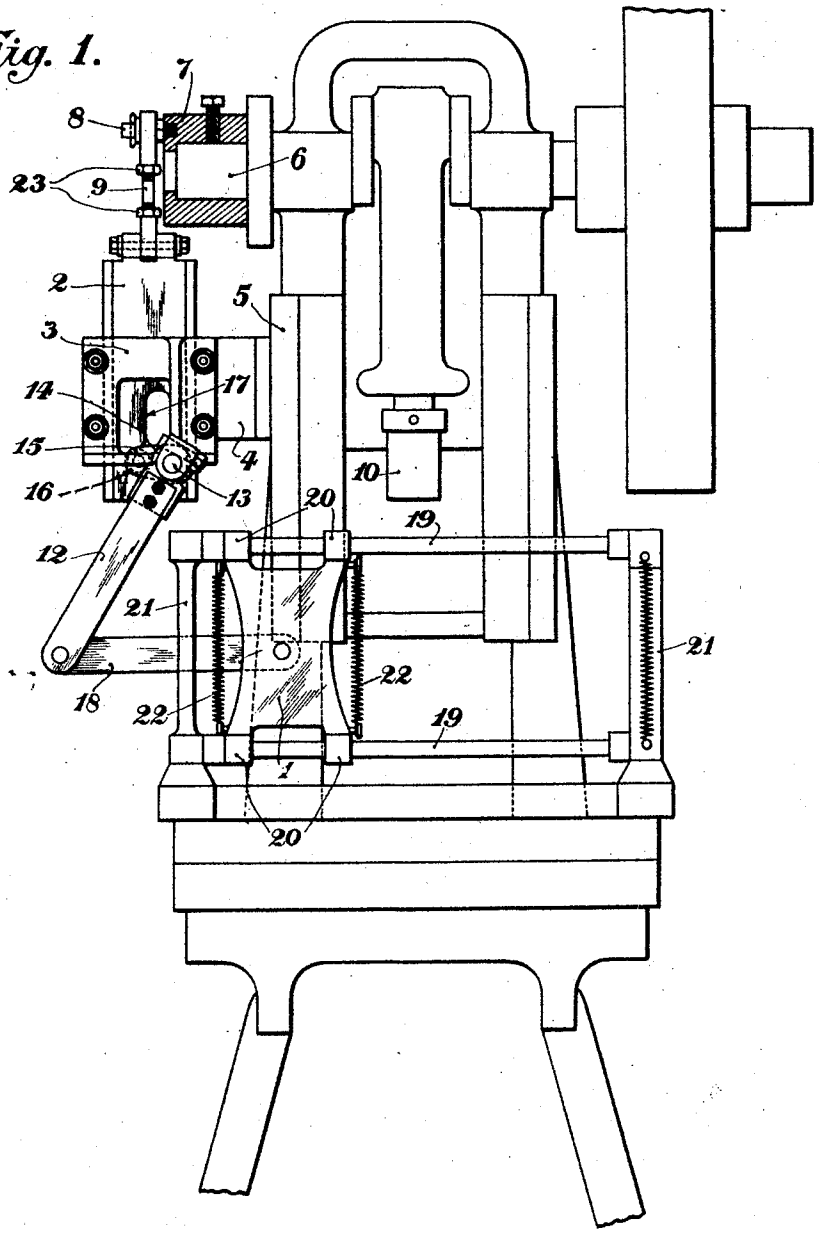
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GUARD FOR MACHINERY

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Fig. 1.



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Fig. 2.

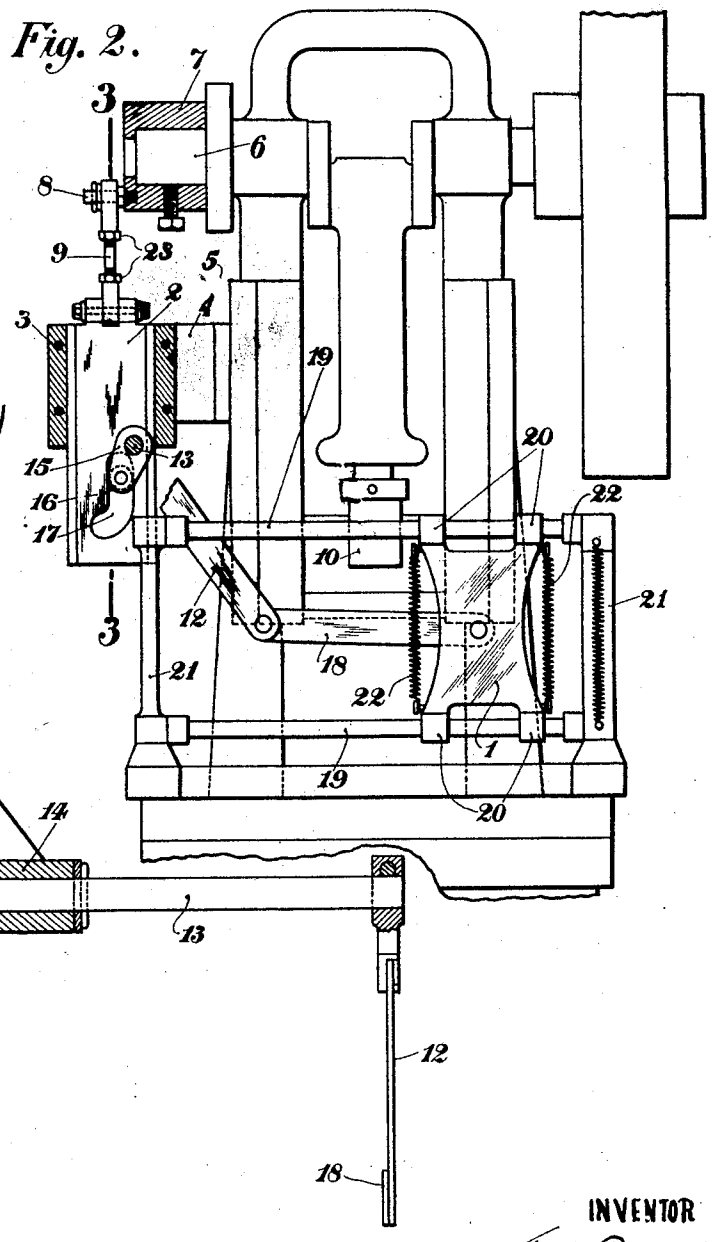


Fig. 3.

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Fig.5.

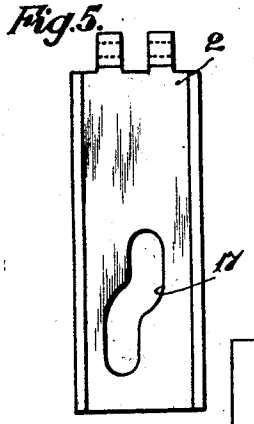
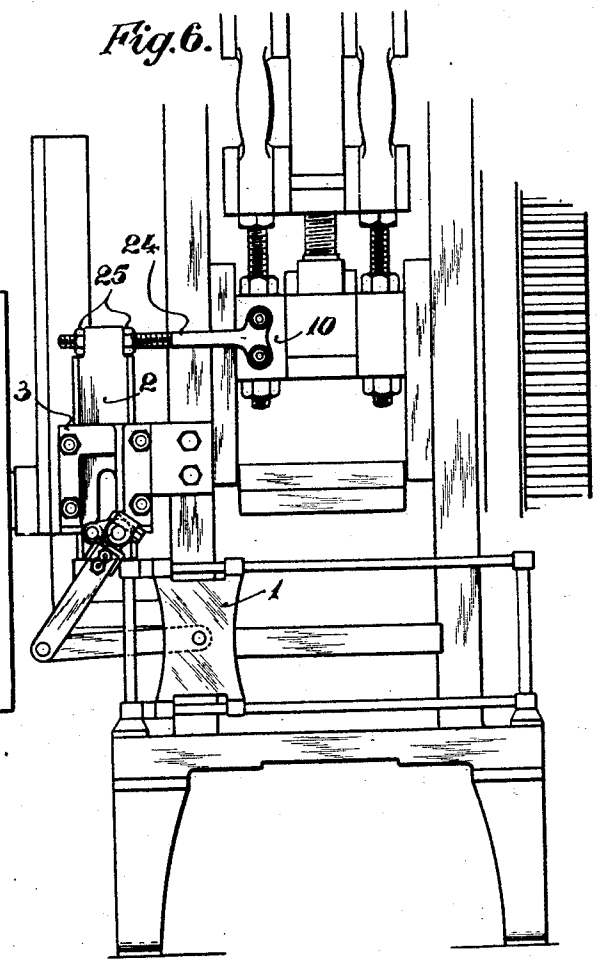


Fig.6.



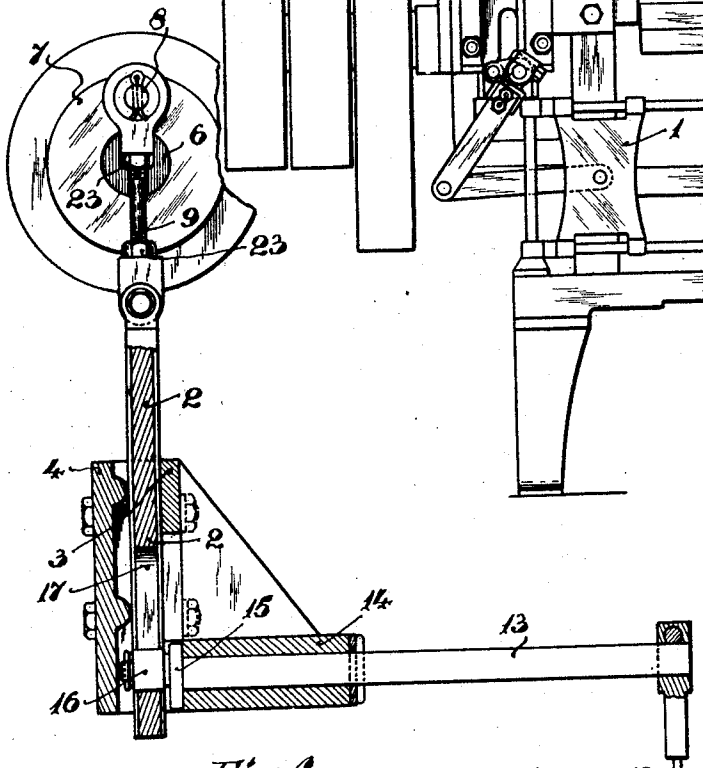


Fig.4.

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Fig. 7.

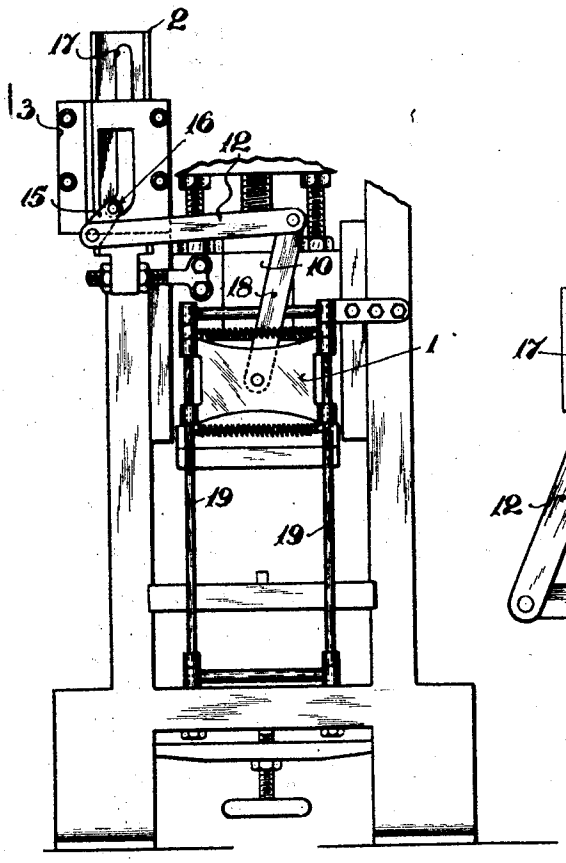
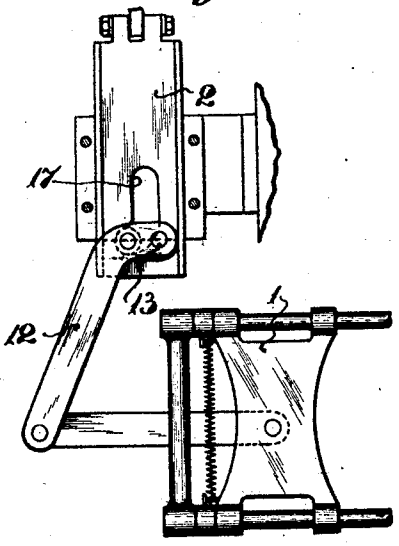


Fig. 8.



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Patented May 5, 1925. 1,536,762

UNITED STATES PATENT OFFICE.

JOSEPH BROUGHTON, OF BIRMINGHAM, ENGLAND.

GUARD FOR MACHINERY.

Application filed April 18, 1923. Serial No. 632,967.

To all whom it may concern:

Be it known that I, JOSEPH BROUGHTON, a subject of the King of Great Britain, residing at 41 Great Charles Street, Birmingham, England, have invented certain new and useful Improvements in Guards for Machinery, of which the following is a specification.

This invention relates to guards for power presses and other machinery, the said guards being of that type which are adapted to be moved in front of the work space during the descent of the plunger or ram of the press or the like, through the medium of a lever actuated from the moving part of the machine.

The object of the present invention is to provide improved and efficient means for positively actuating the guard.

According to the invention, the lever which effects the movement of the guard is actuated by a sliding member or plunger operated by a moving part of the press, the said sliding member being coupled to the said guard-actuating lever by a pin-and-slot connection. The arrangement is preferably such as to cause the guard to move into its operative position prior to the press plunger reaching the danger zone.

Figure 1 of the accompanying drawings is an elevational view of a press fitted with a guard arranged and operated by a sliding member in accordance with this invention, the said sliding member being actuated from the crank-shaft of the press and being shown in its inoperative position at the top of its stroke.

Figure 2 is an elevational view of the press illustrating the manner in which the guard is moved in front of the working space by the sliding member, the guide within which the latter moves being shown in section.

Figure 3 is a vertical section through the sliding member and its guide when the said sliding member is at the bottom of its stroke, and showing more clearly the pin and slot connection between the sliding member and the lever which actuates the guard.

Figure 4 represents a similar section to that in Figure 3, but showing the sliding member at the top of its stroke.

Figure 5 shows a sliding member having an alternative form of slot.

Figure 6 shows an alternative arrangement in which the sliding member is operated by the ram of the press instead of the crank-shaft.

Figure 7 illustrates a further modification in which the guard is caused to move in a vertical direction instead of horizontally.

Figure 8 shows a further arrangement in which another order of lever is employed.

The same reference numerals indicate corresponding parts in each of the figures.

Referring to Figures 1 to 4, the guard or shield 1 is arranged to be moved horizontally backwards and forwards in the front of the working space of the press through the medium of a vertically-sliding plate 2. This plate 2 is arranged to slide within a guide 3 of a shallow box-like formation, open at its upper and lower ends, the said guide being carried by a laterally-extending bracket 4 fixed by any suitable means to the frame 5 of the press, the arrangement being such that the plate 2 comes beneath the end of the crank-shaft 6 which operates the plunger or ram 10 of the press. This end of the crank-shaft is fitted with a cap or boss 7, keyed or otherwise secured thereto, the end of the cap or boss being provided with an eccentrically-mounted and axially extending crank-pin 8. The sliding-plate 2 is connected to the latter by means of a connecting rod 9 hinged at its lower end to the said plate 2, by a bolt or other means, and hinged at its upper end to the pin 8 so as to be free to turn about the latter. Thus, owing to the pin 8 being eccentrically mounted the rotation of the crank-shaft 6 causes the plate 2 to reciprocate vertically within the guide 3. The vertical reciprocating movement of this plate 2 is caused to operate the guard 1 through the medium of a lever and link. This lever comprises a downwardly-inclined long-arm 12 keyed or rigidly fixed at its upper end to a forwardly-extending horizontal shaft 13 (see Figures 3 and 4) mounted to turn within a sleeve-bearing 14 carried by, or integral with, the front face of the guide 3, the said shaft 13 constituting the pivot about which the lever turns. Secured to the opposite end of the shaft 13 is the short-arm 15 of the lever, this arm carrying at its extremity a rearwardly-projecting pin having a roller 16 which is arranged to engage a slot 17 in the sliding plate 2, the said slot being preferably of the shape shown, and comprising a vertical portion terminating at its lower end in a short, substantially hori-

zontal heel or extension. The front of the guide 3 is suitably cut away to allow of the roller 16 moving freely within the slot 17. The lower end of the long-arm 12 of the lever is connected to the guard 1 by a substantially horizontal link 18. The guard 1 comprises a plate adapted to be moved backwards and forwards in front of the working-space of the press upon vertically-separated horizontal guide-bars 19 which pass through sleeves 20 formed at the upper and lower edges of the guard. These horizontal guide-bars 19 are carried at their extremities by vertical members 21 attached to the bed or frame of the press. Coiled springs 22 are preferably attached to each vertical edge of the guard 1 to prevent injury to the hand of the operator.

The operation of the guard is as follows:—When the press plunger or ram 10 is at the top of its stroke the pin 8 upon the end of the crank-shaft 6 is arranged to come at the top, whilst the roller 16 carried by the short-arm 15 of the lever is arranged so that it then engages with the inner end of the short horizontal extension of the slot 17 as shown in Figure 1 of the drawings. As soon as the press plunger 10 commences its downward stroke the plate 2 is likewise moved downwards causing the roller 16 upon the short-arm 15 of the lever to be moved from out of engagement with the heel or horizontal extension of the slot 17 so that it engages the vertical portion of the latter. The short arm 15 is thereby moved downwards and laterally and the lever is consequently turned about its fulcrum so that it assumes the position shown in Figure 2, the long-arm 12 of the lever moving in a direction towards the press and forcing the guard 1 across the work-space of the press through the medium of the link 18. The sliding plate 2 starts to move downwards when the press-plunger starts to descend, and owing to the shape of the slot 17 in the plate 2 the guard commences to move into its protecting position, in front of the work-space, as soon as the plunger commences its downward stroke, the movement of the guard into its protecting position being completed shortly after the press plunger has started to descend, and preferably before it has entered the danger zone. The guard remains in its protective position, as shown in Figure 2, until the press-plunger has nearly completed its succeeding up-stroke, the roller 16 during this time moving idly within the vertical portion of the slot 17. The plate or slide 2 moves upwards with the press plunger so that the roller 16 is thereby moved towards the lower end of the vertical portion of the slot 17, when, just prior to the plunger completing its up-stroke the roller 15 is caused to engage the short horizontal extension of the said slot, so that the guard 1 is, at this instant, moved back clear of the working-space, leaving the latter unobstructed for the removal or insertion of the work. Shortly after the plunger has again commenced its downward stroke the guard 1 is again fully moved in front of the work-space, as above described.

The connecting-rod 9 for coupling the plate or slide 2 to the pin 3 on the crank-shaft is preferably adjustable in length, and comprises a centre portion having externally-screwed extremities which are adapted to be screwed more or less into eye-members for engaging respectively the pin on the crank-shaft and the pin or bolt which couples the connecting-rod to the plate or slide 2. The length of the connecting rod may thus be varied according to requirements. Nuts 23 may be provided for locking the parts of the connecting-rod after adjustment.

Where the end of the crank-shaft is of a sufficiently large diameter the pin 8 may be fixed directly to the said end, instead of to a collar or boss carried by the latter.

The instant at which the guard 1 is moved into its protecting position in front of the working-space may be altered by varying the shape of the slot in the sliding plate 2. Figure 5 shows a plate having a slot 17 shaped so as to cause the guard to move across the working-space after the press plunger has reached approximately the middle of its down-stroke, the guard being moved back clear of the working-space when the plunger reaches the middle of the succeeding up-stroke. The movement of the guard may thus be readily varied to suit different machines by varying the shape of the slot.

Referring to Figure 6 of the drawings, instead of the sliding plate 2 being operated by the crank-shaft, as above described, it may be operated by the pressure plate or by the ram. For this purpose the upper end of the plate 2 is connected to the outer end of a rigid arm 24 extending horizontally from the pressure plate 10 and connected to the latter by bolts or other means. The slide 2 is thus caused to rise and fall with the movement of the pressure plate or ram. The said slide is arranged to work within a guide 3 and is slotted and adapted to operate the guard 1 by a lever and link, in a similar manner to the above described. The outer end of the arm 24 connecting the slide 2 to the ram or plunger of the press may be screw-threaded and the slide may be adjusted in the axial direction of the arm by nuts 25.

The guard 1 may be arranged to move in a vertical plane upon guide-rods 19 instead of moving horizontally. Such an arrangement is shown in Figure 7 of the drawings. The guard 1 is operated by a sliding mem-

ber 2 working within a guide 3 in a precisely similar manner, through the medium of a lever attached to the slide 3 by a pin and slot connection, and a link 18. The long-arm 12 of the lever is, however, arranged to extend in a substantially horizontal direction when the guard 1 is in its inoperative position, and the press plunger 10 is raised, whilst the link 18 connecting the said arm 12 of the lever to the guard 1 extends downwards as shown in the said figure of the drawings. The short-arm 15 of the lever is upwardly inclined and carries a roller 16 which, when the plunger or ram is raised, engages the heel or horizontal extension of the slot 17. As the press plunger and the like descends the roller 16 is caused to enter the vertical portion of the slot 17 so that the long-arm 12 of the lever is consequently moved downwards. The guard 1 is likewise moved downwards in front of the working space. As the press plunger or ram rises, and when it has nearly reached the end of its up-stroke, the roller 16 again enters the horizontal portion of the slot 17 so that the guard is at this instant raised.

Any suitable form of lever may be employed. Figure 8 of the drawings shows a modified form of lever 12, the upper end of which is cranked horizontally, and fulcrumed at its extremity at 13, to the guide 3 within which the slotted plate 2 slides. A rearwardly extending roller 16 is provided near the said pivoted end of the lever which is arranged to engage the slot 17 in the plate 2. As the latter moves downwards on the downstroke of the press plunger the lower end of the lever is caused to move in a direction towards the press and so move the guard 1 in front of the working space.

In any of the above arrangements the sliding member 2 may be arranged to work within any suitable form of guide or guides, whilst the said guide or guides may be attached to any suitable part of the press so as to either come at the side or at the front or rear of the press plunger or ram.

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

1. Means for operating guards for machinery comprising fixed guides independent of the guides for the ram of the machine, a sliding member separate from the ram of the machine and working within the said guides, said sliding member having a cam-shaped slot, means for actuating said sliding member from the crank shaft of the machine, and a lever pivoted to a fixed member and carrying a part engaging the slot in the sliding member, the said lever being connected to the guard so as to impart a reciprocating movement thereto.

2. Means for operating guards for machinery comprising a pin eccentrically carried by the end of the crank shaft of the machine, a connecting rod engaging the said pin, a sliding member operated by the connecting rod and provided with a cam-shaped slot, fixed guides engaged by the sliding member, a lever pivoted to a fixed member and carrying a part engaging the slot in the sliding member, and a link attached to the lever, the said link being connected to the guard so as to impart a reciprocating movement to same.

In testimony whereof I have hereunto set my hand.

JOSEPH BROUGHTON.