

July 14, 1942.

E. J. MASTNEY

2,289,513

INTERLOCK MECHANISM

Filed March 29, 1940

2 Sheets-Sheet 1

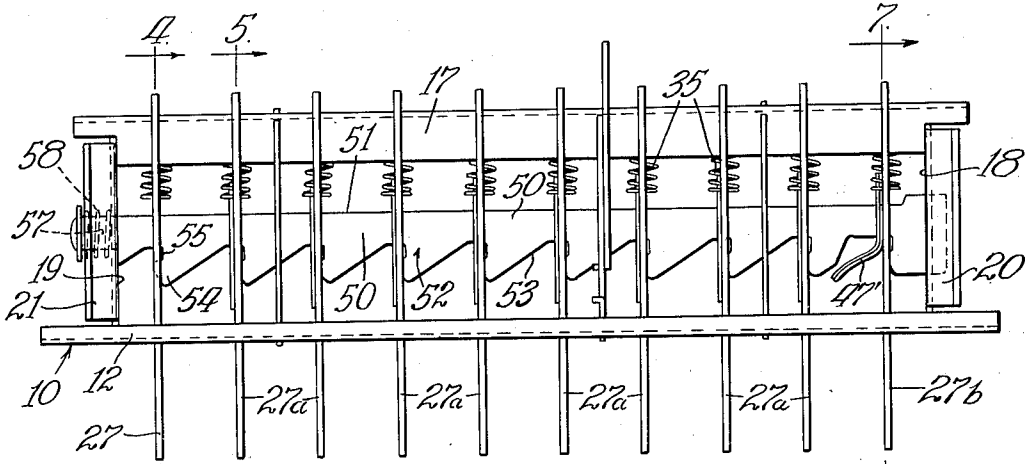


Fig. 1.

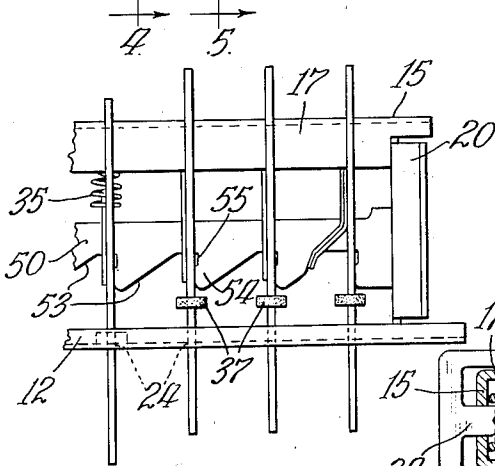


Fig. 2.

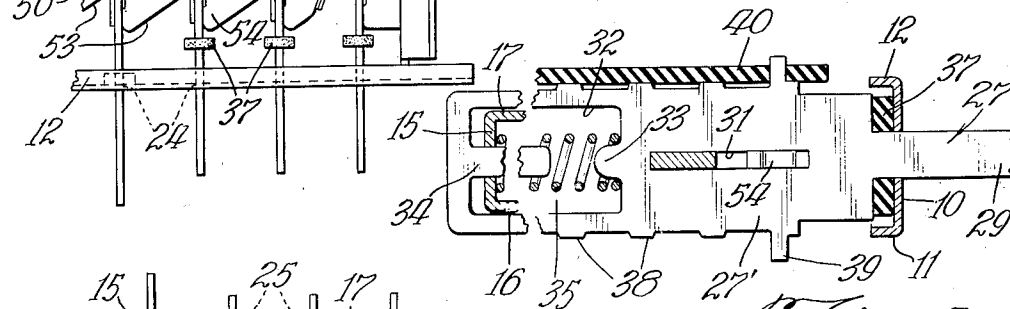


Fig. 3.

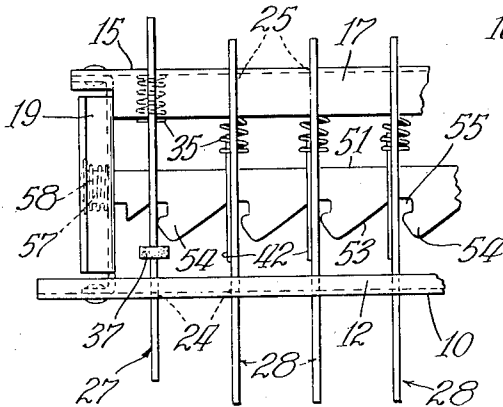


Fig. 4.

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2 Sheets-Sheet 2

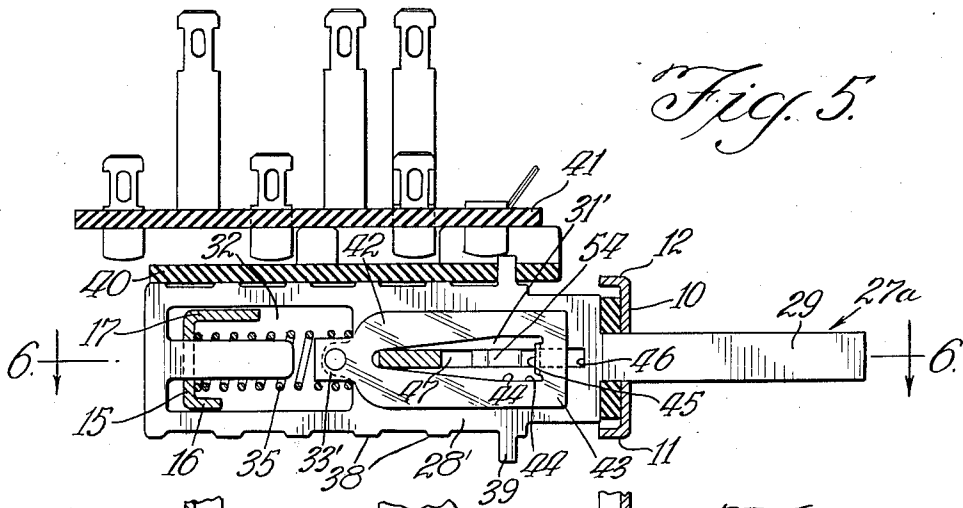


Fig. 5.

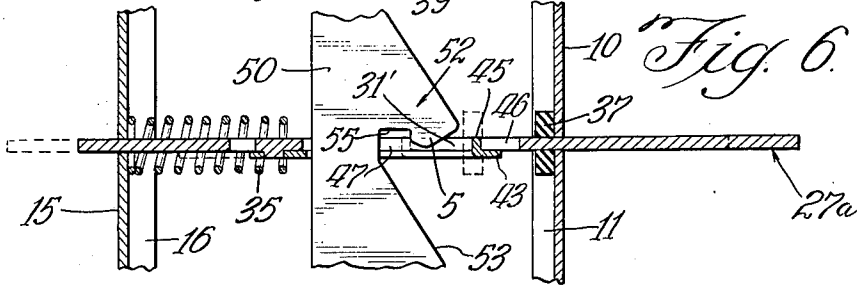


Fig. 6.

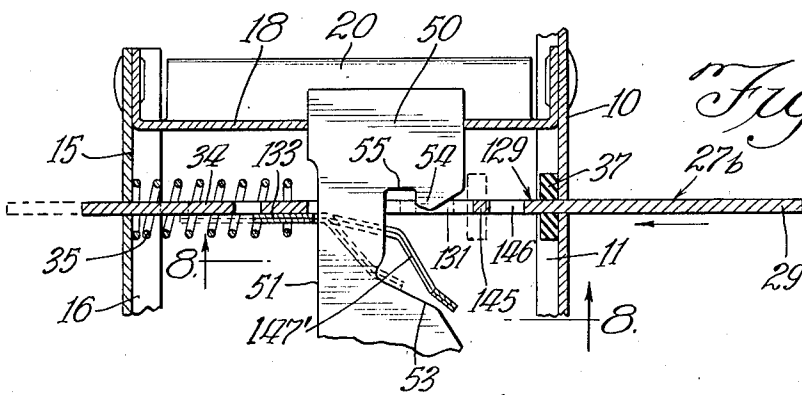


Fig. 7.

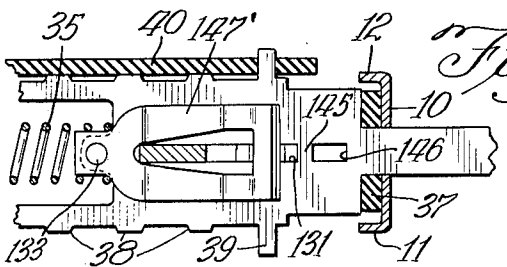


Fig. 8. Inventor:  
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# UNITED STATES PATENT OFFICE

2,289,513

## INTERLOCK MECHANISM

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Application March 29, 1940, Serial No. 326,580

### 1 Claim. (Cl. 74—483)

This invention relates to an interlock mechanism but may be used for electric switching and the like. The mechanism provides a plurality of push button controls movable between two positions. Means are provided whereby each button may be independently locked into a pushed position or may be returned to its free position and in case of the former, means may be provided whereby previously locked push buttons may be unlocked or not as desired.

The interlock mechanism described herein may be used with the switching mechanisms described and claimed in the application of Edward J. Mastney et al., Serial No. 180,742, filed December 20, 1937, or of Kenneth C. Allison, Serial No. 231,399, filed September 23, 1938. The interlock mechanism described herein is an improvement on the interlocking mechanism described in both of the applications above referred to.

Referring to the drawings:

Figure 1 is an elevation view of the mechanism with all parts in a normal position;

Fig. 2 is a detail of the mechanism of Fig. 1 with the locking push rod down into position and several push rods locked thereby;

Fig. 3 is a detail view of the left hand end of the mechanism shown in Fig. 1 with the unlocking rod operated to release all the previously locked push rods;

Fig. 4 is a sectional view on line 4—4 of Fig. 1;

Fig. 5 is a sectional view on line 5—5 of Fig. 1 and showing switching elements operated by the switch mechanism;

Fig. 6 is a section on line 6—6 of Fig. 5;

Fig. 7 is a section similar to Fig. 6 but taken at right angles to the plane of rod 27b and through its longitudinal axis.

Fig. 8 is a section on line 8—8 of Fig. 7.

The mechanism is made of steel or other suitable material and in general comprises a front channel shaped member 10 having turned up edges 11 and 12 and a rear channel shaped member 15 having turned up edges 16 and 17, both forming spaced members rigidly maintained in position by end members 18 and 19 respectively. End members 18 and 19 may be fastened together to the base members 10 and 15 in any suitable fashion. As clearly indicated in Figs 2 and 3, end members 18 and 19 have their sides bent outwardly to form flanges 20 and 21 respectively.

Front member 10 is provided with a plurality of spaced parallel slots 24 extending transversely thereof while rear member 15 is provided with similar slots 25, one slot of each series being adapted to register with a slot of the other series

to form a cooperating pair of slots. Slidably disposed in each pair of slots are unlocking push rod 27, switch operating push rods 27a and locking push rod 27b, push rods 27a being all similar while 27 and 27b differ from each other and from push rod 27a.

Referring particularly to Fig. 4, unlocking push rod 27 is provided with a body portion 28 and a handle portion 29. Body portion 28 has a long narrow slot 31 at one portion thereof and a large cutout 32 near the bottom end thereof. Cutout 32 is of such a shape as to leave opposing fingers 33 and 34 therein, finger 34 being longer and extending through one of the slots 25 in bottom or rear base member 15. A coil spring 35 is disposed around the opposing fingers 33 and 34 between the body 28 of the push rod and the inside of channel member 15 and is adapted to bias the entire push rod toward the front, that is in the position shown in Fig. 1. As clearly shown in Fig. 3, however, push rod 27 may be pushed against the bias of spring 35 to a rear position.

The rear position of push rod 27 and for that matter of all the push rods is limited by the intersection of one upturned edge 17 of rear base member 15 striking the body portion of the push rod.

Push rod 27 may have a felt or rubber washer 37 between the body and inside of front base member 10 to silence the push rod on the return stroke. The push rod is also provided with a plurality of ears 38 and a large ear 39 on each side thereof on which may be loosely mounted a sheet of insulation 40 (to carry contacts) that may be pushed backward and forward during the operation of the rod. As shown in Fig. 5, a stationary insulating member 41 having contacts cooperates with movable member 40.

Push rods 27a are generally similar to push rod 27 in having a handle portion 29 and a cutout portion 32 with opposing fingers 33 and 34 and a coil spring 35. The difference between rods 27a and rod 27 lies in the body portion 28' wherein an elongated slot 31' is provided. Slot 31' is substantially longer than slot 31 in rod 27, the two slots being normally aligned with regard to the side thereof and the rear portion thereof, that is nearest the bottom of the push rod, slots 31' however extending nearer the front base member 10 than slot 31 does. This comparison of course is made with all the rods aligned.

Each push rod 27a has riveted thereto, as for example at 33', a flat spring 42 having an end portion 43 and a cutout 44. Spring 42 is normally disposed to lie against body 28' of the push

rod and by virtue of a tip 45 at end portion 43, long slot 31' is divided into a small forward or upper locking slot 46 and a long rear or bottom slot 47. Long slot 47 has substantially the same length as slot 31 in rod 27.

Locking push rod 27b has the same general construction as push rods 27 and 27a as far as the finger portion 29 and spring supporting portions 33 and 34 within a cutout. The body portion 128 however has a slot 131 which is identical with slot 31 of rod 27 and in addition thereto has a locking slot 146 normally registering with slot 46, the two slots in this rod being punched to leave an intervening partition 145.

Slidably disposed in the end members and threaded through the push rods is a locking bar 50 having a smooth rear edge 51 and a plurality of serrations 52 on the opposite side thereof. The serrations 52 correspond with the push rods 27 to 27b inclusive, there being one serration for each push rod. Each serration comprises a generally straight sloping portion 53 with a tip 54 which goes down into a recessed locking portion 55 and then joins the straight portion 53 of the next serration. One end of locking bar 50 is reduced as at 57 and is provided with a coil spring 58 around said portion as it extends beyond end member 19. Coil spring 58 cooperates with end member 19 to bias the locking bar in the position shown in Fig. 1.

With all the rods shown in the position in Fig. 1 the large slot of each of the push rods register sufficiently to accommodate the tip 54 of each serration. The unlocking slots are adapted to register with serration tip 54 in the depressed position of a push rod.

Push rod 27b has riveted thereto at 133 a spring 147' bent into the shape shown in Fig. 7 and adapted to press against straight portion 53 of the adjacent serration when the rod is pushed down into locking position.

When unlocking rod 27 is pushed to the position shown in Fig. 3, slot 31 goes out of registry with the locking bar with the result that the body portion 28 of the push rod acting upon the tip 54 of the corresponding serration forces the locking bar to the left to an unlocking position. Hence, every tip 54 is moved sideways and out of the corresponding push rod interior and the result is that every push rod is unlocked and permitted to return to its front position in response to the bias of its coil spring 35, if not there already. Unlocking rod 27 not having a locking slot will always return when released.

When one of the push rods 27a is depressed and the locking bar is in the position shown in Fig. 1, then the corresponding slot 47 is thrown out of alignment. Thus referring to Figs. 5 and 6 when the push rod is operated, separating lip 45 carried by the spring 42 is pushed past the locking tip 54 of the particular serration. Spring 42 is stiff enough so that the locking bar will yield due to the cam action of the locking tip 54 of that particular serration. Then the locking tip can move back into small slot 46. At the same time any of the rods 27a which may have been locked previously are permitted to return due to the unlocked portion of the locking bar.

In the event that push rod 27b is pushed into locking position, tip 54 of the serration goes into small slot 146 while spring 147' is pushed into the dotted line position to engage the straight portion 53 of the adjacent serration. This spring 147' is sufficiently stiff to hold the locking bar in the locked position shown in Fig. 1 irrespective of subsequent operation of push rods 27a. Hence if any of the push rods 27a are now pushed down, the locking bar 50 will not yield but will force spring 42 to flex out of the way and permit the locking tip to go into small locking aperture 44'. Hence any of the push rods 27a will remain in a locked position. The entire mechanism including all push rods 27a and locking rod 27b may be released by pressing on rod 27. Since rod 27 does not have any locking aperture the action of the front edge of slot 31 on the locking tip 54 of the bar will force the locking bar to clear all rods 27a and rod 27b and permit them to return. Spring 147' also snaps back into its clear unlocked position.

What is claimed is:

An interlock mechanism for switches or the like, said mechanism comprising a base having a plurality of parallel push rods movable therein between two end positions, said rods having aligned body portions, one of said rods being an unlocking rod, another being a locking rod and remainder being normal operating rods, means for biasing every one of said rods to one position, each rod having a slot in the body thereof to form a series of aligned slots in said one position, a locking bar threaded through said series of rod slots, said locking bar being movable lengthwise transversely of said rods between a locking and unlocking position, said bar having a serration for each rod, each serration normally extending into the slot region of each rod when said rod is in its one position and when the bar is in the locking position, the slots being small so that when a rod is pushed into another position, said serration is normally forced out of the rod slot to move the bar to an unlocking position, said locking and remaining rods having an additional locking slot in the body thereof, said locking slots forming a second series of aligned slots parallel to the first series when the ends are in the same position, each first mentioned slot and locking slot being aligned along the direction of rod movement, a serration being adapted to extend into a locking slot when the corresponding rod is in its other position and said locking bar is in its locking position, means for biasing said locking bar to a locking position, the remaining rods each having a spring member to form the two slots, said spring member being deflectable to permit the push rod to reach its other position in the event that the locking bar does not go to an unlocking position, means on said locking rod for retaining the locking bar in a locked position and retaining said rod in its other position irrespective of the movement of the remaining rods, said unlocking rod however forcing said locking bar to a position for releasing both the locking bar and locking rod when said unlocking rod is moved to its other position.

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