May 17, 1938. E. SINNER 2,117,515

LOCK

Filed March 24, 1937

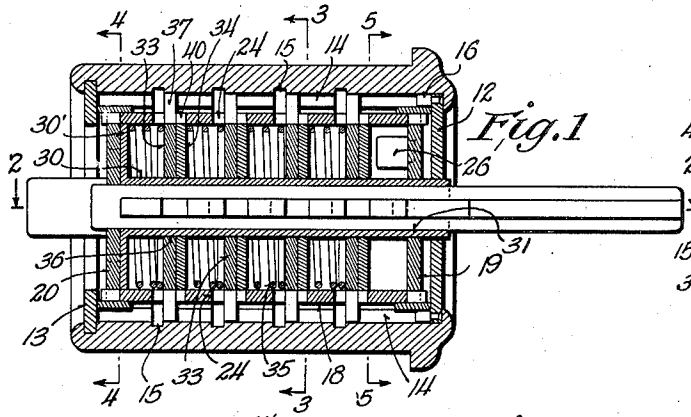

Fig. 1

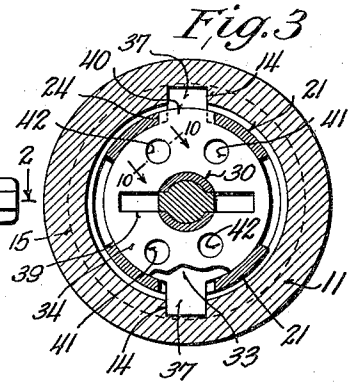

Fig. 3

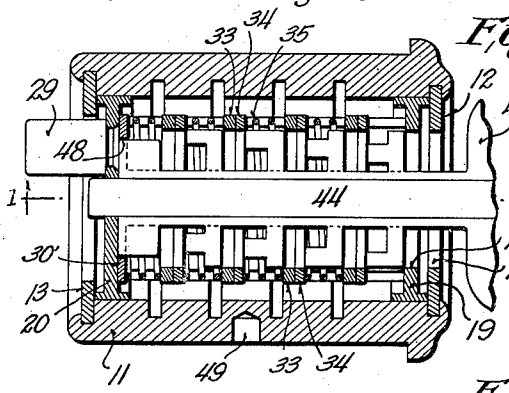

Fig. 2

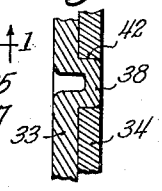

Fig. 10

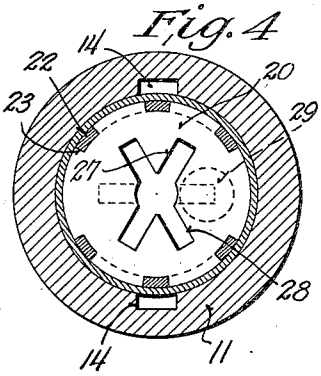

Fig. 4

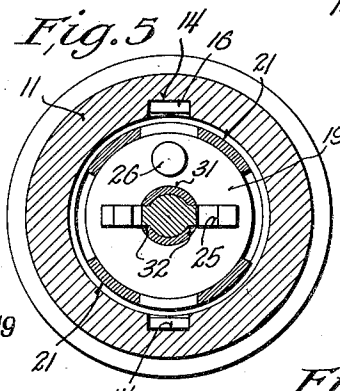

Fig. 5

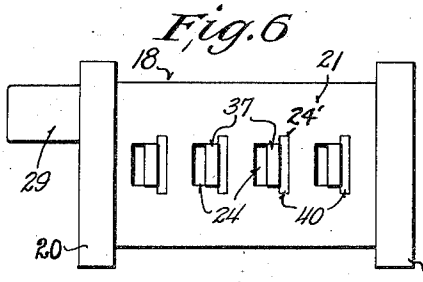

Fig. 6

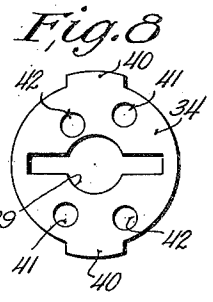

Fig. 8

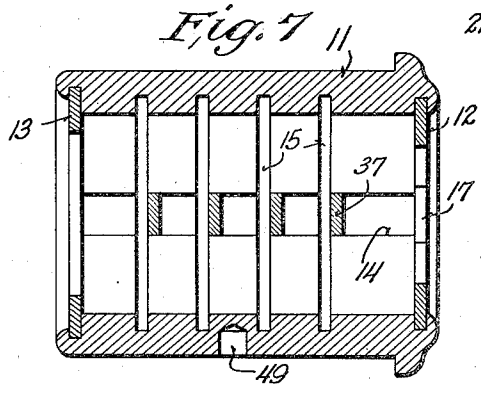

Fig. 7

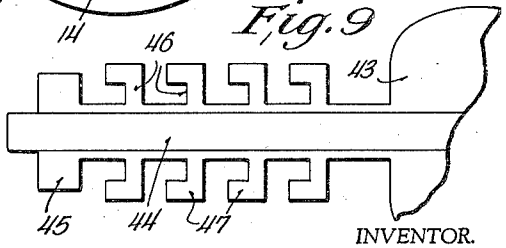

Fig. 9

INVENTOR.

Emil Sinner

BY

Louis O. French

ATTORNEY.

Patented May 17, 1938 2,117,515

UNITED STATES PATENT OFFICE

2,117,515

LOCK

Emil Sinner, Milwaukee, Wis.

Application March 24, 1937, Serial No. 132,704

6 Claims. (Cl. 70—340)

The invention relates to locks.

The main object of the invention is to provide a key controlled tumbler lock mechanism in which most of the parts may be readily formed as stampings and in which the key and the tumblers are so constructed as to prevent picking of the lock.

A further object of the invention is to provide a key controlled tumbler lock mechanism capable of assembly into many different combinations.

A further object of the invention is to provide a key controlled tumbler lock mechanism in which a guest key can only operate one of the lock mechanisms while a master key can operate a whole series of locks controlled by different guest keys.

A further object of the invention is to provide a key controlled tumbler lock mechanism in which the key is provided with a series of laterally disposed nibs which when turned to a certain angle are adapted to enter openings in the guard plates for the tumblers so that the tumblers may be moved to a lock release position, the distance of the openings in the guard plates from the center being varied to obtain the different combinations.

The invention further consists in the several features hereinafter set forth and more particularly described by claims at the conclusion hereof.

Fig. 1 is a vertical sectional view through a lock mechanism embodying the invention, the section being taken on the line 1—1 of Fig. 2;

Fig. 2 is a horizontal sectional view through the lock mechanism, the section being taken on line 2—2 of Fig. 1;

Fig. 3 is a vertical sectional view taken on the line 3—3 of Fig. 1;

Fig. 4 is a vertical sectional view taken on the line 4—4 of Fig. 1;

Fig. 5 is a vertical sectional view taken on the line 5—5 of Fig. 1;

Fig. 6 is a plan view of the lock mechanism;

Fig. 7 is a vertical sectional view through the housing, with parts of the tumblers shown in section;

Fig. 8 is a detail view of one of the tumbler guards;

Fig. 9 is an elevation view of one of the keys;

Fig. 10 is a detail sectional view through the tumbler and its guard taken along the line 10—10 of Fig. 3.

The lock mechanism includes a housing having a tubular body portion 11, end plates 12 and 13 secured to the ends of said body portion by spinning over parts of said body portion, said body portion having diametrically disposed lengthwise extending grooves 14 and a series of spaced transversely disposed annular grooves 15. The plate 12 has inwardly extending tongues 16 engageable within the grooves 14 to prevent rotation and a key hole opening 17 similar to the slot 25. The plate 13 is an annular ring.

The barrel 18 which is mounted to turn or be secured against turning in the housing and which controls lock bolt mechanism of any suitable construction is a hollow cylindrical member formed by end plates 19 and 20 and a pair of segmental tubular sections 21 which have tongues 22 mounted in slots 23 in said end plates and upset against the ends thereof. The sections 21 are provided with a plurality of tumbler-projection-receiving diametrically disposed slots 24. The end plate 19 has a keyhole opening or slot 25 adapted to be alined with the opening 17 in the housing when the lock is unlocked, and it also has a lug 26 formed integral therewith or secured thereto to form a stop for the key to limit the angular movement of the key relative to the barrel. The end plate 20 has angularly disposed key slots 27 and 28, one slot adapted to receive the regular or guest key and the other slot the master key, and said plate also has the eccentrically disposed lock bolt operating pin 29 secured thereto and projecting through the opening in the end plate 13 of the housing.

The barrel has a key guide member 30 mounted therein having a flanged inner end 30' abutting the plate 20 and a tubular portion 31 provided with diametrically disposed slots 32, the end of said tubular portion projecting through the central openings of the key slots in the plates 19 and 12.

Sets of tumblers 33 and guards 34 are mounted in the barrel with springs 35 interposed between each set and between the last set and the flanged end 30' of the key guide.

Each of the tumblers is a disk having a keyhole slot 36 similar to the slot 25 and having diametrically disposed locking projections 37 extending through the slots 24 in the barrel and into the grooves 14 of the housing to normally prevent rotation of the barrel relative to said housing. Each of these disks is longitudinally slidable relative to the barrel and has nibs 38 extending outwardly from the side adjacent its guard and adapted to normally plug a correspondingly disposed key nib receiving opening in said guard.

Each guard is a disk having a keyhole slot 39 therein similar to the slots 36 and 25 and is provided with diametrically disposed projections or keys 40 which fit into the elongated portions 24'

of the slots 24 to prevent rotation of the guards relative to the barrel and also to hold them against longitudinal displacement relative to the barrel. Each guard has two sets of angularly disposed spaced key nib receiving openings 41 and 42 in which the nibs 38 of the tumblers fit, the openings of one set adapted to receive the regular or guest key and those of the other set the master key.

The keys 43 have a shank portion 44 having an end plate engaging end 45 and a series of arms 46 from each of which a nib 47 projects laterally, these nibs being offset at different radial distances so as to enter the holes in the tumbler guard plate.

With this construction when the locking mechanism is locked, the projections 37 engage with the slots 14 of the barrel and are held out of line with the grooves 15 by the springs and are prevented from being moved so as to line up with these grooves by the plates 34 except only when the proper key is inserted. To unlock the lock the key 43 is inserted in the key guide 30 and passes through the openings 17, 25, 36, and 39 and a similar opening 48 in the flanged end 30' of said key guide which opening is of a length to receive the end 45 of the key which end then abuts against the end plate 20. If the key is a regular or guest key, it is given a partial clockwise rotation as viewed from the front end until its nibs 47 aline with the holes 42 in the guard plates which at the same time brings the end 45 into alinement with the slot 27 in the end plate 20. Thereafter, the key is pushed inwardly so that the nibs 47 pass through the openings 42 and in doing so press on the tumblers 33 or their nibs 38 so that all the tumblers are moved laterally to bring their projections 37 into line with the grooves 15, and then on turning the key the barrel 18 will be turned relative to the housing 11 so as to move the pin 29 which transmits its motion to the bolt or latch operating mechanism to unlock the door or other part equipped with this lock. The housing is mounted in the part to be locked in the usual manner and may be secured against movement by a set screw (not shown) engaging a recess 49 in the member 11. The end plate 12 is made of hardened steel to prevent its being drilled. When the master key is used, it is inserted into the lock the same as the guest key and is then turned counterclockwise as viewed from the front end to bring its nibs into register with the openings 41 and its end into register with the slot 28 in the end plate 20, and then by pushing in the key the tumblers 33 are moved to a lock release position as before, and the lock barrel may be turned relative to the housing.

The different combinations are produced by varying the spacing of the holes 41 and 42 relative to the center of the plates 34, one spacing being shown in Fig. 3 and another in Fig. 8. Also these combinations may be varied by varying the position of the plates 34 in the assembled lock relative to each other. However, where the locks are made to take a master key, all the guard plates for a series of locks to be served by one master key have the holes 41 similarly arranged and spaced, but owing to the number of combinations available each office building of a large city may have a lock for each office serviced by a different regular or guest key and all these locks controlled by one master key.

With the exception of the tubular body portion 11 and the key guide 30, the pin 29, and the springs 18 all the parts may be made by stamping from suitable sheet metal.

While the use of nibs 38 on the tumblers 33 to enter the keyholes in the guard plates 34 permit the nibs 47 of the key to be made shorter and also close off these holes so that they cannot be felt in an endeavor to pick the lock, these nibs 38 may be omitted if desired, and even then the lock will be practically pick proof owing to the fact that the control openings of the guards are offset a considerable distance from the center opening of the key guide, and all of them have to be simultaneously entered before the tumblers can be moved.

I desire it to be understood that this invention is not to be limited to any particular form or arrangement of parts except in so far as such limitations are included in the claims.

What I claim as my invention is:

1. In a lock, the combination of a housing, a barrel mounted for rotation in said housing, key controlled tumblers slidably mounted in said barrel and having locking projections engageable with parts of said housing to normally prevent rotation of said barrel relative to said housing, and guard means for said tumblers preventing movement thereof except by a guest key when turned in one direction to a placement position and by a master key when turned in the opposite direction to a placement position.

2. In a lock, the combination of a housing, a barrel mounted for rotation in said housing, key controlled tumbler discs slidably mounted in said barrel and having locking projections engageable with parts of said housing to normally prevent rotation of said barrel relative to said housing, and a guard disc for each tumbler disc mounted in said barrel and having a key nib receiving opening, the opening in one guard having a different position from that of another guard.

3. In a lock, the combination of a housing, a barrel mounted for rotation in said housing and having a key slot, key-controlled tumblers mounted in said barrel and having locking projections slidably engageable with parts of said housing to normally prevent rotation of said barrel relative to said housing, and a guard for each tumbler mounted in said barrel and having key nib receiving openings angularly disposed relative to each other and at different radial distances from said key slot, the openings in one guard having a different radial spacing from that of another guard.

4. In a lock, the combination of a housing, a barrel mounted for rotation in said housing, key controlled tumblers slidably mounted in said barrel and having locking projections engageable with parts of said housing to normally prevent rotation of said barrel relative to said housing, and a guard for each tumbler mounted in said barrel and having a key nib receiving opening, the opening in one guard having a different position from that of another guard, the tumblers having nibs alineable with said openings in said guards to normally plug the same.

5. In a lock, the combination of a housing, a barrel mounted for rotation in said housing, key controlled tumbler discs slidably mounted in said barrel and having locking projections engageable with parts of said housing to normally prevent rotation of said barrel relative to said housing, spring means for biasing said tumblers to a locking position, and a guard disc for each tumbler mounted in said barrel and having a key nib re-

ceiving opening, the opening in one guard disc having a different position from that of another guard disc.

6. In a lock, the combination of a housing having a longitudinally extending groove and transversely disposed annular grooves, a barrel mounted for rotation in said housing and forming a tubular shell provided with end plates and having spaced slots, guard discs mounted in said barrel and alined with said slots, a tumbler disc slidably mounted in said barrel adjacent each guard and provided with a locking projection extending through the slot with which said guard disc is alined and into the longitudinally extending groove of said housing to normally prevent rotation of said barrel relative to said housing, and a key guide rotatably mounted in said barrel and having a slotted tubular portion extending centrally through said tumblers and guards, each guard disc having a key nib receiving opening, the opening in one guard disc having a different radial spacing from the axis of said key guide from another guard disc.

EMIL SINNER.