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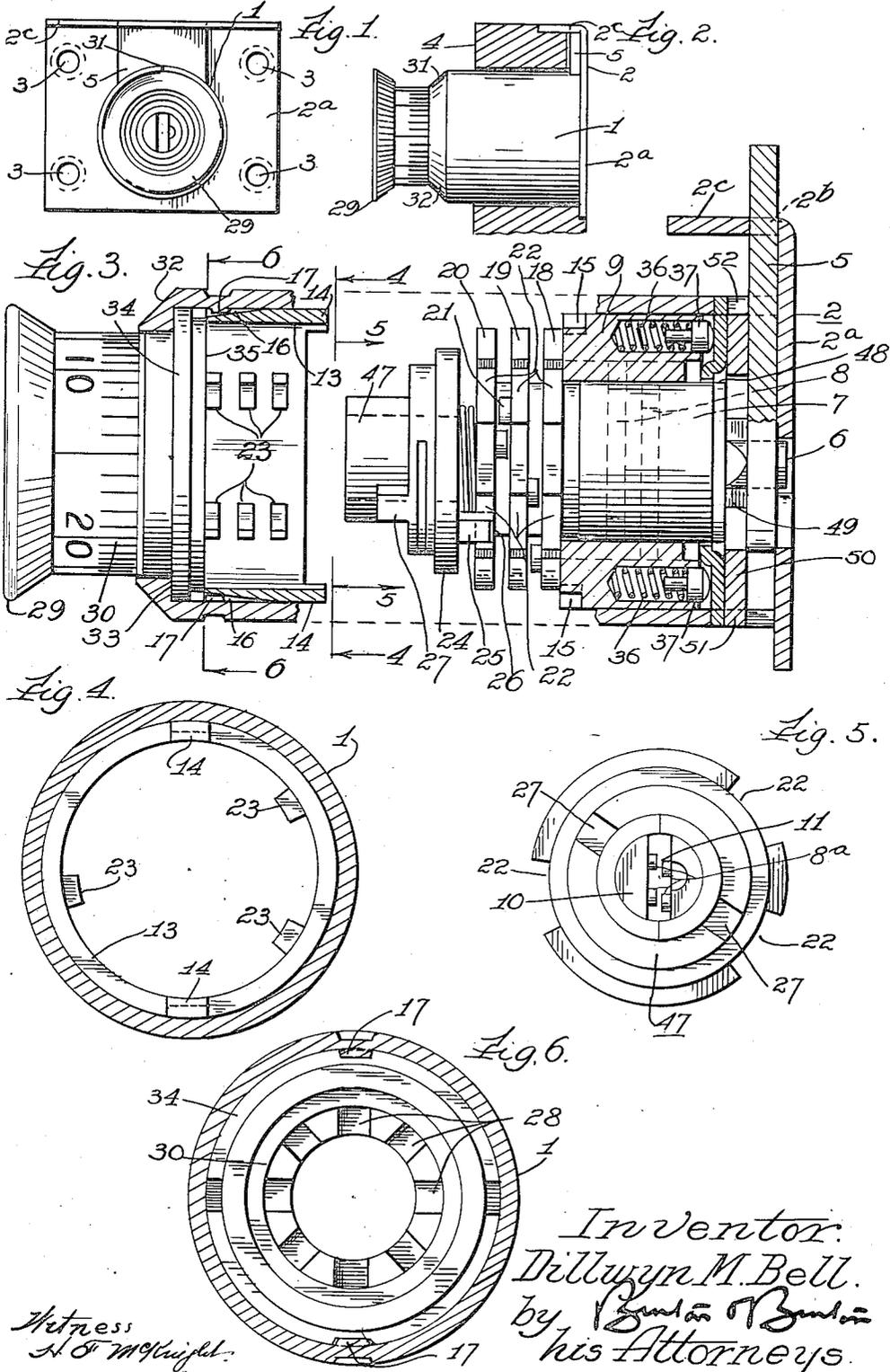
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KEY AND PERMUTATION OPERATED CABINET LOCK

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2 Sheets-Sheet 1



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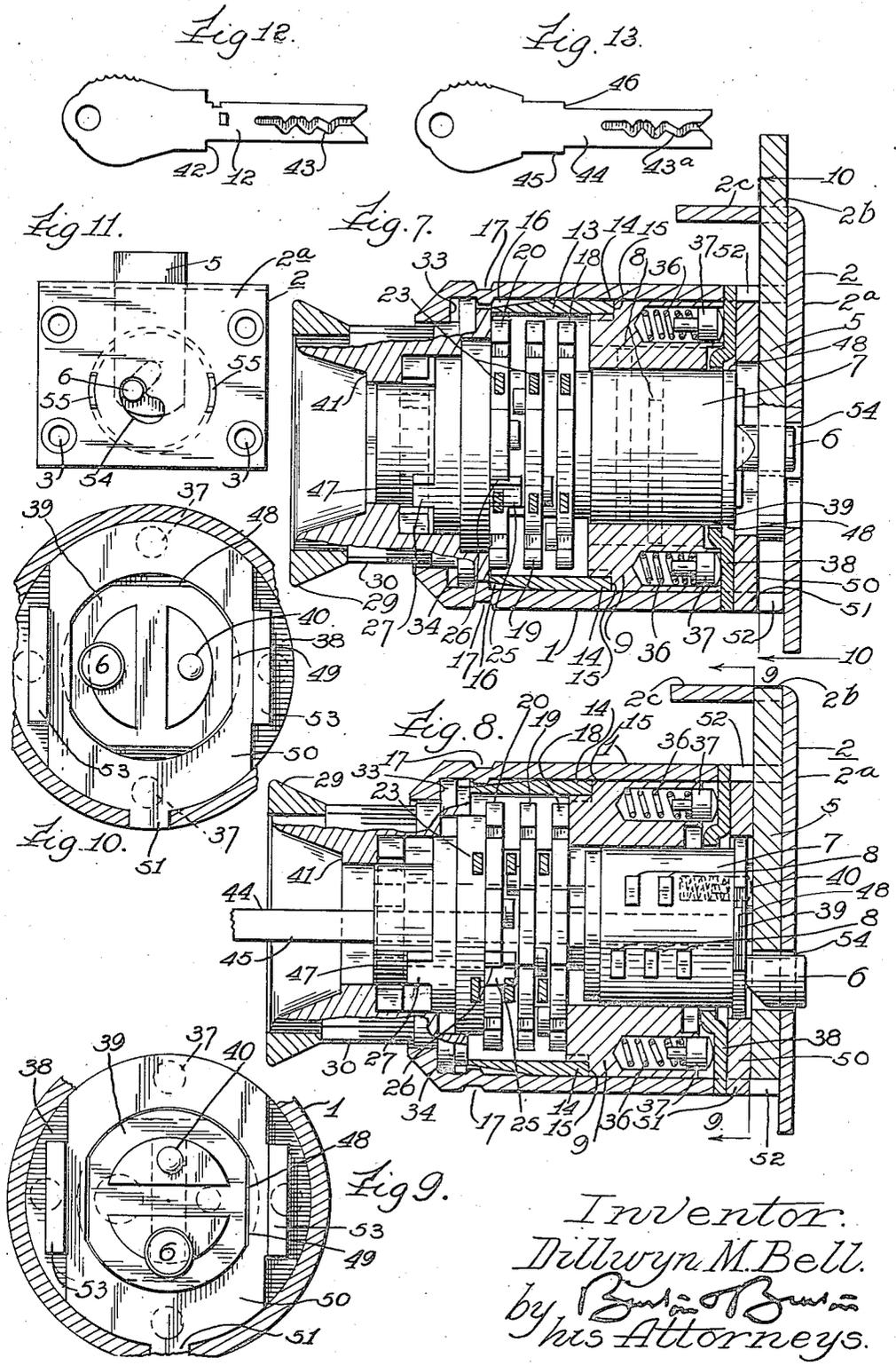
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UNITED STATES PATENT OFFICE

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KEY AND PERMUTATION OPERATED CABINET LOCK

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11 Claims. (Cl. 70—53)

This invention relates to a lock designed for various uses, primarily in connection with cabinet work, as for example, on desk or laboratory drawers or on doors of cupboards, lockers and the like.

5 It includes both key-operated mechanism and a permutation or "combination" mechanism so arranged that the bolt may be actuated by either mechanism independently of the other, and it also includes an arrangement by which the combina-
10 tion may be altered without dismounting or opening the lock casing, but requiring the use of a key, which is not merely a tool for resetting the combination, but which can only be used in the re-
15 setting operation after it has operated a cylinder lock. This may be the same key-operated lock which controls the bolt. The invention therefore consists in the combination of certain features and elements of both lock mechanisms, as herein shown and described, and as indicated by the
20 claims.

In the drawings:

Figure 1 is a front elevation of a cabinet lock embodying this invention as it appears before mounting in the door or drawer which it controls.

25 Figure 2 is a side elevation of the lock, but indicates in section the position of the door frame or drawer front with which it is associated.

30 Figure 3 is a partially sectional and partially disassembled view on a larger scale, showing the operating knob and certain other parts withdrawn axially from the remaining parts, said withdrawn portion of the view being rotated 180 degrees as compared with the remainder of the view.

35 Figure 4 is a transverse section taken as indicated at line 4—4 on Figure 3.

Figure 5 is a transverse section taken at the same plane as Figure 4 but looking in the opposite direction, as indicated by arrows 5—5 on Figure 3.

40 Figure 6 is a transverse section taken as indicated at line 6—6 on Figure 3.

Figure 7 is an axial section showing mainly the same parts as Figure 3, but in the position in which the permutation mechanism has been adjusted preparatory to withdrawing the bolt.

45 Figure 8 is a sectional view taken similarly to Figure 7, but showing the bolt withdrawn by the key-operated mechanism, and also showing the parts adjusted for resetting the combination.

50 Figure 9 is a transverse section taken as indicated at line 9—9 on Figure 3.

55 Figure 10 is a fragmentary section similar to Figure 9 but showing the bolt-operating crank in locking position, being taken at line 10—10 on Figure 7.

Figure 11 is a rear elevation of the lock on the same scale as Figures 1 and 2.

Figure 12 is a side elevation of the regular key for the lock.

Figure 13 is a side elevation of the special reset 5 key employed in changing the combination.

Locks of the type to which this invention relates are frequently employed in large installations, as for example, in school laboratories or in shops or factories where each pupil or workman has a 10 locker or bench drawer in which he may keep clothing or tools. The operating "combinations" of the permutation locks employed on the individual drawers or lockers may be all different, and each workman or pupil will normally know only 15 the combination giving access to his own locker. It is desirable, however, that the instructor or superintendent in charge shall have access to all the drawers or lockers, particularly if they contain tools or equipment belonging to the school or shop. 20 For this purpose each lock is provided with a key-actuated mechanism, and these mechanisms may be arranged so that all of the locks may be opened by a single key, which, in this case, becomes a "master key". This illustrates simply one use of a 25 lock of this character, which may be actuated either by permutation mechanism or by means of a key, but it should be understood that the utility of such a lock is not confined to cases where a large number of locks are all arranged for opera- 30 tion by the same key.

Where the drawer or locker is frequently re-assigned to a new pupil or to another workman, it is desirable that the combination of the lock which has been memorized by the last user be 35 changed upon such reassignment. This could be done by taking the lock apart and inserting different elements in the permutation mechanism, but the present invention greatly simplifies this procedure by providing a special reset key which 40 is inserted in the same manner as the regular key, and is then manipulated to disengage the interior mechanism of the permutation lock from the external knob by which it is operated. This 45 permits the knob to be shifted into a different relation to the internal mechanism and reconnected so that the scale readings constituting the so-called "combination", and representing the necessary adjustments of the knob for opening the lock, will be altered. 50

As shown in the drawings, the lock mechanism is housed mainly in a cylindrical casing, 1, which is secured to an angular mounting plate, 2, provided with holes, 3, to receive securing screws by which it is attached to the inner face of the 55

member, 4, on which the lock is mounted. Said member requires merely a circular opening to receive the cylindrical casing, 1, and a shallow rabbeting in which the plate, 2, is mounted flush with the other surfaces of the member, 4. The bolt, 5, reciprocates against the inner surface of the back plate, 2^a, of the part, 2, and in locking position is projected through a slot, 2^b, in the flange, 2^c, of said plate. In Figures 1, 2 and 8, the bolt is shown in withdrawn or unlocked position.

It may be understood that the bolt, 5, is actuated by a crank arm, 6, projecting from the rear or inner end of the tumbler barrel or plug, 7 whose slidable tumblers, 8, are normally interlocked with grooves in the cylinder, 9, of the key lock mechanism. The plug includes a central spindle, 10, which is rigid with it, so that upon insertion of the proper key in the key slot, 11, of the spindle, 10, the tumblers, 8, are withdrawn out of engagement with the slots in the cylinder, 9, and the plug, 7, may be turned so as to move the crank, 6, through a sufficient arc to withdraw the bolt, 5, to the position shown in Figure 8. A suitable key for this purpose is shown at 12, in Figure 12, though it may be understood that keys and tumblers of other specific types may be substituted.

The cylinder, 9, is interlocked with a cylindrical ring, 13, by means of lugs, 14, on the inner end of the latter engaging notches, 15, in the former, and the cylinder, 13, is normally held against rotation in the casing, 1, by engagement of its grooves, 16, with lugs, 17, projecting inwardly from the walls of said cylinder near its outer end. The cylinder, 13, encompasses the permutation disks, 18, 19 and 20, which are journaled for rotation on the spindle, 10, of the key lock, and are provided with the usual inter-engaging lugs, 21, by which rotation may be transmitted from one tumbler to the next, and so on, for adjusting them into proper relation to each other to permit actuating the bolt by the permutation mechanism. Each tumbler disk, as shown in Figure 5, is formed with three notches, 22, and the cylinder, 13, is formed with three sets of inwardly projecting lugs, 23, spaced apart by unequal angular intervals, which are the same intervals as between centers of the three notches, 22, of each of the disks. These intervals are such that there is only one position in which the notches, 22, of one of the disks may be registered with the lugs, 23, of the cylinder, 13. It may be noted from Figure 5 that two of the notches, 22, are fairly close together. In Figure 3 these are the notches which appear in the edges of disks, 18, 19 and 20, and for purposes of illustration this view shows the cylinder, 13, in section, and as though it had been rotated 180 degrees from the position in which its lugs, 23, would register with the notches, 22, of the disks. Thus the two sets of lugs, 23, which are the closer together, are seen on the inner surface of the cylinder, 13, as here shown.

The outer tumbler, 20, is operatively engaged with a collar, 24, on the spindle, 10, by means of a lug, 25, on said collar fitting in a notch, 26, of the disk, 20. Said collar includes a pair of lugs, 27, projecting forwardly for engagement with notches, 28, in the inner end of the knob, 29. The barrel portion of the knob carries scale markings at 30 which register with a fixed index, 31, on the beveled end surface, 32, of the casing cylinder, 1. This end of the casing provides a shoulder, 33, which engages a flange, 34, on the

knob member for retaining the latter rotatively in the casing. The extreme inner end surface, 35, of the knob member bears against the end of the cylinder, 13, and when by manipulation of the knob the permutation tumbler disks, 18, 19 and 20, have been adjusted with their notches, 22, in alignment and with said notches positioned also in alignment with the corresponding lugs, 23, of the cylinder, 13, the knob, 29, may be pushed in until its flange, 34, strikes the lugs, 17, which results in disengaging the grooves, 16, of the cylinder, 13, from said lugs. This axial movement of the cylinder, 13, shifts its lugs, 23, into the planes occupied by the disks, 18, 19 and 20 respectively, the lugs inter-engaging with the notches, 22, of said disks. Therefore, if, after the knob, 29, has been pushed inwardly in axial direction, it is rotated, the outer disk, 20, of the permutation series which is engaged with the knob through the lug, 25, will be turned, and it will rotate the cylinder, 13, by reason of engagement of the lugs, 23, in notches, 22, of the disk. The cylinder, 13, being inter-locked with the cylinder, 9, will turn the latter, and said cylinder being normally engaged with the plug, 7, through the tumblers, 8, will turn the plug and with it the crank, 6. This will bring the parts to the positions shown in Figure 8 with the crank, 6, at the lowest point of its range, at which position it withdraws the bolt, 5, completely.

The inward movement of the cylinder, 13, and cylinder, 9, is accomplished in opposition to the yielding pressure exerted by springs, 36, pocketed in the cylinder, 9, and acting through plungers, 37, against a plate, 38, which is secured loosely on the end of the plug or barrel, 7, by the overhanging edge of a washer, 39, affixed thereto. A spring-pressed plunger, 40, pocketed in the end of the barrel, 7, bears frictionally against the bolt, 5, to ensure smooth operation thereof without undue play, and also to hold the barrel, 7, against unintentional rotation when the tumblers, 8, are withdrawn by the key. When the cylinder, 13, and cylinder, 9, have been pushed inwardly by the knob, 29, and rotated into position for withdrawing the bolt, 5, they will remain in this position because the lugs, 17, prevent return movement of the parts in axial direction until the knob is turned back to its initial position so as to register the grooves, 16, of the cylinder, 13, with the lugs, 17, once more, thus permitting the springs, 36, to force the parts back.

Figure 12 illustrates the regular master key, 12, employed for operating the lock by direct rotation of the plug or barrel, 7, without manipulating the permutation tumblers. When this key is inserted through the annular knob, 29, its shoulder, 42, strikes the annular shoulder, 41, in said knob, thus limiting the insertion of the key at the correct position for engagement of its lateral grooves, 43, with the inwardly projecting lugs or ribs, 8^a on the tumblers. For actuating the parts to alter the combination of the lock, a separate key, shown at 44, is provided, as shown in Figure 13. This key has a portion, 45, between its main shank and its handle, which portion is dimensioned to pass through the knob, 29, beyond the plane of the shoulder, 41, bringing the shoulder, 46, of the key into contact with the end of the hub, 47, of the collar, 24, which hub extends flush with the end of the spindle, 10. Insertion of the key, 44, to this position, as illustrated in Figure 8, brings the grooves, 43^a, of said key into position for withdrawing the tumblers, 8, of the barrel, 7, thus permitting the

barrel to be rotated to the same extent as it is rotated by the key, 12, in sliding the bolt to unlocking position. When this has been accomplished, the straight edges, 48, of the washer, 39, on the inner end of the barrel, 7, are aligned with the corresponding straight edges, 49, of the aperture in a disk or washer, 50, which is fixed against rotation in the end of the casing, 1, by engagement of its lug, 51, with a notch, 52, in the casing. Incidentally, this member, 50, includes parallel side flanges, 53, which serve as guides for the reciprocation of the bolt, 5. When the washer, 39, is thus registered with the aperture in the part, 50, the plug, 7, may be thrust inwardly by pressure on the key, 44, acting through its shoulder, 46, against the hub, 47, of the collar, 24. This movement carries the lugs, 27, of said collar out of engagement with the notches, 28, in the end of the knob, 29, so that while the parts are thus held at inthrust position against the reaction of the spring-pressed plunger, 40, the knob, 29, now disengaged from the permutation disks, may be turned through any desired angle so as to bring a different pair of its notches, 28, into registration with the lugs, 27. Then, upon release of the inward pressure, the lugs, 27, will be forced into said notches and the knob thus re-engaged with the permutation mechanism, but in a different angular relation thereto, so that the proper readings of the scale, 30, for setting up the combination of the disks, 18, 19 and 20, will be altered. In other words, the "combination" of the lock will thus be changed.

As shown in the rear or inner face view of Figure 11, the back plate, 2, is formed with an arcuate slot, 54, which affords clearance for rotation of the crank, 6, and also permits the crank to be thrust inwardly to any necessary extent in the resetting movement just described. This view also shows how the cylindrical casing, 1, is anchored to the plate, 2, by means of lugs, 55, projecting through slots in the plate and upset or riveted-over against the exposed face of the plate.

While there is shown and described herein certain specific structure embodying the invention, it will be manifest to those skilled in the art that various modifications and re-arrangements of the parts may be made without departing from the spirit and the scope of the invention, and that the same is not limited to the particular form herein shown and described, except in so far as indicated by the appended claims.

I claim:

1. In a lock which includes a bolt and a casing, a permutation mechanism comprising a plurality of notched tumbler disks axially spaced apart with externally accessible means for adjusting said disks with their notches in registration, a cylinder operatively engaged with the bolt for actuating it when the cylinder is rotated, said cylinder being normally held against rotation in the casing and having a row of lugs spaced apart in axial direction and normally disposed in alternating relation to the disks extending between their marginal portions to permit rotative adjustment of the disks; the alignment of the notches of said disks with said row of lugs permitting axial movement of the cylinder for disengagement from the casing, and means for rotating the cylinder to actuate the bolt.

2. In a lock which includes a bolt and a casing, a permutation mechanism comprising a plurality of notched tumbler disks axially spaced apart

with externally accessible means for adjusting said disks with their notches in registration, each disk having a plurality of notches spaced apart circumferentially at unequal intervals, a cylinder operatively engaged with the bolt for actuating it when the cylinder is rotated, said cylinder being normally held against rotation in the casing and having lugs in rows, the lugs of each row being spaced apart in axial direction and normally disposed in alternating relation to the disks, extending between their marginal portions to permit rotative adjustment of the disks, and the rows of notches being angularly spaced apart by intervals similar to those between notches of each disk, whereby alignment of the notches with the rows of lugs permits axial movement of the cylinder for disengagement from the casing, and means for rotating the cylinder to actuate the bolt.

3. In a locking mechanism, a circular member and an annular member co-axial therewith, one of said members having a notch and the other having a lug dimensioned to enter the notch, said notch and lug being normally disposed in different transaxial planes, means for relatively adjusting said members by rotation of one of them for registering said notch with said lug to permit axial movement of one member to bring the notch and lug into substantially the same plane so that one member may rotatively drive the other through said notch and lug for operating the lock.

4. In the combination defined in claim 3, one of said members having a plurality of lugs, said notches being spaced from each other by unequal angular intervals, and the lugs being similarly spaced so that the lugs of one member will register with the notches of the other at only one position of their relative rotative adjustment.

5. In a lock which includes a bolt and a casing, a plug operatively connected with the bolt, a cylinder, means releasably locking said plug to said cylinder for controlling said plug and bolt, said cylinder being rotatably mounted in the casing but normally held against rotation therein, and a permutation mechanism in the casing including a plurality of notched tumbler disks axially spaced apart with externally accessible means for adjusting said disks with their notches in registration, said cylinder extending adjacent said notched disks and having a row of lugs spaced apart in axial direction and normally disposed in alternating relation to the disks extending between their marginal portions, the alignment of the notches of said disks with said lugs permitting axial movement of the cylinder for disengagement thereof from the casing, so that the bolt may be operated by rotating the cylinder and with it the lug.

6. In the combination defined in claim 5, the axial movement of the cylinder serving to shift the lugs thereof respectively into the planes of the tumbler disks thus interlocking said disks with the cylinder so that the means for rotatively adjusting said disks may be employed to drive the cylinder and actuate the bolt.

7. In a lock which includes a bolt and a casing, including a plug operatively connected with the bolt, a cylinder, means releasably locking said plug to said cylinder for controlling said plug and bolt, said cylinder being rotatably mounted in the casing but normally held against rotation therein, and a permutation mechanism in the casing including a plurality of notched tumbler disks axially spaced apart, externally adjustable

means connected with one of said disks, and inter-engaging means between said disk and the others whereby the disks may be rotatively adjusted with their notches in a desired relation, said cylinder extending adjacent said notched disks and having lugs spaced apart in axial direction and normally disposed in alternating relation to the disks extending between their marginal portions, the alignment of the notches of said disks with said lugs respectively permitting axial movement of the cylinder and disengagement thereof from the casing, so that the plug and the bolt connected therewith may be operated by rotating said externally accessible member and rotatively driving the cylinder thereby through engagement of its connected disk with the registered lugs of the cylinder.

8. In a lock which includes a bolt and a casing, a plug operatively connected with said bolt, a cylinder, the plug is normally locked against rotation, means releasably locking the plug to said cylinder for controlling the plug and bolt, said cylinder being rotatably mounted in the casing, but the cylinder and casing having inter-engaging groove and lug features normally locking the cylinder against such rotation, said features being disengageable by the relative endwise movement of the cylinder and casing, spring means acting endwise of the cylinder for retaining said features in locking relation, a permutation mechanism in the casing normally blocking said endwise movement and an externally accessible member rotatably adjustable and connected to said mechanism for adjusting it, the connection being such as to permit axial movement of said member, the member being also engaged with the cylinder for causing axial movement thereof to release the cylinder from the casing

whereby to permit rotation of the cylinder and operation of the bolt through the plug.

9. In a lock, the combination of a bolt, a casing, a cylinder normally interlocked with the casing, a plug releasably interlocked with the cylinder and operatively connected with the bolt for actuating said bolt directly when the plug is released from the cylinder; and means for releasing the cylinder from the casing and rotating it therein for operating the bolt through the interlocked plug.

10. In a lock, the combination of a bolt, a casing, a cylinder normally interlocked with the casing, a key plug operatively connected to the bolt and tumblers by which the plug is interlocked with the cylinder, said tumblers being releasable upon insertion of a suitable key, and the plug being rotatable by such key for actuating the bolt; together with permutation mechanism in the casing including externally accessible means for adjusting said permutation mechanism to permit axial movement of the cylinder for releasing it from its interlocked relation with the casing, said external means having engagement with said cylinder for rotating it in the casing and thus operating the bolt through the interlocked plug.

11. In a lock, the combination of a bolt, a casing, a cylinder normally interlocked with the casing, a key plug normally interlocked with the cylinder and operatively connected to the bolt, said plug being releasable from the cylinder and rotatable by means of a suitable key; and permutation mechanism in the casing with externally accessible means adjustable for releasing the cylinder from the casing and adapted for rotating it therein to operate the bolt through the interlocked plug.

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