Nov. 15, 1938. A. J. DENERICH 2,136,493

PERMUTATION LOCK

Filed Dec. 9, 1936 2 Sheets-Sheet 1

Fig. 1

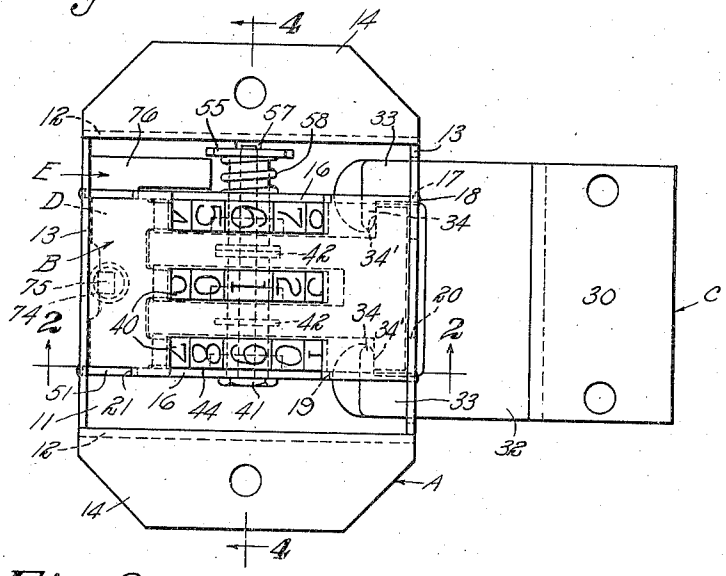


Fig. 2

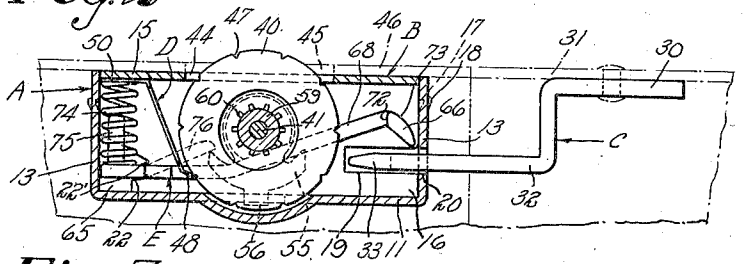


Fig. 3

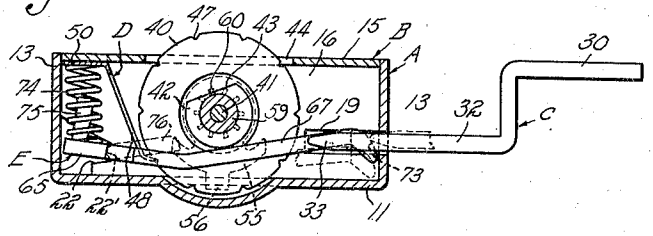
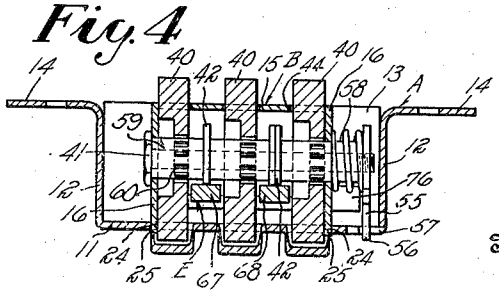


Fig. 4



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Fig. 5

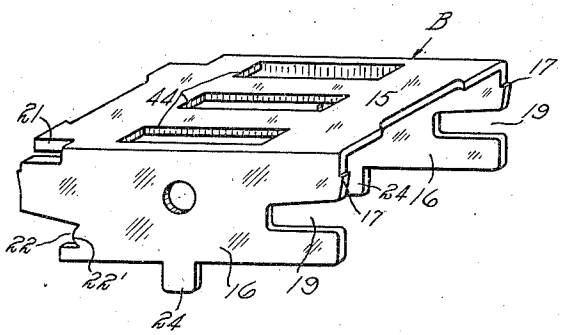


Fig. 6

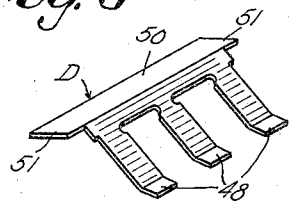
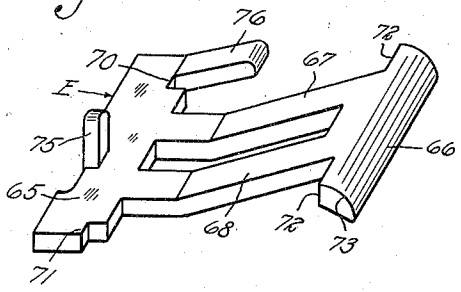


Fig. 7



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UNITED STATES PATENT OFFICE

2,136,493

PERMUTATION LOCK

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Application December 9, 1936, Serial No. 114,941

10 Claims. (Cl. 70—80)

This invention relates to keyless locks and has particular reference to permutation locks of the type provided with a plurality of settable wheels or tumblers bearing suitable indicia and with which are associated lock controlling elements. It is, of course, understood that the improvements of the present invention may be incorporated in locks irrespective of their use, but, by way of example, I have shown my improvements as applied to a lock for use on cash boxes and the like.

An object of the present invention is to provide an improved lock having various features of novelty and advantage and which is particularly characterized by its extreme simplicity and economy in construction.

A further aim of the invention is to provide an improved, simplified, and effective lock wherein the catch or other securing element may be engaged with the locking bolt when the prevailing combination is broken or disturbed by merely moving the catch into its normally locked position. Thus, while the catch is disengaged, the prevailing combination may be broken so that unauthorized persons may not easily determine the combination, and the catch may be engaged by merely moving it home.

Other objects will be in part obvious, and in part pointed out more in detail hereinafter.

The invention accordingly consists in the features of construction, combination of elements and arrangement of parts which will be exemplified in the construction hereafter set forth and the scope of the application of which will be indicated in the appended claims.

In the accompanying drawings, wherein I have shown, for illustrative purposes, one of the many embodiments which the present invention may take:

Figure 1 is a front view of a lock incorporating my invention;

Fig. 2 is a side view of the lock in section, this view being taken substantially on line 2—2 of Fig. 1 and showing the locking bolt in non-effective position;

Fig. 3 is a view similar to Fig. 2 and showing the locking bolt in effective or locking position;

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

Fig. 5 is a perspective view of the chassis or frame which supports the operating parts;

Fig. 6 is a perspective view of the detent which retains the permutation wheels in the various positions to which they may be set; and

Fig. 7 is a perspective view of the locking bolt.

Referring to the drawings in detail, A designates generally a housing preferably formed of sheet metal and having a rear wall 11, side walls 12, and end walls 13. Extending from the edges of the side walls 12 are flanges 14 by means of which the lock may be secured to the wall of a cash box or the like. The letter B designates a chassis or frame which is preferably formed from a blank of sheet metal bent into channel shape so as to provide a front wall 15 and parallel side walls 16. The chassis is of less width than the casing A and fits snugly between the end walls 13. On the ends of the side walls 16 are small nubs 17 adapted to spring into small recesses 18 in the end walls 13 so as to hold the chassis and the parts carried thereby in place within the casing. The side walls 16 of the chassis have, at one end, notches 19 adapted to register with openings 20 in one end wall 13 of the casing so as to accommodate one end of the catch C as later described. These side walls, at their opposite ends, have notches 21 immediately adjacent the front wall 15 for accommodating the detent D, and also recesses 22, the inner ends of which constitute fulcrum seats for the locking bolt E. Extending from the rear edges of the side walls 16 are lugs 24 which take into openings 25 in the rear wall of the casing so that the chassis is held against lateral movement in the casing.

The securing element in the present illustrative disclosure is in the form of a catch C, the same being formed of sheet metal and having an attaching portion 30 adapted to be secured to the wall 31 of a cover of a cash box, for example. The catch also has an offset bolt engaging portion 32 which has, at its free end, spaced arms 33 which terminate in lugs or toes 34 directed towards one another. The lugs 34 provide outwardly facing locking shoulders 34'. The ends of the arms are preferably tapered, as illustrated.

The permutation mechanism is generally similar to that illustrated and described in my Patent No. 1,964,936 granted July 3, 1934. It comprises a plurality of settable wheels 40 suitably supported on a shaft 41 which, in turn, is supported by the side walls of the chassis or frame B. Each permutation wheel has associated with it a concealed lock controlling element here shown as being in the form of a disk 42 cut away at one side as at 43. The peripheries of the permutation wheels are provided with suitable indicia, such as equally spaced markings running from zero to nine. Portions of the peripheries of these wheels extend through slots 44

in the front wall of the chassis and in registering slots 45 in a face plate or wall 46 of the cash box so that the wheels are readily accessible for manipulation. The peripheries of the wheels have spaced notches 47 with which cooperate the free ends of the fingers 48 of the detent D so that the wheels are frictionally held in their various set positions. The detent D is formed from light sheet metal and has a cross portion 50 provided at its ends with lugs 51 which take into the notches 21 of the chassis. For the purpose of permitting the combination to be readily changed, the shaft 41 is mounted for sliding movement and carries a head 55 provided with a lug or finger-piece 56 extending through an opening 57 in the rear wall of the casing A. The spring 58 normally urges the shaft to the position shown in Fig. 4. Each lock controlling element has associated with it a hub 59, and each hub has splines or ribs 60 on its periphery. Each permutation wheel has a central opening provided with grooves adapted to receive the ribs 60 on the respective hub. To change the combination, it is merely necessary to push the shaft to the left (referring to Fig. 4) to thereby disengage the ribs from the wheels, then turn the wheels to the desired combination, and finally release the shaft, whereupon it will resume the position shown in Fig. 1.

Referring now to the locking bolt, which is most clearly shown in Fig. 7, the same comprises a stamping having a cross bar 65 at its pivoted end, a cross or locking bar 66 at its free end, and spaced longitudinally extending members 67 and 68. The cross bar 65 has laterally extending lugs 70 and 71 adapted to engage in the seats or recesses 22 in the chassis. The inner ends of these recesses are angularly formed, as at 22', so as to constitute fulcrums for the locking bolt. The longitudinally extending members 67 and 68 straddle the central permutation wheel and are adapted to engage the peripheries of the lock controlling elements 42. The cross bar or head 66 of the locking bolt extends laterally beyond the longitudinally extending bars so as to provide inwardly facing shoulders 72 which are adapted to cooperate with the outwardly facing locking shoulders 34' of the lugs or toes 34 of the catch. It will be seen from the drawings that the fulcrum for the locking bolt and the locking head of the bolt are disposed to opposite sides of the lock controlling members and the lock controlling members cooperate with the intermediate portion of the bolt, an arrangement which lends simplicity and compactness to the assembly. The bar or head 66 is angularly disposed with respect to the length of the locking bolt, and the outer face 73 of the head is curved so as to provide a cam surface which is disposed at an angle to the direction of movement of the catch as the latter is moved into locking position. The locking bolt is resiliently urged into engagement with the peripheries of the lock controlling elements and is urged into the non-effective or non-locking position shown in Fig. 2 when the prevailing combination is established by a suitable spring which, in the present instance, takes the form of a coiled compression spring 74 positioned between the bar 65 of the locking bolt and the front wall of the chassis. The bar 65 has an angularly disposed finger 75 projecting into the spring so as to hold it against displacement.

In order to prevent surreptitious or careless operation of the combination change means while the locking bolt is in locking position, the bar 65 of the locking bolt is provided at one end with a finger 76 adapted to cooperate with the head 55 which, as stated, is connected to one end of the shiftable shaft 71 on which the permutation wheels are mounted. From Fig. 3, it will be seen that, when the bolt is in locking position, the finger 76 engages behind the head 55 so that the shaft cannot be moved to the left, reference being had to Fig. 4. When the locking bolt is in the non-locking position shown in Fig. 2, the finger is out of the path of movement of the head so that a change in the combination may be effected.

It will be seen, particularly from Figs. 2 and 3, that, when the prevailing combination is set up on the wheels, the flats 43 of the lock controlling members are aligned and are disposed towards the locking bolt so that the locking bolt, under the influence of the spring 74, will be in the non-locking or non-effective position shown in Fig. 2. In this position, it is to one side of the openings 20 which accommodate the catch. With the locking bolt in this position, the catch may be inserted into the casing and may be withdrawn therefrom without affecting the position of the bolt. When one or more of the wheels is turned so as to disturb the prevailing combination, the locking bolt is moved to the locking position shown by full lines in Fig. 3 and in which position the locking shoulders 72 are aligned with and face away from the openings 20. If the bolt is moved from non-locking position to locking position after the catch has been inserted in place, the locking shoulders 72 of the bolt are moved behind the shoulders 34' of the catch and, therefore, the catch is locked in position and cannot be withdrawn until after the prevailing combination is again set up on the wheels. It is desirable that the prevailing combination may be disturbed when the catch is disengaged so that unauthorized persons cannot readily determine what the prevailing combination is and to allow of engagement of the catch with the bolt without again setting the wheels to the prevailing combination. These advantageous features are accomplished with my improved arrangement. Referring to Fig. 3, it will be seen that if the catch has been withdrawn and the prevailing combination is disturbed, the inclined face 73 on the free end of the locking bolt is opposed to the openings 20 in the casing and is inclined to the line of movement of the catch when the latter is moved into the casing. As the forward end of the catch, shown by broken lines in Fig. 3, engages this face, the bolt is cammed to the broken line position shown in that figure; that is to say, the bolt is cammed away from the lock controlling elements. On continued inward movement of the catch, the lugs 34 move past the head 66 of the bolt and then the spring 74 moves the bolt back to locking position and in which position the locking shoulders 72 are opposed to the shoulders 34'. Thus it will be seen that the locking bolt has three positions, namely, an intermediate locking position, a non-effective position to one side of the locking position, and a third position to the opposite side of said locking position. The spring 74 is effective in urging the locking bolt to its locking and non-effective positions, and the locking bolt is moved to its third position only when the prevailing combination is disturbed and the catch is then inserted in place.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made

without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the language used in the following claims is intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

I claim as my invention:

1. In a permutation lock, permutation members each provided with a lock controlling element, a catch movable into and out of locked position, a locking bolt controlled by said lock controlling elements and adapted, when the prevailing combination is set up, to assume a non-effective position and, when the prevailing combination is disturbed, to assume an effective position in which said catch is secured in locked position, said bolt being mounted for movement to a third position beyond said effective position, and interengaging means between said catch and bolt for moving said bolt from effective position to said third position during movement of the catch towards its locked position.

2. In a permutation lock, permutation members each provided with a lock controlling element, a catch movable into and out of locked position, a locking bolt controlled by said lock controlling elements and adapted, when the prevailing combination is set up, to assume a non-effective position and, when the prevailing combination is disturbed, to assume an effective position in which said catch is secured in locked position, means for urging said bolt into engagement with said lock controlling elements, said bolt being mounted for movement to a third position beyond said effective position, and interengaging means between said catch and bolt for moving said bolt from effective position to said third position during movement of the catch towards its locked position.

3. In a permutation lock, permutation members each provided with a lock controlling element, a catch movable into and out of locked position, a locking bolt engageable with said elements and having a non-effective position when the prevailing combination is set up on said members and an effective position when the prevailing combination is disturbed, said bolt being movable beyond said effective position to a third position, and spring means for urging said bolt into engagement with said lock controlling elements, said bolt being provided with a cam engageable, when the bolt is in effective position, with said catch during movement of the latter towards its locked position so that said locking bolt is moved by said catch to said third position and, when the catch has reached its locked position, said locking bolt, under the influence of said spring means, will move back to effective position.

4. In a permutation lock, permutation members each provided with a lock controlling means, a catch movable into and out of locked position and having a locking shoulder, a locking bolt controlled by said lock controlling elements and adapted, when the prevailing combination is set up, to assume a non-effective position and, when the prevailing combination is disturbed, to assume a locking position, said bolt having a locking shoulder opposed to said locking shoulder of said catch when the locking bolt is in effective position and the catch is in locked position, said locking bolt being mounted for movement beyond said effective position to a third position, and spring means for urging said locking bolt against said lock controlling elements, said bolt having a cam surface inclined to the direction of movement of said catch while the latter is being moved into locked position so that the catch, during its movement towards locked position, will move the bolt out of effective position to said third position.

5. In a permutation lock, a supporting frame, permutation members therein and each provided with a rotatable lock controlling element, a catch movable into and out of locked position, a locking bolt fulcrumed in said frame and controlled by said lock controlling elements and adapted, when the prevailing combination is set up, to assume a non-effective position and, when the prevailing combination is disturbed, to assume an effective position in which said catch is secured in locked position, spring means for urging said bolt into engagement with said lock controlling elements, said bolt being mounted for swinging movement to a third position beyond said effective position, and interengaging means between said catch and bolt for moving said bolt from effective position to said third position during movement of the catch towards its locked position.

6. In a permutation lock, permutation members each provided with a lock controlling element, a catch movable into and out of locked position and having a locking shoulder, a locking bolt fulcrumed for swinging movement and engageable with said elements and having a non-effective position when the prevailing combination is set up on said members and an effective position when the prevailing combination is disturbed, said bolt having an inwardly facing locking shoulder cooperating with said first shoulder, said bolt being movable beyond said effective position to a third position, and spring means for urging said bolt into engagement with said lock controlling elements, said bolt being provided with an outwardly facing cam surface engageable with said catch during movement of the latter towards its locked position so that said locking bolt is moved by said catch from effective position to said third position and, when the catch has reached its locked position, said locking bolt, under the influence of said spring means, will move back to effective position.

7. In a permutation lock, a casing having catch receiving openings, permutation members in said casing each provided with a lock controlling means, a catch having lugs movable through said openings into and out of locked position, a pivoted locking bolt controlled by said lock controlling elements and adapted, when the prevailing combination is set up, to assume a non-effective position and, when the prevailing combination is disturbed, to assume a locking position, said bolt having adjacent its free end inwardly facing locking shoulders against which said lugs engage when the locking bolt is in effective position and the catch is in locked position, said locking bolt being mounted for swinging movement beyond said effective position to a third position, and spring means for urging said locking bolt against said lock controlling elements, said bolt having on its free end a cam surface aligned with said openings and inclined to the direction of movement of said catch while the latter is being moved into locked position so that the catch, during its movement towards locked position,

will move the bolt out of effective position to said third position.

8. In a permutation lock, a casing, a support within the casing, a shaft in said support, permutation members journalled on said shaft and each provided with a lock controlling element, a catch movable into and out of locked position, a pivoted locking bolt pivoted to said support to one side of said shaft and having locking shoulders disposed to the other side of said shaft for engagement with said catch, said lock controlling elements being engageable with the intermediate portion of said bolt, spring means intermediate of the casing and locking bolt for normally urging said bolt into engagement with said lock controlling elements, and permitting the locking bolt to spring into locking engagement with said catch whenever the permutation members lie out of predetermined unlocking positions.

9. In a permutation lock, a casing, a chassis within the casing, a shaft in said chassis, permutation members journalled on said shaft and each provided with a lock controlling element, a catch movable into and out of locked position; a pivoted locking bolt having a cross bar at its pivoted end, a locking bar at its free end, and spaced longitudinally extending members connecting said bars; said cross bar being pivoted to said chassis to one side of said shaft and having its locking bar disposed to the other side of said shaft, said lock controlling elements being engageable with the intermediate portions of said longitudinally extending members, and spring means intermediate of the casing and locking bolt for normally urging said bolt into engagement with said lock controlling elements.

10. In a permutation lock, a casing, supporting means in the casing, a shaft in said supporting means, permutation members journalled on said shaft and having wheel portions and lock controlling portions, a catch movable into and out of locked position, a pivoted locking bolt having end cross bars and spaced longitudinally extending members connecting the cross bars, one of said cross bars being pivoted to said supporting means to one side of said shaft and the other cross bar being disposed to the other side of said shaft and having locking shoulders for engagement with said catch, said longitudinally extending members being disposed between said wheel portions and engaging said lock controlling portions, and spring means normally urging said bolt member into engagement with said lock controlling portions.

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