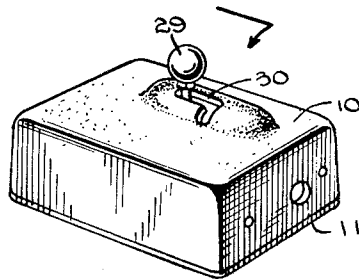
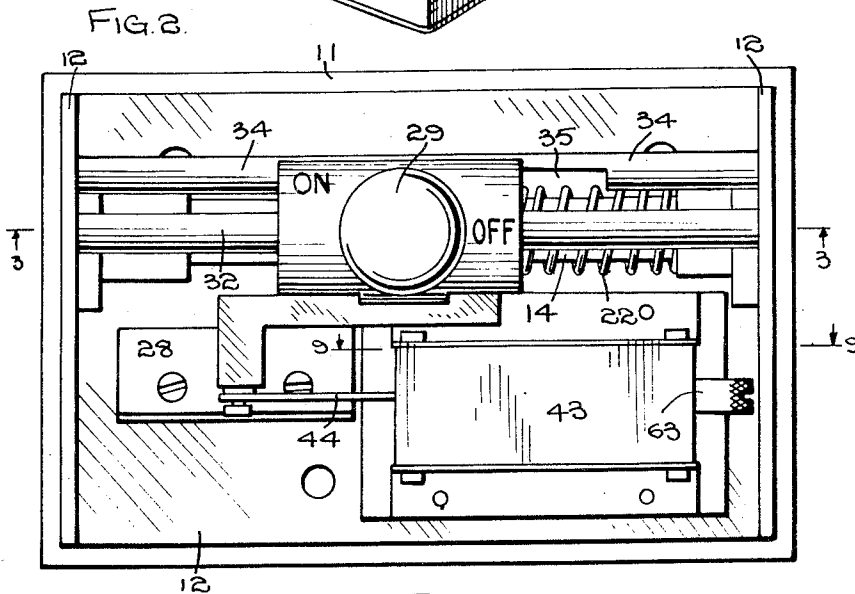
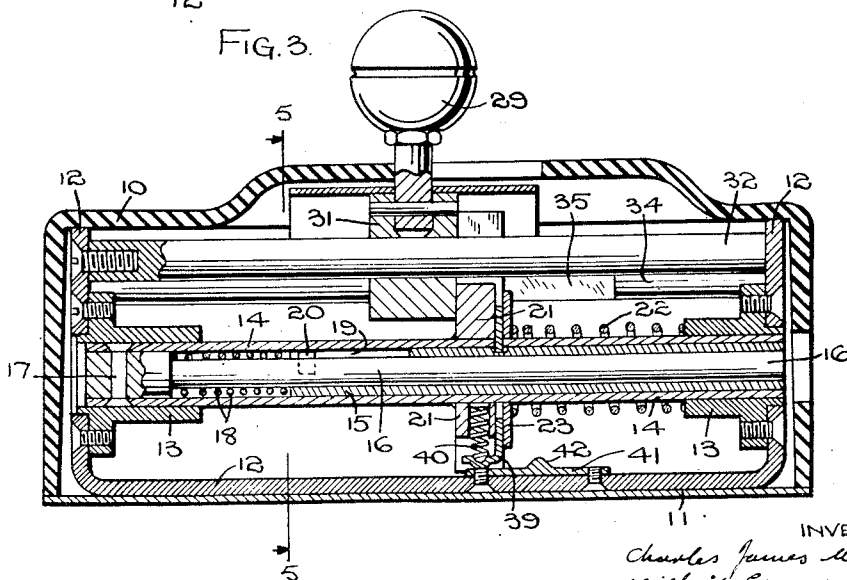


2,600,350

4 Sheets-Sheet 1



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2,600,350

BOLT FOR LOCKS

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FIG. 4.

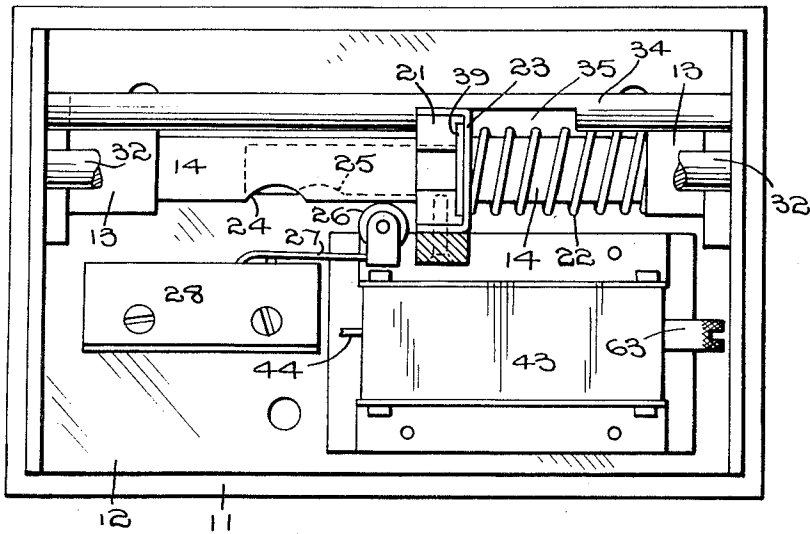
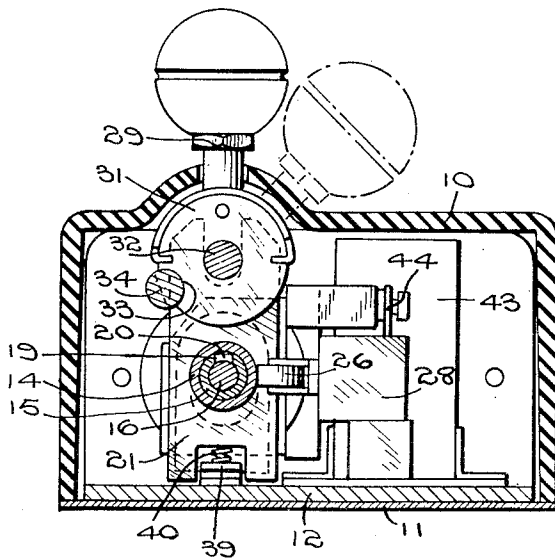


FIG. 5.



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4 Sheets-Sheet 3

FIG. 6.

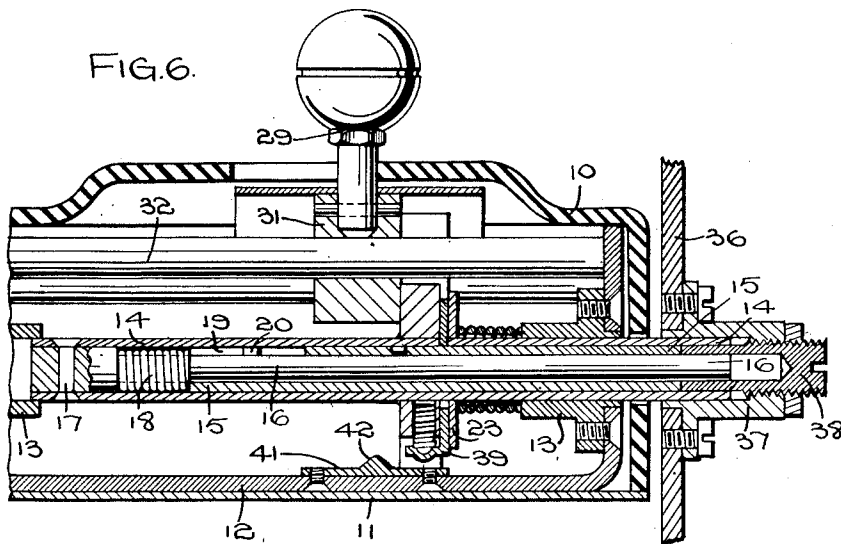


FIG. 7.

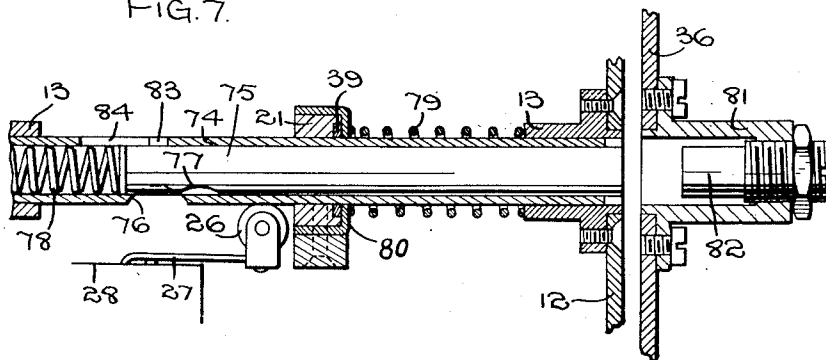
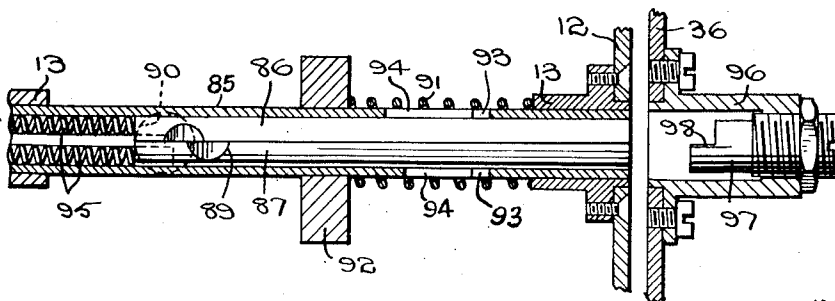


FIG. 8.



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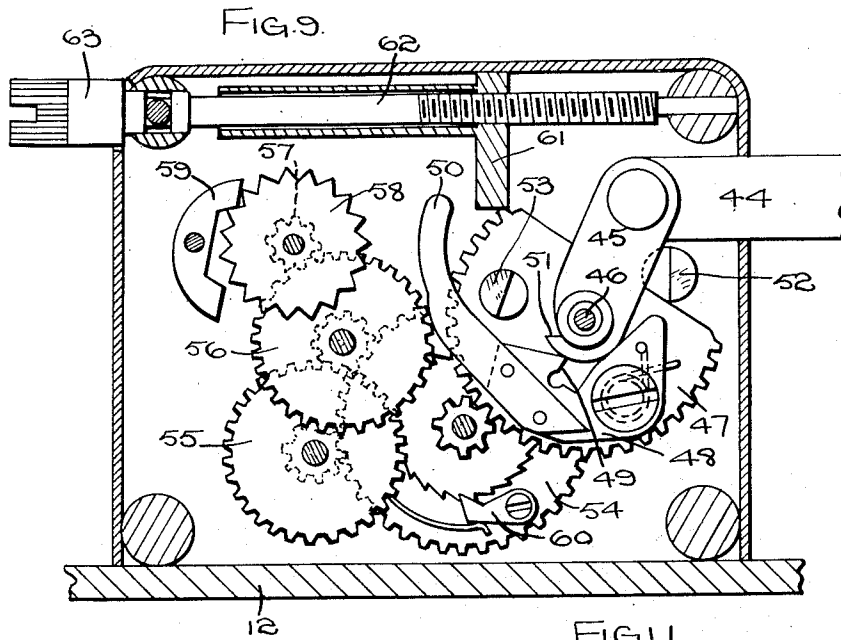
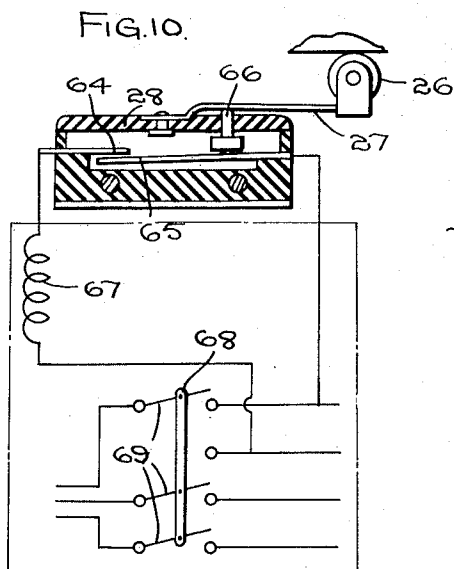
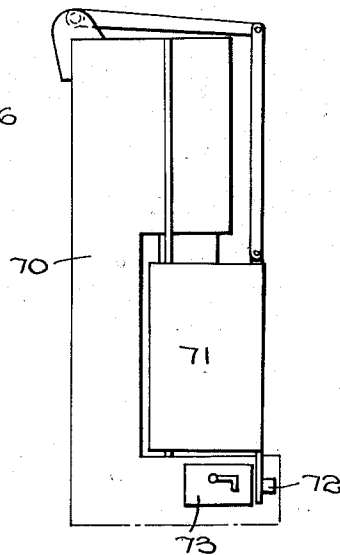
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BOLT FOR LOCKS

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Application April 25, 1950, Serial No. 157,886-
In Great Britain April 29, 1949

13 Claims. (Cl. 200—55)

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This invention relates to bolts for locks, and has especial, though not exclusive, reference to bolts for safety devices such as are described in the specification of our British Letters Patent No. 618,369. It is an object of the invention to provide for a lock a bolt having, in addition to its engagement with a keeper or the like, further means giving security against unauthorized operation of whatever is being protected by the lock.

According to the present invention a lock has a bolt arranged for axial movement into or out of engagement with a keeper and formed in two or more parts movable axially relatively to one another and so shaped as to permit operation of further means essential to the functioning of the lock only when said parts of the bolt have been brought to predetermined relative positions, and means associated with the keeper to move said parts to said predetermined relative positions when the bolt and the keeper are engaged.

The bolt may comprise two concentric tubes, the inner tube containing a rod which is fixedly attached to the outer tube, the inner tube being slidable between them against the action of a spring; and both tubes having notches arranged to be in register when the tubes are in their predetermined relative positions.

The keeper, in this case, may be in the form of a socket having a tubular spigot which can receive the rod but which resists the inner tube and this spigot may be arranged for axial adjustment.

Alternatively the parts of the bolt may comprise a tube and a rod slidable axially within said tube, the tube and rod being formed with notches arranged to be in register when the rod and tube are in their predetermined relative positions and to permit operation of said further essentials, means including a detent entering the registered notches, and the keeper may be constituted by a socket shaped internally to move the rod and tube axially to their predetermined relative positions when the bolt engages the keeper in its shot position.

The rod may be formed in two or more axially separated parts each capable of axial movement relatively to the other parts and to the tube, and the socket may be shaped internally to move the tube and all the parts of the rod axially to their predetermined relative positions when the bolt engages the keeper in its shot position.

The lock may be combined with a safety device such as is described in our aforementioned specification No. 618,369, the detent being arranged,

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when it has entered the registered notches in the parts of the bolt, to close an electric switch or analogous control.

Examples of the invention will be described with reference to such safety device, which is intended for a guard, door, or the like for machinery including power controlling means, such as an electric switch or a hydraulic valve, and comprises a bolt arranged, when shot, to lock the guard or door in its effective position, and interconnecting means between the bolt and the power controlling means so that the latter can be turned on or off only when the bolt is effective to lock the guard or door, and delaying means to prevent the withdrawal of the bolt from the guard or door for a predetermined period of time after the power controlling means have been turned off.

The invention is illustrated in the accompanying drawings wherein three forms of bolt are shown applied to a safety device of the kind described in specification 618,369 and intended for locking in position the protective guard or door on a machine such as a power press.

In the drawings Figure 1 is a perspective view of the complete safety device with cover attached.

Figure 2 is a plan view with the cover removed showing one form of bolt according to the invention.

Figure 3 is a section on the line 3—3 in Figure 2 showing the bolt in the withdrawn (off) position.

Figure 4 is a plan view with the upper parts of Figure 2 removed for clarity.

Figure 5 is a section on the line 5—5 in Figure 3.

Figure 6 is a view similar to Figure 3 showing the bolt in the shot (on) position.

Figures 7 and 8 show two alternative forms of bolt both in the withdrawn position.

Figure 9 is a section on the line 9—9 of Figure 2 showing details of the delay mechanism.

Figure 10 is a diagrammatic view showing the switch controlling the power circuit of the machine to which the safety device is applied.

Figure 11 is a view showing a press having a guard controlled by a safety device embodying the present invention.

In the safety device described in prior specification 618,369 in order to guard against the bolt being shot whilst the guard is in the raised position, it was proposed in the case of a hinged guard to incorporate a switch operable by the hinging of the guard, said switch being in series with the switch actuated by the safety device, or alternatively, it was proposed to provide a cam attached to the guard and arranged to move in

front of the bolt when the guard was open thus preventing the bolt from being shot. The present invention dispenses with the need for providing either a switch with a hinged guard or a cam to move in front of the bolt.

Referring to Figures 1 to 6 of the drawings the safety device which is constructed and operated in the manner of prior specification 618,369 comprises a cover 10 and base plate 11 and the components of the device are mounted within a channel shaped frame 12.

The bolt is supported at each end in bearings 13 and in the form shown in Figures 1 to 6 the bolt comprises two concentric tubes 14 and 15 and a rod 16 arranged within the inner tube 15. This rod 16 is attached by means of a rivet 17 at its one end to the outer tube 14 and there is provided a spring 18 acting between one end of the tube 15 and the enlarged part of the end of the rod 16.

In order to prevent the tube 15 from rotating relative to the other parts it is provided at one end with a slot 19 which is engaged slidably by a peg 20 fixed to the rod 16. Also fixed on the outer tube 14 is an abutment 21 and a further spring 22 is provided on the outside of this tube acting at one end against the bearing 13 and at the other end engaging a plate 23 which is fixed to the abutment 21.

The outer tube 14 and the inner tube 15 are provided with notches 24 and 25 respectively, and these notches when in register are entered by a defent member which is in the form of a roller 26 carried at the end of a spring arm 27. When this roller 26 moves so as to enter the notches 24 and 25 the arm 27 actuates a micro switch 28 for closing the main power circuit of the machine. The operation of the switch 28 is described in more detail hereinafter.

The device is provided with an operating handle 29 which projects upwardly through an L-shaped slot 30 in the top of the cover and has attached to it a barrel 31 which is slidable upon a rod 32 carried at its ends in the frame 12. The barrel 31 has a recessed portion 33 which slidably engages a further rod 34 also carried by the frame 12 and this rod 34 has a cut-away portion 35 so arranged that when the operating handle is moved so as to slide the barrel 31 along the rod 32, the notch 35 comes opposite a groove 33 in the barrel. The operating handle is then moved so as to rotate the barrel 31 about the rod 32 thereby bringing a portion of the barrel into engagement with the cut-away 35, thus preventing the barrel from being moved axially with respect to the rod 32.

Movement of the barrel 31 causes the abutment 21 to move against the pressure of a spring 22 thus moving the bolt into the shot position and compressing the spring 22.

In Figure 6 one form of keeper is shown and this is preferably attached to the guard of the machine, this guard being shown in part at 36. The keeper comprises a socket 37 which is provided with a tubular spigot 38 formed so that it receives the rod 16, but resists the inner tube 15 when the bolt is moved into the shot position, thus the inner tube 15 is forced to move axially with respect to the outer tube 14 and therefore brings its notch 25 into register with the notch 24 thereby allowing the roller 26 to be urged into the notches and operating the switch 28.

The spigot 38 is mounted for axial adjustment in the socket 37 so that when assembling the keeper the spigot may be adjusted to its cor-

rect position having regard to the relative positions of the two notches 24 and 25.

Also, in order to prevent unauthorised persons from trying to move the parts of the bolt before the guard is in position a latch member is provided which maintains the parts of the bolt in fixed relationship with each other until just before the time when the bolt is in the fully shot position.

Referring to Figures 3 and 6 this latch member comprises a plate 39 slidably mounted between the plate 23 and the abutment 21 and arranged to enter into two co-operating notches, one in the outer tube 14 and one in the inner tube 15 so as to hold these two parts in fixed relationship.

This plate 39 is spring urged by a spring 40 into engagement with a cam plate 41 fixed on the base of the frame 12 and having a nose 42 which causes the plate to move upwardly when it passes over the nose, thus releasing the two tubes 14 and 15 from fixed relationship and allowing the parts of the bolt to operate so as to move into the fully shot position.

When it is desired to stop the machine the handle 29 is moved so as to rotate the barrel 31 and bring it out of locked engagement with the rod 34 and then the spring 22 is able to exert pressure to withdraw the bolt. The commencement of withdrawal of the bolt causes the notches 24 and 25 to be displaced out of register and thus roller 26 is moved to open the switch 28. At this stage the delaying means come into operation to delay the return of the bolt so as to allow the machine sufficient time to come to rest and this delaying means is indicated generally at 43 in Figure 2 and shown in more detail in Figure 9.

Referring to Figure 9 a lever 44 is attached at one end to the abutment 21 so as to be moved thereby and at its other end has a link 45 pivoted thereto, this link being fixed on a shaft 46 which carries a toothed segment 47 forming the first wheel in a gear train which provides the delay mechanism.

Fixed upon the segment 47 is a release pawl 48 having a nose 49 and an arm 50. The link 45 also has a nose 51 which is adapted to engage with the nose 49 when the abutment 21 is moved axially so as to move lever 44, thus causing the link 45 to rotate.

A stop 52 fixed to the cover of the delay mechanism engages the segment 47 and a stop 53 carried by the segment 47 is engaged by the link 45 so that as the bolt is moved into the shot position the lever 44 by virtue of its movement causes the nose 51 to engage behind the nose 49.

The segment 47 drives a gear train including gears 54, 55, 56, 57 and an escape wheel 58 which is engaged by an escape lever 59. The gear 54 is provided with a one way clutch in the form of a spring rotated pawl 60 so that when the bolt is being shot the escapement device is not driven through the gear train.

In operation the lever 44 is caused to move axially when the abutment 21 is being urged by the spring 22 into the withdrawn position and this movement of lever 44 causes the link 45 to pivot thereby driving the segment 47 in a clockwise direction as seen in Figure 9, until the arm 50 engages a stop 61 which is formed as a collar mounted on a threaded rod 62 carried by the casing of the device. When the arm 50 engages this stop 61 it commences to disengage the nose 49 from the nose 51 and after a short time there is complete disengagement and the lever 44 is freed

from the delaying action of the delay means thus allowing the bolt to be shot back into its withdrawn position under the action of the spring 22.

The time taken for the noses 49 and 51 to disengage can be varied by adjusting the collar 61 along the rod 62 and for this purpose an operating nut 63 is provided on one end of the rod 62.

Referring to Figure 10 there is shown diagrammatically the switch which controls the main switch for the power circuit of the machine and this is in the form of a microswitch mounted in the case 28 and having contacts 64 and 65 which are actuated by a push-button 66 itself operated by the spring arm 27 so that when the roller 26 enters the co-operating notches in the bolt the contacts 64 and 65 are closed so as to energise solenoid 67 which actuates the mechanism of the main switch 68 so as to close contacts 69 and complete a main circuit to the motor for driving the machine.

Figure 11 shows a general form of a press having a main frame 70 and provided with a movable protective guard 71 which carries at its lower part the keeper shown at 72 for the bolt of the safety device shown at 73.

An alternative form of bolt is shown in Figure 7 and in this form the bolt is carried as before in bearings 13 mounted in the frame 12 and the bolt is formed in two parts, namely an outer tube 74 and an inner rod 75, both having notches 76 and 77 respectively.

The rod 75 is acted upon by the spring 78 and a further spring 79 is disposed around the tube 74 and at one end engages the bearing 13 and the other end engages an abutment 80 fixed to the outer tube 74.

The keeper is formed as a socket 81 having a central spigot 82 which is axially adjustable and which is adapted to engage the end of the rod 75 when the bolt is shot so as to cause the rod to move against the pressure of spring 78 axially with respect to the tube 74 so as to bring the notches 76 and 77 into register and thus allow roller 26 to move into engagement with the notches. A stud 83 fixed on the rod 75 and working in a slot 84 in the tube 74 prevents the rod from rotating with respect to the tube.

A further form of bolt is shown in Figure 8 and in this construction the bolt comprises an outer tube 85 and two separate inner rods 86 and 87 both having semi-circular notches 88 and 89 which, together are adapted to co-operate with a notch 90 in the outer tube.

A spring 91 acts between the bearing 13 and an abutment 92 fixed on the outer tube and to prevent rotation of the inner rods, pegs 93 are provided engaging in slots 94 in the outer tube. Each rod is acted upon by a spring 95 and the keeper in this case comprises a socket 96 having a spigot 97 which is axially adjustable and is provided with a stepped portion 98 so forming two shoulders which engage respectively with the two rods 86 and 87 when the bolt is shot to bring their respective notches into co-operation and into register with the notch 90 so as to allow the roller 26 to enter the notches and operate the switch.

In the present invention it will be seen that it is not possible for unauthorized persons to endeavour to operate the bolt before the guard is in position, owing to the fact that the presence of the keeper is necessary in order to bring the co-operating notches in the bolt into register so that the switch can be operated. Further, the presence of the latch member 39 ensures that the parts

of the bolt shall be held in fixed relationship with each other until just before the bolt reaches the end of its shot position so that again this prevents unauthorized persons from endeavouring to move the parts of the bolt with respect to each other before the guard is in position.

A bolt constructed in accordance with the present invention may be used with the safety device as herein described with machines employing a hinged or sliding guard or otherwise movable guard, and the keeper itself may be mounted upon the guard or arranged so that it only comes into the operative position when the guard is in the closed position.

What we claim then is:

1. In or for lock controlled means, a lock of the type having a keeper and a bolt arranged for axial movement into and out of engagement therewith comprising a bolt formed in a plurality of parts movable axially relatively to one another, said parts having shaped portions which are in register when the parts are brought to predetermined relative positions; a member adapted for operative connection with the means controlled by the lock and adapted to engage said shaped portions, when in register, to cause operation of the lock-controlled means; and means, associated with the keeper, to move the parts of the bolt to said predetermined relative positions when the bolt and keeper are engaged.

2. In or for lock controlled means, a lock of the type having a keeper and a bolt arranged for axial movement into and out of engagement therewith comprising a bolt formed in a plurality of parts including an outer member and an inner member slidable axially within the outer member, said inner and outer members having notches which are in register when the parts are brought to predetermined relative positions; a member adapted for operative connection with the means controlled by the lock and adapted to engage said notches when in register to cause operation of the lock-controlled means; and means, associated with the keeper, to move said inner and outer members to said predetermined relative positions when the bolt and keeper are engaged.

3. In or for lock controlled means, a lock of the type having a keeper and a bolt arranged for axial movement into and out of engagement therewith comprising a bolt formed as two concentric tubes movable axially relatively to one another, and a rod slidable axially within the inner tube and fixedly attached to the outer tube, said tubes having notches which are in register when the tubes are brought to predetermined relative positions; a member adapted for operative connection with the means controlled by the lock and adapted to engage said notches when in register, to cause operation of the lock-controlled means; and means, associated with the keeper, to move said tubes to said predetermined relative positions when the bolt and keeper are engaged.

4. In or for lock controlled means, a lock of the type having a keeper and a bolt arranged for axial movement into and out of engagement therewith comprising a bolt formed as a tube and a rod movable axially within the tube, said tube and rod having notches which are in register when the tube and rod are brought to predetermined relative positions; a member adapted for operative connection with the means controlled by the lock and adapted to engage said notches when in register to cause operation of the lock-controlled means; and means, associated with the keeper, to move said tube and said rod

to said predetermined relative positions when the bolt and keeper are engaged.

5. In or for lock controlled means, a lock of the type having a keeper and a bolt arranged for axial movement into and out of engagement therewith comprising a bolt formed as a tube and a rod therein consisting of two parts movable axially relatively to one another and to the tube, said tube and the two parts of the rod having notches which are in register when the tube and the parts of the rod are brought to predetermined relative positions; a member adapted for operative connection with the means controlled by the lock and adapted to engage said notches when in register, to cause operation of the lock-controlled means; and means, associated with the keeper, to move said tube and the two parts of the rod to said predetermined relative positions when the bolt and keeper are engaged.

6. In or for lock controlled means, a lock of the type having a keeper and a bolt arranged for axial movement into and out of engagement therewith comprising a bolt formed in a plurality of parts including an outer member and an inner member slidable axially within the outer member, said inner and outer members having notches which are in register when the parts are brought to predetermined relative positions; a member adapted for operative connection with the means controlled by the lock and adapted to engage said notches when in register to cause operation of the lock-controlled means; and a keeper in the form of a socket having its interior shaped so as to engage the said inner and outer members to move same to said predetermined relative positions when the bolt and keeper are engaged.

7. In or for lock controlled means, a lock of the type having a keeper and a bolt arranged for axial movement into and out of engagement therewith comprising a bolt formed as two concentric tubes movable axially relatively to one another, and a rod slidable axially within the inner tube and fixedly attached to the outer tube, said tubes having notches which are in register when the tubes are brought to predetermined relative positions; a member adapted for operative connection with the means controlled by the lock and adapted to engage said notches when in register, to cause operation of the lock-controlled means; and a keeper in the form of a socket having an interior tubular spigot adapted to receive the end of said rod and to engage and halt the inner tube so as to move the parts of the bolt to said predetermined relative positions when the bolt and keeper are engaged.

8. In or for lock controlled means, a lock of the type having a keeper and a bolt arranged for axial movement into and out of engagement therewith comprising a bolt formed as a tube and a rod movable axially within the tube, said tube and rod having notches which are in register when the tube and rod are brought to predetermined relative positions; a member adapted for operative connection with the means controlled by the lock and adapted to engage said notches when in register to cause operation of the lock-controlled means and a keeper in the form of a socket having an interior solid spigot adapted to engage the end of said rod so as to move the parts of the bolt to said predetermined relative positions when the bolt and keeper are engaged.

9. In or for lock controlled means, a lock of the type having a keeper and a bolt arranged for axial movement into and out of engagement therewith comprising a bolt formed as a tube and

a rod therein consisting of two parts movable axially relatively to one another and to the tube, said tube and the two parts of the rod having notches which are in register when the tube and the parts of the rod are brought to predetermined relative positions; a member adapted for operative connection with the means controlled by the lock and adapted to engage said notches when in register, to cause operation of the lock-controlled means; and a keeper in the form of a socket having an interior solid spigot of stepped formation providing two axially spaced shoulders adapted to engage the two parts of said rod so as to move the parts of the bolt to said predetermined relative positions when the bolt and keeper are engaged.

10. In or for lock controlled means, having an electric switch operatively connected therewith, a lock of the type having a keeper and a bolt arranged for axial movement into and out of engagement therewith comprising a bolt formed in a plurality of parts including an outer member and an inner member slidable axially within the outer member, said inner and outer members having notches which are in register when the parts are brought to predetermined relative positions; a detent roller adapted to cause operation of the electric switch associated with the means controlled by the lock, said roller being adapted to enter said notches when in register to cause operation of the lock-controlled means; and means, associated with the keeper to move said inner and outer members to said predetermined relative positions when the bolt and keeper are engaged.

11. In combination with the safety guard of a machine operated by an electric power unit and having switch means for starting and stopping said power unit, a lock having the bolt arranged, when shot, to lock the guard in its effective position; said lock having a keeper and a bolt arranged for axial movement into and out of engagement with said keeper and comprising a bolt formed in a plurality of parts movable axially relatively to one another, said parts having shaped portions which are in register when the parts are brought to predetermined relative positions; a member operatively connected with said switch means and adapted to engage said shaped portions, when in register, to cause operation of said switch means to start said power unit; and means, associated with the keeper, to move the parts of the bolt to said predetermined relative positions when the bolt and keeper are engaged.

12. In combination with the safety guard of a machine operated by an electric power unit and having switch means for starting and stopping said power unit, a lock having the bolt arranged, when shot, to lock the guard in its effective position; said lock having a keeper and a bolt arranged for axial movement into and out of engagement with said keeper and comprising a bolt formed in a plurality of parts movable axially relatively to one another, said parts having shaped portions which are in register when the parts are brought to predetermined relative positions; a member operatively connected with said switch means and adapted to engage said shaped portions, when in register, to cause operation of said switch means to start said power unit; means associated with the keeper, to move the parts of the bolt to said predetermined relative positions when the bolt and keeper are engaged; spring means urging said bolt into the withdrawn position; delay mechanism including a gear train and escapement device; means connecting the

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bolt with said delay mechanism whereby movement of the bolt under the influence of said spring means actuates said delay mechanism to delay the complete withdrawal of the bolt from the keeper for a predetermined period.

13. In or for lock controlled means, a lock of the type having a keeper and a bolt arranged for axial movement into and out of engagement therewith comprising a bolt formed in a plurality of parts including an outer member and an inner member slidable axially within the outer member, said inner and outer members having notches which are in register when the parts are brought to predetermined relative positions; a member adapted for operative connection with the means controlled by the lock and adapted to engage said

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notches when in register to cause operation of the lock-controlled means; means associated with the keeper, to move said inner and outer members to said predetermined relative positions when the bolt and keeper are engaged, said members having further notches normally in register when the bolt is in its free position; a latch engaging said notches to hold said members against relative movement and a cam engageable by said latch to release same from said further notches when the bolt is almost fully shot.

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No references cited.