No. 717,350. Patented Dec. 30, 1902.

D. CHURCHILL.

PERMUTATION LOCK.

(Application filed Apr. 19, 1902.)

(No Model.)

Fig. 1.

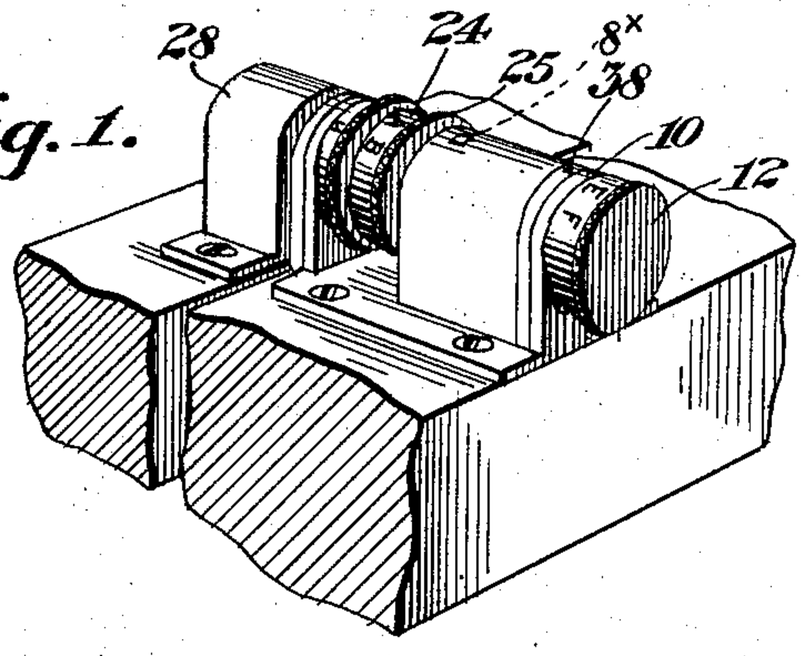


Fig. 2.

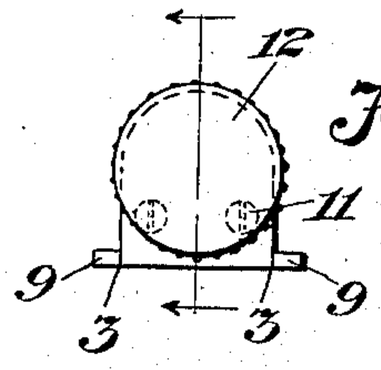


Fig. 3.

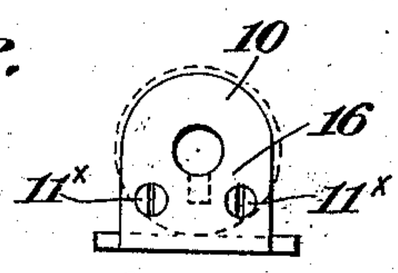


Fig. 4.

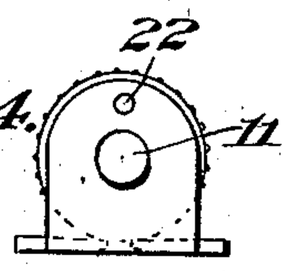


Fig. 5.

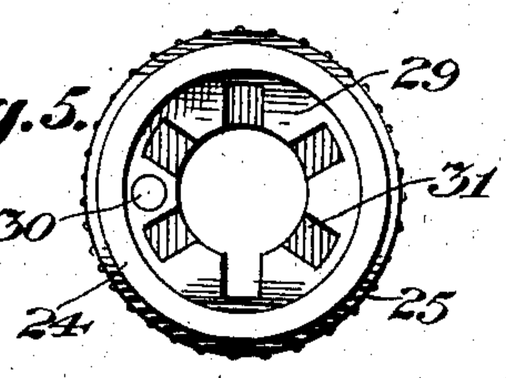


Fig. 6.

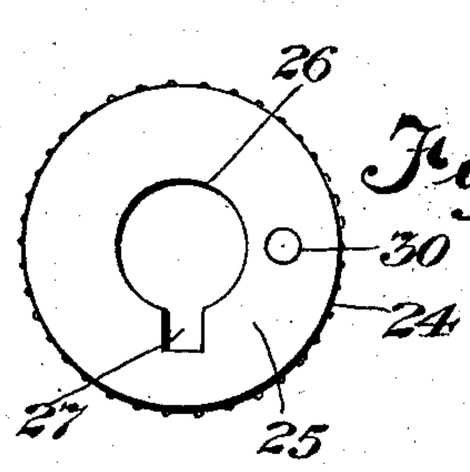


Fig. 7.

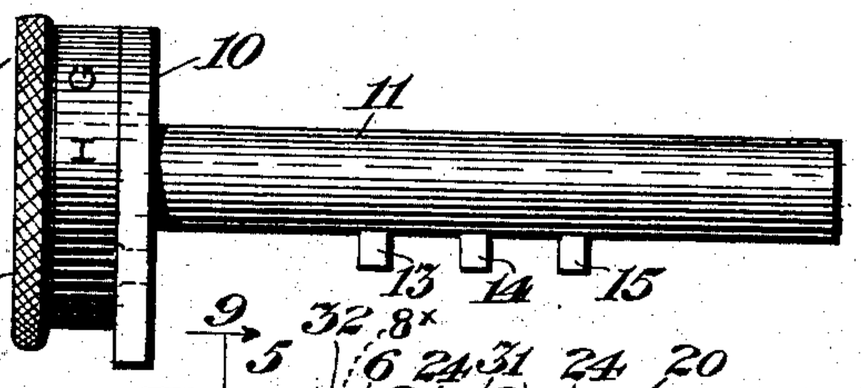


Fig. 8.

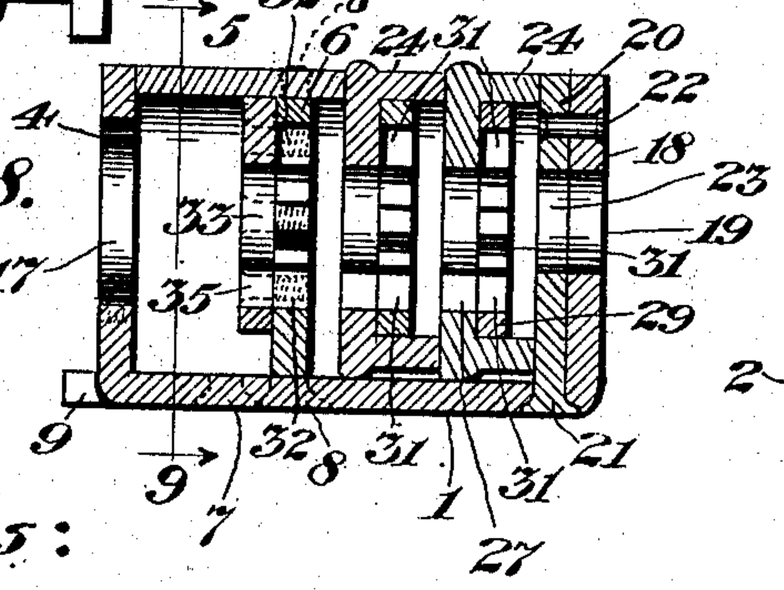
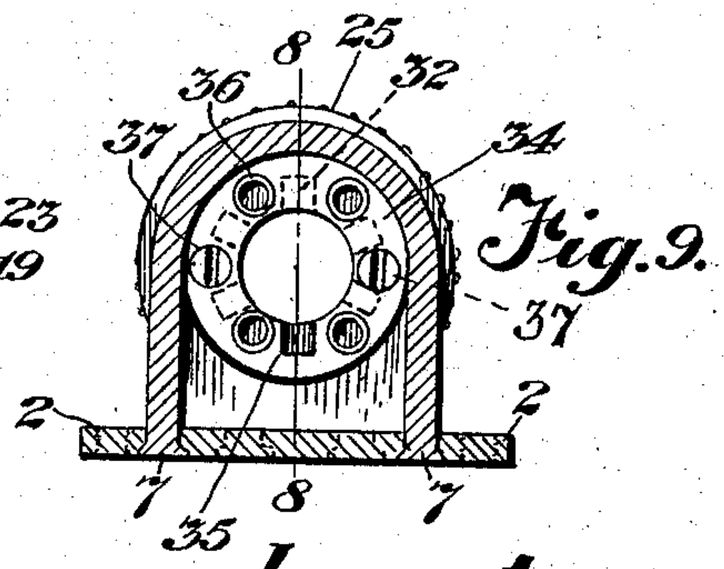


Fig. 9.



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UNITED STATES PATENT OFFICE.

DURAND CHURCHILL, OF CHICAGO, ILLINOIS.

PERMUTATION-LOCK.

SPECIFICATION forming part of Letters Patent No. 717,350, dated December 30, 1902.

Application filed April 19, 1902. Serial No. 103,747. (No model.)

To all whom it may concern:

Be it known that I, DURAND CHURCHILL, a citizen of the United States, 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 full, clear, and exact specification.

My invention relates to that class of permutation-locks in which the tumblers turn on the bolt and the bolt itself turns in the tumblers, so that when the bolt and tumblers arrive at a certain relative position the bolt may be wholly or partially withdrawn through the tumblers, the bolt being provided with a number of retaining-lugs and the tumblers with slots through which such lugs may pass and with notches or false slots in it which the lugs may engage, but through which they cannot pass, whereby means will be provided for preventing the lock being opened by feeling for the real slot with the lugs.

My invention has for its primary object to provide a durable and efficient lock of this character which shall be of simple and inexpensive construction.

A further object of my invention is to provide simple and improved means whereby the combination may be readily changed.

With these ends in view my invention consists in certain features of novelty in the construction, combination, and arrangement of parts by which the said objects and certain other objects hereinafter appearing are attained, all as fully described with reference to the accompanying drawings, and more particularly pointed out in the claims.

In the said drawings, Figure 1 is a perspective view of my improved lock, showing it applied to two members to be locked together. Fig. 2 is a view of the knob end of the lock in elevation. Fig. 3 is a similar view with the knob omitted. Fig. 4 is an end elevation of the opposite end. Fig. 5 is an enlarged detail view of one of the tumblers looking into the open side of the same. Fig. 6 is a similar view of the opposite side. Fig. 7 is a detail side elevation of the knob and bolt, also showing the end member for holding the bolt in place in the housing. Fig. 8 is a vertical sectional view of the housing and tumblers, taken on the line 8 8, Fig. 9. Fig. 9 is a transverse section taken on the line 9 9, Fig. 8.

1 is a base-plate, which may be formed with flanges 2 at the sides thereof, whereby it may be secured to one of the members to be locked together by any suitable means. One end of this base-plate is slitted near both sides, as shown at 3, for a short distance, and the metal lying between these slits is turned upwardly at substantially right angles to the base-plate 1, so as to form an end wall 4 of the housing, whose sides and top are constituted by an arch 5, while the opposite end wall is constituted by a partition 6. The piece of metal which constitutes the end wall 4 is of substantially the same width as the distance between the slits 3, and its upper edge is preferably rounded, so as to conform to the rounding top of the arch 5, against the edge of which arch the end wall 4 is closely fitted. The lower ends or edges of the arch 5 are provided with rivets 7, which are passed through the base-plate 1 and upset to give the arch secure attachment to the base-plate, and the lower edge of the partition 6, which is fitted snugly under the arch, is also provided with a rivet 8, which is likewise passed through the base-plate and upset, it being riveted at top, as shown at $8^{\times}$.

The purpose of slitting the base-plate, as at 3, is to form two shoulders 9 for holding the lower edge of a retaining member 10, which is accurately fitted between these shoulders 9 and secured to the end wall 4 by means of screws 11 or any other suitable devices, but preferably screws, so that the retaining member 10 may be removed when knob 12 of bolt 11 is backed off after the bolt has been unlocked, the purpose of the retaining member 10 being to prevent the lugs 13 14 15 of the bolt from being withdrawn through end wall 4 when the bolt is unlocked, it being understood that when the bolt is in position it passes through an aperture 17 in the end wall. When the bolt is in position and locked, the screws $11^{\times}$ are covered by the knob 12, and thus rendered inaccessible to any one attempting to take the lock apart without first unlocking it.

The end of the plate 1 opposite that on which the end wall 4 is formed is bent up-

wardly substantially parallel with end wall 4, so as to form a support and journal-bearing 18 for the inner end of the bolt, such support being provided with a circular aperture 19, through which the bolt passes. This support 18 may be reinforced by a plate 20, placed against the inner side thereof and secured to the base 1 by rivet 21 and to the upper edge of the support 18 by rivet 22, the plate 20 having registering aperture 23 for the bolt.

The end support 18 is located at a greater or less distance from the inner edge of the arch 5, according to the number of tumblers to be employed. In the present example of my invention I have shown but two tumblers, and these are arranged in line with the bolt between the end support 18 20 and the arch 5. They are similar in construction and operation, and hence a description of one will suffice for both. Each consists of a ring or cylinder 24 and a disk 25, which is shown as being formed integrally with the cylinder 24 and whose outer edge, if desired, may be milled or otherwise roughened to facilitate turning. The disk 25 is provided with a central aperture 26, of circular formation, arranged in line with the circular apertures 17 19 23, and the edge of this aperture 26 is provided with a slot 27, sufficient in size to permit the lugs 14 15 to pass through.

When the bolt 11 is in place and inserted to the limit of its inward movement, its end protrudes through the aperture 19 a sufficient distance to enable such end to be utilized for locking the door or member to be secured, the latter being provided with any suitable socket, such as that shown at 28, for receiving and holding the protruding end, and at such time the lugs 14 15 lie between the plate 20 and right-hand tumbler and the back of the right-hand tumbler and face or inner side of the left-hand tumbler, respectively, and are capable of turning with the bolt in these spaces, so as to bring them into register with the slots 27, the lug 13 at such time being located between the back of the left-hand tumbler and the right-hand side of the partition 6, which latter is set inwardly from the edge of the arch 5, so as to form a requisite space between it and the adjacent tumbler. The inner side of each of the tumblers is provided with a plate 29, which is preferably formed separately therefrom, and after being forced thereinto may be secured by rivet 30 or other suitable device passing through the plate and the tumbler, and each of these plates 29 is formed with a series of radial slots 31 at least as large as the lugs 14 15, so as to be capable of receiving the latter; but the disk 25 of the tumbler, as before described, is provided with but one of the slots 27, and hence the lugs 14 15 can pass through only that one of the slots 31 which is in register with the slot 27, the remaining slots 31 constituting notches or false slots for engaging the lugs 14 15 in the event it should be attempted to open the lock by feeling for the slot 27 with the lugs.

The partition 6 is formed with a series of slots 32, radiating from a central aperture 33 therein, through which the bolt passes, and secured to the side of partition 6 adjacent to end wall 4 is a washer-shaped plate or ring 34, whose central aperture registers with the aperture 33. This plate 34 is formed with but one slot 35, radiating from its central aperture and which is capable of being placed in register with any one of the slots 32 in partition 6. In order that the plate 34 may be readily secured to partition 6 and its position thus changed as desired, it is provided with as many perforations 36 as there are slots 32 in the partition 6, so that by means of two screws 37, threaded in the partition and passing through two of said perforations, the ring 34 may be secured in place. As shown in Figs. 8 and 9, the slot 35 in the ring 34 is now arranged opposite the lower one of the slots 32 in the partition, and with the lugs 13 14 15 arranged, as shown, in line with each other it will be understood that in order to unlock the bolt it will be necessary to place both tumblers in such position that the slots 27 therein will be at the bottom and in register with the slot 35, so that the bolt may be withdrawn far enough to bring its end clear of the socket 28, and in which position the lugs 13 and 14 will be in the space between the end wall 4 and the ring 34. Should it be desired to change the combination, the slot 35 would be set opposite another one of the slots 32, and in that case it would be necessary to turn the knob 12 to a different position from that at which the device formerly unlocked, it being understood that the knob may be provided on its periphery with letters or other signs or characters adapted to register with a point or index 38 on the plate 10 and the peripheries of the tumblers with letters or characters adapted to register with suitable marks or indexes on the plate 20 and the arch 5, respectively, as is common in locks of this character. It is also seen that all of the slots 32, excepting the one which is in register with the slot 35, serve as false slots or notches for the engagement of the lug 13 and prevent the slot 35 being found by pressing the lug 13 against the inner face of partition 6 while turning the bolt.

In assembling the parts the retaining-plate 10 is inserted over the bolt before either the knob or the lugs are secured thereon, and this plate is screwed to the under wall 4 of the casing before the bolt is entirely inserted. Should it be desired to change the combination, the bolt is entirely withdrawn, with plate 10 thereon, as shown in Fig. 7, and the screws are then removed and the ring 34 turned to the desired position, the aperture 17 in end wall 4 being sufficiently large to admit a screw-driver therethrough. The combination may also be altered by interchanging the tumblers.

Having thus described my invention, what

I claim as new therein, and desire to secure by Letters Patent, is—

1. In a permutation-lock the combination of a plate having its ends turned upwardly substantially parallel with each other and provided with apertures arranged in line, a plate forming three sides of an inclosure secured to said first plate and having one edge arranged in close relation to one of said bent ends, a partition secured to said first plate contiguous to the end of said second plate and having an aperture arranged in line with the apertures in said bent ends, a tumbler arranged between said partition and one of said bent ends and having an aperture in line with the aforesaid aperture, a bolt adapted to be passed through the apertures in said bent ends, partition and tumbler, and lugs projecting laterally from said bolt adapted to engage with said tumbler and partition, said tumbler and partition being provided with slots for the passage of said lugs, substantially as set forth.

2. In a permutation-lock the combination of a plate having its ends bent upwardly substantially parallel with each other and provided with alined apertures, one or more tumblers having apertures arranged in line with the aforesaid apertures, located between said ends, a reinforcing-plate 20 secured at its outer end to one of said bent ends and at its inner end to the first said plate and having an aperture alined with the aforesaid apertures, and a bolt passing through said apertures and having lugs adapted to engage with said tumblers, said tumblers having slots for the passage of said lugs, substantially as set forth.

3. In a permutation-lock the combination of a plate having its ends bent upwardly substantially parallel with each other and provided with alined apertures, a reinforcing-plate secured against the inner face of one of said ends and also to the main part of said plate and having an aperture alined with the aforesaid apertures, a third plate arranged against the other of said bent ends and forming three sides of an inclosure or casing with its ends secured to the main part of said first plate, an apertured partition arranged at one side of said third plate and secured to the main part of said first plate, an apertured tumbler arranged between said partition and one of the said bent ends and a bolt adapted to pass through said apertures and having lugs adapted to engage with said tumbler and partition, said tumbler and partition having a slot for the passage of said lugs, substantially as set forth.

4. In a permutation-lock the combination of a plate having its ends bent at an angle thereto substantially parallel with each other and provided with alined apertures, an arch arranged contiguous to one of said ends and secured to the main part of said plate, a partition arranged in said arch and secured to said plate and having an aperture alined with the aforesaid apertures, a tumbler arranged between the other one of said bent ends and said arch and having an aperture alined with the aforesaid apertures and a bolt adapted to pass through said apertures and having lugs adapted to engage with said tumbler and partition, said tumbler and partition having slots for the passage of said lugs, substantially as set forth.

5. In a permutation-lock the combination of a plate, the apertured end wall 4 carried thereby, a bolt provided with a knob and lugs, a retaining-plate inserted on said bolt between said knob and lugs, means for securing said retaining-plate to said end wall when the bolt is inserted through the latter and means for locking said bolt against endwise movement through said retaining-plate, substantially as set forth.

6. In a permutation-lock the combination of a rotatable bolt provided with a laterally-projecting lug, an apertured member through which said bolt passes held against rotary motion and having a plurality of notches around the edges of the aperture therein adapted to receive said lug, a member movably secured with relation to said apertured member and covering said notches, said second member having a slot adapted to register with one of said notches for permitting said lug to pass, and means for inclosing said members for excluding said slot from view, substantially as set forth.

7. In a permutation-lock the combination of a rotatable bolt having a lug projecting therefrom, an apertured member through which said bolt passes having a plurality of notches around the edge of the aperture therein, a second member having an aperture registering with the aperture in said first member and a number of screw-holes equal to the number of said notches, screws for securing said second member to said first member and covering the notches therein, said second member having a slot adapted to register with any one of said notches when the second member is turned with relation to the first member, and means for excluding said slot from view, substantially as set forth.

8. In a permutation-lock, the combination of a rotatable bolt having a lug projecting therefrom, an apertured tumbler through which said bolt passes having a slot for the passage of said lug, and a separate apertured plate or ring secured in said tumbler and fixed against rotation with relation thereto and having notches around the edge of its aperture for receiving said lug, and means for supporting the ends of said bolt and excluding said notches and slot from view, substantially as set forth.

9. In a permutation-lock the combination of a rotatable bolt having a lug, a tumbler rotatably mounted thereon and having a slot for the passage of said lug, a base-plate, supports on said plate for the ends of said bolt, the arch 5 secured to said base-plate over said

bolt, the partition 6 through which said bolt passes, secured in said arch to said base-plate at a distance from said tumbler, so as to leave room between it and the tumbler for the rotation of said lug, said partition having notches adapted to receive said lug and a slot adapted to permit the lug to pass through, substantially as set forth.

10. In a permutation-lock the combination of a rotatable bolt having a lug, a casing in which said bolt is journaled, an apertured partition in said casing through which said bolt passes, having notches around the edge of said aperture adapted to receive said lug, a ring through which said bolt passes removably secured to said partition over said notches and having a slot registering with one of said notches for the passage of said lug, one of the end walls of said casing having an aperture of sufficient size to afford access to said ring, a knob on said bolt and a retaining-plate inserted on said bolt between said knob and said lug and removably secured to said apertured end wall, substantially as set forth.

11. In a permutation-lock the combination of the base-plate 1 having slits 3 and the upturned end 4 between said slits, provided with an aperture, retaining-plate 10 removably secured between said slits against said end 4 and having an aperture, a bolt passing through said apertures and means for locking said bolt against endwise movement, substantially as set forth.

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