Dec. 2, 1930. B. J. VICTOR 1,783,817

SAFETY ATTACHMENT FOR PUNCH PRESSES

Filed Dec. 9, 1929 2 Sheets-Sheet 1

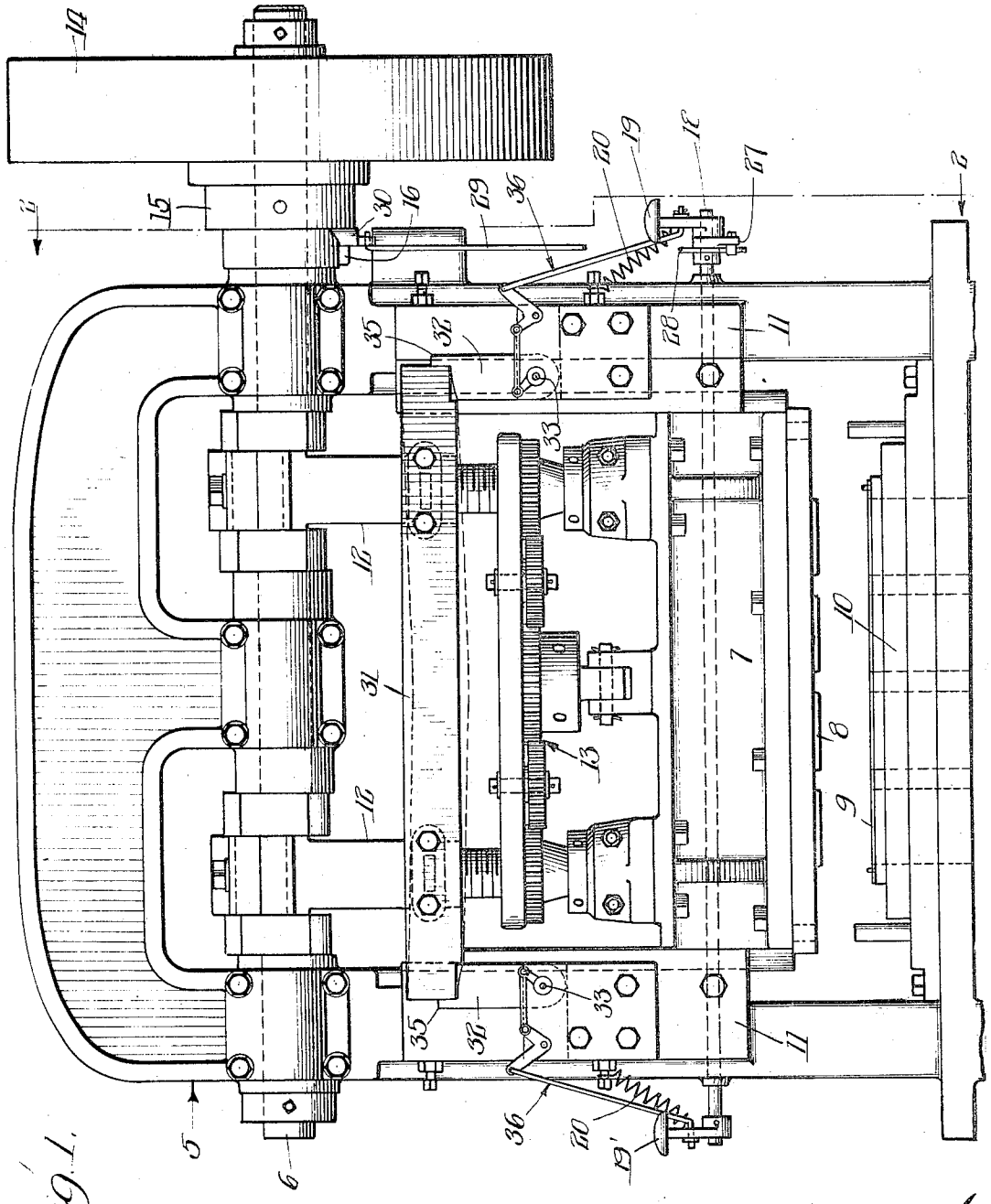


Fig. 1.

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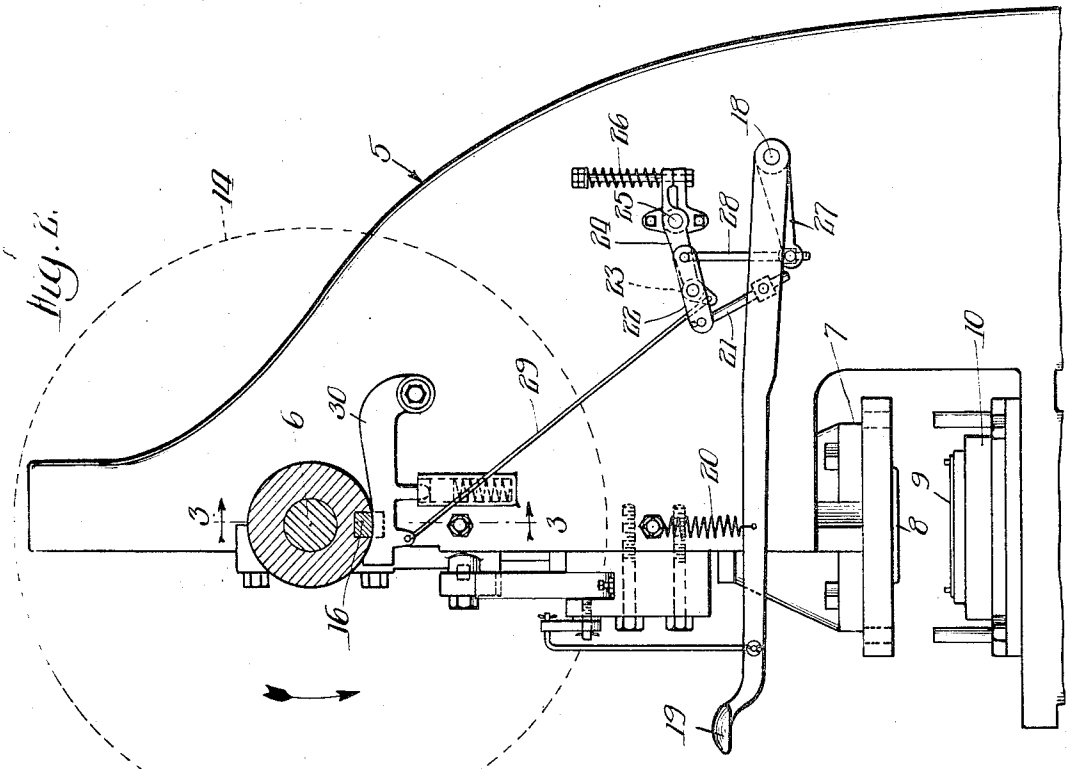


Fig. 2.

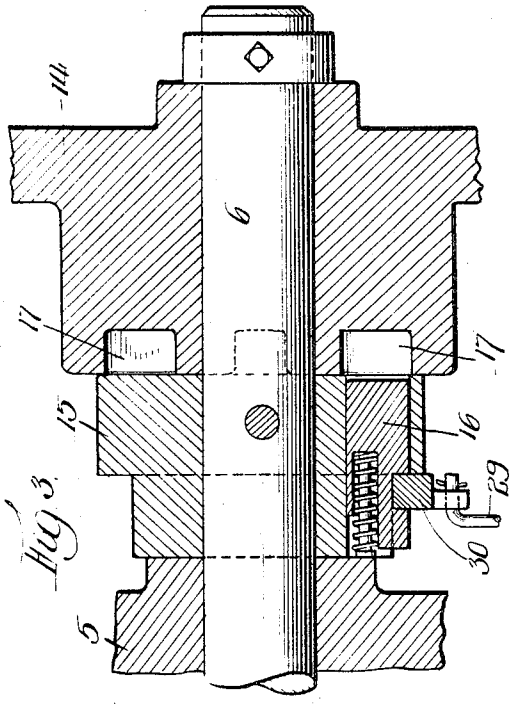


Fig. 3.

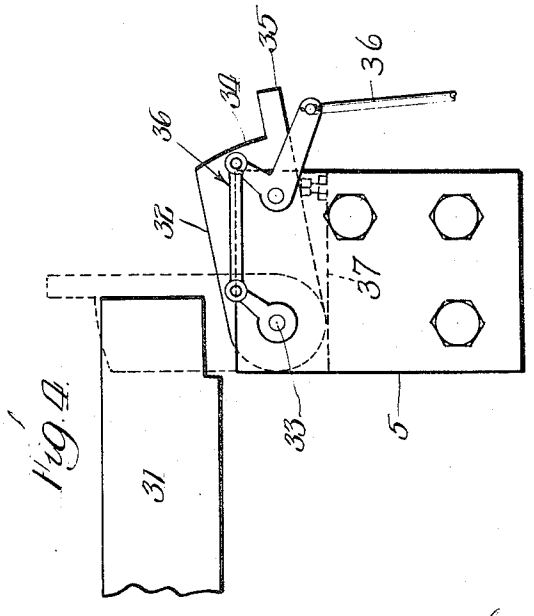


Fig. 4.

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UNITED STATES PATENT OFFICE

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SAFETY ATTACHMENT FOR PUNCH PRESSES

Application filed December 9, 1929. Serial No. 412,727.

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

Another object of the invention is to insure against accidental failure of a safety attachment for punch presses and other machines by positively locking the machine against operation and holding it in this locked condition until both hands of the operator are in use to release the locking means and to set the machine in operation.

And a further object of the invention is to provide separately operable means to lock a punch press or other machine so that it cannot be set in operation until both of said locking means are released.

For this application I have illustrated the invention in a selected embodiment in a punch press in the accompanying drawings and referring thereto,

Fig. 1 is a front view of so much of a punch press as is necessary for an understanding of the construction and operation of the machine.

Fig. 2 is a sectional view on the line 2—2 of Fig. 1.

Fig. 3 is a detail enlarged sectional view on the line 3—3 of Fig. 2.

Fig. 4 is a detail enlarged view of one locking device.

Referring to the drawings 5 indicates generally the main frame of the punch press and 6 is the crank shaft journaled in bearings in the frame to operate a ram or head 7 carrying dies 8 to punch the material 9 supported on a bed 10. The ram slides in guides 11 on the frame and it is connected by rods 12 with the crank shaft. Means designated generally 13 are provided for adjusting the ram as required. The crank shaft is operated by a pulley wheel 14 which is mounted loosely on the shaft and is operatively secured thereto as required by a suitable clutch. The clutch shown in the drawings comprises a clutch member 15, Fig. 3, fast on the crank shaft 6 and provided with a spring-pressed clutch bolt 16 adapted to engage recesses 17 in the hub of the pulley 14 which forms the other member of the clutch. The machine so far described is a commercial punch press and it has been provided with an attachment intended to protect the operator against injury in the operation of the press and also requiring both hands of the operator to set the machine in operation. This attachment includes a shaft 18, Fig. 1, which extends across the frame and carries operating levers 19, 19′ on its ends at each side of the frame. These levers are normally held in up position by springs 20 which are fastened to the levers and to some convenient part of the frame. One of the levers 19 is free and the other lever 19′ is pinned on the shaft 18. The operating lever 19 is connected by a rod 21, Fig. 2, to one end of a balance lever 22 which is pivoted midway between its ends at 23 to a lever arm 24 which is pivoted at 25 on the main frame and is held in normal position by a spring 26. An arm 27 is rigidly secured on the shaft 18 and it is connected by a rod 28 with the other end of the lever 22. The lever arm 24 is connected by a rod 29 with the spring-pressed throw-out arm 30 which operates the clutch bolt 16 in a manner well understood. With the attachment thus described working under the best conditions the clutch cannot be engaged until both operating levers 19, 19′ are depressed and this requires the use of both hands of the operator. The lever 19 is free on the shaft 18 and if operated alone it will swing the balance lever 22 on its pivot and may also swing the lever arm slightly, but not enough to swing the throw-out arm 30 sufficiently to release the clutch bolt. If the operating arm 19′ is operated alone the balance lever will be swung on its pivot and the results will be the same as in the case of the separate operation of the operating lever 19. But if both levers are operated the balance lever 22 will be bodily moved downward, Fig. 2, swinging the lever arm 24 and withstanding the throw-out arm 30 to release the clutch bolt 16. This entire operation takes place quickly and before the operator could place his hands under the ram in position to be injured thereby. While this safety attachment will operate as described under the best con-

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ditions it is liable to fail for many causes and these have been known to happen and to result in injury to operators. Failures may be due to wear or to breakage of parts which do not become known immediately and since the machine is operated rapidly for continuous periods it may appear to be in good working condition and yet fail unexpectedly and cause injury to an operator. It is the object of my invention to provide working 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 hand levers 19, 19′; and as soon as these levers are operated and released the locking means automatically return to initial position and again lock the ram. A cross bar 31 is secured on the connecting rods 12 above the adjusting means so that it will not be affected by any adjustment of the ram. Locking dogs 32 are rigidly mounted on shafts 33 supported in the main frame and are cut away and beveled at 34, Fig. 4, to engage beneath the ends of the bar 31. A projection 35 on each dog engages the end of the bar 31 to limit the swinging movement of the dog to locking position, Fig. 1. The hand operating levers 19, 19′ are connected with the shafts 33 by suitable means indicated generally 36 which may comprise links and levers of any kind arranged to swing the locking dogs down, Fig. 4, to release the cross bar 31 and permit the ram to operate when both hand-operating levers 19, 19′ are depressed, and to return these dogs to up locking position, Fig. 1, under the influence of springs 20 when the hand operating levers are released. The locking dogs are independent of each other, they are operated independently, but both of them must be operated to release the ram for operation. The dogs provide a positive lock entirely separate from the power devices so that they will not be affected by any wear or breaks that may occur therein. These locking dogs are connected to be operated by the same levers which control the power devices but in all essential respects they are entirely separate from the power devices and would not release the ram even if some part of such devices should fail. The locking devices are strong and substantial in construction and constitute a safety attachment which positively locks the ram against operation until these devices are both manually operated to release the ram and they can only be released by operation of both operating levers.

The customary operation of the machine shown in the drawings is one complete cycle, the machine being brought to rest at the end of each complete operation. While the machine is at rest the operator removes the stamping from beneath the ram and inserts a new blank in place. If, for example, the throw-out arm should fail to operate for any reason the machine would continue to operate instead of stopping if it were not provided with the dogs, but the dogs swing into locking position on the up movement of the ram and lock the ram whether or not the power devices have operated properly. This is of great importance because machines which are performing the same operation repeatedly and rapidly may wear to the failing point and break down unexpectedly. The operator goes through the same cycle of movements repeatedly and rapidly in feeding blanks into the machine and removing the stampings therefrom. He depends upon the machine to operate properly and governs his movements accordingly. If the machine does not stop at the end of one complete stamping operation, as it is intended to do, the operator may get his hands caught in the ram in removing the stamping from the machine. It is to obviate this possibility that I have provided the locking means of this invention, not to save the machine, but to protect the operator from accidental injury. I make the cross bar of sufficient strength to function with the dogs properly and prevent a downward movement of the ram which would crush the operator's hands, but I prefer that this bar should yield slightly to cushion the jar on the machine when the locking devices function in case of a failure of the machine to stop, and thereby provide some flexibility of parts which will prevent damage to the crank shaft and other parts of the machine. A bent cross bar can be easily removed and straightened and replaced with little loss of time and at small cost. When the cross bar and dogs function to stop the downward movement of the ram the crank shaft is stopped also which results in throwing the power belt operating on pulley 14 or some other belt in the power line, or in shearing the pin which secures the clutch member 15 to the crank shaft. The pivot end of each dog is rounded to operate freely above the shoulder 37 on the main frame but the parts are arranged close together so that the shoulder will receive the blow on the dog to relieve the pivot 33.

I have shown the invention on a commercial punch press in a simple embodiment which has been found satisfactory in use but I do not limit the invention to this machine or to this embodiment and I reserve the right to make all such changes in the form, construction and arrangement of parts that may be necessary or desirable to adapt the invention to other machines, or for other purposes, and within the scope of the following claims.

I claim:

1. In a machine of the character described, the combination of a main frame, a crank shaft and means for operating the same, a ram, rods connecting the ram to the crank shaft for operating the ram, a cross bar rig-

idly fastened to said connecting rods, a plurality of separate and independent means on the main frame cooperating with the cross bar to lock the ram normally in initial position, and separate and independent means for releasing said locking means from said cross bar to permit operation of the ram, said releasing means being spaced apart and requiring conjoint operation and the use of both hands of the operator to release said locking means.

2. In a machine of the character described, the combination of a main frame, a ram and means for operating the same, a plurality of separate and independent dogs pivotally mounted on the main frame and operatively disposed to lock the ram normally in initial position, a pair of levers pivotally connected to the main frame, and separate and independent means connecting each lever to a dog, said levers being spaced apart and requiring conjoint operation and the use of both hands to swing said dogs out of operative relation to the ram.

3. In a machine of the character described, the combination of a main frame, a ram and means for operating the same, a plurality of separate and independent dogs pivotally mounted on the main frame and operatively disposed to lock the ram normally in initial position, a pair of levers pivotally connected to the main frame, separate and independent means connecting each lever to a dog, said levers being spaced apart and requiring conjoint operation and the use of both hands to swing said dogs out of operative relation to the ram, and means for swinging said dogs into position to lock the ram after one complete operation of the ram.

4. In a machine of the character described, the combination of a ram and means for operating the same, means for stopping the ram at the end of a cycle of operation, means for adjusting the ram to the work, and means between said adjusting means and the operating means for rendering the ram inoperative in event the stopping means fail to operate.

5. 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, and yielding means moving with the ram rendering the ram inoperative in event the stopping means fail to operate.

6. In a machine of the character described, the combination of a frame, a crank shaft journaled in the frame, means for operating the crank shaft and including means for stopping the shaft at the end of a complete cycle of operation, a ram connected with and operated by the crank shaft, and yielding means moving with the ram for locking the crank shaft at the end of each cycle of operation of the machine.

7. In a machine of the character described, the combination of a frame, a crank shaft journaled in the frame, means for operating the crank shaft, a ram, means connecting the ram with the crank shaft for operating the ram, a cross bar rigidly secured to the connecting means, locking dogs movably mounted on the frame, and means for releasing said dogs, said cross bar adapted in cooperation with the dogs to lock the crank shaft at the end of a cycle of operation of the machine and yielding sufficiently to cushion the locking action.

8. In a machine of the character described, the combination of a main frame, a crank shaft journaled in the frame, means for operating the crank shaft, a ram guided in the frame, rods connecting the ram with the crank shaft for operating the ram, means for adjusting the ram on the connecting rods, a cross bar rigidly secured to the connecting rods between the adjusting means and the crank shaft, locking dogs movably mounted on the main frame and operatively disposed to engage said cross bar to lock the ram normally in initial position, separate and independent levers connected to the main frame and to said locking dogs, said levers being spaced apart and requiring conjoint operation and the use of both hands of the operator to release said locking dogs from the cross bar and permit operation of the ram, and means for returning said locking dogs into locking relation with the cross bar at the conclusion of a complete operation of the ram.

9. In a punch press which has a frame, operating means, a ram, rods connecting the ram with the operating means, means for adjusting the ram, and means for controlling the operating means, the combination of a safety means including spaced locking dogs pivotally mounted on the frame, a cross bar on said rods between the operating means and the adjusting means and movable with the ram, said dogs arranged to engage the cross bar at the ends thereof to prevent downward movement of the ram, and means for withdrawing the locking dogs from engagement with the cross bar when the controlling means are operated.

10. 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 spaced locking dogs pivotally mounted on the frame, a cross bar movable with the ram, said dogs arranged to engage the cross bar at the ends thereof to prevent downward movement of the ram, said cross bar being capable of yielding slightly when engaged by said locking dogs, and means for withdrawing the locking dogs from engagement with the cross bar when the controlling means are operated.

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