Jan. 9, 1945. W. J. PIRIE 2,366,930

SAFETY GUARD FOR INTERRUPTED CYLINDERS

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FIG. 1.

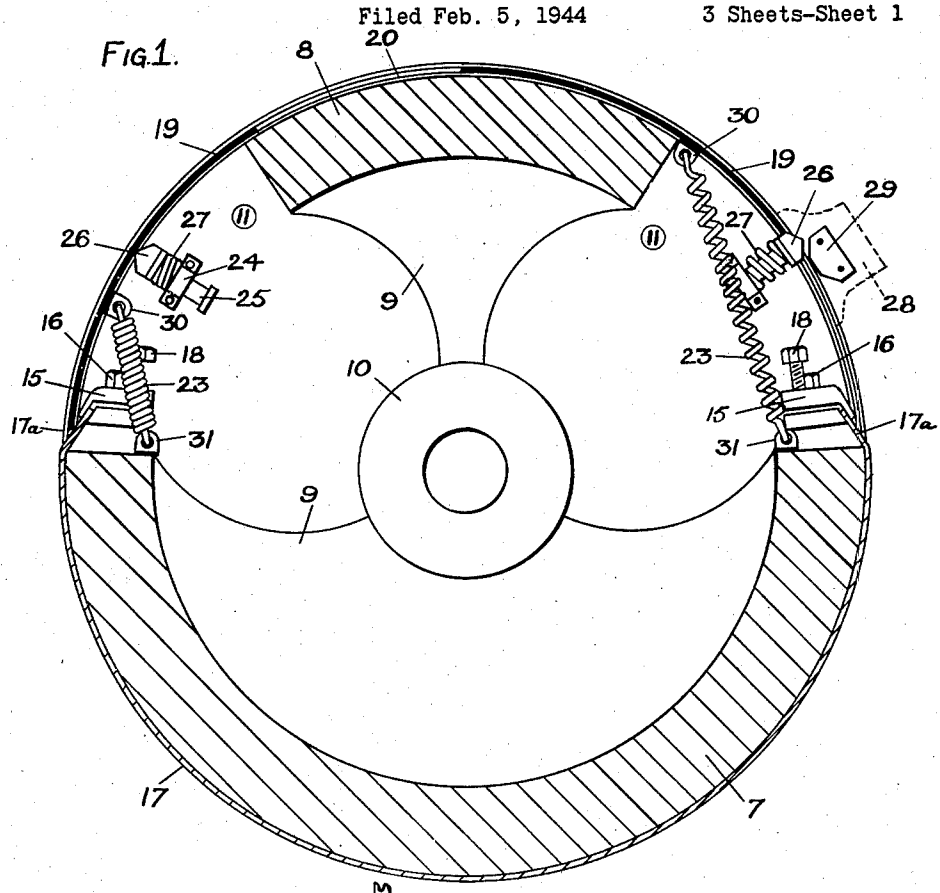
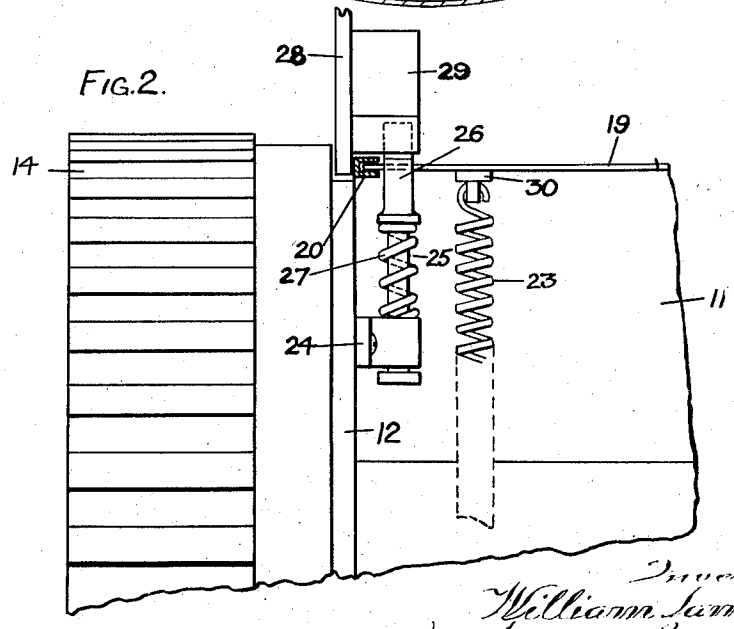


FIG. 2.



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FIG. 3.

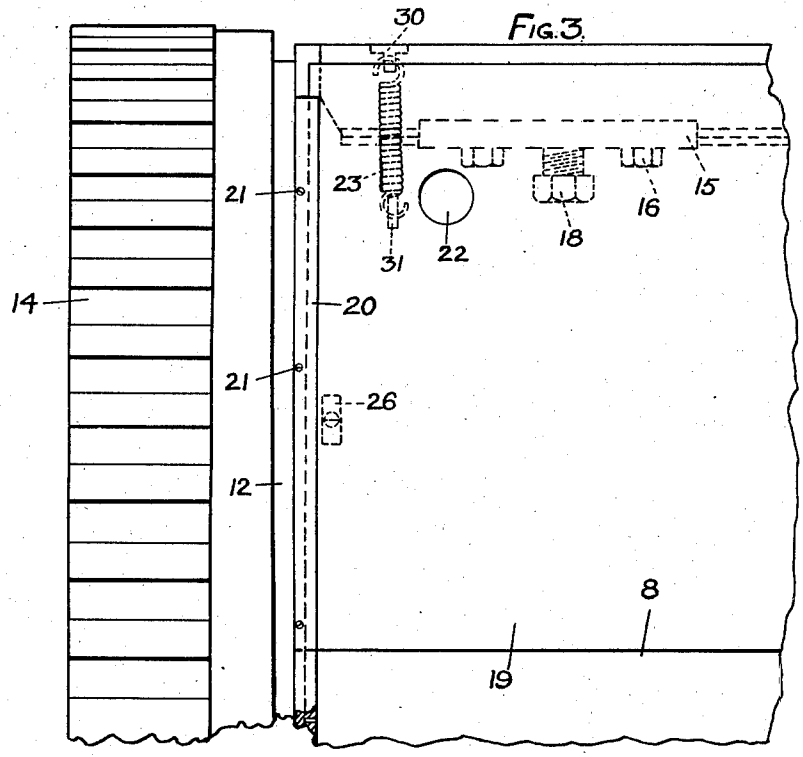
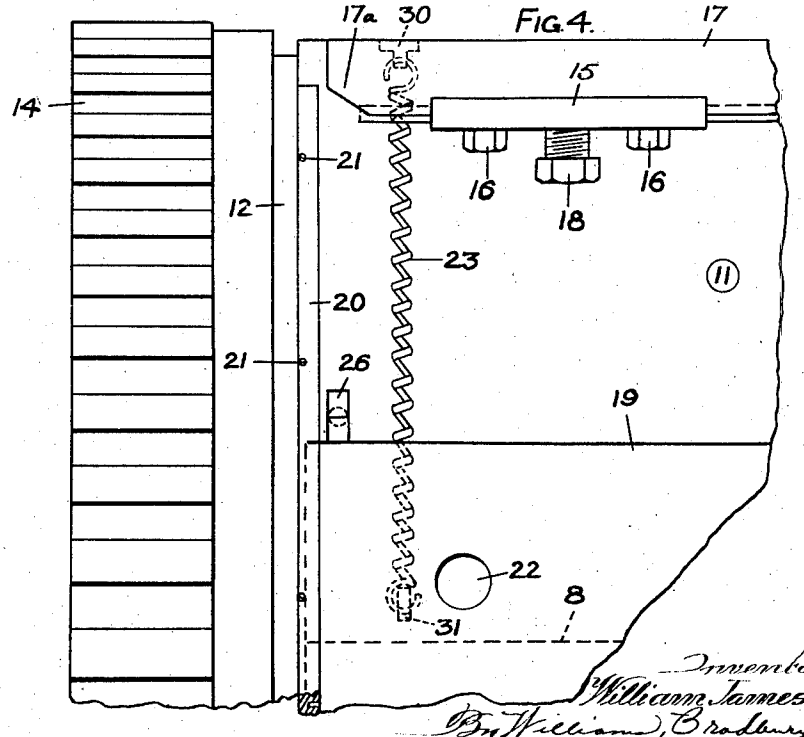


FIG. 4.



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SAFETY GUARD FOR INTERRUPTED CYLINDERS

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FIG. 5.

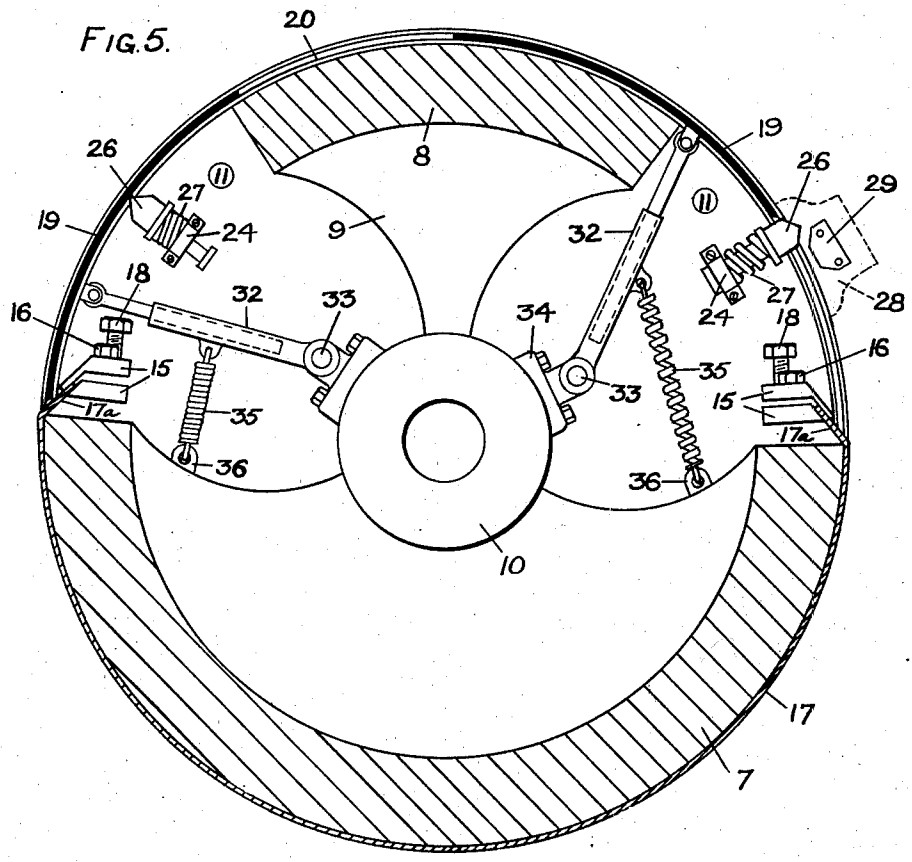
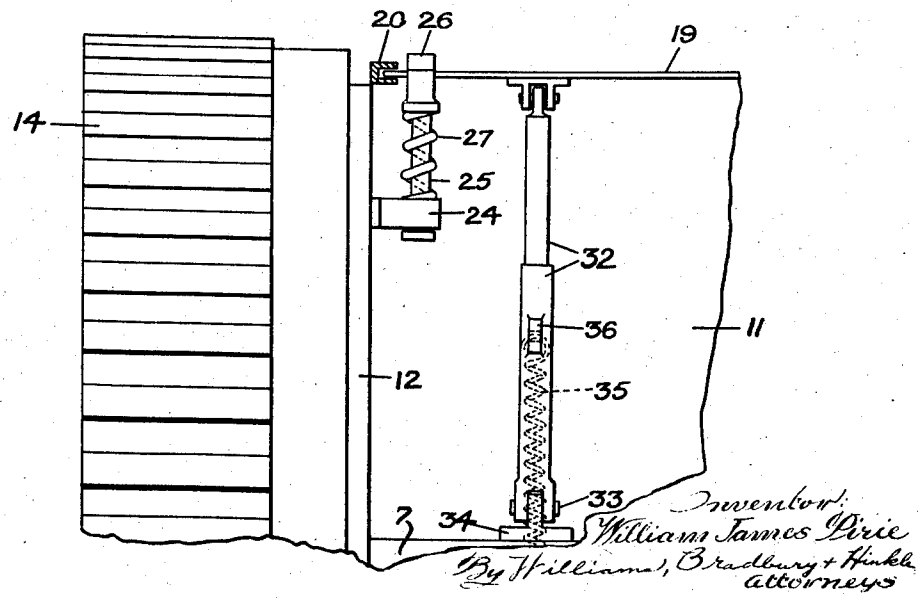


FIG. 6.



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UNITED STATES PATENT OFFICE

2,366,930

SAFETY GUARD FOR INTERRUPTED CYLINDERS

William James Pirie, Edinburgh, Scotland

Application February 5, 1944, Serial No. 521,242
In Great Britain, February 19, 1943

5 Claims. (Cl. 74—613)

This invention has reference to the provision of improved means for safeguarding operators from the risk of injury when working on rotating hollow cylinders of printing and other machines in which the cylinder surface is interrupted or not continuous.

In rotary off-set printing machines, the printing plate or other cylinders have gaps in the surface to give access to clamps or screws or other means in the interior of the cylinder, e. g. for adjusting and securing the printing plate upon the printing sector of the cylinder. Such gaps are dangerous to the operator, whose hand or fingers may become trapped between the edge of the gap and some other part of the machine when the cylinder is in rotation, and it is desirable to provide means for closing the gaps in the cylinder so as to make the cylinder surface in effect continuous. Such closing means must be so arranged as to be nearer the centre of the cylinder than the surface of the printing plate, in order to avoid interference with printing.

Although my invention is primarily designed for application to the rotary printing plate cylinders of off-set printing machines, it may also be applied to interrupted cylinders of other types of printing machines or to the rotary cylinders of any machine in which the cylinder surface is not continuous.

The present invention provides a cylinder surface which is in effect continuous and has no screws or other projections which might catch the hand or clothing of the operator or any cloth which he may be using while the cylinder is in rotation. In the case of printing machines, the operator frequently has to wipe the surface of the printing plate either with the palm of his hand or with a cloth, while the cylinder is in rotation, in order to remove fluff or other foreign matter which has adhered to the printing plate, and it is in the course of such operations that the hand of the operator may become trapped and drawn into the machine.

It is therefore the object of the present invention to provide a safety guard device which will be operative at all times and which will enable access to be obtained to the plate clamps, screws, or other adjusting means in the interior of the cylinder without removal of the guard device from the cylinder, the improved safety guard device normally completely closing the gap in the cylinder so that the latter presents an effectively uninterrupted surface.

The invention enables the gap in the cylinder to be opened when the cylinder is stationary, and means are provided whereby the safety guard device automatically closes the gap should the cylinder rotate through a predetermined angle and before it makes a complete revolution. The operator thus has complete access to the interior of the cylinder for making adjustments and complete protection from being trapped by the gap in the cylinder. Moreover, my improved safety guard completely covers the edges of the printing plates, so that the operator's hand cannot be trapped against the leading edge of the printing plate, heretofore a frequent source of accidents.

The safety guard device of the present invention comprises a segmental guard slidably mounted in arcuate guides for closing and opening movement across the gap in the cylinder, means operative to effect closing movement of the guard, a locking device for holding the guard in open position, and a tripping device operative to release the said locking device automatically on rotation of the cylinder through a predetermined angle of less than one complete revolution. The arcuate guides are concentric or approximately concentric with the axis of the cylinder and are of such radius that the outer surface of the guard is slightly nearer the centre of the cylinder than the effective contact surface of the cylinder.

In printing plate and like cylinders, it is usual for the cylinder to be formed with a dead sector which also acts as a balancing sector, a gap being provided between each edge of the dead sector and the adjacent edge of the effective or printing plate sector of the cylinder, and the dead sector surface has a radius of curvature equal to or slightly smaller than the radius of curvature of the printing plate sector. My invention accordingly further consists in providing a pair of segmental guards slidably mounted in arcuate guides for closing and opening movement of the guards across the gaps and over the surface of the dead sector, the latter being of such a radius that the guards when over the dead sector will be nearer the centre of the cylinder than the effective contact surface of the cylinder, the said guards being positioned either in the same radius of curvature as each other so as to abut when open, or being arranged to overlap each other when open, and means being provided for automatically effecting closing movement of the guards in opposite directions, each guard co-operating in open position with an automatically operating locking device adapted to be automatically released by a tripping device on partial rotation of the cylinder.

In order that the invention may be more clearly understood, reference is hereinafter made to the accompanying drawings whereon:

Fig. 1 is a cross-sectional view through a printing cylinder illustrating one gap guard closed and the other open.

Fig. 2 is a fragmentary sectional elevational view of the cylinder showing the gap guard open.

Figs. 3 and 4 are fragmentary elevational views of the cylinder showing the gap guard closed and opened respectively.

Figs. 5 and 6 are views corresponding to Figs. 1 and 2 illustrating a slight modification.

Referring to the drawings, there is illustrated a conventional form of printing cylinder having a prinitng sector 7 and a balancing sector 8, each supported by webs 9 from a hub 10 which is adapted to be secured on a rotary shaft of a printing machine. Gaps 11 extend longitudinally of the cylinder between end discs, one of which is shown at 12. Integral with or secured to the end disc 12 is a gear wheel 14 which provides a means of rotating the cylinder by meshing with suitable gearing on the machine. As is usual in printing cylinders of this type, the gaps 11 accommodate clamps 15 fitted with clamping screws 16 to enable the clamps 15 to grip the end margins 17*a* of a printing plate 17 which extends around the printing sector 7. Adjusting screws 18 also enable the clamps 15 to be adjusted for fitting and removing or changing the printing plate 17, and for stretching or tightening the printing plate upon the printing sector.

It will be observed that the gaps 11 form slots between the sectors 7 and 8 the full length of the cylinder. The clamps 15 are supported in these slots in any usual manner. It will also be observed that the radius of curvature of the printing surface of the plate 17 is greater than the radius of curvature of the surface of the balancing sector 8 so that the latter will not pick up ink from the inking rollers or contact the damping rollers with which the printing plate 17 co-operates during the printing operation.

In order to prevent the operator's hands or fingers from being inserted in the gap 11, I provide a safety guard which in the form shown comprises a plate 19 which can be made of metal or any suitably stiff material which is curved as shown to substantially follow the periphery of the cylinder. The curved edges of the segmental plate 19 are received in arcuate guides formed by channels 20 providing arcuate grooves at the ends of the cylinder. The channels 20 or their outer webs may be removably secured by screws 21 (Figs. 3 and 4) to enable the guard plate 19 to be detached for repairs. Finger holes or recesses 22 (Figs. 3 and 4) in the plates 19 enable them to be moved in the channels 20 to open the guards when the cylinder is stationary.

As shown in Figs. 1 to 4, each guard plate 19 is attached on its inside to springs 23 anchored to the interior of the cylinder in such a position that the springs tend to close the guards. Attached to each end disc 12 of the cylinder is a bracket 24 which slidably receives the tail stem 25 of a radially movable detent 26 urged outwards by a spring 27. The detent 26 is located in such a position as to engage the free edge of the guard plate 19 when the latter is open as shown at the right-hand side of Fig. 1 and in Figs. 2 and 4. When the guard plate 19 is closed or nearly closed, the detent 26 bears against the inside of the guard plate and springs into locking position to hold the guard open when the edge of the guard plate clears the detent. Mounted on a convenient part 28 of the machine, at a point where the guard plates, on closing, are out of the reach of the operator, is a tripping element 29 which, as shown, may be in the form of a fixed cam arranged to engage the detent 26 and press it radially inwards sufficiently to enable the guard plate 19 to close under the action of the springs 23. The outer end of the detent 26 may be oppositely bevelled as shown so that one bevelled edge rides against the fixed cam 29 when the cylinder has moved through a predetermined angle, while the other bevelled face of the detent engages the edge of guard plate 19 and has an angle of bevel such that the closing springs 23 can cause the edge of the guard plate 19 to push the detent further inwards after the fixed cam 29 has initially pressed the detent inwards, the guard plate 19 finally riding over the detent 26 and being closed to cover the gap in the cylinder by the pull of the closing springs 23. One edge of each guard plate 19 abuts, when the guard plate is closed, against the inturned marginal edge 17*a* of the printing plate, and the other edge of the guard plate 19 overlaps the dead sector 8 of the cylinder, and the surface of the guard plate 19 is at all times sufficiently below the surface of revolution of the printing plate to be clear of the inking and damping rollers or other elements which co-operate with the cylinder. The closing springs 23 may be anchored at one end to lugs 30 on the inside of the guard plate 19 and at the other end to lugs 31 on the effective sector 7, so as to obtain the maximum effective pull on the guard plate.

Referring now to Figs. 5 and 6 which illustrate a slight modification, each guard plate 19 is shown articulated to telescopic radius rods 32 pivoted at their inner ends at 33 to brackets 34 secured to the hub 10, or the radius rods 32 may be pivoted at their inner ends to any other convenient part in the interior of the cylinder. The radius rods 32 are controlled by tension springs 35 which connect the radius rods to lugs 36 at fixed points in the interior of the cylinder in such a position that the springs 35 tend to turn the radius rods about their pivots 33 in a direction to close the guard plates. This alternative arrangement may be found more convenient where it is desired to give complete freedom of access to the printing plate clamps 15 and the adjusting screws 16 and 18.

I claim:

1. In combination with a rotary cylinder having the cylinder surface interrupted by a gap extending longitudinally of the cylinder, a safety guard device comprising a segmental guard, arcuate guides on the cylinder to slidably receive the curved edges of said guard for closing and opening movement across the gap in the cylinder, means operative to effect closing movement of the guard, a locking device for holding the guard in open position, and a tripping device operative to release the said locking device automatically on rotation of the cylinder through less than one complete revolution.

2. In combination with a rotary cylinder having the cylinder surface interrupted by a gap extending longitudinally of the cylinder, a safety guard device comprising a segmental guard, arcuate guides on the cylinder to slidably receive the curved edges of said guard for closing and opening movement across the gap in the cylinder,

means operative to effect closing movement of the guard, a locking device for holding the guard in open position, and a tripping device operative to release the said locking device automatically on rotation of the cylinder through less than one complete revolution, said arcuate guides being concentric or nearly concentric with the axis of the cylinder and of such a radius that the outer surface of the guard is at all times slightly nearer the centre of the cylinder than the effective contact surface of the cylinder.

3. In combination with a rotary printing cylinder having a printing sector, a dead sector of smaller radius than the printing sector and separated therefrom by gaps extending longitudinally of the cylinder, a safety guard device comprising a pair of segmental guards, arcuate guides on the cylinder arranged to slidably receive the curved edges of said guards for closing and opening movement across the gaps in the cylinder and for movement over the surface of the dead sector, said arcuate guides being so positioned that the outer surfaces of the guards are at all times nearer the centre of the cylinder than the effective contact surface of the printing sector, means for automatically effecting closing movement of the guards in opposite directions, automatically operative locking devices co-operating with each guard to hold it in open position, and means for automatically releasing said locking devices on partial rotation of the cylinder.

4. In combination with a rotary cylinder having the cylinder surface interrupted by a gap extending longitudinally of the cylinder, a safety guard device comprising a segmental plate adapted to cover the gap and of slightly smaller radius than the radius of curvature of the effective contact surface of the cylinder, arcuate channels at the ends of said cylinder, said channels slidably receiving the curved edges of said plate, spring means connecting said plate on its inside to the interior of the cylinder, said spring means tending to close said plate over the gap, a radially-movable detent attached to the end of the cylinder and urged outwards by a spring, said detent being arranged to engage one edge of said plate to hold it in a position in which it uncovers the gap, and a fixed tripping element arranged to trip said detent in one position of the cylinder to enable the plate to close under the action of the said spring means.

5. In combination with a rotary cylinder having the cylinder surface interrupted by a gap extending longitudinally of the cylinder, a safety guard device comprising a segmental plate adapted to cover the gap and of slightly smaller radius than the radius of curvature of the effective contact surface of the cylinder, arcuate channels at the ends of said cylinder, said channels slidably receiving the curved edges of said plate, spring means connecting said plate on its inside to the interior of the cylinder, said spring means tending to close said plate over the gap, a radially-movable detent attached to the end of the cylinder and urged outwards by a spring, said detent being arranged to engage one edge of said plate to hold it in a position in which it uncovers the gap, said detent having oppositely bevelled faces at its outer end, and a fixed cam arranged to engage one of the bevelled faces of said detent to trip said detent in one position of the cylinder and to permit the edge of the guard plate to engage the other bevelled face of said detent, so that said spring means can close the plate over the gap.

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