines and that variations and modifications may be made therein and I therefore do not wish to be limited to the precise details set forth but desire to avail myself of such changes and alterations as fall within the purview of the following claims.

I claim:

1. In a machine of the character described, the combination of a frame, a ram and means for operating the same, means for stopping the ram at the end of a cycle of operation, a cross bar carried by the ram, locking dogs pivotally mounted on the frame and normally disposed in stopping position in engagement with opposite ends of the cross bar, yieldable means acting directly on said locking dogs for urging said locking dogs into said stopping position, means for supporting said yieldable means to prevent displacement thereof, and means including levers connected with the stopping means and the locking dogs and requiring conjoint operation for retracting said stopping means and said locking dogs to permit a cycle of operation of said machine.

2. In a machine of the character described, the combination of a frame, a ram and means for operating the same, means for stopping

the ram at the end of a cycle of operation, a cross bar carried by the ram, locking dogs pivotally mounted on the frame and normally disposed in stopping position in engagement with opposite ends of the cross bar, yieldable means acting directly on said locking dogs for urging said locking dogs into said stopping position, means for supporting said yieldable means to prevent displacement thereof, means including levers requiring conjoint operation for retracting said stopping means and said locking dogs to permit a cycle of operation of said machine, and means for holding said locking dogs out of stopping position during the cycle of operation of the machine.

3. In a machine of the character described, the combination of a frame, a ram and means for operating the same, means for stopping the ram at the end of a cycle of operation, a cross bar carried by the ram, slide bars at opposite ends of the cross bar, locking dogs pivotally mounted on the frame and normally disposed in stopping position in engagement with opposite ends of the cross bar, yieldable means for urging said locking dogs into said stopping position, means for supporting said yieldable means to prevent displacement thereof, means including levers requiring conjoint operation for retracting said stopping means and said locking dogs to permit a cycle of operation of said machine, and means for connecting said slide bars to said locking dogs whereby said slide bars will be moved into position to withhold said locking dogs from stopping position during a cycle of operation of the machine.

4. In a punch press which has a frame, a ram, means for operating the ram, and means for controlling the operating means, the combination of a safety means including a cross bar movable with the ram, locking dogs pivotally mounted on the frame and engaging the cross bar at the ends thereof to prevent downward movement of the ram, yieldable means acting directly on said locking dogs for urging said locking dogs into engagement with the cross bar, means for supporting said yieldable means to prevent displacement thereof, means for withdrawing the locking dogs from engagement with the cross bar when the controlling means are operated, and chains interconnecting said locking dogs and said withdrawing means.

5. In a punch press which has a frame, a ram, means for operating the ram, and means for controlling the operating means, the combination of a safety means including a cross bar movable with the ram, locking dogs pivotally mounted on the frame and having shoulders thereon engageable with the cross bar at the end thereof to prevent downward movement of the ram, means for withdrawing the locking dogs from engagement with the bar when the controlling means are operated, and means at opposite ends of the cross bar for withholding the shoulders on the locking dogs from engagement with the bar after withdrawal thereof by said withdrawing means.

6. In a punch press which has a frame, a ram, means for operating the ram, and means for controlling the operating means, the combination of a safety means including a cross bar movable with the ram, locking dogs pivotally mounted on the frame and having shoulders thereon engageable with the cross bar at the end thereof to prevent downward movement of the ram, means for withdrawing the locking dogs from engagement with the bar when the controlling means are operated, and means at opposite ends of the cross bar and movable from the locking dogs to withhold the shoulders on said dogs from engagement with said bar after withdrawal thereof by said withdrawing means.

7. In a punch press which has a frame, a ram, means for operating the ram, and means for controlling the operating means, the combination of a safety means including a cross bar movable with the ram, locking dogs pivotally mounted on the frame and having shoulders thereon engageable with the cross bar at the end thereof to prevent downward movement of the ram, means for withdrawing the locking dogs from engagement with the bar when the controlling means are operated, means at opposite ends of the cross bar for withholding the shoulders on the locking dogs from engagement with the bar after withdrawal thereof by said withdrawing means, and means for releasably retaining the means at opposite ends of the cross bar in determined positions.

8. In a punch press which has a frame, a ram, means for operating the ram, and means for controlling the operating means, the combination of a safety means including a cross bar movable with the ram, locking dogs pivotally mounted on the frame and engaging the cross bar at the ends thereof to prevent downward movement of the ram, yieldable means for urging said locking dogs into engagement with the ram, means for withdrawing the locking dogs from engagement with the bar when the controlling means are operated, slide bars mounted at opposite ends of the cross bar, and links for interconnecting said locking dogs and said slide bars whereby said slide bars will be moved when said locking dogs are withdrawn by said withdrawing means, said slide bars engaging said locking dogs to withhold the same from engagement with the cross bar during movement thereof with the ram.

9. In a punch press which has a frame, a ram, means for operating the ram, and means for controlling the operating means, the combination of a safety means including a cross bar movable with the ram, locking dogs piv-

otally mounted on the frame and engaging the cross bar at the ends thereof to prevent downward movement of the ram, yieldable means for urging said locking dogs into engagement with the ram, means for withdrawing the locking dogs from engagement with the bar when the controlling means are operated, slide bars mounted at opposite ends of the cross bar, links for interconnecting said locking dogs and said slide bars whereby said slide bars will be moved when said locking dogs are withdrawn by said withdrawing means, said slide bars engaging said locking dogs to withhold the same from engagement with the cross bar during movement thereof with the ram, and means for releasably retaining said slide bars in determined positions relative to said cross bar.

BENJAMIN J. VICTOR.