Nov. 3, 1925. 1,559,570

P. GIBA

PERMUTATION LOCK

Filed May 23, 1925 2 Sheets-Sheet 1

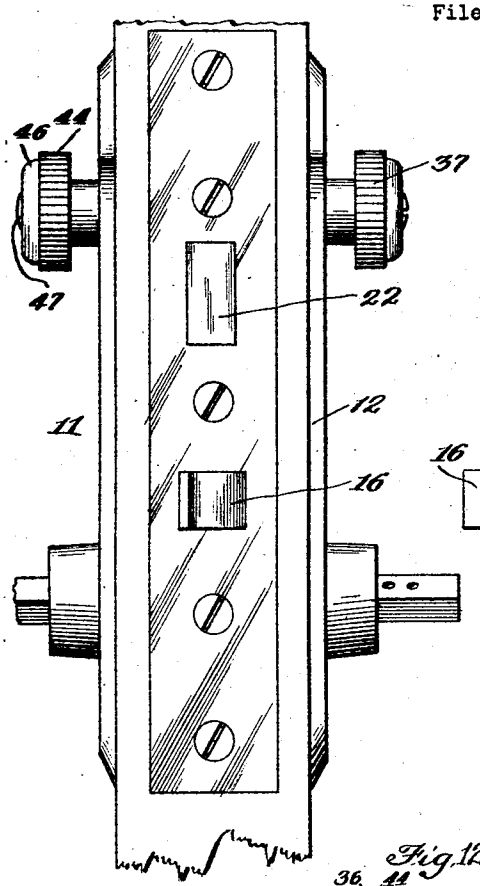


Fig. 2.

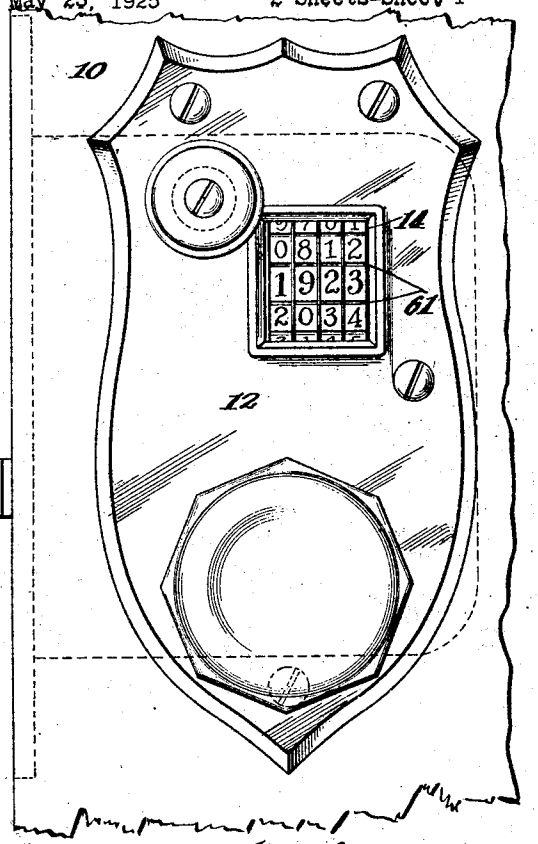


Fig. 1.

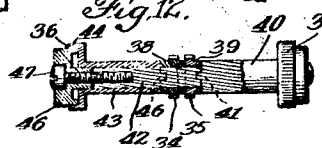


Fig. 12.

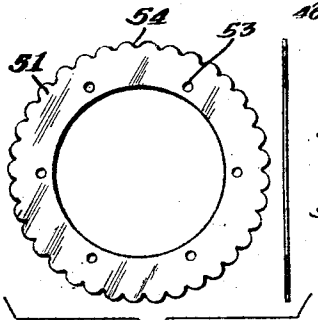


Fig. 7.

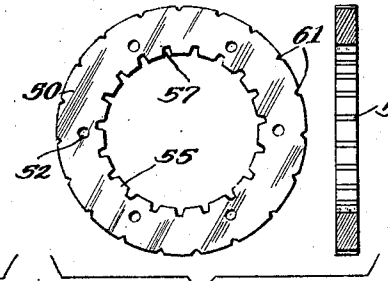


Fig. 8.

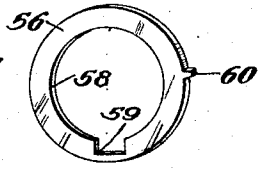


Fig. 9.

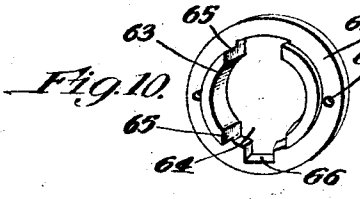


Fig. 10.

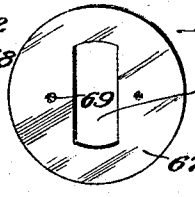


Fig. 11.

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PERMUTATION LOCK

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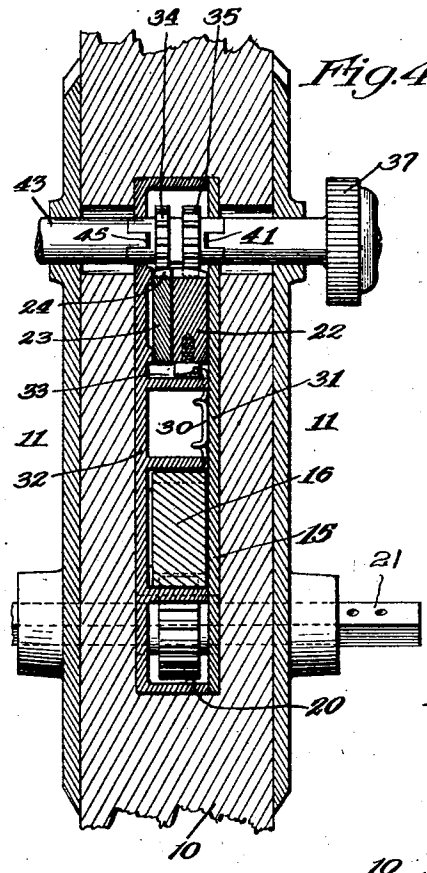


Fig. 4.

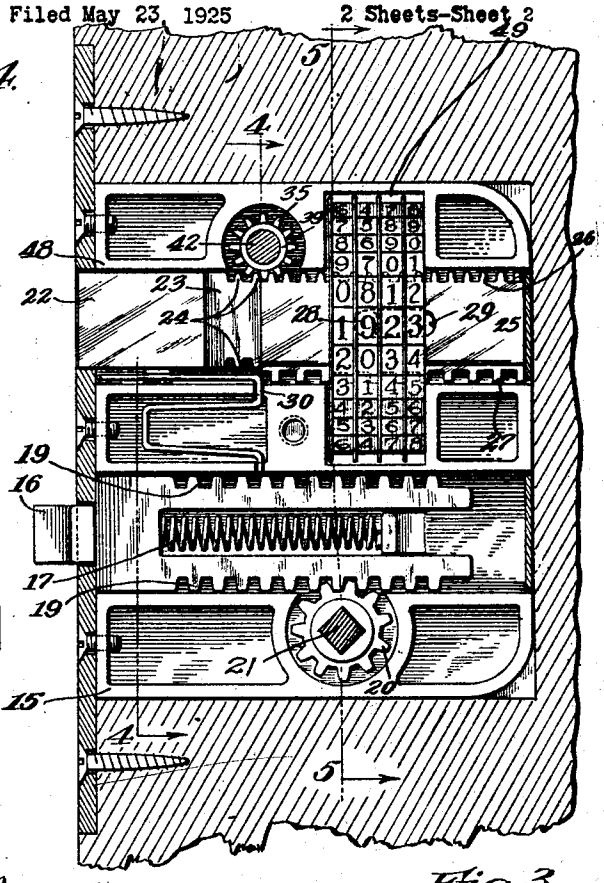


Fig. 3.

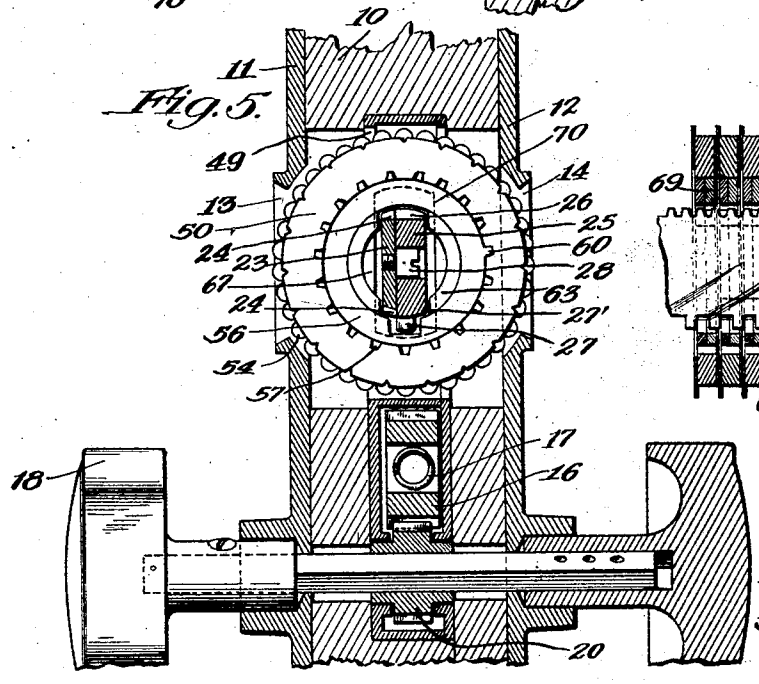


Fig. 5.

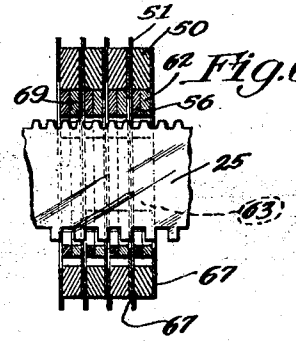


Fig. 6.

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Patented Nov. 3, 1925. 1,559,570

UNITED STATES PATENT OFFICE.

PIOTR GIBA, OF CHICAGO, ILLINOIS.

PERMUTATION LOCK.

Application filed May 23, 1925. Serial No. 32,440.

To all whom it may concern:

Be it known that I, PIOTR GIBA, a citizen of Poland, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Permutation Locks, of which the following is a specification.

This invention relates to permutation locks designed particularly for the use in connection with doors, and its main object is the provision of a lock wherein the combination is readily changeable.

Another object of the invention is the provision of a lock of the character stated which is so constructed that it may be operated from the inside by a knob without requiring to set the combination while to open the lock from the outside the combination must be first set.

With the above general objects in view and others that will appear as the nature of the invention is better understood, the same consists in the novel construction, combination and arrangement of parts hereinafter more fully described, illustrated in the accompanying drawings and pointed out in the appended claims.

In the drawings forming a part of this application, and in which like designating characters refer to corresponding parts throughout the several views.

Fig. 1 is a fragmentary side view of a door showing an embodiment of the lock in place therein;

Fig. 2 is an edge view of Fig. 1;

Fig. 3 is a longitudinal sectional view through Fig. 1 showing the inner mechanism of the lock with cover plate removed;

Fig. 4 is a cross-sectional view taken on line 4—4 of Fig. 3;

Fig. 5 is a cross-sectional view taken on line 5—5 of Fig. 3;

Fig. 6 is a cross-sectional view through the permutation disks;

Fig. 7 is a face and cross-sectional view of one of the rings by means of which the permutation disks are operated;

Fig. 8 is a face and cross-sectional view of a permutation disk;

Fig. 9 is a perspective view of a locking disk;

Fig. 10 is a perspective view of a guide member associated with each permutation disk;

Fig. 11 is a perspective view on a reduced scale of an anti-friction plate associated with each guide member; and

Fig. 12 is a view on a reduced scale, partly in section and partly in elevation, of the bolt operating knobs.

In the drawings, the numeral 10 designates a door provided with inside and outside escutcheon plates 11 and 12, respectively, having formed herein sight openings 13 and 14, respectively. The lock, designated generally by the numeral 15, is mortised into the door, as indicated by the dotted lines in Fig. 1 and seen on Figs. 3 and 4, and contains the customary spring actuated latch 16, the movements of which are controlled by the spring 17 and the knob 18, as illustrated on Figs. 3, 4 and 5, the body of the latch 16 being provided, on opposite horizontal edges, with rack teeth 19 in engagement with the pinion 20, through which the rectangular spindle of the knob 21 extends.

Mounted in parallel relation with the latch 16 is the locking bolt comprising head 22 and a reduced inner portion 23, the opposite parallel edges of said reduced portion are provided with racks 24 for the purpose later described. An auxiliary bolt 25, which is wider than said first named bolt 23 is positioned upon said reduced portion and is adapted for longitudinal sliding movement thereupon, the outer face of the head 22 being flush with the outer face of said auxiliary bolt 25. The upper edge of the auxiliary bolt 25 is provided with a rack 26, said rack 26 being in alinement with the upper rack 24 of bolt 23. The lower edge of said auxiliary bolt 25 is provided with teeth 27, said teeth being farther spaced apart than the teeth on rack bar 26, the teeth 27 extending downwardly beyond the line of teeth 24, as plainly seen on Figs. 3 and 5. In cross-section said teeth 27 are reduced in width affecting a shoulder 27′ on the adjacent edge of said auxiliary bolt 25 as seen on Fig. 5. Said shoulder 27′ is in alinement on the peripheral line with the lower rack 24 of the bolt 23.

The reduced portion 23 has a pin 28 which is received within a longitudinal slot 29 made substantially in the central portion of said auxiliary bolt 25. Said pin 28 and slot 29 cooperate to limit the longitudinal sliding movement of said auxiliary bolt 25 in respect

of the bolt 23. A flat spring 30 interposed between the cover 31 and casing 32 cooperates with pin 33, which is positioned upon the lower edge of the bolt head 22, for preventing any creeping movement of the bolt 23 when in withdrawn position as shown on Fig. 3.

Said bolt 23 and auxiliary bolt 25 are independently operated by means of pinion 34 and pinion 35 meshing with the upper rack 24 and teeth 26, respectively. Said pinions are positioned within the lock housing as plainly seen on Fig. 4 and are controlled by means of the inside knob generally indicated by 36 and the outside knob 37, respectively. As plainly seen on Fig. 12 said pinions are provided with sleeves 38 and 39, respectively, the inner ends of said sleeves telescope one into another, permitting free and independent rotary movement of one pinion in respect of the other. The outside knob 37 has a shank 40 which is in engagement with sleeve 31 through the medium of claw clutch 41 cooperating between the inner end of said shank 40 and the outer end of sleeve 39 of the pinion 35. Integrally formed with said shank 40 and reduced in thickness is a spindle 42 which passes through said pinions and has positioned thereupon a hollow cylinder 43, said cylinder being integrally formed with a shell 44 which forms a part of the inner knob 36. Through the medium of claw clutch 45 between the inner end of said cylinder 43 and the outer end of sleeve 38 the pinion 34 is rotated on turning shell 44. Fitting into said shell 44 and abutting the end of spindle 42 is a head 46 which is rigidly affixed to said end of said spindle 42 by means of screw 47.

From the hereinabove described mechanism illustrated on Fig. 12 it will be apparent that on turning knob 37 a rotary movement will be imparted to the pinion 35 without in any manner affecting the pinion 34, cylinder 43 or shell 44. Also when said shell 44, which remains on the inside of a dwelling is turned, the pinion 34 will be rotated without affecting the pinion 35 or the outside knob 37.

Transversely of the channel 48 in the lock housing wherein bolts 23 and 25 move is an opening 49 through said lock housing for positioning therewithin a plurality of permutation disks as plainly seen on Figs. 3 and 5.

Said permutation disks are indicated by 50 and illustrated in detail on Fig. 8. A round plate or ring 51 shown on Fig. 7 is positioned upon one face of each disk 50 and is rigidly fixed thereto by means of rivets or screws passing through the registering apertures 52 and 53 made in said disk and said plate, respectively. The diameter of said plate 51 being greater than that of the disk 50 a narrow portion of said plate projects outwardly beyond the periphery of the disk as plainly seen on Fig. 6, said projecting portion of the plate being indented as at 54 in order to provide a rough edge to facilitate the manual rotation of the disks. Centrally each disk is provided with a comparatively large bore 55 for reception herewithin of locking disk 56, illustrated on Fig. 9. The inner periphery of the disk 50 adjacent said bore 55 is provided with a series of transversal notches 57 for the purpose hereinafter stated. The locking disk 56 has a shape of a round plate which has a central bore 58, the thickness of said locking disk being smaller than the thickness of the disk 50. On its inner periphery said disk 56 is provided with a transversal recess 59 for the purpose hereinafter specified, while the outer periphery of said disk is provided with a radially projecting tooth 60, which, when the said disk 56 is positioned within bore 55 of the permutation disk 50, fits into any one of the notches 57 in said disk 50. The diameter of said disk 56 is equal to the diameter of the bore 55 and when said disks 50 and 56 are in assembled position the disk 56 is frictionally held within said bore 55.

The permutation disk 50 on its outer periphery is further provided with numerals as plainly seen on Figs. 1 and 3, the numeral spaces being divided by transversal grooves 61, which facilitate making the proper alinement of the combination numerals on several permutation disks, as plainly seen on Fig. 1.

Each permutation disk 50 contains a guide member illustrated on Fig. 10. Said guide member embodies a circular plate or flange 62 adapted to be received within the bore 55, the diameter of said flange being slightly smaller than the diameter of said bore in order to permit a free rotary movement of the disk 50 on the periphery of said flange 62. Said guide member further embodies a cylindrical stud 63 fitting into the bore 58 of the locking disk 56. The diameter of said stud is smaller than the diameter of the bore 58 for permitting a free rotary movement of said locking disk 56 upon said stud 63.

Longitudinally of said stud 63 and through said flange 62 of the guide member runs an oblong slot 64 receiving therewithin the bolts 23 and 25 as plainly seen on Fig. 5. The upper edge of said slot 64 has an arcuate formation and registers with the inner periphery 58 of the disk 56. Oppositely of said upper arcuate edge of slot 64 there is formed in said flange 62 a recess 66 which is adapted to register with the recess 59 of the locking disk 56.

It is observed that when the permutation disks are in assembled position illustrated on Fig. 6 and the locking disks 56 and flanges 62 are within the bores 55 of the several

disks 50, said disks 56 and flanges 62 completely fill the spaces within said bores so that the outer face of disk 56 and the end of the stud 63 remain flush with the corresponding face of the disk 50 and the face of the flange 62 remains flush with the other face of said disk 50.

Flange 62 on its face carries an anti-friction plate 67 which is in any suitable manner affixed to the face of said flange 62. The apertures 68 and 69, in said flange and said plate, respectively, suggest one means of affixing the plates to said flange. Said plate is provided with an oblong slot 70. The narrower edges of said slot are arcuate and when the several parts of the permuatation disks are assembled said edges remain outwardly beyond the inner periphery 58 of the disk 56 and the edge of the recesses 59 and 66, as plainly indicated by dotted lines on Fig. 5. The diameter of said anti-friction plate is equal to the diameter of the permutation disk 50 as plainly seen on Fig. 6.

When the permutation disks and bolts 23 and 25 are in operative association illustrated on Figs. 3, 5 and 6, the longiudinal inner walls of stud 63 abut the adjacent outer walls of said bolts 23 and 25 and thus said studs 63 and flanges 62 at all times remain in a stationary position in respect of said bolts, as best illustrated on Fig. 5.

The guide members, including flanges 62, do never engage the several series of teeth upon bolts 23 and 25, but permit their free sliding movement. Unless the disks 50 with their cooperating locking disks 56 are brought to a position where the recesses 59 of said latter disks register with the recesses 66 of the guide member of Fig. 10 the inner edges of the locking disks 56 remain in engagement with teeth 27 of the auxiliary bolt 25 and as long as that engagement continues in any one of the several permutation disks, it will be impossible to move said auxiliary bolt 25.

To open the lock from the outside the combination must be known to a person desiring to open the lock. By properly arranging the disks 50 so that the recesses 59 come into alinement with the recess 66 bolt 25 may be moved.

Fig. 3 illustrates the position of the two bolts 23 and 25 immediately upon opening the lock from the outside. The assumed combination number there is number 1923, each digit being upon a separate disk, for the purposes of illustration the combination number being distinguished by heavier lines, but in practice all numerals upon the permutation disks should be stamped in a like style.

Upon entering the dwelling the person operates the knob 36 for drawing bolt 23 outwardly of the lock housing, said bolt carrying with it the auxiliary bolt 25 by means of pin 28 which abuts the outer end of slot 29. Thereupon the person turns one or more disks to bring recesses 59 out of alinement with recesses 66, the inner peripheral edges of the disks 56 sliding in between the teeth 27 of the auxiliary bolt 25 prevent the sliding movement of the auxiliary bolt 25. Since the bolt 23 at all times remains out of engagement with the locking disks 56 it is possible to withdraw the same from locked position within the door frame by turning the inside knob shell 44 without in any manner affecting the locked engagement of the auxiliary bolt 25 with the disks 56 or without requiring to set the combination of the permutation lock.

Assuming that the two bolts remain in the relative longitudinal position illustrated on Fig. 3, but with the bolt head 22 in locking engagement with the door frame and the permutation disks being not arranged in accordance with the combination number, or in other words the inner peripheral edges of the locking disks 56 being in engagement with the teeth 27 of the auxiliary bolt 25, a person desiring to open the lock from the outside of the dwelling will set the combination, thereby permitting the backward sliding movement of the auxiliary bolt 25. By turning the outside knob 37, the said auxiliary bolt 25 through the medium of the pinion 35 will be caused to slide in the opposite direction from that previously mentioned. During this operation the bolt 23 will be also drawn in the same direction by virtue of the abutment of pin 28 against the adjacent end of slot 29.

As seen on Fig. 3 there is a space between the inner termination of bolt head 22 and the adjacent end of the auxiliary bolt 25. Owing to this arrangement and also due to the slot 29 the bolt 23 may be caused to slide independently of the auxiliary bolt 25 on turning the inside knob 36 or rather the shell 44, and this notwithstanding whether the auxiliary bolt 25 is in engagement with the inner peripheral edge of the locking disks 56 or out of engagement therefrom.

It is observed that the setting of the bolt 23 into an operative position, that is into locking engagement with the door frame, from the outside of the door should be avoided, for the reason that such operation could be had only by means of the auxiliary bolt 25, pinion 35 and the outside knob 37, and consequently the end of the auxiliary bolt would come in abutment with the inner end of head 22, and on locking said auxiliary bolt within the permutation disks, a person remaining inside of a dwelling could not retract the bolt 23 by operating the shell 44, because the end of bolt 25 abutting the head 22 would prevent any backward movement of bolt 23 in which case the turning of shell 44 would give no result.

To obviate such an assumed occurrence the inside sight 13 is provided permitting the setting of the combination from the inside. When the combination has been set from the inside, head 47 of the inside knob 36 must be resorted to to retract the bolt 23 through the medium of pinion 35 and auxiliary bolt 25. Since the bolt 23 with the bolt head 22 is as long as the channel 48, during that latter operation the inner end of bolt 23 on striking the edge of the lock housing will limit the farther movement of the bolt 23 and by operating the knob 37 the position of the auxiliary bolt 25 will be reset as shown on Fig. 3.

It should be borne in mind that when it is desired to lock the door from the outside the auxiliary bolt, after the bolt head 22 has been brought into engagement with the door frame, should be retracted to the position as shown on Fig. 3 before the permutation disks are turned, because on failure to do this the operation described in the preceding paragraph must be resorted to in order to recondition the bolt 23 for operation from within the dwelling.

It is observed that the periphery of disk 50 is provided with two sets of the like numerals, the two like numerals being on diametrically opposite points so that the combination may be set with equal facility either from the inside or outside of the door.

The projecting tooth 60 on the outer periphery of the disk 56 not only holds said disk in rigid engagement with the permutation disk 50, but also serves as a marker for the combination number on the particular disk 50. It will be apparent from Fig. 5, on reference to Fig. 3, that tooth 60 points toward numeral 1 on the periphery of the first or outermost permutation disk 50. Thus here is a certain definite positional relation of the recess 59 in respect to the combination number on a given disk 50, and since each disk carries duplicate numerals, two like numerals being on diametrically opposite points on each disk as already explained, it follows that there is a definite positional relation between the recess 59 and the two like numerals of each disk 50. Said relation may be stated to be such that when the disk is turned so that two opposite combination numerals remain on a horizontal line, or in other words when each of them is positioned centrally within the sights 13 and 14, respectively, the recess 59 will then be positioned directly oppositely from the imaginary center of the disk 50 on a vertical line running downwardly, or in other words will register with the recess 66 of the guide member of Fig. 10, which at all times remains stationary, the shoulders 65 whereof abutting the faces of bolts 23 and 25 preventing any rotary movement thereof.

From the above explanation it will be apparent that the changing of combination in each permutation disk is an easy matter.

To change the combination the disk 56 should be withdrawn from bore 55 and reinserted upon altering its former relative position in respect of the disk 50 and in the altered position the combination numeral will be that numeral on the periphery of the disk 50 toward which tooth 60 points.

It is not my intention to restrict the use of the lock shown on the drawings and herein described to doors. The principle of the invention may be adapted to other objects such as trunks, safes, automobiles, etc.

While there is described herein a preferred embodiment of the present invention, it is nevertheless to be understood that minor changes may be made therein without departing from the spirit and scope of the invention as claimed.

What I claim as new is:

1. In a lock of the class described, guide members, permutation disks thereupon, said permutation disks being adapted for rotary movement upon said guide members, a bolt within said guide members, said guide members remaining stationary in respect of said bolt, teeth upon said bolt, and means within said permutation disks engaging said teeth for holding the bolt locked.

2. In a lock of the class described, guide members, permutation disks, locking disks within said permutation disks, said locking disks being adapted for rotary movement upon said guide members, said guide members remaining stationary in respect of said bolt, and teeth upon said bolt, said locking disks being adapted to engage said teeth for holding said bolt locked.

3. In a lock of the class described, a bolt, guide members upon said bolt in stationary relation therewith, teeth upon said bolt, said guide members having recesses in alinement with said teeth, locking disks rotatably positioned upon said guide members, said locking disks by their inner peripheral edges being adapted to engage said teeth for holding the bolt locked, said locking disks having recesses adapted to register with said recesses in said guide members, and permutation disks rigidly positioned upon said locking disks, said permutation disks being provided with means for indicating when the two series of said recesses are in alinement for moving said bolt.

4. In a lock of the class described, a bolt, guide members, said guide members including flanges and studs, a bolt within said guide members, teeth upon said bolt, said flanges having recesses in alinement with said teeth, said guide members including said flanges and said studs being in stationary relation with said bolt, locking disks rotatably mounted upon said studs, permutation disks having central bores for receiv-

ing therewithin said flanges and said locking disks, said locking disks being rigidly held within said bores, said locking disks having recesses adapted to register with the recesses in said flanges, the peripheral edges of said locking disks being adapted to engage said teeth, and means in said permutation disks when the two series of said recesses are in alinement for moving said bolt.

5. In a lock of the class described, a bolt, stationary guide members thereupon, locking disks rotatably mounted upon said guide members, permutation disks rigidly mounted upon said locking disks and enclosing said guide members, teeth upon said bolts, said guide members and said locking disks being provided with recesses, said bolt being adapted for longitudinal sliding movement when the two series of said recesses are in alinement, the peripheries of said permutation disks being provided with two series of like numerals, the pairs of like numerals being upon diametrically opposite points of the periphery of each permutation disk, and means cooperating with said locking disks and said permutation disks for adjusting the recesses upon said guide members into a definite positional relation in respect of a given pair of opposite numerals upon the peripheries of each of said permutation disks.

6. In a lock of the class described, a bolt, stationary guide members thereupon, locking disks rotatably mounted upon said guide members, permutation disks rigidly mounted upon said locking disks and enclosing said guide members, teeth upon said bolt, said guide members and said locking disks being provided with recesses, said bolt being adapted for longitudinal sliding movement when the two series of recesses are in alinement, the peripheries of said permutation disks being provided with two series of like numerals, the pairs of like numerals being upon diametrically opposite points of the periphery of each permutation disk, and means cooperating with said locking disks and said permutation disks for adjusting the recesses upon said guide members into a definite positional relation in respect of a given pair of opposite numerals upon the peripheries of each of said permutation disks, said means including a tooth upon each locking disk and grooves upon said permutation disks wherein said tooth is adapted to be selectively positioned.

7. In combination with permutation lock having a bolt freely operable from the inside and having an auxiliary bolt operable from the outside on setting the combination, a pinion associated with said bolt, a pinion associated with said auxiliary bolt, an outside knob cooperating with said last named pinion, a spindle integrally formed with said outside knob, said spindle passing through both said pinions, and a knob shell positioned upon said spindle and cooperating with said first mentioned pinion.

In testimony whereof I affix my signature.

PIOTR GIBA.