Dec. 17, 1940. H. MACHINIST 2,224,875

COMBINATION CABINET LOCK

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Fig. 1.

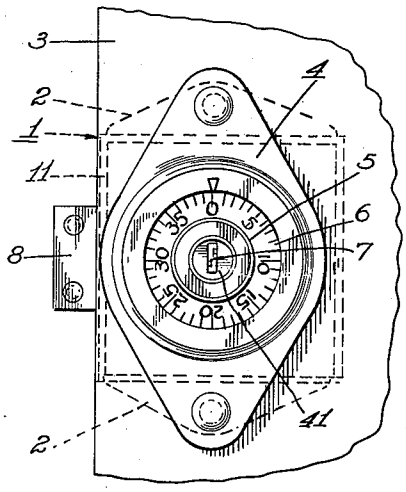


Fig. 3.

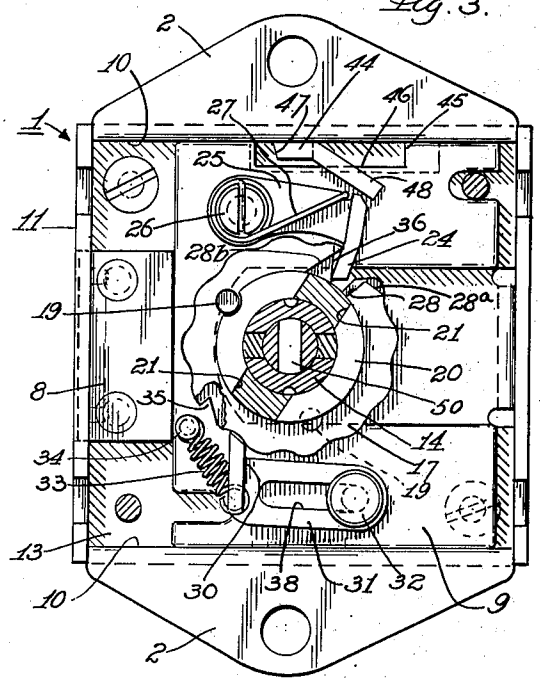
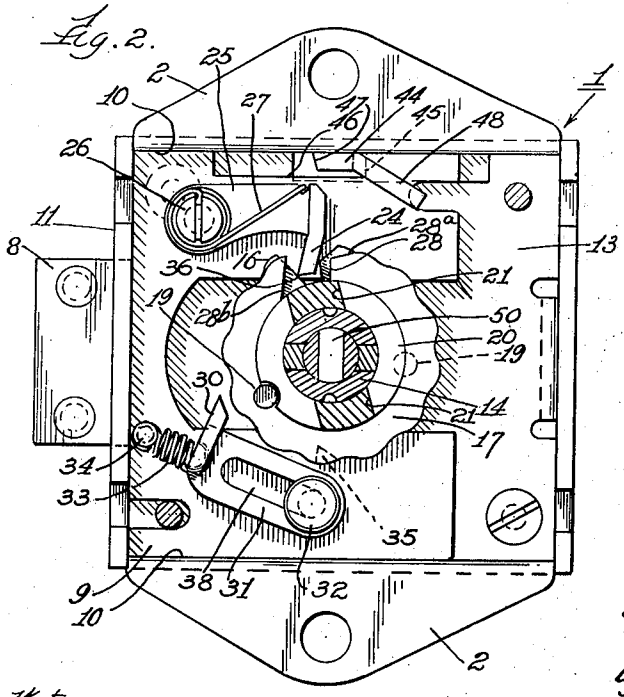


Fig. 2.



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Fig. 7

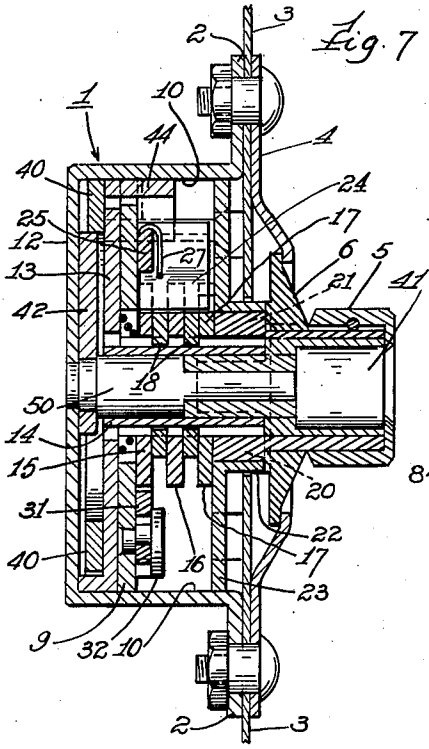


Fig. 4.

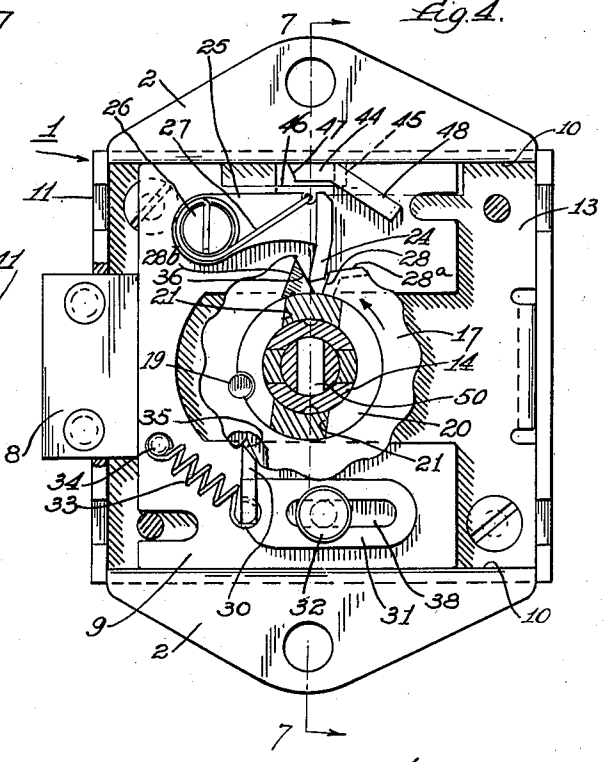


Fig. 5.

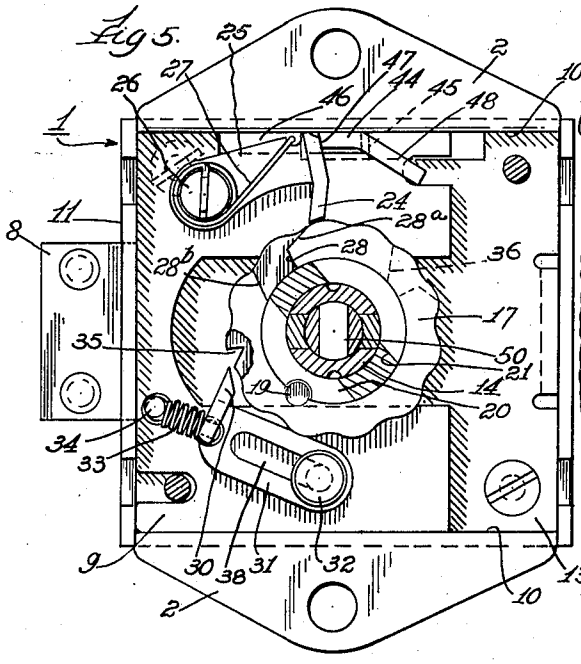
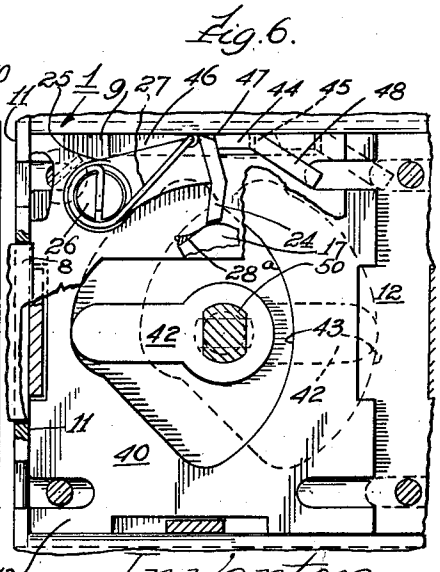


Fig. 6.



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2,224,875

COMBINATION CABINET LOCK

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Application June 12, 1939, Serial No. 278,641

6 Claims. (Cl. 70—129)

This invention relates to locks, and more particularly to locks of the permutation type, and it is illustrated as applied to a so-called cabinet lock adapted for various types of closures, such as lockers, wall safes, cupboards and the like. The particular lock illustrated also includes key operable means for actuating the bolt independently of the permutation mechanism. One object of the invention is to provide a simple and dependable structure for operating the bolt of the lock through a permutation mechanism. Another object is to provide means for automatically upsetting or dispersing the disks of the permutation mechanism. And a further object is to utilize for the key operation of the lock some of the parts which serve for actuating it through the permutation mechanism in order to simplify the structure and reduce the number of parts required. The invention consists of certain features and elements in combination, as herein shown and described and as indicated by the claims.

In the drawings:

Fig. 1 is a face view showing a cabinet lock of the type embodying this invention as mounted on a closure.

Fig. 2 is a front elevation of the lock with the cover plate removed to reveal details of the mechanism and illustrating the parts in the position which they occupy when the permutation disks have been adjusted, ready for opening the lock.

Fig. 3 is a similar elevation showing the parts shifted to the position for withdrawing the bolt.

Fig. 4 is also an elevation of the mechanism showing the parts as shifted part-way toward locking position.

Fig. 5 is a front elevation showing the parts fully shifted to locking position with the permutation disks dispersed.

Fig. 6 is a front elevation with parts in section and with the permutation mechanism removed to show connections by which the bolt may be key-operated.

Fig. 7 is a vertical section taken substantially as indicated at line 7—7 on Fig. 4 for indicating the relative positions of the several parts.

As shown in the drawings, the lock mechanism is contained in a case 1 of rectangular outline, having flanges 2, 2 by which it may be secured against the rear face of a door or other closure, such as that indicated at 3 in Fig. 1. A face plate 4 is applied to the outer face of the door with a rotatable knob 5 and dial 6 associated therewith; and in the case of the illustrated lock the knob is formed with a key slot 7 for the introduction of a key, which, it may be understood, will actuate the bolt 8 independently of the permutation mechanism. The bolt 8 is slidably carried in the case by a plate 9 which may be integral with the bolt or a portion of it, and which is guided between the end walls 10, 10 for movement sufficient to project the bolt through a suitable opening in the wall 11 or withdraw it to a position substantially flush with that wall.

Within the casing 1 and spaced from the back wall 12 a partition plate 13 provides the surface upon which the bolt plate 9 is slidably carried, and extending forwardly from the partition 13 a bearing sleeve 14 serves to journal the spindle 50 which operates the bolt through a key mechanism, as hereinafter described; and the sleeve 14 also serves as a bearing for the tumbler disks 15, 16 and 17 of the permutation mechanism. The disks are separated by spacing washers 18 and are inter-engaged with each other by the usual lugs 19 projecting from adjacent faces of the tumbler disks. The outer disk 17 is formed with a hub 20 with notches 21 by which it is interconnected with the manually operable knob 5 the knob being journaled in an upstanding collar 22 formed on the cover plate 23 of the casing. Thus the permutation disks are adjusted in the usual way, that is, by turning the knob 5 first in one direction until, through the medium of inter-engaging lugs 19 it has picked up tumblers 15 and 16 for rotation, then stopping at a predetermined point to leave the tumbler 15 in adjusted position, then turning the knob in the opposite direction until the tumbler 16 is adjusted, and finally again reversing the rotation of the knob 5 to bring the tumbler 17 into adjustment. Such adjustment consists in aligning the notches of the three tumblers in registration with the nose 24 of a pawl 25 pivoted at 26 on the plate 9 of the bolt 8. A spring 27 then swings the pawl 25 into the aligned notches of the disks, as shown in Fig. 2. When this occurs, a further rotation of the knob 5 in clockwise direction will transmit motion through the pawl 25 to the bolt so as to withdraw the bolt to the position illustrated in Fig. 3. The bolt is of the dead-bolt type, and thus remains adjusted at unlocking position until again moved through the operation of the knob 5.

Return movement of the bolt to locking position is accomplished by reverse rotation of the knob 5—that is, in counter-clockwise direction, turning with it the outer tumbler 17. The radial face 28 of the notch in the disk 17 engages the

nose 24 of the pawl 25 as seen in Fig. 4, and thus drives the bolt 8 toward locking position.

However, during this reverse rotation of the knob 5 and disk 17 the other two disks 15 and 16 are held against rotation by means of the tooth 30 of a detent member 31 carried by a pivot 32 on the plate 9. A spring 33 connecting one end of the detent 31 with an anchor pin 34 on the plate 9 normally holds the member 31 in a position approximately tangent to the permutation disks, as seen in Fig. 2; but when the bolt 8 is retracted to the position shown in Fig. 3, the tooth 30 is brought into contact with the disks, and the member 31 is swung out of alignment with its spring 33 so that the spring is stressed and thus presses the tooth 30 firmly against the peripheries of the permutation disks, as seen in Fig. 3. During the initial portion of the return stroke of the bolt 8 toward locking position, the detent notches 35 in the disks 15 and 16 are brough into registration with the detent tooth 30. This resists rotation of the disks 15 and 16 so that as the disk 17 is turned further by the knob 5 the nose 24 of the pawl 25 is caused to climb the sloping faces 36 of the notches in disks 15 and 16 until the corner of the nose 24 passes the outer edge of the face 28 of the notch in disk 17.

By this time the bolt 8 has been fully projected to locking position, and further rotation of the knob and disk 17 causes the sloping face 28^a of the notch in disk 17 to cam the nose 24 entirely out of the notch to the position shown in Fig. 5. With the nose 24 engaged between the face 28 of the notch in disk 17 and the sloping faces 36 in disks 15 and 16 the latter are forced to rotate a few degrees, and after the detent tooth 30 has entered the notches 35; this further stresses the spring 33 as indicated in Fig. 4, but the tooth 30 is permitted to remain in engagement with the notches 35 by virtue of the slot 38 formed in the member 31 which permits it to slide on its pivot 32 as seen in Fig. 4. As the nose 25 is forced out of the tumbler notches by cam surface 28^a the disks 15 and 16 are released from the nose 24 and are rotated in clockwise direction through a considerable distance as the stressed spring 33 expends its force through the tooth 30. Contraction of the spring 33 returns the detent member 31 to its normal position tangent to the tumbler disks and just out of contact therewith, as shown in Fig. 5. The extent of rotation of the disks 15 and 16 produced by the detent, will depend primarily upon friction,—between the disks and their spacing washers 18 and at other points,—but, in any event, it will be sufficient to throw the disks out of the position in which their large notches would register with the nose 24 of the pawl 25. And the final counter-clockwise rotation of the knob 5 involving the effort of sliding the bolt 8 to locking position, will insure that the disk 17 will be turned somewhat beyond its position for registration with the nose 24; in fact, it must be turned beyond that position to permit the cam surface 28^a to function, as already described. Therefore, when the bolt has been fully shifted to locking position all three tumblers will be turned out of their position of registered adjustment, and the combination must be completely reset before the bolt can again be actuated by the knob 5.

For actuation of the bolt 8 and its plate 9 by means of a key, and independently of the permutation mechanism, there is provided a plate 40 which, as shown in Figs. 6 and 7, is mounted between the back wall 12 and the partition 13. The spindle 50 journaled in the sleeve 14 may be understood as inter-engaged with any suitable key-operated cylinder lock, denoted at 41 in Fig. 7, and having its key slot 7 presented at the outer end of the knob 5. Insertion of the proper key in the slot 7 and rotation of the spindle 50 thereby turns an arm 42 against the edge 43 of a cam-shaped opening in the plate 40 and thus shifts the plate within the casing 1 by the distance necessary for withdrawing the bolt 8 from locking to unlocking position. The plate 40 carries an upstanding lug 44 which engages against the end 45 of a slot 46 in the plate 9 for thus withdrawing the bolt. In the normal position of the permutation mechanism, as illustrated in Fig. 5, the end of the pawl 25 engages against the opposite edge 47 of the lug 44 and the presence of the tumbler disks in their unregistered relation prevents the pawl from becoming disengaged from this edge of the lug. Therefore, when reverse rotation of the key in the lock 41 causes return movement of the plate 40 its lug 44 drives the bolt plate 9 and its bolt 8 back to locking position.

The upstanding lug 44 includes an obliquely bent portion 48 which functions in cooperation with the permutation mechanism. As the knob 5 is rotated to unlock the bolt 8 it drags the bolt to unlocking position by virtue of the engagement of the pawl nose 24 in the notches of the tumbler disks, and particularly in the notch of disk 17. The face 28^b of the notch in disk 17 is inclined so as to maintain engagement with the pawl nose 24 as well as possible, but to insure such engagement the oblique portion 48 of the lug 44 acts as a guard to hold the pawl in the notch of the tumbler.

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 rearrangements of the parts may be made without departing from the spirit and 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. A lock including a case, a bolt slidable therein, a plurality of notched tumbler disks rotatable in the case, a pawl connected to the bolt and engageable in the tumbler notches when they are adjusted in registered relation, rotation of the tumblers in one direction thus serving to shift the bolt to unlocking position and reverse rotation of the tumblers shifting the bolt back to locking position, the notch of one of said tumblers having one side inclined to the radius, and means for checking the reverse rotation of such tumbler, whereby the inclined side of its notch acts to eject the pawl as the latter is moved by continued reverse rotation of another tumbler in the locking movement.

2. A lock including a case, a bolt slidable therein, a plurality of notched tumbler disks rotatable in the case, a pawl connected to the bolt and engageable in the tumbler notches when they are adjusted in registered relation, rotation of the tumblers in one direction thus serving to shift the bolt to unlocking position and reverse rotation of the tumblers shifting the bolt back to locking position, the notch of one of said tumblers having one side inclined to the radius, and means for checking the reverse rotation of such

tumbler, whereby the inclined side of its notch acts to partially eject the pawl as the latter is driven by continued reverse rotation of another tumbler in locking direction, the engaged notch of said other tumbler having the outer portion of one edge also inclined to the radius for acting as a cam to complete the ejection of the pawl as the locking movement is completed.

3. A lock including a case, a bolt slidable therein, a plurality of notched tumbler disks rotatable in the case, a pawl connected to the bolt and engageable in the tumbler notches when they are adjusted in registered relation, whereby rotation of the tumblers in one direction serves to shift the bolt to unlocking position and reverse rotation of the tumblers shifts the bolt back to locking position, yielding means engageable with at least one of the tumblers during its reverse rotation and yieldingly opposing such movement, together with means for ejecting the pawl at the completion of the locking movement of the bolt whereupon said yielding means forcibly rotates the said tumbler out of registered relation.

4. A lock including a case, a bolt slidable therein, a plurality of notched tumbler disks rotatable in the case, a pawl connected to the bolt and engageable in the tumbler notches when they are adjusted in registered relation, whereby rotation of the tumblers in one direction serves to shift the bolt to unlocking position, and reverse rotation of the tumblers shifts the bolt back to locking position, a detent device carried by the bolt and positioned to be engaged with at least one of the tumblers by the movement of the bolt, said detent acting to check reverse rotation of the tumbler during the locking movement of the bolt, the notches of said tumbler and of another tumbler being formed to cooperate for ejecting the pawl by virtue of the relative rotation of the tumblers which is effected by checking reverse rotation of one of them.

5. A lock including a case, a bolt slidable therein, a plurality of notched tumbler disks rotatable in the case, a pawl connected to the bolt and engageable in the tumbler notches when they are adjusted in registered relation, whereby rotation of the tumblers in one direction serves to shift the bolt to unlocking position, and reverse rotation of the tumblers shifts the bolt back to locking position, a movable detent carried by the bolt and normally out of contact with the tumblers when the bolt stands at locking position, said detent being engaged with one of the tumblers by movement of the bolt and including yielding means whereby it yieldingly opposes reverse rotation of such tumbler, and means for ejecting the pawl from the tumbler notches at the completion of the locking movement of the bolt whereupon said yielding means forcibly rotates the said tumbler out of registered relation.

6. A lock including a case, a bolt slidable therein, a plurality of notched tumbler disks rotatable in the case, a pawl connected to the bolt and engageable in the tumbler notches when they are adjusted in registered relation, whereby rotation of the tumblers in one direction serves to shift the bolt to unlocking position, and reverse rotation of the tumblers shifts the bolt back to locking position, a detent device pivotally carried by the bolt and engageable with one of the tumblers as the bolt is retracted, the pivotal mounting of the detent providing play which permits return movement of the bolt without corresponding movement of the detent, and yielding means reacting between the bolt and detent and arranged to be stressed by such return movement of the bolt, together with means for ejecting the pawl from the tumbler notches upon completion of the locking movement whereupon said yielding means takes up the play in the connection and causes the detent to forcibly rotate the tumbler out of registered relation.

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