Dec. 4, 1928. 1,693,731

C. F. SIOBERG

LOCK

Filed Sept. 20, 1924 3 Sheets-Sheet 1

Fig. 1

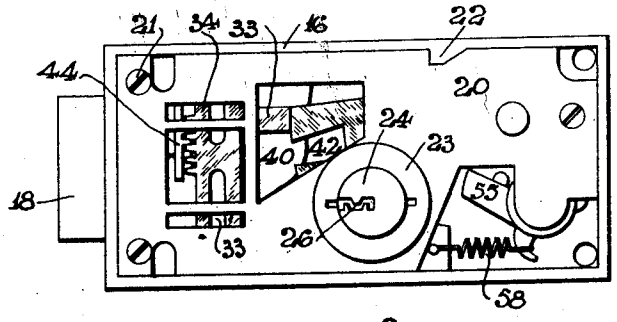


Fig. 2

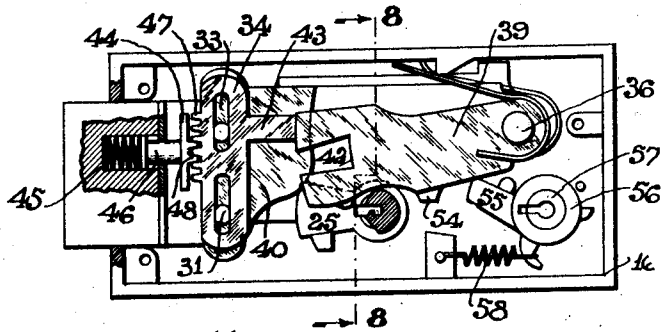


Fig. 3

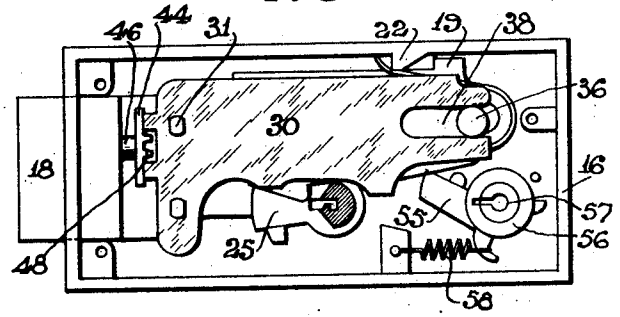


Fig. 4

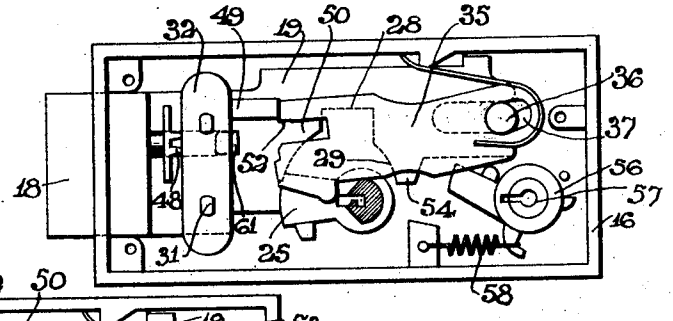
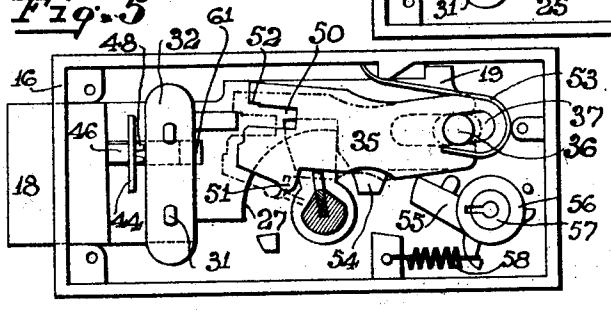


Fig. 5



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Fig. 6

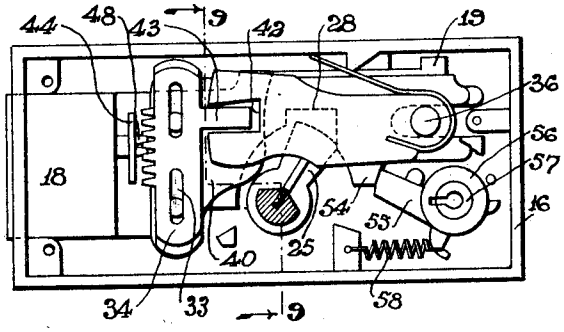


Fig. 13

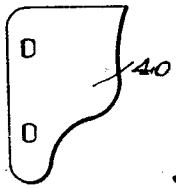


Fig. 14

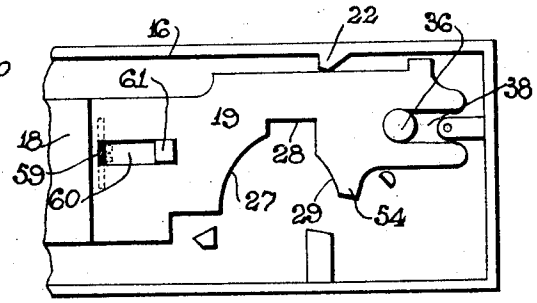
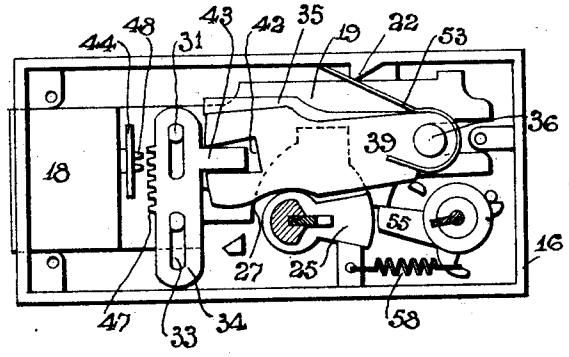


Fig. 12



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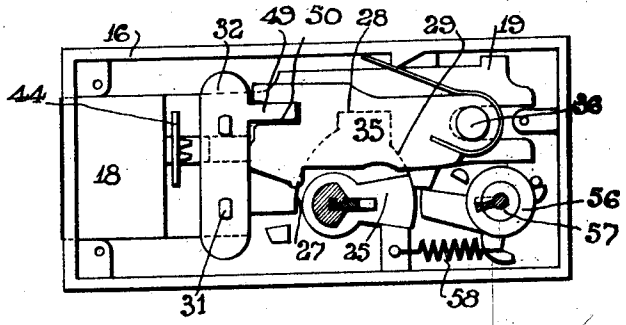
Dec. 4, 1928. 1,693,731

C. F. SIOBERG

LOCK

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Fig. 7



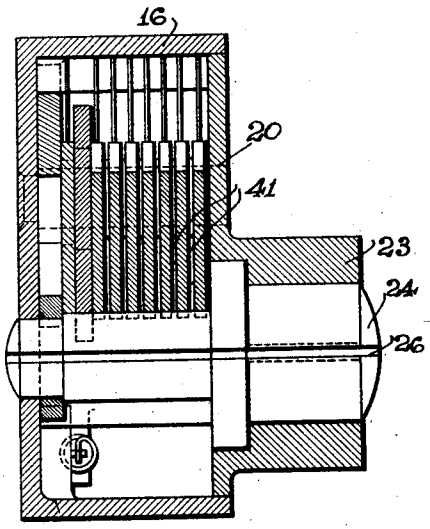


Fig. 8

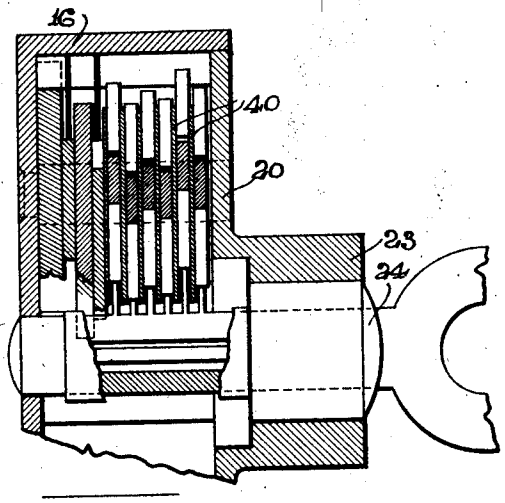


Fig. 9

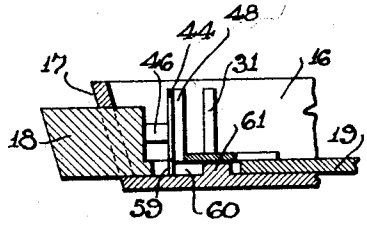


Fig. 10

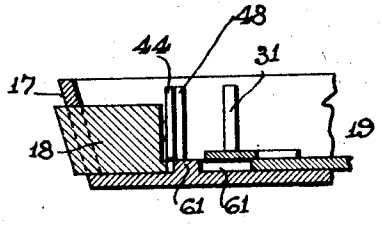


Fig. 11

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UNITED STATES PATENT OFFICE.

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LOCK.

Application filed September 20, 1924. Serial No. 738,786.

This invention relates to a lock, and aims to provide an improved device of this character which will incorporate a changeable combination or permutation in that the mechanism thereof will be such that it may be set to be operated by means of different keys.

It is an object of the invention to provide an improved device of the type stated which will offer a freedom from mechanical difficulties.

A further object resides in the construction of a lock the permutation mechanism of which may readily be reset without subsequent manual adjustments or disassembly of the lock being necessary.

A still further object is to be predicated on the provision of an improved lock which may not be readily opened without the use of the proper keys.

An additional object is that of providing a lock which will efficiently perform the purposes for which it is intended, and which will also be economically and readily manufactured and assembled.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention accordingly comprises the features of construction, combination of elements, and arrangement of parts which will be exemplied in the construction hereinafter set forth and the scope of the application of which will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention reference should be had to the following detailed description taken in connection with the accompanying drawings, in which:

Fig. 1 is a front elevation of one form of lock, embodying the improved construction of the present invention, with portions of the cover thereof cut away in order to disclose the underlying mechanism;

Fig. 2 is a partly sectional view similar to Fig. 1, but showing the cover removed;

Fig. 3 shows the lock with the auxiliary tumblers, washers, and stump members removed therefrom;

Fig. 4 illustrates the parts with the main washer removed and the guard tumbler in its locked or initial position;

Fig. 5 is a view corresponding to Fig. 4, but showing the guard tumbler in its secondary as well as unlocked positions;

Fig. 6 is a view corresponding to Fig. 2, but showing the bolt in its normally retracted position;

Fig. 7 is a similar view, but showing the bolt in its fully retracted position, and with the main stump member fully retracted with respect to the master tumbler;

Fig. 8 is a transverse section taken on the lines 8—8 and in the direction of the arrows indicated in Fig. 2;

Fig. 9 is a view similar to Fig. 8, but taken along the lines 9—9 and in the direction of the arrows indicated in Fig. 6;

Figs. 10 and 11 are fragmentary sectional plan views of the bolt and casing, and illustrating the cooperation between certain operations of the lock mechanism when the parts assume either the position shown in Figs. 1 to 6, or in Fig. 7, respectively;

Fig. 12 is a view similar to Fig. 6, but showing the mechanism during the resetting operations;

Fig. 13 illustrates one of the washers used in association with the stump members; and

Fig. 14 shows in detail the construction of the bolt-shank.

In the present instance the invention has been exemplified as incorporated in a lock of that nature which is particularly adapted for use in association with safe deposit boxes. It will be understood, however, that the invention might be applied to advantage in numerous different other associations, and that the construction of the lock might be modified to meet the various conditions of operation encountered.

Thus, in the present instance, the reference numeral 16 indicates a lock casing having an angular end-portion 17 formed with an opening for the passage of a bolt-head 18, it being noted that the outer edge of this head is also formed to extend in a plane substantially parallel to that of the outer edge of the casing.

In order to effect a retraction and projection of the bolt-head the latter conveniently has a rearwardly-extending shank in the nature of a plate 19, which may lie adjacent, and is movable relatively to, the inner face of the casing. The outer plate 20 which is carried by the lock casing 16 is held immovable relatively to the same preferably by the use of screws 21 and a projecting portion 22, and is formed with an opening serving as a mounting for a hub-bearing 23 and a key-hub 24. This hub extends transversely of the

lock and carries at its inner end a talon 25 so that, assuming a key of the proper type be inserted into the key-slot 26 which forms a part of the hub 24, the latter may be turned in order to correspondingly rock the talon 25, which latter lies adjacent the inner face of the casing 16 and the plate 19 which forms the shank of the bolt.

This shank is provided with a recess, the forward edge 27 of which has a curvature corresponding to the degree of curvature of the path of travel of the outer edge-portion of the talon 25, and the edge of this recess, as, for example in Fig. 4, normally lies at points where it will be concentric with the axis and in sliding contact with the outer edge of the talon. The recess formed in the shank is continued at points beyond the edge 27 in the form of a notch 28, the rear edge of which, in the present instance, is of materially greater length than the forward edge thereof, and the rear edge of this recess is curved as at 29, the degree of curvature being equal to the degree of curvature of the edge 27, the purpose of this construction being hereinafter brought out.

However, at this time it will be understood that, in operation, with the talon moving in the manner aforedescribed, the same will have a path of travel under which its outer edge will be in sliding contact with the forward edge 27 of the shank recess, and this travel may be continued until the rear edge of the talon engages the rear wall of the notched portion 28, at which point pressure will be brought to bear upon the latter, resulting in a retraction of the bolt-shank, and, consequently, the head 18 carried thereby. Under this condition it will be obvious that the forward edge 27 of the recess has been moved to a point at which it intersects the path of travel of the talon. Due to the fact that if a projection of the bolt is desired the talon will engage the forward edge of the notched portion 28 until it is capable of sliding beyond the outermost portion of the same, it will be obvious that the parts will return to their normal position and the bolt may thus be again projected.

Now, with a view to providing means which will serve to prevent a retraction of the bolt unless exactly those keys are utilized which are necessary for this operation, it will be observed that in the present instance the bolt-shank at a point in advance of its recess portion mounts a series of stump members, which, for present purposes, may be divided into two groups, one of which comprises that stump member which cooperates with the guard tumbler, the second group embracing the stump members which cooperate with the auxiliary tumblers,—the two groups being preferably separated by means of a washer 30, which may also be supported by the bolt-shank. One of the most convenient methods of supporting these members, as well as the washer 30, is by utilizing pins 31, having one of their ends secured to the shank, their bodies extending through openings in the body of the main stump member 32 and similar openings in the body of the washer 30, the pins at points beyond the washer 30 extending through slots 33 formed in the bodies 34 of the auxiliary stump members. The guard tumbler previously referred to embraces a body 35, which is carried within the casing by means of a transversely-extending pin 36, which latter extends through a slot 37 formed in the rear end of the body 35, the guard tumbler being further supported by having its lower edge normally resting upon the extension of the key-hub 24. The rear end of the main separating washer 30 may also be supported by the pin 36 by having its rear edge formed with a notch 38, thus providing arms, the inner edges of which ride upon the pin. Similarly to the guard tumbler 35, the bodies 39 of the auxiliary tumblers have their lower edges normally resting upon the extension of the hub member 24, and the rear ends of each of the auxiliary tumblers are formed with openings of a size equal to the size of the pin 36, so that they rock therearound, it being thus obvious that the parts are properly supported. At this time it will be noted, as has been clearly brought out in Figs. 2, 8 and 9, that each of the auxiliary stump members may be separated from adjacent ones by means of a series of washers 40, which are mounted upon the pins 31, it being appreciated that one of these washers is interposed between each of a pair of auxiliary stump members. These washers serve to prevent any binding of the parts, as well as any possibility of an appreciable sidewise movement and misalignment of the stump members. In addition to the foregoing, washers 40 are preferably of such a size, as has been clearly brought out in Fig. 13, as to substantially cover the area embraced by the auxiliary stump members. As a consequence, it is impracticable for a person to determine the setting of the lock by merely examining the same, in that it becomes necessary to remove the washers covering each stump member in order to ascertain the disposition thereof. While on this subject it will also be noted that the auxiliary tumblers may be separated from one another by means of the washers 41 mounted upon the pin 36 and interposed one between each pair of tumblers so that any binding of these parts is also prevented.

The forward edge of each of the tumblers 39 is formed with a notch 42 of a size sufficient to accommodate the stump 43 of an adjacent auxiliary locking stump 34, it being noted in this latter connection—and attention being particularly invited to Figs. 1 and 2—that the length of the stump 43 is such that in the

normal locked position of the parts it has its rear edge lying adjacent to, and bearing against, a forward edge-portion of the adjacent auxiliary tumbler 39. As a consequence, it will be obvious that, the stump members being carried by the bolt and the tumbler members being carried by the casing, a retraction of the bolt is prevented incident to this engagement. However, assuming that the stump and tumbler members are so moved relatively to each other that the rear ends of the stumps come to lie adjacent the mouths of the notches, the bolt may be freely retracted upon the talon being rotated.

In the present exemplification the stump members are normally immovable relatively to the bolt, while the tumblers are movable with respect to the bolt as well as the casing. The stump members may be retained against movement, for example, by the use of a spring-pressed locking dog 44, which is carried by the bolt-head 18 and normally tends to move rearwardly of the same incident to the force exerted by a spring 45 carried within a recess formed in the bolt-head and acting against the stem 46 which supports the dog. The forward edge of each of the auxiliary stump members presents a series of teeth 47, and the rear face of the dog has a transverse groove, provided, in the present instance, by utilizing a pair of ribs 48, so that, due to the fact that the teeth 47 lie adjacent this rear face, it will be understood that one of the series of teeth presented by each auxiliary stump member will extend into the groove presented by the locking dog in order to normally prevent any movement of the parts with respect to each other.

The main stump member 32 has a stump 49 corresponding to the stumps 43 of the auxiliary members, and of such a size as to be readily accommodated within a notch 50 in the forward edge of the guard tumbler 35, it being thus appreciated that if the guard tumbler is brought to a point at which the mouth of this notch lies adjacent the rear edge of the stump 49, and furthermore, that if the auxiliary tumblers are arranged in what may be termed a permutation corresponding to the permutation provided by the different relative positions occupied by the stump members 34, in which positions the auxiliary tumblers will have their mouths adjacent the rear edges of the stumps 43 of these members, the bolt may be retracted by swinging the talon 25 in the manner aforedescribed.

The proper positioning of these tumblers will always be assured, in that the permutation under which the stump members are arranged will correspond to the permutation provided by the key bittings. More particularly, any key of the proper type will serve to swing the talon to a certain extent, and in such swinging the key bittings engaging the lower edges of the respective auxiliary tumblers will move the same against the action of the springs 53 to occupy various positions, but upon the talon engaging the rear edge of the notched portion of the shank recess it will be obvious that the bolt may not be retracted, due to the fact that the notches of the various auxiliary tumblers will not be in positions at which their mouths will be adjacent the rear edges of the stumps, and, consequently, the latter will engage the forward or outer edges of the tumblers to prevent any rearward movement of the bolt. However, if a key with its bittings formed to correspond to the permutation under which the stump members are disposed is inserted through the nose of the key-hub, it will be obvious that these bittings, upon the key and hub member being turned, will cause the auxiliary tumblers to occupy positions at which the mouth of the notch of each of the same will come to lie adjacent the stump of the corresponding member so that, accordingly, the bolt may be freely retracted incident to the fact that the stumps will enter the notches of the tumblers.

In locks of this nature it is customary to provide two keys, each of which must be used in order to effect a retraction of the bolt. For this reason there has been provided in the present instance the guard tumbler and the guard stump member previously referred to. The initial key, which is commonly known as the guard key, will be primarily inserted through the nose of the hub when the latter is in the position shown in Fig. 1, and the bitting of this key will be of such a nature that an extended portion thereof will ride against the under edge of the guard tumbler 35 and swing the same upwardly from the position shown in Fig. 4 to that illustrated in Fig. 5, and a subsequent reversal in the turning movement of the hub member will cause the extended portion of this bitting to engage a projection 51 extending from the under edge of the master tumbler to thus carry the same forward to the position indicated in dotted lines in the figure last-mentioned, in which position the stump 49 of the member 32 will lie within the mouth of the notch 50, it being noted that for this and an additional purpose the notch may be slightly enlarged or offset as at 52 adjacent its mouth portion. The guard key is now retracted from within the hub 24, and a second key, i. e., the renter's key—for example, that illustrated in Fig. 9—is now inserted in the hub and turned in order to produce the results described in the preceding paragraphs, it being thus appreciated that the master or guard tumbler 35 and stump 49 are initially disposed in proper relation, and that, subsequently, the auxiliary tumblers and stump members are likewise disposed in order to permit a retraction of the bolt. It will fur-

thermore be understood that when the bolt has been projected by means of the renter's key all of the tumblers are returned to their normal position, this result being obvious in connection with the auxiliary tumblers, and being apparent in connection with the main or guard tumbler in that, in the present instance, the main tumbler 35 is formed with a slot 37 rather than a mere opening accommodating the pin 36. In other words, while, in the position of the parts illustrated in Fig. 4 the pin bears against the forward edge of this slot, which condition is continued throughout the operation illustrated in full lines in Fig. 5, this edge of the slot is moved out of contact with the pin when the parts reach the position illustrated in dotted lines in this last-mentioned figure. However, due to the frictional engagement of the parts, contact will be resumed between the forward edge of the slot 37, and the pin 36 upon the bolt being retracted, and, in fact, it is for this purpose that the offset portion 52 is provided adjacent the mouth of the notch 50, it being understood that this offset portion, while not interfering with the positive entry of the stump 49 into the notch, will, nevertheless, assure a slight rearward movement of the main tumbler 35 so that when the bolt is again projected this tumbler may fall or be moved under the influence of its spring 53 to the position shown in Fig. 4.

A retraction of the bolt beyond the position indicated in Fig. 6 is prevented by virtue of the fact that the bolt-shank is formed with a rearwardly-facing shoulder 54 at its lower edge, and this shoulder is normally engaged by a movable stop member 55. These parts are so arranged that when the mechanism reaches the position illustrated in Fig. 6 a further retraction of the bolt is prevented, it being understood, however, that this retraction is adequate to permit of an opening of the closure with which the lock is associated. If now it is desired to change the permutation of the lock, this may be done, in a semi-automatic manner, by simply swinging the stop member 55 to a position beyond the shoulder 54, as in Fig. 7. This swinging operation is accomplished preferably in that the inner wall of the casing carries a hub-bearing 56 and a key-hub 57, so that upon the latter being turned against the tendency of the spring 58, and incident to the fact that the stop is carried by the hub member, this stop may be swung to the position previously referred to. As a consequence, a continued turning of the key by means of which the bolt has been retracted will permit the talon 25 to slidably bear against the rear edge of the notch portion 28 until the rear edge 29 of the recess is moved to a position permitting the outer edge of the talon to slide over the same. Under this condition the bolt and shank will be retracted to the extent shown in Fig. 7, in which position of the parts the stop 55 is prevented from interfering with the rearward movement of the shoulder and the key which has been utilized to swing the stop member may not be withdrawn from the key-hub 57.

Attention is now invited to Figs. 10 and 11. From these views it will be noted that the dog 44 carries an extension 59 which rides within a slot 60 formed in the bolt-shank 19, and the inner face of the casing is formed with a projection 61, also riding within this slot. During normal operation of the parts, i. e., locking and unlocking movements of the bolt, this mechanism in the present instance will not have any particular function other than serving as a guide. However, if the parts are moved from the position shown in Fig. 6 to that illustrated in Fig. 7, the extension 59 will engage with the projection 61 so that upon the bolt being fully retracted the dog 44 will have its stem 46 retracted against the pressure exerted by the spring 45. This retraction will obviously result in the teeth of the auxiliary stump members moving out of engagement with the groove presented by the dog so that the stump members will be free to ride upon the pins 31, and due to the fact that the stumps 43 are extending into the notches 42, and furthermore due to the fact that each of the auxiliary tumblers is acted upon by one of the springs 53, all of the stump members, with the exception of that one which cooperates with the guard tumbler, will move to the position shown in Fig. 12. In this position it might be said that all of the stump members, with the exception of that indicated at 32, will be in their neutral position, it being understood that it is necessary to change the setting of the locking stump 49 or the guard tumbler, due to the fact that in the present instance, a guard key of a particular type will always be used.

A renter's key having different fittings from that previously used may now be inserted in the key slot of the extension of that hub member, and it will be obvious that upon turning this element in order to project the bolt the following sequence of operations will result: First, the various auxiliary tumblers, together with the stump members will be moved to assume a permutation corresponding to the positions occupied by the new key fittings. After once assuming these positions the stump members will have their teeth engaged by the groove of the dog 44, which is moved from the position shown in Fig. 11 to that illustrated in Fig. 10. Subsequently, the stop 55 will swing to a position behind the shoulder 54 due to the tendency exerted by the spring 58, and incident to this swinging the key which has been used to turn the hub 57 may be retracted. A continued movement on the part of the new renter's key will result in the parts assuming the position shown in Figs. 1 and 4 and 8. Now, while due to the

fact that the permutation of the lock has been automatically reset, it is no longer practicable to effect a retraction of the bolt by the use of the guard key and previously employed renter's key, this bolt may readily be retracted by employing the guard key, together with that renter's key which has been utilized to reset the permutation.

From the foregoing it will be understood that a lock is provided of the change-key type, and this lock is of such a nature that no danger exists of the setting becoming disarranged in that the permutation under which the mechanism has been disposed will not be disturbed under any ordinary conditions of operation, particularly, if the lock is constructed in such a manner that it embodies a form of the invention similar to that illustrated in the accompanying drawings. The permutation of the lock will only be reset when this mechanism is adjusted or rearranged to be operated by means of the key having a different arrangement of bittings from that previously used.

In other words, according to the illustrated embodiment the locking stumps will be prevented from movement relatively to each other and to the bolt, even though the guard key and renter's key are freely used. However, these members may be automatically reset and moved with respect to the bolt after the stop 57 has been turned to permit of the bolt being fully retracted, and this resetting will be accomplished before the normal operating position is again reached, i. e., before the different renter's key has projected the bolt-shank to a position at which the stop-member 55 comes to lie behind the shoulder 54.

Quite irrespective of the foregoing it will be additionally observed that in the present exemplification, incident to the fact that the tumblers are mounted at a point remote from the points of engagement with the locking stumps, and still more remote from the points of mounting of the latter, a maximum movement of the tumblers and, during resetting operations, a maximum movement of the stump members, is assured. Thus, it is practicable to make the parts relatively rugged of construction, and assurance may be had that the mechanism of the lock will function with a freedom from mechanical difficulties.

From the foregoing it will be appreciated that the objects of this invention have been accomplished, and since certain changes may be made in the above construction and different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which as a matter of language might be said to fall therebetween.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A lock, including, in combination, a casing and a bolt movable with respect thereto, locked means normally preventing a retraction of said bolt, means for retracting said bolt to a predetermined point without disturbing said first-named means, means whereby said bolt may be retracted beyond said predetermined point, and means associated with said casing adjacent said bolt, said means operatively connecting with said locked means during such further retraction of the bolt to automatically unlock said locked means.

2. A lock, including, in combination, a casing, a bolt slidable within said casing, a series of members movably carried by said bolt, a series of tumblers carried by said casing and normally cooperating with said members to prevent a retraction of said bolt, means mounted for movement in a straight line slidably associated with said bolt and normally cooperating with said members to lock the same against movement with respect to said bolt, and means associated with said casing and cooperating with said last-named means to move the same with respect to said bolt and unlock said members during a certain stage in the retraction of said bolt.

3. A lock, including, in combination, a casing, a bolt slidable within said casing, a series of members movably carried by said bolt, a series of tumblers carried by said casing and normally cooperating with said members to prevent a retraction of said bolt, means mounted for movement in a straight line slidably associated with said bolt and normally cooperating with said members to lock the same against movement with respect to said bolt, said bolt being formed with an opening, and a pin carried by said casing and extending through said opening and in the path of travel of said last-named means whereby during a certain stage in the retraction of said bolt said pin will engage said means to unlock said members.

4. A lock, including, in combination, a casing, a bolt slidably mounted within said casing, stump members movably carried by said bolt, a plurality of tumblers associated with said casing and normally cooperating with said members to prevent a retraction of said bolt, said tumblers being formed with notches for the accommodation of the stumps of said members whereby said bolt may be retracted to a predetermined point, a locking dog associated with said bolt and engaging said mem-

bers to normally prevent movement thereof, and means for automatically moving said dog out of locking engagement with said members when said bolt is retracted beyond a predetermined point.

5. A lock, including, in combination, a casing, a bolt slidably mounted within said casing, stump members movably carried by said bolt, a plurality of tumblers associated with said casing and normally cooperating with said members to prevent a retraction of said bolt, said tumblers being formed with notches for the accommodation of the stumps of said members whereby said bolt may be retracted to a predetermined point, a spring-pressed locking dog slidably carried by said bolt and bearing against said members to normally prevent a movement thereof, and means for forcing said dog out of contact with said members upon said bolt being retracted beyond a predetermined point.

6. A lock, including, in combination, a casing, a bolt slidably mounted within said casing, stump members movably carried by said bolt, a plurality of tumblers associated with said casing and normally cooperating with said members to prevent a retraction of said bolt, said tumblers being formed with notches for the accommodation of the stumps of said members whereby said bolt may be retracted to a predetermined point, a locking dog associated with said bolt and engaging said members to normally prevent movement thereof, said bolt being formed with a slot, and a pin carried by said casing and extending through said slot into the path of travel of said locking dog whereby when the bolt is retracted beyond a predetermined point said pin will move said dog out of engagement with said members.

7. A lock, including, in combination, a casing and a bolt movable with respect thereto, locked means normally preventing a retraction of said bolt, means for retracting said bolt to a predetermined point without disturbing said first-named means, and further means whereby said bolt may be retracted beyond said predetermined point, said locked means being unlocked during said further retraction.

In testimony whereof I affix my signature.

CHARLES FREDERICK SIOBERG.

CERTIFICATE OF CORRECTION.

Patent No. 1,693,731. Granted December 4, 1928, to

CHARLES FREDERICK SIOBERG.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 4, line 103, for the word "necessary" read "unnecessary", line 108, for the word "fittings" read "bittings", and line 130, for the words "Figs. 1 and 4" read "Figs. 1 to 4"; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 5th day of February, A. D. 1929.

M. J. Moore,
Acting Commissioner of Patents.

(Seal)