C. O. FORBES.

PERMUTATION LOCK.

APPLICATION FILED JAN. 25, 1916.

1,276,633.

Patented Aug. 20, 1918.

2 SHEETS—SHEET 1.

Fig. 1.

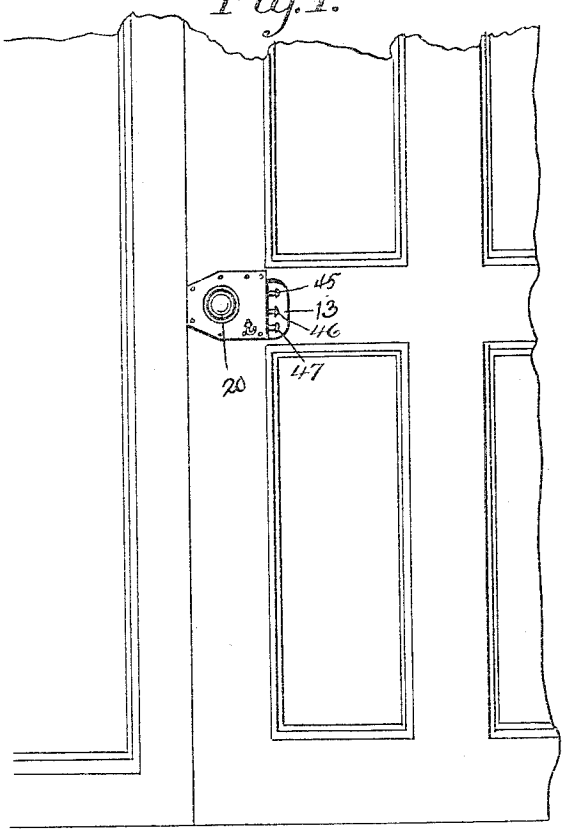


Fig. 4.

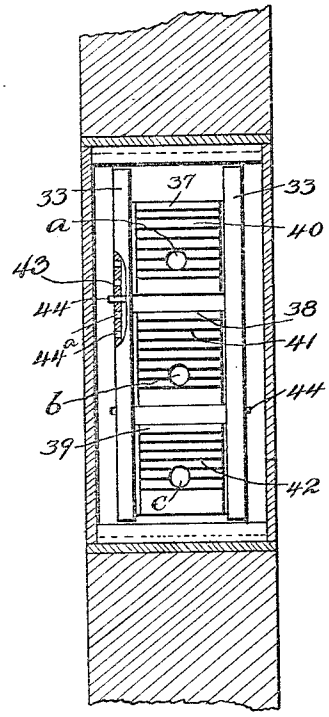


Fig. 5.

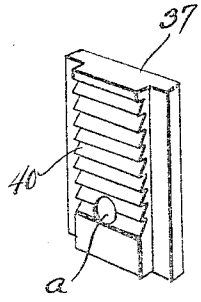
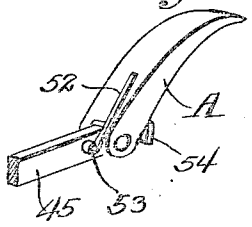


Fig. 6.



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2 SHEETS—SHEET 2.

Fig. 2.

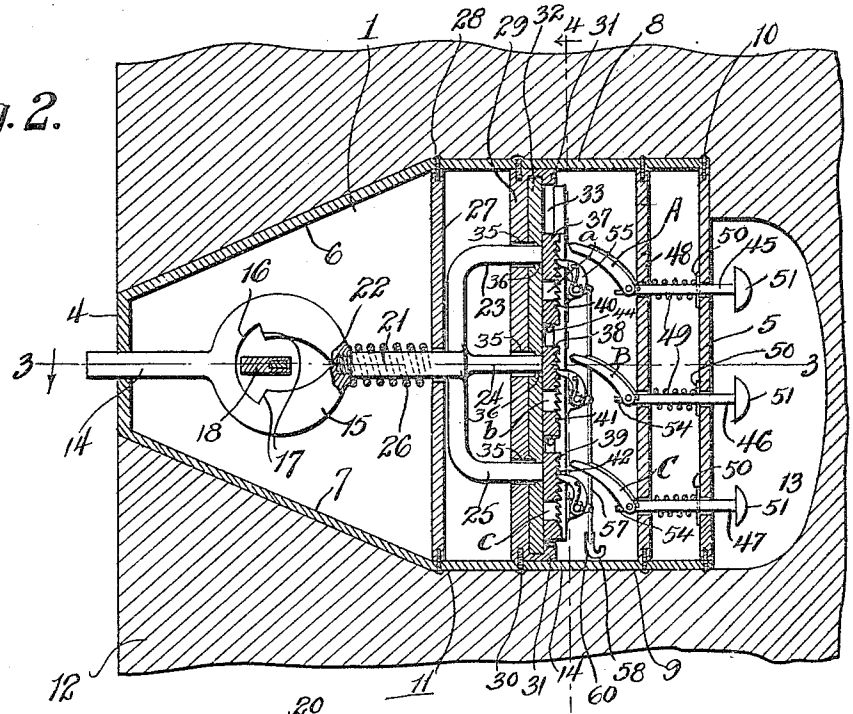
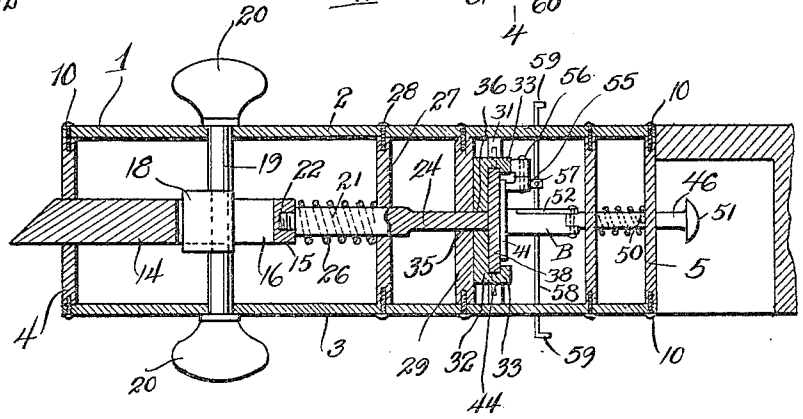


Fig. 3.



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CHARLES OWEN FORBES, OF GLASGOW, MONTANA.

PERMUTATION-LOCK.

1,276,633. Specification of Letters Patent. Patented Aug. 20, 1918.

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To all whom it may concern:

Be it known that I, CHARLES OWEN FORBES, a citizen of the United States, residing at Glasgow, in the county of Valley and State of Montana, have invented certain new and useful Improvements in Permutation-Locks, of which the following is a specification.

My invention relates to permutation locks, and has particular reference to that class of permutation locks known as push pin locks, the primary object of the invention being to provide a lock of this class which permits the manipulation of a combination by means of a plurality of pins operable to move a series of tumblers into position to allow movement of a reciprocating bolt of any desired construction having a specially modified extremity for coöperation with the tumblers.

Another object of my invention is to provide means for rendering inoperative the permutation feature of the lock when it is desired to use the door independently of the lock.

A further object of my invention is to provide means for maintaining the tumblers in position for releasing the reciprocating bolt and means for releasing said maintaining means.

With the above and other objects in view my invention resides preferably in the construction, combination and arrangement of parts as hereinafter set forth in the specification and illustrated in the accompanying drawings, in which,

Figure 1 is a side fragmentary elevation of a door and door frame showing my improved lock in position.

Fig. 2 is a longitudinal vertical sectional view taken through my improved lock.

Fig. 3 is a longitudinal sectional view taken on the line 3—3 of Fig. 2 looking in the direction of the arrow.

Fig. 4 is a transverse vertical sectional view taken on the line 4—4 of Fig. 2 looking in the direction of the arrow.

Fig. 5 is an enlarged perspective view of one of the tumblers, and

Fig. 6 is a similar view of one of the operating pawls therefor.

Similar reference characters designate corresponding parts throughout the various views of the drawings.

Referring more particularly to the drawings in which the preferred embodiment of my invention is illustrated, I provide a housing designated in its entirety by the numeral 1 and having side walls 2 and 3 and end walls 4 and 5, the end wall 4 being provided with diverging sections 6 and 7 forming top and bottom walls respectively, said portions being extended in relative parallelism to provide walls 8 and 9. The side walls 2 and 3 are secured to the end, top and bottom walls by means of screws 10 or the like. As will be clearly seen from an inspection of Figs. 2 and 3, the housing 1 is seated in a complementally formed recess 11 provided in the door 12, the recess 11 being extended as at 13 to provide an aperture through which the lock may be manipulated as hereinafter set forth in detail.

A reciprocating bolt 14 may be mounted in the end wall 4 and is provided with an enlarged portion 15 provided with an opening 16 shouldered as at 17 to permit engagement by a lug 18 carried by and rotatable with the shaft 19 on which the door knobs 20 are mounted. The bolt 14 is provided with means for coaction with the permutation devices hereinafter described, this means comprising preferably an extension 21 detachably connected with the enlarged portion 15 of the bolt 14 as indicated at 22, and provided with a plurality of longitudinally extending relatively parallel arranged spaced arms 23, 24 and 25. A coil spring 26 or the like may be placed about the extension 21 having one extremity thereof bearing against the partition 27. The partition 27 is detachably mounted within the housing by means of screws 28 or the like. The partition 27 also forms a limiting means for the reciprocating bolt under the action of the coil spring 26. The structure of the bolt 14 and housing hereinbefore described may be modified to meet the various conditions which may be encountered in installing or designing a lock for practical purposes and I therefore do not lay any claim to this structure, the same merely being included to show one application of my invention, however, I do claim the peculiarly constructed arrangement of the arms 23, 24 and 25 and their function as will hereinafter appear.

My invention includes a supporting and guiding frame or partition 29 mounted in the housing between the top and bottom walls 8 and 9 and detachably secured therein by means of screws 30 or the like. The top and bottom extremities of the partition 29

are provided with guiding flanges 31 to receive a supplemental guide plate 32 having guide flanges 33 on its marginal edges. The partition 29 is provided with a plurality of openings 35 through which the arms 23, 24 and 25 project, and the plate 32 is provided with a similar number of openings 36 for normal registration with the openings 35.

The permutation devices of my invention forming the combination for maintaining the reciprocating bolt in locked position comprise a plurality of reciprocating tumblers designated 37, 38 and 39, said tumblers being provided with apertures *a*, *b* and *c* respectively. The outer faces of the tumblers are toothed as indicated at 40, 41 and 42. Each of the tumblers is preferably provided with a like number of teeth for a purpose which will hereinafter appear. In order to limit the downward movement of the tumblers and to provide a normal position for the same, the flanges 33 of the plate 32 are apertured at a plurality of points, as indicated at 43 in Fig. 4, and pins 44 are insertible through said apertures for the purpose set forth.

In order to manipulate the tumblers to permit movement of the reciprocating bolt 14 to unlock the door I provide a plurality of push pins 45, 46 and 47 mounted in and reciprocating upon the end wall 5 and an apertured partition 48 mounted in the housing 1. Suitable coil springs 49 or the like may be placed about the pins 45, 46 and 47 and transverse pins 50 are carried by each of said push pins engaged by the springs 49 to move the pins to normal position after an operation. The outer free extremities of the pins are provided with finger-engaging portions or knobs 51 for engagement by the fingers of the person manipulating the lock. The inner extremities of the push pins carry pivotally mounted pawls A, B and C maintained in operative position by means of flat springs 52 carried by the push pins 45, 46 and 47, as indicated at 53, this structure being shown to advantage in Fig. 6. The push pins are provided with extensions 54 which limit the downward movement of the pawls under the action of the springs. In normal position the operative extremities of the pawls are spaced from and entirely out of engagement with their respective tumblers 37, 38 and 39, but it will be readily apparent that when reciprocatory motion is imparted to the pins the pawls will be engaged with the uppermost of the teeth of the tumblers, thereby imparting vertical movement to the latter. In order to maintain the tumblers in a position to which the pawls A, B and C may move them I provide a plurality of retaining pawls 55 mounted in brackets 56 formed integral with the guide flanges 33 of the plate 32, one pawl being provided for each one of the tumblers. It will be readily apparent that when the tumblers are moved to a position to permit unlocking of the door the pawls 55 by virtue of their engagement with the teeth of each of the tumblers will maintain the latter in such position thus permitting the door to be opened. In order to release the tumblers and allow the same to fall back to normal position the spring-pressed pawls 55 are interconnected by means of links 57, the lowermost of the links having a pivoted extension 58 provided with operating members or knobs 59 which extend through substantially L-shaped openings 60 provided in the walls 2 and 3 of the housing. By means of the links and the operating members 59 the pawls may be all simultaneously disengaged from their respective tumblers, thus permitting the latter to return either by gravity or by a suitable spring (not shown) to normal position. It is of course to be understood that the normal position of the tumblers is determined by means of the adjustable pins 44 so that the combination may be changed at will. For this purpose, a plurality of openings 44ª are provided in the walls of the flanges 33, as shown in Fig. 4.

In operation, assuming that the combination is a given number of impulses to each of the push pins, said number of impulses should be delivered thereto. This operation will cause the tumblers to move upwardly to a position whereby the openings *a*, *b* and *c* thereof register with the openings 35 and 36 in the partition 29 and plate 32, whereupon the reciprocating bolt 14 may be moved rearwardly to open the door, the arms 23, 24 and 25 projecting through said openings *a*, *b* and *c*. The pawls 55 will maintain the tumblers in the releasing position as hereinbefore set forth, and the springs 49 will move the push pins to normal position withdrawing the pawls A, B and C out of the path of movement of the tumblers. To release the tumblers it is only necessary to direct a downward pull on the operating members 59 withdrawing the pawls 55 from engagement with their respective tumblers and thereby allow the latter to return to normal position. It will be readily apparent that the combination may be changed by merely changing the position of the pins 44 in the holes 44ª, raising or lowering the tumblers and thereby necessitating a greater or less number of impulses to be imparted to the push pins, it being of course understood that the planes of operation of the pawls A, B and C are fixed. It is of course to be understood that I do not limit myself to the exact means for maintaining the links in position to release the pawls 55 since they may be independently controllable or collectively, as shown. It will be seen that the provision of this type of lock allows the

change of a combination through a wide range, and while Fig. 2 shows the combination as being arranged for the same number of impulses for each push pin it will be of course understood that this combination may be changed so as to vary the number of impulses relatively necessary for each of the pins. Attention is also directed to the fact that any number of push pins may be provided, but it would appear from the present disclosure that three push pins are preferable. To adjust or change the combination suitable markings may be placed along the flanges 33 of the plate 32 apprising those who wish to change the combination as the number of impulses necessary for each push pin when the adjustable pins 44 are at a given location.

From the above description taken in connection with the accompanying drawings it is thought that a clear and comprehensive understanding of the construction, operation and advantages of my invention may be readily gathered, and while I have shown and described the same as embodying a specific structure I desire that it be understood that I may make such changes therein which do not depart from the spirit and scope of the invention as claimed.

I claim:

1. In a permutation lock, the combination of a reciprocating bolt, a guide plate having guide flanges formed thereon, a tumbler slidably mounted upon said plate and being guided by said flanges, said plate having an opening formed therethrough, said bolt projecting into said opening and bearing against said tumbler, thus causing the bolt to be held in a set position by said tumbler, one of said guide flanges having openings formed therein, a pin carried within a selected opening, thus normally retaining said tumbler in a set position, and means for shifting said tumbler for freeing said bolt.

2. In a permutation lock, the combination of a reciprocating bolt, a guide plate having guide flanges formed thereon, said guide plate having on opening formed therethrough, said bolt projecting into said opening, a tumbler slidably mounted upon said plate and being guided by said flanges, means adjustably mounted upon one of said flanges for normally supporting said tumbler in a set position and means for shifting said tumbler for permitting the bolt to be freed.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES OWEN FORBES.

Witnesses:

L. P. EVANS,

C. L. PENCE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents. Washington, D. C."