

1,420,186.

Patented June 20, 1922.

2 SHEETS—SHEET 1.

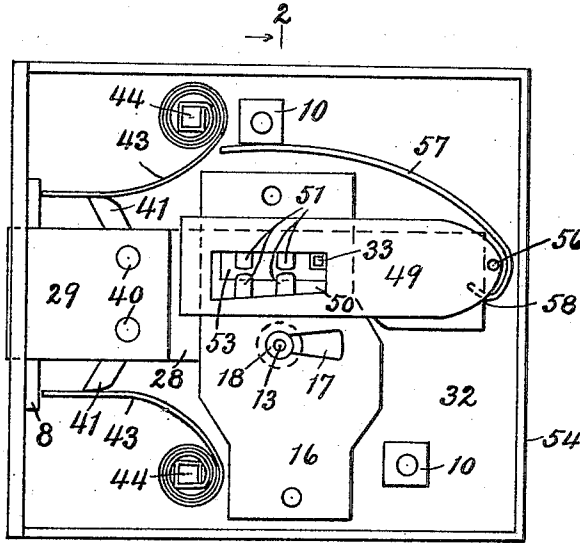


FIG. 1.

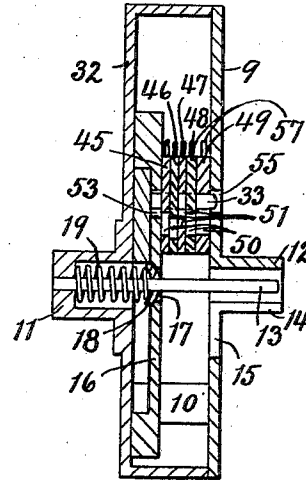


FIG. 2.

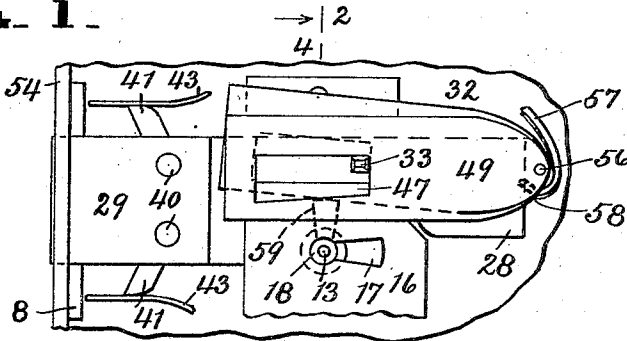


FIG. 3.

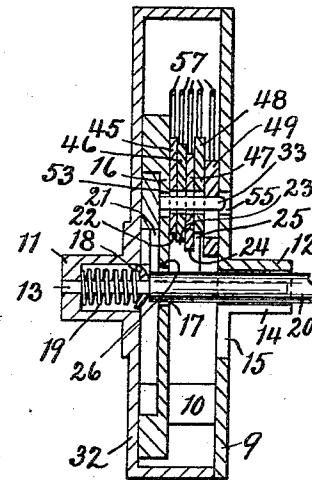


FIG. 4.

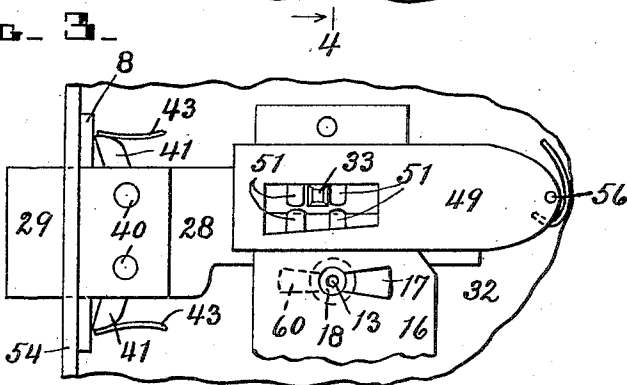


FIG. 5.

WITNESS:

7. A. Cutter.

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LOCK.

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2 SHEETS—SHEET 2.

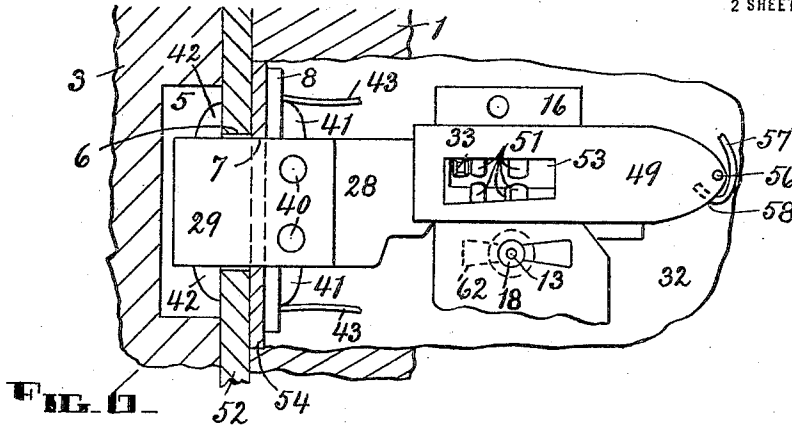


FIG. 7.

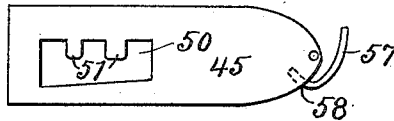


FIG. 8.

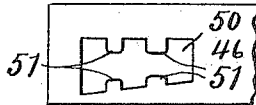


FIG. 9.

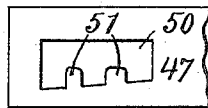


FIG. 10.

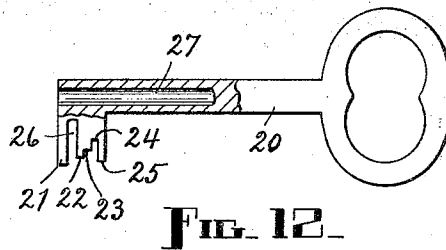
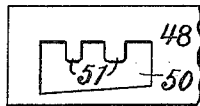


FIG. 12.

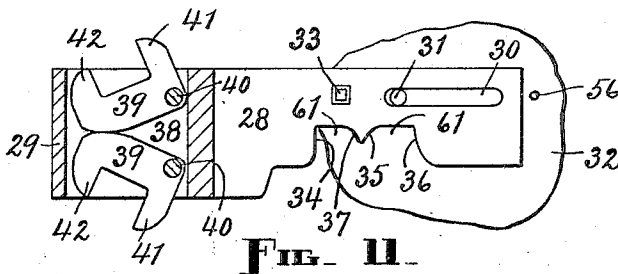


FIG. 11.

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UNITED STATES PATENT OFFICE.

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LOCK.

1,420,186.

Specification of Letters Patent. Patented June 20, 1922.

Application filed May 17, 1921. Serial No. 470,323.

To all whom it may concern:

Be it known that I, RAPHAEL DE SEVO, a subject of the King of Italy, residing at East Longmeadow, in the county of Hampden and State of Massachusetts, United States of America, have invented a new and useful Lock, of which the following is a specification.

My invention relates to improvements in key locks for doors and other objects which it is desired to secure with devices of this character, and consists essentially of a suitable case or casing, a bolt of special construction, which bolt is provided with auxiliary securing means in the form of latches, certain peculiar means whereby it is required to introduce the key in an unusual manner in order to utilize the same for effectually operating the lock mechanism, and a plurality of tumblers which are of peculiar construction, together with a key designed and adapted for successfully operating said lock mechanism, and such other parts and members as may be necessary or desirable in order to render the lock complete in every respect, all as hereinafter set forth.

The primary object of my invention is to produce an unusually strong and safe lock, of the character described, which is applicable for most purposes for which locks of such character are adapted, the same being durable, comparatively simple in construction, not liable to get out of order, and withal highly efficient and serviceable.

Another object is to provide means, in a lock of this kind, whereby one unfamiliar with the same is unable to use the key for throwing the bolt either in or out of engaging or locking position.

My lock construction is susceptible of being changed in such a manner that different keys are required for operating different locks, the changes usually required being made in the tumblers and in the wards of the key, although sometimes changes are made in the bolt and in other key-engaging parts, also in key-receiving parts, as in other types of tumbler and key locks.

Still another object is to provide a lock

with auxiliary means for locking the bolt in projected position, to the end that an object secured by means of said lock may be double locked, and whereby an increased amount of security is obtained.

This lock is practically non-pickable, being rendered more especially so because of the presence therein of the auxiliary locking feature residing in the latches by means of which the bolt is itself locked, such locking means for said bolt being in addition to any securing means therefor that are or may be afforded or provided by the tumblers.

Other objects and advantages will appear in the course of the following description.

A preferred embodiment of my invention, whereby I attain the objects and secure the advantages of the same, is illustrated in the accompanying drawings, and I will proceed to describe the invention with reference to said drawings, although it is to be understood that the form, construction, arrangement, etc., of the parts in various aspects are not material and may be modified without departure from the spirit of the invention.

It is to be understood that in different locks the tumblers may be varied in number, thickness, and form, and that the keys for such locks must be made to fit the same.

In the drawings, in which similar characters of reference designate similar parts throughout the several views, Figure 1 is a front elevation of a lock which embodies a practical form of my invention as aforesaid, the front plate having been removed, and the bolt being in retracted position; Fig. 2, a vertical section through said lock, taken on lines 2—2, looking in the direction of the associate arrow, in Fig. 1; Fig. 3, a fragmentary detail of the lock mechanism, showing the operation produced by the key when properly inserted and turned to operate the tumblers, it being assumed that the key has made an effective quarter turn, although a half turn in all; Fig. 4, a vertical section through the lock, on lines 4—4, looking in the direction of the associated arrow, Fig. 3, showing the key in operative position in said lock; Fig. 5, a

fragmentary detail, similar to that shown in Fig. 3, but showing the effect produced on the bolt and tumblers by giving the key another quarter turn; Fig. 6, another similar detail, but showing the bolt advanced to its full extent, and the latches thereon thrown out in operative position or engaging relative to the bolt-plate, this result being produced during the second operating revolution of key, or just before the latter completes one and one-half operating revolutions; Fig. 7, a front elevation of the rear-most tumbler; Fig. 8, a front elevation of the locking portion of the next tumbler; Fig. 9, a similar view of the third tumbler from the rear; Fig. 10, a similar view of the foremost tumbler; Fig. 11, a front elevation, in partial section, of the bolt, showing the latches with which said bolt is provided, and, Fig. 12, a side elevation, in partial section, of the key which is required for this lock.

Although the locking operation has been mentioned above in connection with the operative and other views, they illustrate both the locking and the unlocking operations, as will hereinafter clearly appear.

In Fig. 6 I have shown a fragmentary portion of a door at 1, and a fragmentary portion of a door-casing at 3, with a part of a bolt-plate in section at 52. A bolt-receiving opening or recess is represented at 5 in the door-casing 3, and a bolt-receiving slot at 6 in the bolt-plate 52. In this view that portion of the front, outer, or left-hand end of the lock case or casing is shown in section, and there is a bolt-receiving slot 7 therein.

Necessarily a lock of this character must be provided with or consist in part of a case or casing, and the same is represented at 54. The case 54 is designed to be attached to the door (1), or other object which it is desired to secure by means of the lock, with the exposed end of said case at the outer edge of such door or other object—see Fig. 6. The slotted portion of the exposed end of the case 54 is reinforced, as represented at 8. Said case consists in part of a front cover-plate 9, and there are two posts 10 projecting forwardly from the backside of the case to assist in supporting said cover-plate. The backside of the case 54 is indicated by the numeral 32. The cover-plate 9 is secured to the case 54 and the posts 10 by any suitable means such as are usually found in lock-case construction. Extending rearwardly from the backside 32 of the case, adjacent to the center thereof, is a barrel 11, and projecting forwardly from the cover-plate 9, with its axis in line with the axis of said barrel, is a sleeve 12. A horizontal pin or rod 13 has its rear terminal fixed in the back end, which is closed, of the barrel 11, and said rod projects forwardly through said barrel, the case

54, and the sleeve 12. A slot 14 is formed in the underside of the sleeve 12, said slot being parallel with the axis of said sleeve, and a slot 15 is formed in the cover-plate 9 in the same vertical plane with said first-named slot, and opens at the upper end into said first-named slot at the rear end thereof. The slots 14 and 15 form the outer key-hole of the lock, or the key-hole in the lock case.

Secured within the case 54 to the backside 32 is a vertical bridge-piece 16. A key-hole 17 is formed in the bridge-piece 16, which key-hole is at right-angles to the key-hole slot 15 in the cover-plate 9, said key-hole in the present instance extending to the right from the axial center or the eye thereof, while said slot extends downwardly from the axial center of the key-hole of which said slot forms a part. The rod 13 passes through the eye of the key-hole 17, it being understood that the axes of said eye, of the sleeve 12, and said rod are all in the same straight line.

There is a guard 18 mounted on the rod 13, which is arranged and adapted normally to close the eye of the key-hole 17, being held in closed position by means of a spiral-spring 19 which encircles said rod between the closed end of the barrel 11 and said guard. The edges of the guard 18 and the eye of the key-hole 17 are so formed as to permit the former to close the latter without being forced forwardly clear through the same, and said guard is cupped on the backside to receive the spring 19. The guard 18 is capable of sliding on the rod 13. Obviously a key, as 20, introduced in the key-hole formed by the slots 14 and 15 in the cover-plate 9, and guided by the rod 13, would come to rest against the guard 18, and thus be prevented from entering the key-hole 17, unless sufficient force be exerted to overcome the resistance of the spring 19 and force said guard rearwardly on said rod. Thus it is seen that one unfamiliar with the construction of this lock, or with the manner in which the same is successfully operated, would merely insert the key in the casing 54 as far as the bridge-piece 16, and so fail to operate the lock mechanism in a manner to produce any desired result, as will presently more clearly appear. It may be observed here that the key 20 must be given a quarter turn to the left, after being inserted in the case 54, in order to position or locate the tumbler- and bolt-actuating members of said key in registry with the key-hole 17, which is the first step required in any operation of the lock, provided said key be out of said lock. Until the aforesaid tumbler- and bolt-actuating members of the key are in line with the key-hole 17, said key cannot, of course, be pressed rearwardly to overcome the force of the spring 19, displace the guard 18, and enter said key-hole, be-

cause while said members are in any other position the bridge-piece 16 presents an impenetrable obstacle to the further inward or rearward movement of the key on the rod 13.

Before proceeding further with the description of the lock, it is desired to call attention to the key 20 illustrated in Figs. 4 and 12. This key is the one required for the present construction and arrangement of the bolt, tumblers, and other parts of the lock, and is provided with wards 21, 22, 23, 24, and 25, said first-named ward being at the extreme inner end of the shank or barrel of the key, and said last-named ward being the most remote from such end. There is a slot 26 between the wards 21 and 22. The key 20 is also provided with a longitudinal passage 27 to receive the rod 13. Differently constructed keys are required for differently constructed locks, as herein previously observed.

Slidingly arranged within the bridge-piece 16 is a horizontal bolt 28 having a head 29 which is receivable in and operates through the slot 7 in the exposed edge of the case 54, and the slot 6 in the bolt-plate 52, and is receivable in the opening or recess 5 in the door-casing 3. The bolt 28 operates against the backside 32 of the case, and against the upper edge of the passage through the bridge-piece 16. Said bolt is further positioned and guided by the edges of the slot 7, and the edges of a longitudinal slot 30 in and adjacent to the right-hand terminal of said bolt, into which slot a post or lug 31 projects from the backside 32, as clearly shown in Fig. 11. The bolt 28 is provided with a forwardly-extending pin, stud, or post 33, and is recessed in its lower edge, at 61—61, to form contacting surfaces 34, 35, 36, and 37, as is also clearly shown in the aforesaid view.

A vertical slot 38 extends through the head 29 of the bolt 28, and a pair of latches 39 is arranged within said slot. The heel of each latch 39 is pivoted at 40 to the bolt head 29, and such latch has an operating or actuating lug 41 which is adjacent to said pivot, and a locking lug 42 which is at the opposite or forward terminal of the latch. Flat springs 43—43 are arranged to bear at their free terminals on the lugs 41, the free ends of which lugs protrude at all times from the slot 38 above and below the bolt head 29. The springs 43 are above and below the bolt, and they have their other terminals wound on and secured to posts 44—44 which extend forwardly from the backside 32 of the case, said posts necessarily being above and below said bolt, as are said springs. Normally the springs 43, acting on and through the lugs 41, force the latches 39 toward each other and into contact at their free or forward ends, and on a line intermediate of the pivots 40 and perpendicular to

a line drawn between said pivots, as best shown in Fig. 11. When the latches 29 are thus disposed the locking lugs 42 are wholly within the slot 38, so that they in no way interfere with the free movement of the head 29 through the slots 7 and 6.

Arranged between the front side of the bridge-piece 16 and the backside 32 of the cover-plate, in the order named from back to front, are four tumblers 45, 46, 47, and 48, and a filling-plate 49.

The tumblers 45, 46, 47 and 48 correspond in thickness with the thickness of the wards 22, 23, 24, and 25, respectively, of the key 20, and the width of the thickness of the thin portion of the bridge-piece 16 approximates the distance between the closed sides of the slot 26 in said key, while the thickness of the ward 21 is somewhat less than the distance between the backside 32 and said thin portion of said bridge-piece.

In each of the aforesaid tumblers is a slot 50, and the tumblers are provided with lugs or stops 51, there being two such stops depending from the top of the slot in the tumbler 45, two depending from the top and two rising from the bottom of the slot in the tumbler 46, two rising from the bottom of the slot in the tumbler 47, and two depending from the top of the slot in the tumbler 48. The stops 51 extend into their respective slots 50, and the upper stops normally block the path of the post 33 which extends through said slots. There is also a slot 50 in the filling-plate 49. The slots 50 have a correspondence generally with each other in size and shape, and they are so arranged in their respective members as to enable them to be brought into approximate registry with each other. The spaced relationship of the stops 51 is practically the same in each case, that is to say, the right-hand stops are in substantially the same transverse vertical plane, and the left-hand stops are in substantially the same transverse vertical plane. The stops with which each tumbler is provided are spaced from each other and from the ends of the slot into which they extend. There is also a slot 53 in the bridge-piece 16, behind the slot 50 in the tumbler 45. The slot 53 extends transversely of the bridge-piece 16, while the slots 50 in the tumblers and in the filling-plate 49 extend longitudinally thereof.

The post 33 on the bolt 28 projects into and through the slot 53 before entering the slots 50, and in the present case said post projects into a slot 55 in the cover-plate 9. When the bolt 28 is in its retracted position, the post 33 is in the upper right-hand corner of the slot 53, and, when said bolt is in its most projected position, said post is in the upper left-hand corner of said slot. When the bolt is actuated, the post 33 rides

on or bears against the upper edge of the slot 53, and thus assists the lug 31, which is in the slot 30 in said bolt, in guiding the latter. The stroke of the bolt 28 in both
 5 directions is also limited and determined by the ends of the slot 30 and the lug 31, said lug being in the left-hand end of said slot when said bolt is in retracted position, and in the right-hand end of said slot when said
 10 bolt is in its most projected position.

The tumblers 45, 46, 47, and 48 and the filling-plate 49 are pivotally mounted at their right-hand ends on a stud 56 that projects forwardly from the backside 32 of the
 15 case, and said tumblers and plate are pressed downwardly into normal contact with the post 33, which extends through the slots in said members, by means of a plurality of
 20 springs 57, there being one such spring for each of said tumblers and for said plate. Each spring 57 has one terminal secured to the oscillatory member actuated thereby, at a point below and to the left of the stud 56,
 25 as represented at 58, extends up over the right-hand edge of such member, and then to the left far enough for the free terminal of said spring to bear against the underside of the upper post 10. Thus the springs 57
 30 have a constant tendency to swing the tumblers and the filling-plate 49 downwardly on the stud 56, and the construction and arrangement of parts are such that normally some of the stops 51, with which said tumblers are provided, extend into and obstruct
 35 the path of the post 33, as previously stated.

Having described the construction of my lock, I will now explain in detail the manner in which the same is operated.

The key 20 is first inserted in the sleeve
 40 12 and in the key-hole which comprises the slots 14 and 15, with the rod 33 in the passage 27, until said key encounters the guard 18. Now, if the key be inserted by a person unfamiliar with the construction or proper
 45 operation of the lock, and said key be rotated in either direction, the wards of the key will, in the present case, act on the tumblers 45, 46, 47, and 48, and the filling-plate 49, bearing against the under edges thereof,
 50 and oscillate said tumblers and plate on the stud 56, without having any effect whatsoever on the bolt 28, such being the case whether said bolt be in retracted or in projected or advanced position.

55 Assuming that the person who has inserted the key 20 is experienced in the proper use of the lock, and that the bolt 28 is in retracted position, as in the first view, said key is given a quarter turn to the left
 60 while rearward pressure is exerted thereon, when the ward 21 comes into alignment with the key-hole 17, the spring 19 yields, and the key is forced further inwardly, carrying with it the guard 18, until said ward is behind the thin part of the bridge-piece 16, in

the space behind such part and the backside 32 of the case, when said key has imparted thereto a complete revolution, or at least a half revolution in the same direction, that
 70 is, to the left. The result produced by this rotary motion of the key 20, after the ward 21 has entered behind the thin part of the bridge-piece 16, is as follows: The first quarter revolution of the key causes the tumblers 45, 46, 47, and 48 to be swung upwardly
 75 against the resiliency of their springs 57, to the extent necessary to remove such stops 51 as are in the path of the post 33 from such path, on the one hand, and not so far as to interpose in such path the stops 51 that normally are out of the same, on the other hand.
 80 It is, in the present example, the depending stops 51 that must be removed from the path of the post 33, and the other stops that must not be thrust into said path. The lock mechanism is now disposed as illustrated in Figs. 3 and 4, and the position of the wards of the key 20 is that indicated by dotted lines at 59 in Fig. 3. During this operation the
 85 wards 22, 23, 24, and 25 pass into contact with the bottom edges of the tumblers 45, 46, 47, and 48, respectively. The second quarter revolution of the key causes the ward 21 to contact with the surface 34 of the bolt 28, and to actuate said bolt to the left,
 90 and the other wards to pass out of contact with the tumblers. The ward 21 next passes out of contact with the bolt. The mechanism is at this time disposed substantially as shown in Fig. 3, with the wards of the key in the position indicated by the dotted
 95 lines 60 in that view. The head 29 of the bolt 28 is in locking position in the bolt-plate 52 and door-casing 3, and the tumblers have been actuated by their springs 57 into contact with the post 33 again, but, inasmuch as the bolt 28 has been moved to the left,
 100 said post is now between the upper lugs 51, as shown in Fig. 4, instead of between the right-hand upper lugs 51 and the right-hand ends of the slots 50, as was the case in the first instance. The second half of the revolution of the key 20 is required, if it be desired to remove said key. In that event the
 105 key is permitted to be thrown forward, by the spring 19 and the guard 18, when the ward 25 arrives behind the key-hole 17, and then, if it be desired to withdraw the key from the lock, the same must be given a quarter turn to the right in order to bring
 110 the wards in line with the key-hole slots 14 and 15. If the key be thus withdrawn it must be again inserted and pressed rearwardly into place, with the ward 21 beneath the bolt 28, for the purpose of either double
 115 locking the bolt or unlocking the same. The operation is the same, after the key has been forced rearwardly into operative position the second time, as would be the case if it had not been removed, consequently the ex-
 120
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 130

planation following will be based on the assumption that the key has not been removed from the lock.

Starting, therefore, with the key in the position indicated by the dotted line 59 in Fig. 4, the key is given a half turn to the left to complete the first active revolution, and then said key is given a further half turn in the same direction, with the result that the bolt 28 is projected to its full extent, and receives the benefit of the additional security afforded by the latches 39. The wards of the key are now in the position indicated by the numeral 62, and in approximately the same position as they were in Fig. 4, but have arrived there the second time. Due to the fact that, in order to throw the bolt into locking position and secure the same in such position with the latches 39, it is necessary to give the key two complete active revolutions, before the same can be withdrawn from the lock, another half revolution of said key, from the position indicated at 62 in Fig. 6, still in the same direction, being required to enable the key to be withdrawn from the key-hole 17, and then a quarter revolution in the other direction to enable the key to be withdrawn from the key-hole slots 14 and 15. The locking mechanism including the tumblers is now disposed as clearly shown in Fig. 6, with the bolt head 29 fully projected in the recess 5 in the door-casing 3, and the latch lugs or hooks 42 projected outwardly in engagement above and below said head with the bolt-plate 52, so that it is impossible to actuate the bolt 28 inwardly and thus to unlock the door 1.

Any rotary movement of the key 20, when the wards thereof are all in the space between the bridge-piece 16 and the cover-plate 9, is considered as inactive or inoperative, since then no result is accomplished beyond the idle oscillation of the tumblers and filling-plate 49, which oscillation serves no useful purpose. It is only when the key is so disposed as to enable the ward 21 to act on the bolt 28, when said key is rotated, that the rotation of the key is termed operative or inactive.

When the second active revolution of the key is made, and before one-half of such revolution is complete, the wards 22, 23, 24, and 25 again act on the tumblers 45, 46, 47, and 48, respectively, to force them upwardly, against the resiliency of their springs 57, and so to remove from the path of the post 33 the stops 51 which are in such path, and to open the way between all of the tumbler lugs for said post to pass to the left in the slots 53 and 50. This is during the first quarter of the second active revolution. Then, during the second quarter of the second active revolution, the ward 21 contacts with the surface 35 of the bolt 28 and actu-

ates said bolt still further to the left, or as far as it is capable of being moved in that direction, when said last-named ward passes clear of said surface, as it had previously passed clear of the surface 34. When this additional movement is thus imparted to the bolt 28, the lugs 41 at the inner ends of the latches 39 encounter the inner face of the reinforcement 8, and said latches are thereby rocked outwardly on the pivots 40 until the lugs 42 at the outer ends of said latches come into contact with the inner face of the bolt-plate 52 above and below the head 29. The latches 39 are at this time caused to separate at their free ends, and to thrust their lugs 42 out of the slot 38 and into engagement with the bolt-plate 52. This action on the part of the latches 39 is produced against the resiliency of the springs 43. The bolt head 29 is held very securely in locking position, by means of the latch lugs 42 and 41, so that the bolt can be forced in neither direction. The post 33 is at the left of the left-hand set of upper tumbler stops 51, and these parts would prevent the bolt 28 from being forced inwardly, even without the aid of the latches 39, although not affording, of course, the same amount of security as is afforded by said latches, just as said post and the right-hand set of upper tumbler stops 51 prevent said bolt from being forced inwardly when said post is located between the left- and right-hand sets of tumbler stops.

In unlocking the bolt 28, the key 20 is inserted in active or operative position as before, and then given two revolutions to the right, after which said key may be withdrawn, or it may be withdrawn, if desired, after giving the first revolution in its active or operative position, but then the bolt is only partially retracted and the door 1 is not unlocked. The first operative revolution of the key disposes the tumblers in a manner to open the way to the right for the post 33, and the ward 21 bears on the operating surface 36 of the bolt 28 and moves said bolt to the right before passing clear of the same, the bolt being moved to the extent illustrated in Fig. 4. When the bolt 28 begins to move to the right and to carry the pivots 40 inwardly, from the vicinity of the reinforcement 8, the springs 43 begin at once to act on the latches 39 in such a manner as to cause the lugs 42 to be actuated, so that, by the time said bolt is disposed as shown in the aforesaid view, said latches are in initial position again with said lugs wholly within the slot 38, where they offer no obstruction to the passage of the bolt head 29 through the slot 6 in the bolt-plate 52. Upon the second operative or active revolution of the key, the tumblers are again manipulated and disposed so as to open the way for the passage of the post 33 to the extreme right-hand end

of its travel, and the ward 21 acts on and engages the surface 37 of the bolt and actuates said bolt to the right as far as the bolt can travel in that direction. When the key completes its second active revolution to the right, the parts are disposed once more as shown in Fig. 1.

The spaces between the stops 51 in each pair of upper and under stops, with which the tumbler 46 is provided, are wide enough to permit the post 33 to pass when said lugs are disposed above and below the path of said post.

When the key 20 is in operative position and rotated, it does not act on the filling-plate 49, as it does when in inoperative position against the unseated guard 18 which is then pressed into the eye of the key-hole 17 by the spring 19. When the key is forced inwardly through the key-hole 17 into operative position, it bears on the guard 18 and thrusts the same inwardly against the resiliency of the springs 19, and said guard and spring tend to retain the ward 21 in contact with the inner surface of the thin part of the bridge-piece 16. If it be desired to retain the key in operative position while the wards are passing the key-hole 17, it is necessary to exert pressure on said key to prevent the same from being thrust forwardly out of said position by the spring 19. No spring is required for the bolt of this lock.

It is understood, of course, that, when the key 20 is properly seated and turned in the lock, the relative proportions of the wards 22, 23, 24, and 25 to the tumblers 45, 46, 47, and 48, the slots 50 therein, and the stops 51 with which said tumblers are provided, are such that the proper amount of displacement is imparted to said tumblers to open a path for the post 33. A key having incorrectly proportioned wards would fail to actuate all of the tumblers, or would not actuate them to the extent required to remove the upper stops 51 from the path of the post 33, or would actuate them so far as to project the under stops 51 into such path.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, in a lock, with a case provided with a fixed member, said case and member having key-holes therein, a key-operated bolt in said case on one side of said fixed member, and a spring-pressed and key-operated tumbler in said case on the other side of said member, said tumbler being adapted normally to block the movement of said bolt, of a key, and yielding means normally to close the key-hole in said fixed member against the entrance of said key.

2. The combination, in a lock, with a case provided with a fixed member, said case and member having key-holes therein which are out of alignment with each other, a key-op-

erated bolt in said case on one side of said fixed member, and a spring-pressed and key-operated tumbler in said case on the other side of said member, said tumbler being adapted normally to block the movement of said bolt, of a key, and yielding means normally to close the key-hole in said fixed members against the entrance of said key.

3. The combination, in a lock, with a case provided with a fixed member, said case and member having key-holes therein, a key-operated bolt in said case on one side of said fixed member, and a spring-pressed and key-operated tumbler in said case on the other side of said member, said tumbler being adapted normally to block the movement of said bolt, of a key, and a spring-pressed guard in the case behind said fixed member, and in operative relation to the key-hole in said member, whereby said key is prevented from entering said last-named key-hole without exerting pressure with the key.

4. The combination, in a lock, of a case, provided with a fixed rod, a sliding bolt in said case, a bridge-piece in said case over said bolt, said bridge-piece having a key-hole therein through which said rod extends, and a spring-pressed guard arranged on said rod normally to close the entrance to said key-hole.

5. The combination, in a lock, of a slotted case having an exterior slotted sleeve, the slots in said case and sleeve forming a key-hole, a fixed rod projecting through said case into said sleeve, a sliding bolt in said case, a bridge-piece in said case over said bolt, said bridge-piece having a key-hole therein, and said rod passing through the eyes of both of said key-holes, and a spring-pressed guard arranged on said rod normally to close the eye of the key-hole in said bridge-piece.

6. The combination, in a lock, with a case, a key-operated bolt in said case, said bolt having a post, spring-pressed latches carried by the head of said bolt, and normally retained out of locking position, said latches being provided with projections which are adapted, when said bolt is advanced, to contact with the case and throw said latches into locking position, a plurality of spring-pressed slotted tumblers pivotally mounted in said case, said tumblers being provided with two sets of stops, some of which stops extend and others are adapted to be actuated into the path of said post, and a slotted and key-hole-provided bridge-piece between said bolt and tumblers, said post extending through the slot in said bridge-piece and tumblers, of a key slotted to receive said bridge-piece, and having a ward to engage and intermittently actuate said bolt, and wards to actuate said tumblers to open a path for said post, the construction and arrangement of parts being such that more

than a complete revolution of said key is required in order to actuate said bolt to either end of its travel.

7. The combination, in a lock, with a case, 5 a key-operated bolt in said case, said bolt having a post, a plurality of spring-pressed slotted tumblers and a spring-pressed slotted filling-plate pivotally mounted in said case, said tumblers being provided with stops to 10 block the path of said post, and a slotted and key-hole-provided bridge-piece between said bolt and tumblers, said post extending through the slots in said bridge-piece, tumblers, and filling plate, of a key slotted to receive said bridge-piece, and having a ward to 15 engage said bolt, and wards to actuate said tumblers to open a path for said post, the construction and arrangement of parts being such that said filling-plate is actuated by 20 said key when the latter is out of position to actuate the bolt.

8. The combination, in a lock, with a case, a key-operated bolt in said case, said bolt having a post, a plurality of spring-pressed 25 slotted tumblers pivotally mounted in said case, said tumblers being provided with stops to block the path of said post, and a slotted and key-hole-provided bridge-piece between said bolt and tumblers, said post extending 30 through the slots in said bridge-piece and tumblers, of a key slotted to receive said bridge-piece, and having a ward to engage said bolt, and wards to actuate said tumblers to open a path for said post, and yielding 35 means to prevent said key from entering the key-hole in said bridge-piece.

9. The combination, in a lock, with a case, a key-operated bolt in said case, said bolt having a post, spring-pressed latches carried 40 by the head of said bolt, and normally retained out of locking position, said latches

being provided with projections which are adapted, when said bolt is advanced, to contact with the case and throw said latches into locking position, a plurality of spring-pressed slotted tumblers pivotally mounted 45 in said case, said tumblers being provided with two sets of stops, some of which stops extend and others are adapted to be actuated into the path of said post, and a slotted and 50 key-hole-provided bridge-piece between said bolt and said tumblers, said post extending through the slots in said bridge-piece and tumblers, of a key slotted to receive said bridge-piece, and having a ward to engage 55 said bolt, and wards to actuate said tumblers to open a path for said post, and yielding means to prevent said key from entering the key-hole in said bridge-piece.

10. The combination, in a lock, with a 60 case having a key-hole therein, a key-operated bolt in said case, said bolt having a post, a plurality of spring-pressed slotted tumblers pivotally mounted in said case, said tumblers being provided with stops, 65 some of which stops extend and others are adapted to be actuated into the path of said post, and a slotted bridge-piece between said bolt and said tumblers, the key-holes in said case and bridge-piece being out of line 70 with each other, and said post extending through the slots in said bridge-piece and tumblers, of a key slotted to receive said bridge-piece, and having a ward to engage said bolt, and wards to actuate said tumblers 75 to open a path for said post, and yielding means to prevent said key from entering the key-hole in the bridge-piece.

RAPHAEL DE SEVO.

Witnesses:

F. A. CUTTER,

A. C. FAIRBANKS.