Sept. 30, 1958 C. A. VAHLSTROM 2,853,868

PERMUTATION LOCK

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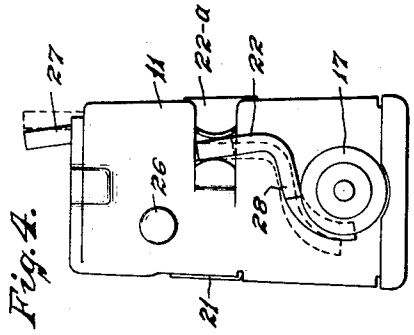


Fig. 4.

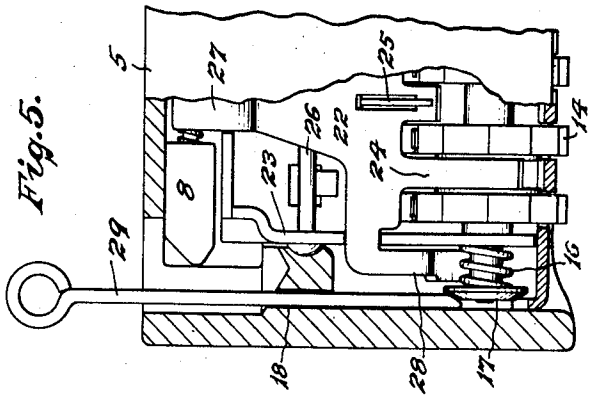


Fig. 5.

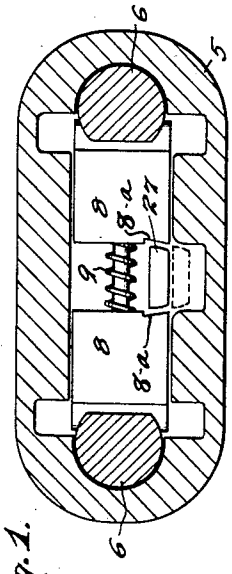


Fig. 1.

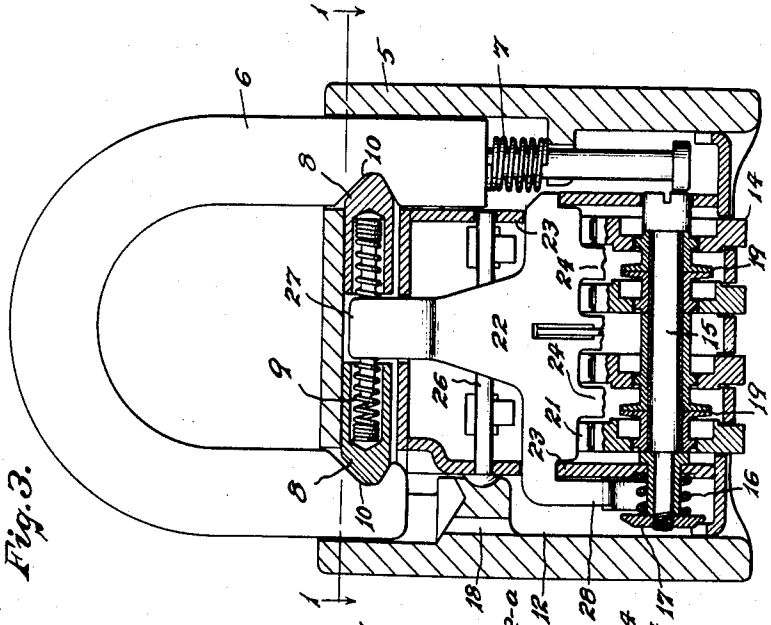


Fig. 3.

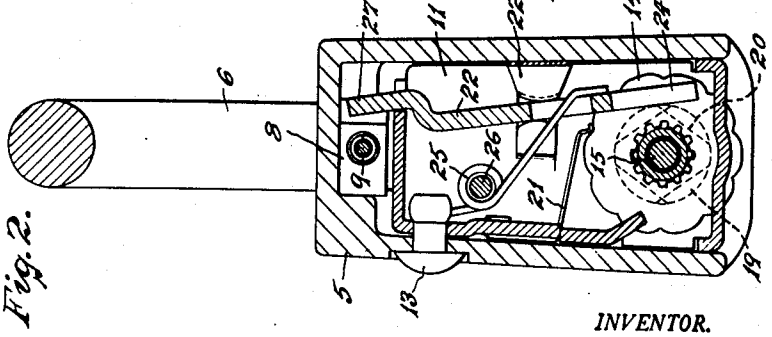


Fig. 2.

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PERMUTATION LOCK

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5 Claims. (Cl. 70—24)

This invention relates to a permutation lock, and more particularly to improvements in permutation padlocks of the type disclosed in United States Patent No. 1,964,936 of Anthony Denerich, dated July 3, 1934.

In said permutation padlocks the shackle of the padlock was retained in locked position by means of a locking plate which was controlled by settable wheels or tumblers forming part of the permutation mechanism. It was found that if a sufficiently strong pull was applied to the shackle of the padlock, the portions of the locking plate engaged with the legs thereof could be bent and disengaged from the shackle to permit opening thereof by unauthorized persons not knowing the prevailing combination.

The primary object of the present invention is to provide improved locking means for the shackle of such a padlock which are controlled by the locking plate of the permutation mechanism, but which form no part of said plate and are a great deal stronger than the locking means heretofore used.

A further object of this invention is to provide improved locking means for such locks which will greatly increase the efficiency of the permutation mechanism and prevent the opening of the lock by unauthorized persons not knowing the prevailing combination and attempting to open the lock by force, feel, by tapping or otherwise jarring the lock so as to disengage the shackle thereof.

A still further object of this invention is to provide an improved lock mechanism for a padlock in which the permutation control locking plate is remote from the shackle member so that movement of the permutation mechanism cannot be transmitted to the shackle, thereby preventing manipulation of the mechanism for opening the lock without knowledge of the required combination.

The instant invention also has as one of its objects the provision of improved means for changing the combination of such a permutation mechanism.

Further objects and advantages of this invention will be more clearly understood from the following description and the accompanying drawings in which:

Fig. 1 is a sectional plan view, on line 1—1 of Fig. 2, showing a padlock embodying the present invention.

Fig. 2 is a side view of said padlock in central vertical section.

Fig. 3 is a front view of said padlock partly in central vertical section.

Fig. 4 is a side view of the case containing my improved mechanism.

Fig. 5 is a front view partly in central vertical section showing a portion of the padlock and the manner in which the combination may be changed.

As shown in the drawings, the numeral 5 denotes the body of the padlock and 6 denotes the securing element thereof which is in the form of a shackle that is biased towards unlocked position by means of a spring 7.

The shackle locking means embodying the instant invention include a pair of oppositely disposed locking bolts 8—8 which are biased in opposite directions by a spring 9 therebetween that urges said locking bolts into notches 10—10 in the opposite legs of the shackle.

The locking mechanism for said bolts is preferably of the permutation type disclosed in the above mentioned patent and is contained within a case 11 that is insertable into a cavity 12 in the body 5 and the case is preferably secured to said body by means of a blind rivet 13.

The permutation mechanism preferably includes a plurality of permutation wheels 14 which are carried by a shaft 15 that is longitudinally shiftable in suitable bearings in the case 11 and is biased towards normal position by means of a spring 16. The said shaft carries a shifting disk 17 which is located below and in line with an opening 18 in the case for the purpose to be hereinafter described.

Each of the wheels 14 is normally engaged with a lock controlling element in the form of a disk 19 which is rotatably mounted on the shaft 15 and is cut away at one side thereof to provide a flat 20 on the periphery of said disk. Each of said permutation wheels is retained in its set position by means of a spring member 21 which engages a series of notches in the periphery thereof.

The present invention also provides a locking element, preferably in the form of a locking plate 22, which is pivotally supported intermediate its ends on side walls 23—23 of the case 11 and is adapted to be rocked about its support. Said plate is retained in position thereon by a spring 22–*a*, and has fingers 24 that extend between the permutation wheels 14 and are disposed adjacent to the peripheries of the controlling disks 19. The said plate 22 is biased towards the peripheries of the controlling disks 19 by a spring member 25 which is mounted on a suitable shaft 26 that extends across the case 11.

The said locking plate 22 has a central extension in the form of a finger 27 which is insertable between the bolts 8—8 to retain bolts 8—8 in locking position. The inner ends of the bolts 8—8 are notched to provide angularly disposed abutment surfaces 8–*a*—8–*a* adjacent the finger 27 as clearly shown in Fig. 1.

At one side of the locking plate there is provided an extension 28 which is in register with the space between the disk 17 and the side of the case 11 and is adapted to enter said space to prevent movement of the shaft 15 while the mechanism is in locked condition.

The operation of my improved lock mechanism is as follows:

When the mechanism is in locked position, as illustrated in the drawings, the locking plate 22 is held, by contact with the peripheries of the controlling disks 19, so that the finger 27 of said plate is disposed between the locking bolts 8—8 and interferes with movement of the said locking bolts from the notches 10—10 in the shackle 6 so that said shackle is retained in locked position. If an attempt is made to pull the shackle outwardly while the locking bolts are in locked position, the angled surfaces 8–*a*—8–*a* on the inner ends of the bolts will engage the fingers 27 therebetween and will tend to cam said finger further into locked position.

When it is desired to unlock the shackle 6, the controlling disks 19 are rotated by their respective permutation wheels until the proper combination appears thereon. All of the flats 20 on said controlling disks will then be aligned and will be adjacent to the cooperating lower end of the plate 22 whereupon the spring 25 will force the said end of said plate inwardly and swing the finger 27 outwardly from between the bolts 8—8 and into the position indicated in dotted lines in Fig. 1. The said bolts may then be readily forced inwardly by a pull on the shackle 6 or, if desired, the spring 7 may be made to provide sufficient pressure to force the said shackle into open position by camming the bolts 8—8 inwardly against the pressure of the spring 9.

When it is desired to lock the said mechanism, the shackle **6** is forced inwardly, into the position shown in Fig. 3, and the permutation wheels **14** are arbitrarily rotated to locate the controlling disks **19** in different positions so as to bring their outer peripheries against the end of the plate **22** and thereby move the said plate into locked position.

It will be noted that when it is desired to change the combination of the permutation mechanism shown, the shackle is unlocked and a suitable tool, such as shown at **29** in Fig. 5, is inserted through the opening **18** and forced against the shifting disk **17** so as to shift the shaft **15** inwardly against the pressure of the spring **16** and thereby disengage all of the disks **19** from their respective permutation wheels **14**. The said permutation disks may then be rotated independently of the disks **19** to indicate a different combination and the tool **29** then removed so that the shaft **15** will be returned to its normal position by the spring **16** and the controlling disks again locked to their respective permutation wheels.

The combination cannot be changed when the locking plate is in its locked position because the extension **28** thereon is disposed between the disk **17** and the side of the case **11** so that the said disk **17** cannot be forced inwardly as above described. When the plate **22** is in its open, or unlocked, position, the said extension **28** will be in the position indicated in dotted lines in Fig. 4 wherein it is clear of the disk **17** and the said disk may be forced inwardly with the tool **29** as above described.

It will be understood that the permutation mechanism shown and described may be modified, or a different type of a lock mechanism, such as a key operated mechanism, may be used in lieu thereof for controlling the locking plate **22** without departing from the scope of the present invention.

I claim:

1. A lock including a body having a shackle movable therein, a pair of locking bolts slidable in opposite directions in said body, spring means normally urging said locking bolts in opposite directions into locking engagement with the shackle, a locking member pivotally mounted in said body and having an extension thereon movable into locking position between said locking bolts to prevent retraction thereof out of locking position relatively to the shackle, lock means for moving said extension into locking position, and means normally urging the said extension out of locking position relatively to said bolts.

2. A lock including a body having a member movable thereon, a pair of locking bolts oppositely movable into locking engagement with said movable member, a locking plate having an extension thereon movable into position between said locking bolts to prevent retraction thereof into unlocking position relatively to the movable member, a permutation mechanism for controlling the movement of said extension into and out of locking position, means movable in said permutation mechanism for permitting resetting thereof for changing the combination required to cause the permutation mechanism to release the locking plate, and an extension on said plate movable into position to prevent operation of the movable means while the said plate is in its locked position.

3. A lock mechanism including a body, a shackle movable relatively to said body between locked and unlocked positions, a pair of locking bolts movable transversely in opposite directions in said body and engageable with the legs of said shackle for retaining it in locked position, spring means urging said locking bolts in opposite directions and into locking engagement with said shackle, a locking member movable in said body and having an extension movable to a position between said locking bolts to prevent retraction thereof out of locking engagement with said shackle, spring means normally urging said locking member to a position wherein said extension is removed from between said locking bolts, and lock means for moving said locking member to a position wherein said extension is disposed between said locking bolts.

4. A lock mechanism including a body, a shackle movable relatively to said body between locked and unlocked positions, a pair of locking bolts movable transversely in opposite directions in said body and engageable with the legs of said shackle for retaining it in locked position, spring means urging said locking bolts in opposite directions and into locking engagement with said shackle, supporting structure in said body including fulcrum means, a locking plate mounted on said fulcrum means for rocking movement and having an extension movable into and out of position between said locking bolts, and a separate permutation mechanism in said body including a plurality of settable controlling elements engageable by said locking plate and controlling its movement.

5. A lock mechanism including a body, a shackle movable relatively to said body between locked and unlocked positions, a pair of locking bolts movable transversely of said body in opposite directions and engageable with the legs of said shackle for retaining it in locked position, a plurality of permutation members mounted in said body and each having a controlling element associated therewith, fulcrum means between said permutation mechanism and locking bolts, a locking plate supported intermediate its ends on said fulcrum means for rocking movement about an axis extending transversely of said body, an extension on one end of said locking plate movable into and out of a position between said locking bolts and, when disposed therebetween, preventing retraction of said locking bolts out of locking engagement with said shackle, and fingers at the opposite end of said locking plate engageable with said controlling elements.

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