Aug. 4, 1936. G. W. ALDEEN 2,049,416

LOCK

Filed Sept. 24, 1930

Fig. 1.

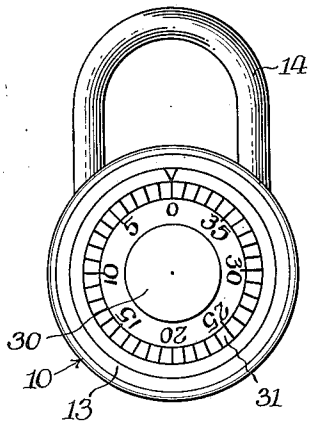


Fig. 2.

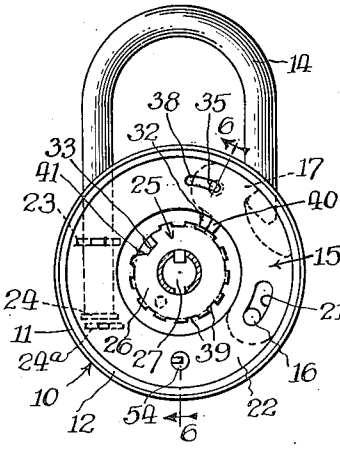


Fig. 3.

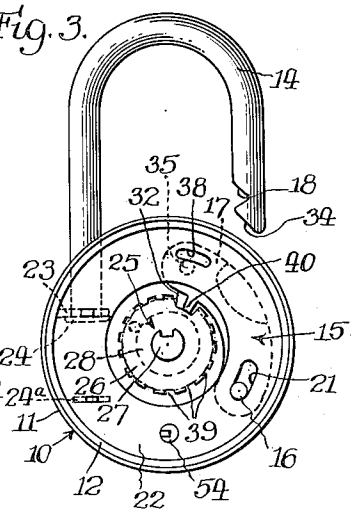


Fig. 4.

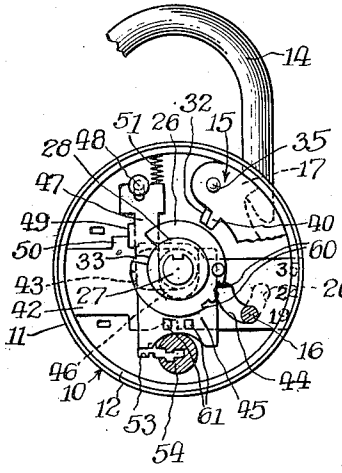


Fig. 5.

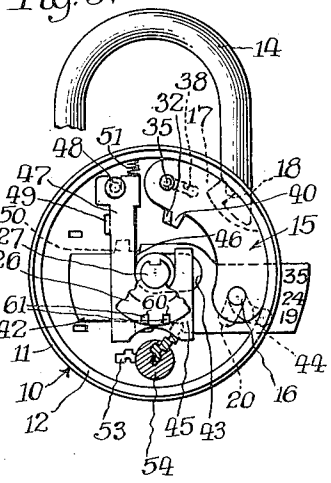


Fig. 6.

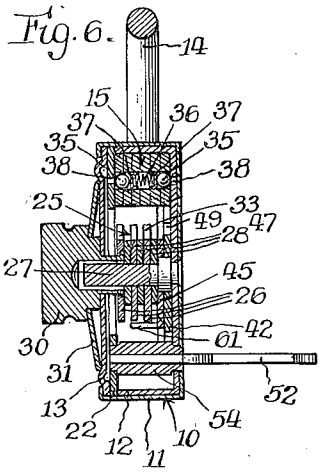
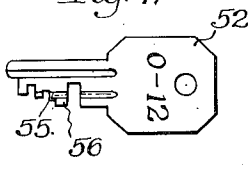


Fig. 7.



Inventor:
Gedor W. Aldeen,
By Churchill Parker Carlson
Attys.

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UNITED STATES PATENT OFFICE

2,049,416

LOCK

Gedor W. Aldeen, Rockford, Ill., assignor to American Cabinet Hardware Corp., Rockford, Ill., a corporation of Illinois

Application September 24, 1930, Serial No. 484,071

40 Claims. (Cl. 70—113)

The invention relates to locks and has for its general object the provision of a new and improved lock which may be unlocked either by a key or by a permutation device.

Locks used on lockers in schools, clubs, or the like, are frequently made to operate by a permutation device. With such locks it is necessary for the authorities in charge of the lockers to keep a complete record of settings required to open each lock, so that, in case the user forgets the characters of the setting, or the authorities wish to have ready access to each locker, the lock may still be opened. Such a record is a nuisance to keep, and to hunt up the setting of any one lock requires some time.

Key-operated locks for lockers also have many disadvantages, one of which is that the keys given to the users of the lock are frequently lost, thus causing an added expense in replacing them.

Locks having both permutation-operated and key-operated devices for opening them have been made. While such locks do permit the authorities to have ready access to the lockers, the nuisance of having to keep a record of all the settings is still present.

An important object of the present invention is to provide a lock arranged to be opened by a permutation-operated device and having means for displaying the characters of the setting for the device at which the lock may be opened, said characters being normally hidden from view but being arranged to be brought into view only by one having authority to do so.

Another object is to provide a lock having both permutation-operated and key-operated devices for opening it, and which, when opened by the key, will display the characters of the setting of the permutation-operated device at which the lock may be opened.

Still another object is to provide such a lock in which the permutation-operated device must be moved to a setting other than that required to open the lock thereby, before the key-operated device can be operated.

Still another object is to provide such a lock in which the key indicates the setting of the permutation-operated device required for the operation of the key-operated device.

A further object is to provide a novel lock having a bolt or locking device arranged to be moved from a locking position to either of two unlocking positions respectively by two operating means.

A still further object is to provide such a lock which cannot easily be forced open or picked, and yet may be manufactured at a relatively low cost.

Other objects and advantages will become apparent from the following description taken in connection with the accompanying drawing, in which:

Figure 1 is a face view of a lock embodying the features of the invention.

Fig. 2 is a view similar to that shown in Fig. 1 but with the face plate removed.

Fig. 3 is a view similar to that shown in Figs. 1 and 2 and showing the permutation-operated mechanism in an unlocked position.

Fig. 4 is a view similar to that shown in Fig. 2 but with parts removed to show the key-operated mechanism in a locked position.

Fig. 5 is a view similar to that shown in Fig. 4 but with the key-operated mechanism in unlocked position.

Fig. 6 is a section taken along the line 6—6 of Fig. 2.

Fig. 7 is a view of the key.

While the invention is susceptible of various modifications and alternative constructions, I have shown in the drawing and will herein describe in detail the preferred embodiment, but it is to be understood that I do not thereby intend to limit the invention to the specific form disclosed, but intend to cover all modifications and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claims.

The present embodiment of the invention is in the form of a padlock and comprises in general a casing, a shackle having its arms extending into the casing, a bolt engaging one arm of the shackle when in its locked position and arranged to be moved to either of two unlocking positions, a permutation-operated device arranged when set to permit the bolt to be moved to one of the unlocking positions, and a key-operated device arranged to move the bolt to and from the other unlocking position and including a means having the characters of the setting for the permutation-operated device marked thereon, which means is movable from a position in which said characters are hidden from view to a position in which said characters are on display, when the bolt is moved to an unlocking position by the key-operated device, the key-operated device being operable only when the permutation-operated device is moved to a setting different from the one at which the lock may be opened.

As shown in the drawing, the present embodiment comprises a casing generally indicated at

10 which comprises an outer cup 11 and a relatively heavy inner cup 12, each having a cylindrical side wall integral with a rear wall. To close the front of the casing, a front wall or face plate 13 is seated on the edge of the inner cup 12, and the edge of the outer cup 11, which extends slightly beyond the inner cup 12, is turned over to hold the face plate 13 rigidly in place.

A shackle 14 having a U-shape is mounted with its arms extending through apertures in the side wall of the casing and is permitted to have a limited sliding movement longitudinally of the arms. One of the arms is shorter than the other so that, when the shackle is pulled to the outer limit of its longitudinal movement, the end of the short arm is outside of the casing and the shackle may then be rotated about the axis of the long arm.

Mounted within the casing is a bolt or locking device generally indicated at 15 which engages the short arm of the shackle when in its locked position and is arranged to be moved to either of two unlocking positions. The bolt comprises a plurality of laminations riveted together and having a pin 16 at one end extending slightly beyond its surfaces. Portions of the inner laminations are cut away to form a hook 17, which, when in a locked position as shown in Figs. 2 and 4, enters a notch 18 cut in the side of the short arm of the shackle 14. The pin 16, extending beyond the surfaces of the bolt, fits into an arcuately-shaped slot 20 cut in the rear wall of the inner cup 12 (see Figs. 4 and 5) and in a similar slot 21 cut in a ring 22 (see Figs. 2 and 3) which lies immediately under the cover plate 13. Thus, the bolt may be pivoted about the pin 16 or moved bodily so that the pin 16 slides in the arcuate slots 20 and 21 to guide the movement of the bolt.

The long arm of the shackle 14 is slidably supported within the casing preferably by an apertured bar 23 through which the arm extends and which is transversely fixed in the casing as by a pair of projections formed on its respective ends and seated in slots cut respectively in the rear wall of the inner cup 12 and in the ring 22. To prevent the long arm from sliding completely out of the casing, a flange 24 is formed on its end which is arranged to abut against the bar 23, and to prevent the shackle 14 from moving into the casing beyond its normal locked position, the flange 24 is arranged to abut against a lug 24^a extending between the ring 22 and the rear wall of the inner cup.

As mentioned above, the invention includes a permutation-operated device, indicated generally at 25 (see Figs. 2, 3 and 6), arranged when set to permit the bolt 15 to be moved to one of its unlocking positions. In the present instance, the permutation-operated device 25 is mounted centrally of the casing and comprises a plurality of disks 26 rotatably mounted against a shoulder on a spindle 27 secured to the rear wall of the inner cup 12. In the present instance, three such disks are provided, although fewer or more such disks may be used. Spacing washers 28 non-rotatably secured to the spindle 27 are interposed between the respective disks.

The front disk is secured to the shank of a knob 30 which is rotatably mounted on the end portion of the spindle 27 and on the front wall 13. The knob 30 is mounted externally of the front wall 13 and has secured to it a dial 31 which rotates in a dished portion of the front wall 13.

The rear and front disks 26 are each provided with a projection on the faces toward the middle disk, and the latter is provided with similar projections on each of its faces. Thus, when the knob 30 is turned, the front disk is rotated and, when the projection thereon strikes one projection on the middle disk, the latter may also be rotated. Continued rotation of the knob will eventually cause the rear disk to be rotated in a similar manner. It is evident that, in this manner, the rear disk may be turned to a given position, then by reverse rotation the middle disk may be moved to a different position, and finally the front disk may be properly positioned.

The dial 31 has a series of characters marked thereon, and a fixed mark is placed on the front wall or face plate 13 to cooperate with the characters on the dial. Thus, it will be seen that given positions of the disks will correspond to the certain characters on the dial, and the disks may be accurately set by means of the characters on the dial.

To permit the bolt 15 to be pivoted out of engagement with the notch 18 of the short arm of the shackle, each disk 26 has a notch 33 cut in its periphery. The bolt has a tongue 32 extending inwardly from the edge thereof, and when the disks are set, by rotating them as above described, with their notches alined adjacent the tongue 32, the bolt may be pivoted out of its locking position and the tongue 32 of the bolt may enter the notches in the disks. To move the bolt from its locking position to the unlocking position described above, the inner side of the notch 18 in the shackle is slanted so that, when the notches in the disks are alined, by pulling the shackle outwardly, the slanted side of the notch 18 will have a camming action on the hook 17 of the bolt, which action pivots the bolt out of its locking position. When the notches in the disks 26 are not alined, the bolt cannot be pivoted as the tongue 32 will bear against the peripheries of the disks.

The end of the short arm of the shackle is beveled, as at 34, so that, in case the short arm is withdrawn from the casing and the bolt should be moved into the position it occupies when locked, the beveled end of the short arm, when again inserted into the casing, will cam the bolt out of the way.

Friction means is also provided which tends to hold the bolt against pivotal movement. As illustrated herein, the friction means comprises a pair of balls 35 positioned in an aperture extending through the end of the bolt adjacent the tongue 32. Interposed between the balls 35 within the aperture is a compression spring 36 having caps 37 over each end and pressing the balls outwardly.

The balls 35, when the bolt is in a locked position, rest respectively in arcuate slots 38 cut in the rear wall of the inner cup 12 and the ring 22. The slots 38 have a width less than the diameter of the balls 35 so that, when the bolt is pivoted, the balls will be pressed into the aperture in the bolt against the action of the spring 36. Thus, the bolt is held frictionally by the balls resting in the slots 38 when the bolt is in its locked position, the frictional resistance to movement of the bolt being sufficient to withstand the tendency to move the bolt due to the weight of the lock when suspended by the shackle and to any slight pres-

sure accidentally applied in operating the permutation device. When the bolt is pivoted to the position in which the tongue 32 enters the notches in the permutation disks 26, the pressure of the balls against the rear wall of the cup and against the ring 22 offers some resistance to the movement of the bolt, although not as much as when the balls rest in their slots.

Attempts are often made, in picking a lock, to determine the position of the notches in the permutation disks either by pressing or pulling on the shackle to cause the bolt to press against the edges of the disks. When the disks are rotated under such pressure and the bolt passes over a notch, a slight click or jar may be felt. In this manner, the positions of all the notches in the disks may be determined and the lock may be opened by one not authorized to do so.

To prevent such an occurence, the outer disk 26, which is slightly larger than the others, has a series of shallow notches 39 cut around its periphery which are of less width than the tongue 32. That portion of the lamination, opposite the front disks, which forms a part of the tongue 32 is cut away to form a narrower tongue 40 arranged to slip into the shallow notches 39 when the bolt is pressed toward the disks by the shackle. Thus, the notch in the upper disk which permits the bolt to be pivoted cannot be detected from the shallow notches nor can the notches in the other disks, while the shallow notches practically form a lock, together with the tongue 40, against rotation of the disk under pressure, and detection of the position of the notches 33 is prevented.

When the tongue 32 is in the notches 33, to throw the bolt into locking engagement with the shackle, a cam surface 41 is cut on one side of the notch 33 in the upper disk 26 and rotation of the upper disk (in a clockwise direction when the cam surface 41 is on the side illustrated) will force the tongue 32 out of the notch 33 and the bolt back into a locked position.

The key-operated device, referred to above, is mounted between the permutation disks 26 and the rear wall of the casing and is arranged to move the bolt 15 bodily to a different unlocking position from the position of the bolt when unlocked by the permutation-operated device.

The key-operated device (see Figs. 4 and 5) comprises a slidable plate 42 resting on the rear wall of the inner casing and having one end supported in an aperture in the cylindrical side wall of the casing, and having an elongated slot 43 punched intermediate its ends to fit over an enlarged portion of the spindle 27. The end of the plate 42 adjacent the bolt has a cam slot 44 cut therein through which the pin 16 of the bolt extends. When the plate 42 is moved to the right, from the position shown in Fig. 4 to the position shown in Fig. 5, the cam slot 44 causes the bolt to be moved bodily out of engagement with the short arm of the shackle and circumferentially around the disks 26, the arcuate slots 20 and 21 guiding the pin 16 and the upper end of the bolt being guided by the peripheries of the disks 26, as well as the balls 35 riding in the slots 38.

Overlying the plate 42 is a second plate 45 which has a notch 46 fitting around the enlarged portion of the spindle 27 and an arm 47 extending upwardly from one side thereof which is notched at its end to slide on a pin 48 secured to the rear wall of the casing. On one side of the arm 47 is a rearwardly extending lug 49 which abuts against a lug 50 formed on the upper edge of the plate 42 when in a locked position. Thus, when the plate 45 is moved transversely of the plate 42, the lug 49 is moved out of the way of the lug 50 and movement of the plate 42 is permitted. A compression spring 51 positioned between the side wall of the casing and the end of the arm 47 tends to hold the plate 45 in a position where the lug 49 engages the lug 50.

The two plates 42 and 45 are arranged to be moved by a key 52 which may be inserted into the casing through a key-hole 53 cut in the rear wall of the casing. The key 52 when inserted is rotatably guided by a cylinder 54 journaled in the rear wall of the casing and in the ring 22. The key 52 is provided with two bits 55 and 56.

The bit 55, as the key is rotated, strikes a cam surface on the plate 45 and moves the latter against the action of the spring 51 to a position in which the lug 50 on the plate 42 may pass the lug 49 on the plate 45.

The bit 56 strikes a cam surface on the plate 42, when the key is rotated, and causes the plate 42 to be slid to the right as viewed in Figs. 4 and 5, the aperture in the side wall of the casing and the slot 43 fitting around the spindle 27 controlling the movement of the plate 42 imparted by the key. Thus, rotation of the key moves the plate 45 to a position permitting the plate 42 to be moved, and then slides the plate 42 so that the cam slot 44 will move the bolt bodily out of engagement with the shackle.

To provide added security against unauthorized opening of the lock, if a person attempting such unauthorized opening were able to fit a key to the lock, it is necessary first to move the permutation-operated device to a setting other than that required to open the lock thereby, before the key-operated device can be operated. To accomplish this end, the permutation disks 26 are provided with another set of notches which cooperate with the key-operated device.

As illustrated in the drawing, the rear and middle disks 26 each have a pair of notches 60 which are narrower than the notches 33 so that the tongue 32 cannot enter therein. Formed on the plate 45 adjacent the key cylinder 54 are a pair of upstanding members 61 extending adjacent the peripheries of the rear and middle disks 26, and arranged to enter the notches 60 when the latter are alined and in a position opposite the members 61. When the notches 60 are not so positioned, the plate 45 cannot be moved by the key. Thus, only those who know the characters of this second setting of the permutation-operated device, as well as having possession of a key, are able to open the lock by the key-operated device. Although in the preferred mode of operation it is desirable to disaline the disks 26 after the padlock has been relocked by the key in order to require a resetting of the disks, the lock may be opened by the key alone if, after the disks have been set and the lock opened by the key, the lock is closed by the key without disturbing the seting of the disks.

On the key, in the possession of one authorized to open the lock, are means indicating the second setting such as the characters of the second setting stamped as shown in Fig. 7.

An important feature of the invention as mentioned above, is to provide means having the characters of the first setting for the permutation-operated device marked thereon, which means is movable from a position in which said characters are hidden from view to a position in which the characters are on display, such movement taking place when the bolt is moved to an unlocking po-

sition by the key-operated device. To accomplish this feature, the end of the plate **42**, which slides through the aperture in the cylindrical side wall of the casing, has stamped thereon the characters corresponding to the first setting of the dial **31** at which the notches **33** in the permutation disks **26** will be alined.

When the key-operated device is in its locked position, the said end of the plate **42** is within the casing so that the characters marked thereon are hidden from view. But when the lock is opened by the key-operated device, the plate **42** slides to a position in which the said end extends beyond the side wall of the casing and the characters may be seen.

When a number of these locks are used, as in the case of a school, each student is given the characters of the setting at which his lock may be opened by the permutation-operated device. The key is in possession of the school authorities and is a master key which may open all the locks or any particular group of locks. If the student forgets the characters of his setting, the school authorities may, by the use of the key, quickly determine the setting by moving the plate **42** to the position in which characters may be seen. Thus, no record of the settings of locks need be kept by the authorities as such settings are immediately available through the use of the key. And at the same time at which the characters are placed on display by the key-operated device, the lock is opened thereby.

The lock is especially strong and cannot easily be forced open on account of the double casing formed by the outer and inner cups **11** and **12**, and all slots in the inner cup **12**, such as the arcuate slot **20** and the slot **38** are covered over by the outer cup **11**. Nor can the lock be easily picked as the permutation-operated device must first be set and the plate **45** moved, before the plate **42** can be moved. Yet, with these features, the lock may be manufactured at a relatively low cost.

I claim as my invention:

1. A lock comprising, in combination, a permutation-operated device, and means having marked thereon the characters of the setting of said device at which the lock may be opened, said means being independent of said device and movable from a position in which said characters are hidden from view to a position in which said characters are in view.

2. A lock comprising, in combination, a permutation-operated device arranged when set to permit the lock to be opened, means for displaying the characters of the setting of said device at which the lock may be opened, said means normally holding said characters hidden from view, and means independent of said device for operating said first-mentioned means to display said characters.

3. A lock comprising, in combination, a casing, a permutation-operated device mounted in said casing and arranged when set to permit the lock to be opened, means having marked thereon the characters of the setting of said device at which the lock may be opened and normally holding said characters hidden within said casing, and means independent of said device for moving said first-mentioned means to a position in which the characters may be seen.

4. A lock comprising, in combination, a casing, a permutation-operated device mounted in said casing and arranged when set to permit the lock to be opened, means having marked on a portion thereof the characters of the setting of said device at which the lock may be opened, said means being mounted in said casing and normally completely enclosed within said casing to hide said characters from view, and means for moving said first-mentioned means to a position where said marked portion extends externally of said casing to display said characters.

5. A lock comprising, in combination, a casing having an aperture therein, a permutation-operated device mounted in said casing and arranged when moved to a predetermined setting to permit the lock to be opened, means slidably mounted in said aperture and normally completely enclosed within said casing, said means having marked on the end thereof the characters of said setting, and means for sliding said first-mentioned means through said aperture to a position where said marked end extends beyond said casing to display said characters.

6. A lock comprising, in combination, a permutation-operated device arranged when moved to a predetermined setting to permit the lock to be opened, and key-operated means for displaying the characters of said setting and normally holding said characters hidden from view.

7. A lock comprising, in combination, a casing, a permutation-operated device mounted in said casing and arranged when moved to a predetermined setting to permit the lock to be opened, and key-operated means having marked thereon the characters of said setting and normally holding said characters hidden within said casing.

8. A lock comprising, in combination, a casing having an aperture therein, a permutation-operated device mounted in said casing and arranged when moved to a predetermined setting to permit the lock to be opened, and key-operated means slidably mounted in said aperture and normally completely enclosed within said casing, said means having marked on the end thereof the characters of said setting and being slidable from said normal position to a position in which said marked end extends beyond said casing to display said characters.

9. A lock comprising, in combination, a permutation-operated device arranged when moved to one predetermined setting to permit the lock to be opened, and key-operated means operable only when the permutation device is moved to another predetermined setting, said key-operated means being movable to display the characters of said first setting and normally holding said characters hidden from view.

10. A lock comprising, in combination, a locking device movable from a locking position pivotally to one of two unlocking positions and bodily to the other of said unlocking positions, a first means for controlling the pivotal movement of said locking device to one of said unlocking positions, and a second means for governing the movement bodily of said locking device to the other of said unlocking positions.

11. A lock comprising, in combination, a pivoted bolt, a permutation-operated device operable to permit said bolt to be pivoted from a locking position to one unlocking position, and a key-operated device operable to move said bolt bodily from said locking position to a different unlocking position.

12. A lock comprising, in combination, a bolt, a key-operated device operable to move said bolt bodily to one unlocking position and pivotally supporting said bolt, and a permutation-operated

device operable to permit said bolt to be pivoted to a different unlocking position.

13. A lock comprising, in combination, a bolt, a permutation-operated device comprising a plurality of disks each having a notch in its periphery and operable when the notches are alined to permit said bolt to be moved to an unlocking position in which it enters said notches, and a key-operated device operable to move said bolt circumferentially around said disks to a different unlocking position.

14. A padlock comprising, in combination, a casing, a shackle extending into said casing through the side wall thereof, a bolt mounted in said casing and movable from a position in which it engages said shackle pivotally to one of two positions in which it is disengaged from said shackle and bodily to the other of said two positions, a permutation-operated device operable to permit said bolt to be moved pivotally to one of said disengaging positions, and a key-operated device operable to move said bolt bodily to the other of said disengaging positions.

15. A padlock comprising, in combination, a cylindrical casing, a shackle extending into said casing, a bolt mounted in said casing and constructed to engage said shackle, a permutation-operated device centrally mounted in said casing and arranged when set to permit said bolt to be moved substantially radially relative to said device to a position out of engagement with said shackle, and a key-operated device mounted in said casing for moving said bolt circumferentially around said permutation-operated device to a position out of engagement with said shackle.

16. A lock comprising, in combination, a casing having guide means therein, a bolt arranged to be moved bodily under control of said guide means and to be pivoted relative to said guide means, a key-operated plate slidably mounted in said casing and having a cam slot for moving said bolt bodily under control of said guide means, and a permutation-operated device operable to permit said bolt to be pivoted relative to said guide means.

17. A lock comprising, in combination, a bolt movable from a locking position to either of two unlocking positions, a permutation-operated device operable when moved to one predetermined setting to permit said bolt to be moved to one of said unlocking positions, and a key-operated device operable only when said permutation-operated device is moved to another predetermined setting to move said bolt to and from the other of said unlocking positions.

18. A lock comprising, in combination, a bolt, a permutation-operated device comprising a plurality of disks each having a notch constituting, with the corresponding notches in the other disks, a first set constructed to permit said bolt to be moved to an unlocking position in which it enters said notches, said disks also having a second set of notches, and a key-operated device arranged to move said bolt circumferentially around said disks to a different unlocking position, said key-operated device having a member constructed to enter said second set of notches and being operable only when said notches are alined.

19. A lock comprising, in combination, a bolt, a key-operated device for moving said bolt bodily to and from an unlocking position comprising a first plate movable by the key and having a cam slot for bodily moving said bolt and a second movable plate controlling the movement of said first plate, and a permutation-operated device having a first set of notches arranged when alined to permit said bolt to be pivoted to and from a different unlocking position and having a second set of notches arranged when alined to permit said second plate to be moved.

20. A lock comprising, in combination, a casing, a bolt arranged to be moved bodily and to be pivoted, means formed in said casing arranged to guide said bolt when moved bodily and to permit said bolt to be pivoted therein, a key-operated device comprising a first plate slidably mounted in said casing and having a cam slot for moving said bolt bodily under control of said guide means, and a second plate slidably mounted in said casing and controlling the movement of the first plate, and a permutation-operated device having a first set of notches arranged when alined in a predetermined position to permit said bolt to be pivoted to and from a different unlocking position and a second set of notches arranged when alined in a predetermined position to permit said second plate to be moved, said permutation-operated device being constructed to permit only one of said sets of notches to be alined at a time.

21. A lock comprising, in combination, a casing, a bolt arranged to be moved bodily or to be pivoted within said casing, a first key-operated plate slidably mounted in said casing and arranged to move said bolt bodily, a second key-operated plate having a lug arranged to be moved into and out of the path of said first plate to control the movement thereof, a permutation-operated device comprising a plurality of disks having two sets of notches, one of said sets being arranged when alined to permit said bolt to be pivoted, and a pair of lugs on said second plate arranged to enter the other set of notches when the second plate is moved to a position permitting movement of said first plate.

22. A lock comprising, in combination, a permutation operated device arranged when moved to a predetermined setting to permit the lock to be opened, means for displaying the characters of said setting and a key-operated device for opening the lock and for operating said means to display the characters of said setting when the lock is opened thereby.

23. A lock comprising, in combination, a permutation-operated device arranged when moved to a predetermined setting to permit the lock to be opened, a key-operated device for opening the lock, and means having the characters of said setting marked thereon, said means being movable from a position in which the characters are hidden from view to a position in which said characters may be seen when the lock is opened by said key-operated device.

24. A lock comprising, in combination, a casing, a permutation-operated device mounted in said casing and arranged when moved to a predetermined setting to permit the lock to be opened, a key-operated device mounted in said casing for opening the lock, and means having the characters of said setting marked thereon and slidable from a position in which said characters are hidden within said casing to a position extending outside of said casing to permit said characters to be seen when the lock is unlocked by said key-operated device.

25. A lock comprising, in combination, a bolt movable to either of two unlocking positions, a permutation-operated device operable to permit said bolt to be moved to one unlocking position, a key-operated device operable to move said bolt

to the other unlocking position, and means having the characters of the setting of the permutation-operated device marked thereon, said means being movable to a position where said characters may be seen when said bolt is moved to the last-mentioned unlocking position.

26. A lock comprising, in combination, a pivoted bolt, a permutation-operated device operable to permit said bolt to be moved by a pivotal movement to an unlocking position, and a key-operated device including a slidable plate having a cam slot for moving said bolt bodily to an unlocking position and having the characters of the setting of the permutation-operated device marked thereon, said characters being moved into view when said plate moves said bolt into the unlocking position.

27. A lock comprising, in combination, a casing having an arcuate slot formed therein, a bolt having a pin extending into said slot, a permutation-operated device operable to permit said bolt to be pivoted on said pin to open the lock, and a key-operated device including a plate having a cam slot fitting around said pin for moving it arcuately within the slot in the casing to open the lock, said plate being slidably guided by said casing and having a portion projecting beyond said casing with the characters of the setting of the permutation-operated device marked thereon.

28. A lock comprising, in combination, a bolt, a permutation-operated device arranged when moved to one predetermined setting to permit the bolt to be moved to an unlocking position, and a key-operated device for moving the bolt and displaying the characters of said setting when the lock is opened thereby, said key-operated device being operable only when said permutation operated device is moved to another predetermined setting.

29. A padlock comprising, in combination, a casing, a shackle, a bolt arranged to be moved into and out of engagement with said shackle, a permutation-operated device arranged to permit said bolt to be pivoted out of engagement with said shackle, a key-operated device arranged to move said bolt circumferentially around said permutation-operated device out of engagement with said shackle, and friction means tending to hold said bolt against pivotal movement comprising a pair of balls positioned in an aperture extending through said bolt, a spring interposed between said balls within the bolt and pressing said balls outwardly, and a pair of slots in said casing partially receiving said balls.

30. A lock comprising, in combination, a casing, a bolt movably mounted in said casing, a first key-operated plate slidably mounted in said casing and arranged to move said bolt, a second key-operated plate having a lug arranged to be moved into and out of the path of said first plate to control the movement thereof, a permutation-operated device comprising a plurality of disks having a set of notches therein, and a lug on said second plate arranged to enter said set of notches when alined to permit said second plate to be moved to a position permitting movement of said first plate.

31. A padlock comprising, in combination, a casing, a shackle, a bolt arranged to be moved into and out of engagement with said shackle, a permutation-operated device arranged to permit said bolt to be pivoted out of engagement with said shackle, a key-operated device arranged to move said bolt circumferentially around said permutation-operated device out of engagement with said shackle, and friction means tending to hold said bolt against movement, said means comprising spring-pressed members mounted in the bolt and coacting with the casing, and means formed in the casing for increasing the frictional resistance to pivotal movement of the bolt out of its locking position.

32. A lock comprising, in combination, a bolt, a permutation-operated device operable to permit said bolt to be moved from a locking position to an unlocking position about an axis extending through said bolt, and a key-operated device operable to move said bolt from said locking position to a different unlocking position about an axis extending externally of said bolt.

33. A lock comprising, in combination, a permutation-operated device arranged when moved to one predetermined setting to permit the lock to be opened, and a key-operated device for opening the lock operable only when the permutation-operated device is moved to another predetermined setting differing from said first setting.

34. A lock comprising, in combination, a permutation-operated device preventing opening of the lock except when moved to one predetermined setting, and a key-operated device for opening the lock, said permutation-operated device also preventing operation of the key-operated device except when moved to another different predetermined setting.

35. A lock comprising, in combination, a bolt, a permutation-operated device comprising a plurality of disks having a first set of notches constructed when alined to permit said bolt to be moved to an unlocking position, said disks also having a second set of notches, and a key-operated device for moving said bolt to an unlocking position including a member movable into said second set of notches when alined, said disks being constructed to prevent simultaneous alinement of said two sets of notches.

36. A lock comprising, in combination, a bolt, a key-operated device comprising a first plate movable by the key for moving said bolt and a second movable plate controlling the movement of said first plate, and a permutation-operated device having a first set of notches arranged when alined to permit said bolt to be moved and having a second set of notches arranged when alined to permit said second plate to be moved.

37. A lock comprising, in combination, a movable bolt, a permutation-operated device having one predetermined setting which permits the bolt to be moved to unlocking position, and a key-operated device for moving the bolt including a member movement of which is positively obstructed by the permutation-operated device when in said one setting, said permutation-operated device being shiftable to another predetermined setting to permit operation of the key-operated device.

38. A lock comprising, in combination, a movable bolt, a permutation-operated device arranged when in one predetermined setting to permit movement of the bolt and in any other setting to prevent a similar movement of the bolt, and a key-operated device for moving the bolt, said permutation-operated device when in said one setting preventing operation of said key-operated device and when in another predetermined setting permitting operation of the key-operated device.

39. A lock comprising, in combination, a bolt movable to unlocking position, two independent means for moving the bolt to unlocking position,

and a permutation-operated device arranged when set in one predetermined position to permit operation of the bolt by the first of said means and preventing operation of said bolt by the second of said means, said permutation-operated device also being arranged when set in a different predetermined position to prevent operation of the bolt by the first of said means while permitting operation of the bolt by said second of said means.

40. A lock comprising, in combination, a bolt mounted for two different kinds of movement, two independent means for effecting shifting of said bolt to unlocking position by the respective movements, and a permutation-operated device arranged when set in one predetermined position to permit one of said movements of the bolt by one of said means and preventing the other movement of the bolt by the other means and arranged when set in another predetermined position to prevent said one movement of the bolt by said one means and permitting said other movement of the bolt by said other means.

GEDOR W. ALDEEN.