

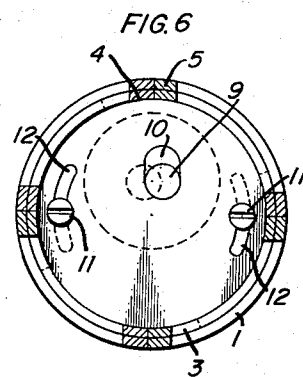
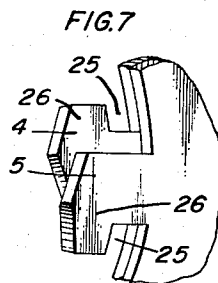
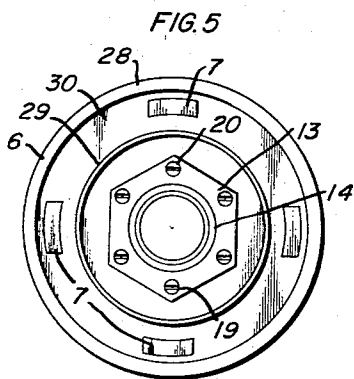
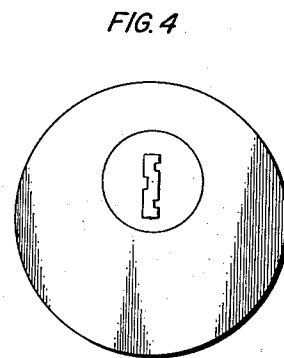
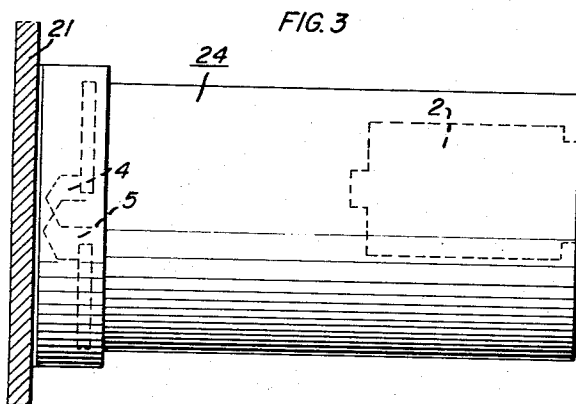
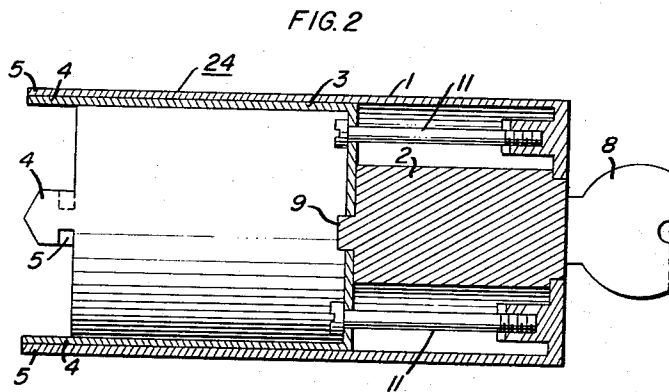
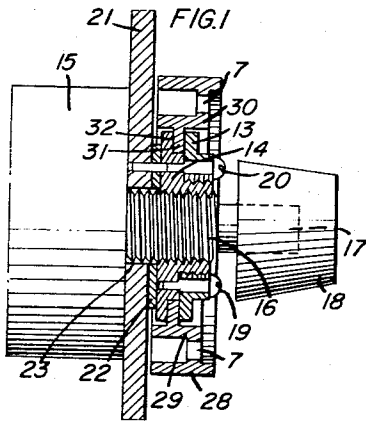
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CONTROL LOCK

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3,358,480

CONTROL LOCK

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ABSTRACT OF THE DISCLOSURE

A locking device for restricting access to a knob included in a panel and comprising a latching element supported from the panel and a housing shaped to extend over the knob. The latching element includes a plate disposed behind the knob and having a set of arcuate slots arranged on the circumference of a circle coaxial with the knob. The housing includes a pair of interfitting hollow cylindrical frames, that are rotatable with respect to one another. The outer frame includes a set of lugs which project through the slots and which have notches extending in from one side for over-fitting the plate at one end of the slots when such outer frame is rotated in one direction. The inner frame also includes a set of lugs which project into the slots and these lugs include notches extending in from one side for over-fitting the plate at the end of the notches opposite the one end when such frame is rotated in the direction opposite the one rotational direction of the outer frame. Means is also provided for effecting such opposite relative rotation of the inner and outer frames to lock them to the panel to restrict access to the knob.

This invention relates generally to locks and more particularly to a locking device construction for use in securing control devices, such as electric switches, circuit breakers, variable resistors, variable condensers, variable reactors, push buttons, control lights, telephone jacks, receptacles, indicators as well as pneumatic, hydraulic, mechanical, magnetic and similar control devices which are usually mounted on control panels, control boards, control plates, machinery, apparatus and the like.

An object of the invention is to provide a control lock which, by novel means, can be applied to new or existing control devices of various types to prevent operation of or tampering with such control devices by unauthorized persons and which will permit quick unlocking for normal operation.

Another object of the invention is to provide a control lock which is simple in construction, easy to use, well adapted for its intended purposes and relatively inexpensive to manufacture.

Still another object of the invention is to provide a control lock of small dimensions due to novel design, which permits use in confined areas.

The locking device of the present invention essentially comprises a latching element supported from the panel and a housing that is adapted to extend over the knob. The housing comprises an outer frame and an inner frame supported by the outer frame. One of the frames is movable with respect to the other.

A latching element, that is engageable with the panel supported latching element, is included in the housing and is actuated by the relative movement of the frames.

The housing also includes means for moving one of the frames with respect to the other frame.

These together with other objects and advantages which will become subsequently apparent reside in details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawing forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

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FIGURES 1 and 2 show, in top section, all elements of one development of a control lock constructed in accordance with this invention, FIGURE 1 showing a typical control knob mounted on a panel and a latching element supported from the panel, and FIGURE 2 showing a housing and included latching element;

FIGURE 3 is a side elevation of the panel supported latching element and housing, shown in FIGURES 1 and 2, the housing being in the locked position;

FIGURE 4 is a right end view of the housing shown in FIGURE 3;

FIGURE 5 is a right end view of the adapter flange shown in FIGURE 1, the control knob being removed;

FIGURE 6 is a left end view of the housing, shown in FIGURE 2, the ends of the lugs forming the latching element being cross hatched for clarity;

FIGURE 7 is a perspective detail of the housing latching element.

In carrying out this development of the invention, referring now specifically to the drawing, there is provided a housing 24 that includes an outer frame 1. The outer frame 1 is open on one end and a conventional cylinder lock 2 is mounted in the other end. An inner frame 3 is rotatably supported by the outer frame 1. The two frames are preferably concentric cylinders. The frames 1 and 3 each include four lugs 4 and 5 respectively, that extend from their respective open ends. The lugs 4 and 5 include oppositely facing notches 25 and the extending ends of the lugs 4 and 5 form latching lips 26. When the cylinder lock 2 is in the unlocked position and the locking lugs 4 and 5 are in alignment, the locking lugs 4 and 5 can be inserted into the adapter 6 through the slots 7.

With the locking lugs 4 and 5 inserted in slots 7, turning the key 8, will cause the cylinder lock 2 eccentrically positioned pin 9 to be moved through an arc. Since the pin 9 extends through the slot 10, in the closed end of the inner frame 3, the circular movement of the pin will cause the inner frame 3 to rotate with respect to the outer frame 1 thus, moving the locking lugs 4 and 5 out of alignment and into the position shown in FIGURE 3. The latching lips 26 of lugs 4 and 5 will then engage the adapter 6 on both ends of slot 7, thus locking the housing 24 over the control knob 18 thereby rendering it inaccessible and the control device 15 inoperable.

Movement of inner frame 3 longitudinally in the outer frame 1 is restricted by screws 11 extending from the outer frame, as shown in FIGURE 2 and FIGURE 6. The inner frame 3 includes arcuately shaped, elongated openings 12 through its inner end for accepting the screws 11. The openings 12 are of sufficient length to permit rotation of inner frame 3 with respect to outer frame 1 sufficiently for the locking lugs 4 and 5 to rotate into locked position with the adapter 6 as shown in FIGURES 3 and 7.

The adapter 6 is comprised of an outer hollow cylinder 28, an inner hollow cylinder 29 and a ring plate 30. The inner cylinder 29 includes an inwardly extending flange 31 that is adapted to be utilized to retain the adapter 6. The slots 7 are included in the plate 30. A retainer 13 is threaded onto a mounting nut 14. The retainer 13 and mounting nut 14 form a groove 32 for accepting flange 31, thereby leaving the adapter 6 free to turn in the groove. The retainer 13 and mounting nut 14 are secured together by screws 19. A longer screw 20 extends through the retainer 13 and nut 14 and into the panel 21. Thus, when the housing 24 is locked into position with the adapter 6, the screws 19 and 20 are inaccessible and the retainer 13 and nut 14 cannot be removed from sleeve 16.

In operation of the lock, a control device 15 of the single-hole-mount type, having an integral threaded mounting sleeve 16 and a concentric operating shaft 18,

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is mounted on the panel 21. The adapter 6 mounted on the panel 21 by retainer 13 and nut 14 being tightened on the threaded sleeve 16 and against the lock washer 22. The knob 18 is then installed on the shaft 17. The control device is then in normal operating condition. To install the control lock, key 8 is inserted in the cylinder lock 2 and lock 2 turned in a clockwise direction, as viewed in FIGURE 6, thus causing eccentric pin 9, to move in an arc around the axis of the cylinder lock 2. The pin bears against one edge of slotted opening 10 at a point above the axis of inner frame 3, causing relative rotational movement between inner frame 3 and outer frame 1, until locking lugs 4 and 5 are in alignment, as in FIGURES 2 and 6, and can be inserted in slots 7. The lugs 4 and 5 are then inserted in the slots 7 and the key 8 is turned in the opposite direction, to cause the eccentric pin 9 to bear against the locking edge of slotted opening 10 thereby causing relative rotation of the frame 3. The lugs 4 and 5 are thus moved out of alignment until they reach the locked position with notches 25 extending over the plate 30 at the end of the slots 7 and the lips 26 engaging the underside of the plate as in FIGURES 3 and 7. This locked position is reached simultaneously with the cylinder lock 2 reaching its locked position so that the key 8 can be removed. To unlock, that is to permit access to the control device, the key 8 is inserted in the cylinder lock 2 and turned in the unlocking direction so that by reverse action of means previously described in the locking operation the locking lugs 4 and 5 are moved into alignment, permitting the housing 24 to be removed from the adapter 6.

The elongated openings 12, FIGURE 6, in the end portion of the inner frame 3 are exactly sized in their length dimension to act as stops to limit the relative rotational movement of frames 1 and 3 around their common axis to coincide with the alignment of lugs 4 and 5 on one extreme and to coincide with the locked position of cylinder lock 2 in the opposite extreme position.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily be apparent to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

Having thus completely and fully described the invention, what is now claimed as new is as follows:

1. A locking device for restricting access to a knob included in a panel, which device comprises in combination:

(A) a first latching element supported from the panel and including a rearwardly facing latching surface,
(B) a housing that is adapted to extend over the knob, which housing includes:

- (1) an outer frame;
- (2) an inner frame supported in the outer frame, said frames being movable relative to one another;
- (3) a second latching element including a forwardly facing latching surface on one of said frames;
- (4) means for moving said one frame with respect to the other frame;
- (5) means on said other frame engaging said first latching element (A) and causing said forwardly facing latching surface to engage behind said rearwardly facing latching surface upon the relative movement in one direction of said one frame to lock the housing into position extending over the knob.

2. A locking device as defined in claim 1, characterized in that the relative movement between said inner frame (B) (2) and said outer frame (B) (1) is rotational and that said frames are shaped to enable such relative movement.

3. A locking device as defined in claim 2, characterized in that said outer frame (B) (1) is cylindrically shaped.

4. A locking device as defined in claim 2, characterized in that said inner frame (B) (2) is cylindrically shaped.

5. A locking device as defined in claim 2, characterized in that said first latching element (A) includes:

- (1) a latching surface disposed in the rotational path of said second latching element (B) (3) and facing in one rotational direction;
- (2) a latching lip disposed in the rotational path of said second latching element (B) (3) and facing in the opposite rotational direction;

and further characterized in that said second latching element (B) (3) includes:

- (a) a lug extending from said outer frame (B) (1) and adapted to interfit said latching surface (A) (1) and said latching lip (A) (2);
- (b) a lug extending from said inner frame (B) (2) and adapted to interfit said latching surface (A) (1) and lip (A) (2), one of which lugs includes a latching lip for engaging said latching lip (A) (2).

6. A locking device as defined in claim 2 wherein said first latching element (A) includes a radially extending surface facing in one direction of rotation and wherein said forwardly facing latching surface included in said second latching element (B) (3) is included in one of said frames and the other of said frames includes a radially extending surface facing in the direction of rotation opposite said one direction of rotation for engagement by said first mentioned radially extending surface upon relative rotation in said one direction of said one frame to lock said forwardly facing latching surface behind said rearwardly facing latching surface.

7. A locking device as defined in claim 2 that includes means for fastening said inner frame (B) (1) and said outer frames (B) (3) together.

8. A locking device as defined in claim 2, characterized in that said moving means (B) (4) includes:

(a) a key operated locking mechanism.

9. A locking device as defined in claim 8, characterized in that said key operated mechanism (4) (a) is operatively rotatable and that the mechanism is supported by one of said frames with its axis of rotation extending longitudinally of the axis of rotation of the rotatable frame and disposed transversely therefrom and further characterized in that the key operated mechanism includes:

- (1) an operating peg extending longitudinally of the axis of rotation and disposed transversely of the mechanism axis of rotation;

and further characterized in that the other of said frames includes:

- (a) a notch for engaging the mechanism operating peg, which notch extends transversely of the mechanism axis and parallelly of a line extending from the mechanism axis to said rotatable frame axis.

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