(No Model.) 2 Sheets—Sheet 1.

H. D. HINCKLEY.

LOCK.

No. 563,925. Patented July 14, 1896.

Fig. 1.

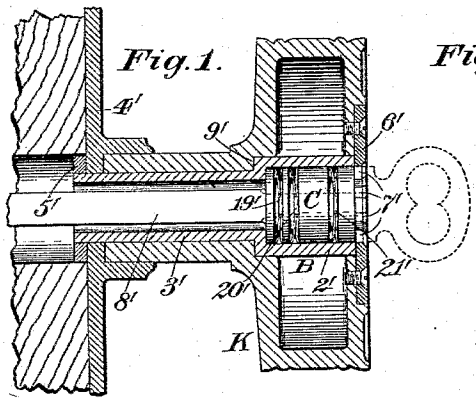


Fig. 2.

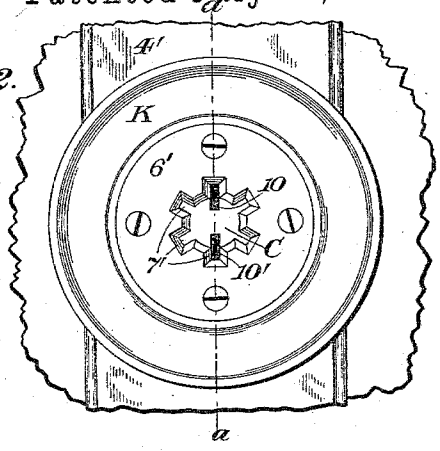


Fig. 3.

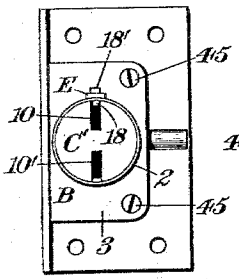


Fig. 5.

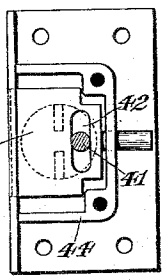


Fig. 6.

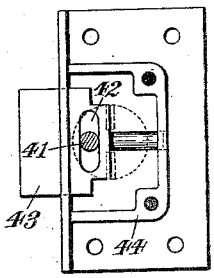


Fig. 7.

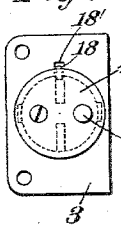


Fig. 8.

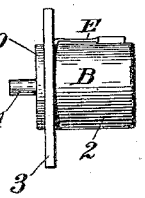


Fig. 4.

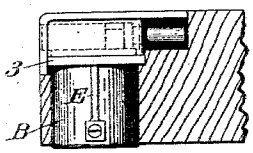


Fig. 9.

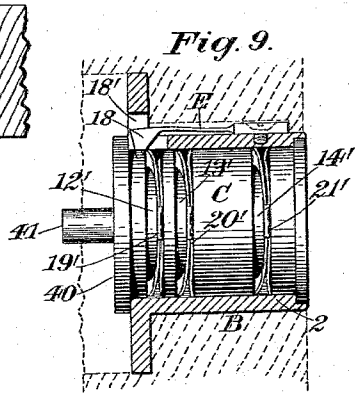


Fig. 10.

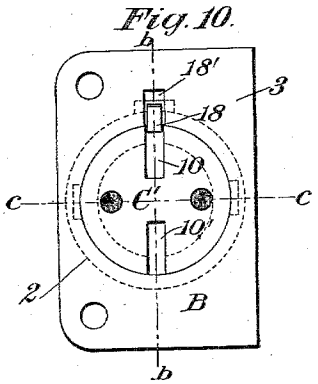


Fig. 11.

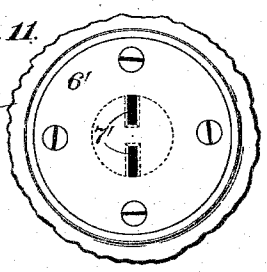
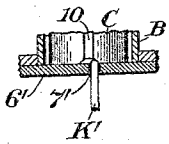


Fig. 12.



Witnesses:
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Fred. J. Dole.

Inventor:
Henry D. Hinckley.
By his Attorney,
F. A. Richards.

(No Model.)

2 Sheets—Sheet 2.

H. D. HINCKLEY.

LOCK.

No. 563,925. Patented July 14, 1896.

Fig. 13

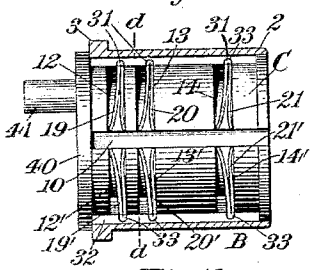


Fig. 16.

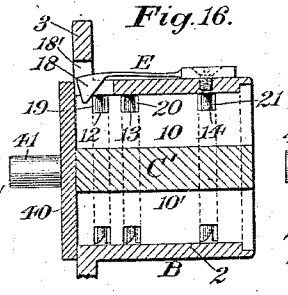


Fig. 19.

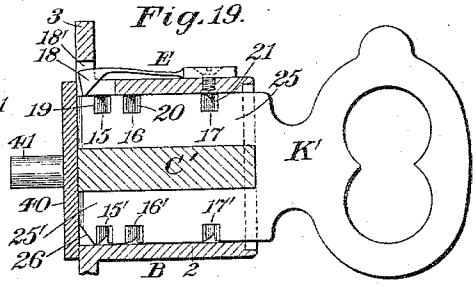


Fig. 14.

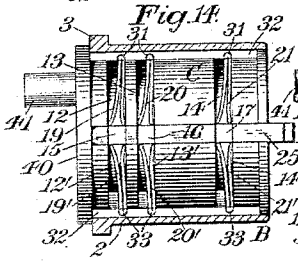


Fig. 17.

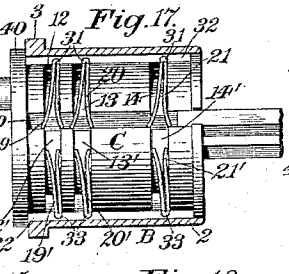


Fig. 20.

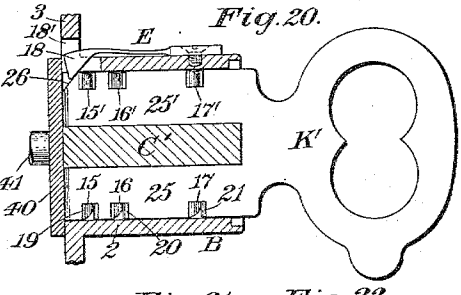


Fig. 15.

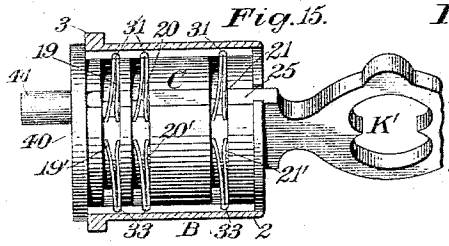


Fig. 18.

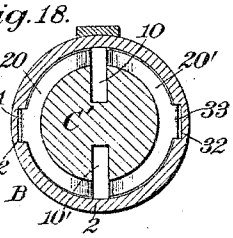


Fig. 21.

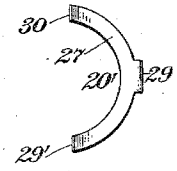


Fig. 22.

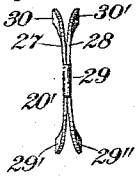


Fig. 23.

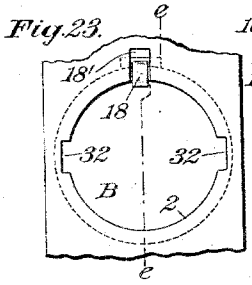


Fig. 24.

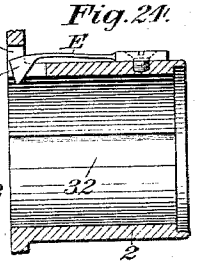


Fig. 25.

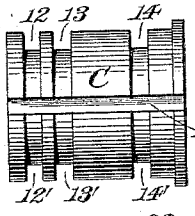


Fig. 26.

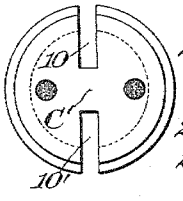


Fig. 27.

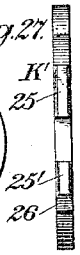


Fig. 28.

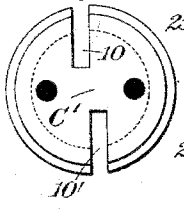


Fig. 29.

Fig. 30.

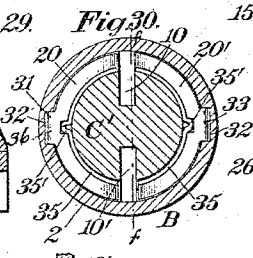


Fig. 32.

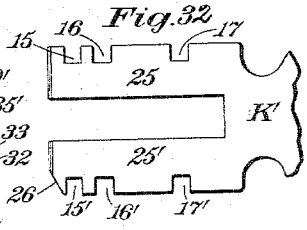


Fig. 33.

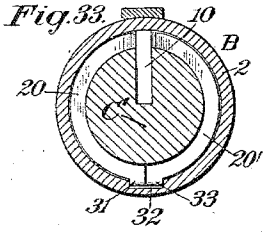


Fig. 31.

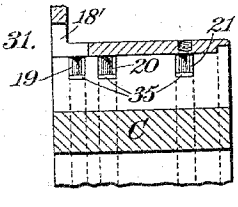


Fig. 34

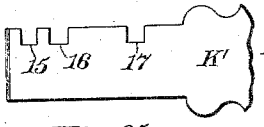
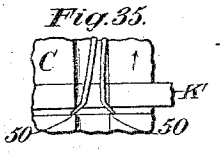


Fig. 35.



Witnesses:

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Fred. J. Dole.

Inventor:

Henry D. Hinckley.

By his Attorney,

F. W. Richards.

UNITED STATES PATENT OFFICE.

HENRY D. HINCKLEY, OF HARTFORD, CONNECTICUT.

LOCK.

SPECIFICATION forming part of Letters Patent No. 563,925, dated July 14, 1896.

Application filed February 14, 1896. Serial No. 579,213. (No model.)

To all whom it may concern:

Be it known that I, HENRY D. HINCKLEY, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Locks, of which the following is a specification.

This invention relates to locks of that class having rotary tumbler-carriers and commonly known as "cylinder-locks," the object of the invention being to furnish an improved lock of the class specified embodying a simplified and highly reliable organization of mechanism that will effectually defeat any attempt to open the lock by "picking," and which may be readily assembled for use by any unskilled person without the employment of special tools.

A further object of the invention is to furnish a lock of the class specified which is not only applicable to all uses that the so-called "Yale" lock is now applied, but may also be applied to and constitute a part of a door-knob, handle, or other analogous device.

In the drawings accompanying and forming part of this specification, Figure 1 is a vertical section taken in dotted line *a a*, Fig. 2, of my improved lock embodied in and constituting a part of a door-knob attachment, said figure showing the lock proper concentrically supported within a door-knob and showing a key in dotted lines. Fig. 2 is a front view of the device shown in Fig. 1, as seen from the right hand in said figure, said figure showing an axially-recessed plate secured to the knob concentric to the lock proper, and having a series of radial key-slots therein. Fig. 3 is a front view of a mortise or desk lock embodying my improvements. Fig. 4 is a plan view of the lock shown in Fig. 3, a portion of the article to which the lock is attached being shown in section. Fig. 5 is a front view of the lock-case shown in Fig. 3, and showing the sliding bolt, which is supported in said case, in its retracted or unlocked position, the bolt-actuating pin or stud being shown in full lines in section, and the bolt-actuator carrying said pin being shown in dotted line. Fig. 6 is a view, similar to Fig. 5, of the same parts, and showing the bolt in its advanced or locking position. Fig. 7 is a rear view of the bolt-actuator or tumbler-guide and its bearing or case, as seen from the left hand in Fig. 8. Fig. 8. is a side view of the bolt-actuator case, as seen from the right hand in Fig. 7. Fig. 9 is a longitudinal vertical section of my improved lock, minus the bolt, taken in dotted line *b b*, Fig. 10, as seen from the left hand in said figure, this figure being on a relatively large scale as compared with the view of the same parts shown in Fig. 1. Fig. 11 is a front view of a portion of a door-knob, showing the bolt-actuator in dotted lines, and also showing, in modified form, a guide-plate secured thereto. Fig. 12 is a cross-sectional view of a portion of the lock and guide-plate shown in Fig. 11, and illustrating the operation of inserting a key, a portion of the key being shown in this figure. Fig. 13 is a sectional plan view of the lock proper, the section being taken in dotted line *c c*, Fig. 10, and showing the combined tumbler-guide and bolt-actuator in its normal position, or in the position to receive the key. Fig. 14 is a view, similar to Fig. 13, of the same parts, showing the key-blade inserted into the lock in position to turn the tumbler-guiding bolt-actuator. Fig. 15 is a view, similar to Fig. 14, of the same parts and showing the tumbler-guiding bolt-actuator turned slightly from the position shown in Fig. 14 and showing the tumblers extending through the grooves of the key and in position to lock said key against withdrawal. Fig. 16 is a vertical longitudinal section of the parts shown in Fig. 13, taken in dotted line *b b*, Fig. 10, said figure showing the tumbler-guilding bolt-actuator in its normal position and locked against accidental rotation by the actuator-locking detent. Fig. 17 is a view, similar to Fig. 14, of the same parts and showing the tumblers in locked engagement with the bolt-actuator. This figure is intended to illustrate the actions of the tumblers in case the lock is tampered with, and said figure shows a key partially inserted into a lock. Fig. 18 is a cross-sectional view of the lock, taken on a line corresponding to the dotted line *d d*, Fig. 13, and looking toward the right in said figure. Fig. 19 is a vertical section of the lock, similar to Fig. 16, and showing the key inserted in said lock in position to release the action of the locking-detent. Fig. 20 is a

view, similar to Fig. 19, showing the key and actuator as having been turned one-half of a complete rotation, the detent in this position of the parts reëngaging the actuator. Figs. 21 and 22 are side and edge views, respectively, of one of the actuator-locking tumblers or wards. Fig. 23 is a rear end view of a portion of the bolt-actuator casing and the actuator-locking detent, the bolt-actuator being removed. Fig. 24 is a longitudinal section of the bolt-actuator casing and detent, taken in dotted line *e e*, Fig. 23, and looking toward the left hand in said figure. Fig. 25 is a side view of the combined tumbler-guide and bolt-actuator detached. Fig. 26 is an end view of said actuator, as seen from the left hand in Fig. 25. Fig. 27 is an end view of the key detached, as seen from the left hand in Fig. 19. Fig. 28 is an end view, similar to Fig. 26, of a slightly-modified form of bolt-actuator, said figure showing the key-groove in said actuator located in different relative planes. Fig. 29 is a cross-sectional view of a key adapted to fit the key-grooves of the actuator shown in Fig. 28. Fig. 30 is a cross-sectional view of the lock, similar to Fig. 18, showing the same provided with superimposed actuator-locking tumblers or wards. Fig. 31 is a longitudinal section of the parts shown in Fig. 30, and taken in dotted line *f f*, Fig. 30. Fig. 32 is a side view of a portion of the key adapted for the lock shown in Figs. 13 to 20, inclusive. Fig. 33 is a cross-sectional view, similar to Fig. 30, of a portion of the lock, showing the actuator as having only one longitudinal key-slot and showing a slightly-modified form of tumbler. Fig. 34 is a side view of a portion of the key adapted to fit the lock shown in Fig. 33. Fig. 35 is a side view, similar to Figs. 13, 14, and 15, of a portion of the bolt-actuator, showing a slightly-modified form of tumbler, this figure being intended to show means for engaging and locking the bolt-actuator in case a key is inserted in said actuator, which has all the requirements for actuating the bolt with the exception of thickness.

Similar characters designate like parts in all the figures of the drawings.

In the preferred embodiment of my invention (shown most clearly in Figs. 1, 9, and 13) the lock proper—excluding the latch or bolt and its casing, which constitutes no essential part of this invention—comprises a casing, (designated in a general way by B;) a combined tumbler-guide and bolt-actuator, (designated in a general way by C,) rotatively supported in said casing and held as against longitudinal movement; one or more actuator-locking tumblers circumferentially disposed about said actuator and held as against rotative movement, and a detent (designated in a general way by E) for engaging the bolt-actuator at predetermined points in its rotary movement and for normally locking the same in its locking or unlocking position.

The casing B, which may be of any suitable general construction for carrying the operative parts of the lock, comprises a cylindrical bearing 2, adapted for receiving and supporting the rotative bolt-actuator, and which will usually have a flange 3 at the inner end thereof to form a means for attaching the same to the casing which carries the bolt, as shown, for instance, in Figs. 3 and 4.

When the lock is used in connection with, and constitutes a part of, a door-knob, as illustrated in Figs. 1 and 2, the inner end of the casing B will usually be cylindrical in cross-section and externally screw-threaded to receive a nut by means of which said casing or cylinder may be secured to the escutcheon-plate and knob of the door.

Referring to Figs. 1 and 2 of the drawings, which show the lock incorporated in the knob attachment and illustrate one embodiment of this invention, the bolt-actuator casing B is shown cylindrical in cross-section from end to end and in different diameters. The larger outer end portion 2′ constituting the bearing for the bolt-actuator, and the smaller inner end portion 3′, which constitutes a support for the door-knob K, extends for a short distance through the escutcheon-plate 4′, secured to the door, and is provided with a nut 5′.

The knob K, which constitutes an actuator for the key of the lock, is axially recessed to receive the casing B of the lock, and is shown provided at the front end thereof with a guard-plate 6′, which has key-guides 7′, formed therethrough and which register with the key-slots of the bolt-actuator, as will be hereinafter more fully described.

In the form thereof shown in Fig. 1 of the drawings, the bolt-actuator has an elongated extension or spindle 8′ at the inner end thereof, which is adapted to be operatively connected with the draw-bolt or bolt-actuating cam (not shown) in any suitable manner.

In the construction and organization of locking device shown in Fig. 1, the door-knob will be fitted so as to freely rotate upon the cylindrical actuating-casing, and will be held against longitudinal movement on said casing by reason of the shoulder 9′ on the door-knob abutting against the enlargement of said casing, as will be understood by reference to said figure.

The bolt-actuator C, which also constitutes a guide for the tumblers of the lock, as hereinafter described, and which may be hereinafter termed "the combined bolt-actuator and tumbler-guide," or "tumbler-guiding bolt-actuator," is, in the preferred form thereof shown in Figs. 9 and 25 of the drawings, in the nature of a solid cross-sectional cylindrical member, is fitted for rotation in the bearing 2 of the case, and has, in the form thereof shown in said figure, two opposing sets of approximately semicircular guide-grooves or guideways, extending, respectively, around opposite, peripheral portions of the bolt-actuator, and each set comprising three

ways 12′, 13′, and 14′ of said actuator. These tumblers, in the preferred form thereof shown in Figs. 21 and 22, are segmentally circular and of a length slightly less than the peripheral length of the guideway in which they are seated, said tumblers being usually constructed of two superimposed approximately semicircular plates 27 and 28, joined together midway of their free outer ends, as shown at 29 in said Figs. 21 and 22. These tumblers will, in practice, usually be constructed of thin spring metal, and will have their adjacent outer ends 29′ and 29″ and 30 and 30′ normally sprung apart, so as to bear firmly against the side walls of the guideways in the bolt-actuator C, and so as to spring outwardly in opposite directions, as shown in Fig. 17, and engage the side wall of the key-groove in said actuator, when the bolt-actuator is turned without the proper key from the positions shown in Fig. 13 to that shown in Fig. 17, thereby locking the actuator against further movement.

The tumblers, in the form shown in Figs. 13 to 22, inclusive, will be of a width, in the direction of their radii, equal, or substantially so, to the depth of the guideway, and will be set up edgewise in said guideway, so that their outer free ends will normally have a tendency to move in opposite directions sidewise of said guideways and longitudinally of the axis of the bolt-actuator C.

The two sets of locking devices or tumblers, in the organization thereof shown in Figs. 13 to 20, inclusive, lie in the guideway and extend, respectively, around opposite halves of the periphery of the bolt-actuator, a sufficient space being left at opposing ends of the opposing sets of tumblers to permit the free insertion between said sets of the proper key.

Some suitable means is provided for preventing the rotation of the tumblers within the actuator-case. For this purpose, the tumblers of one set of tumblers are shown having projections 31, engaging in a channel or way 32, formed longitudinally in the inner face of the case at one side of the bolt-actuator, and the tumblers of the other set of tumblers are shown having projections 33, which engage in a similar channel or way formed longitudinally in the opposite inner face of the actuator-case.

When the proper key is inserted in proper position in the keyways of the bolt-actuator, the walls of its notches coincide with and practically constitute a continuation of the side walls of the adjacent guideway, and thus form a continuous surface or bridge over which the locking ends or points of the tumblers may pass without engaging the side walls of the notches or bolt-actuator to prevent the rotation thereof. If, however, the walls of said key-notches be not accurately placed relatively to the walls of the guideways—or if the notches in said key are of greater or less width or depth than the guideways—the tumblers will, on the turning of the bolt-actuator, spring outwardly and engage either the corners of the walls of the key-notches or engage the side wall of the keyway in the bolt-actuator, thus effectually preventing the operation of the lock.

In the duplex organization of locking mechanism for the bolt-actuator shown in Figs. 13 to 20, inclusive, as well as in Figs. 1 and 9, the number of locking-points and abutments are doubled, as compared with the organization shown in Fig. 33, and additional security against the opening of the lock by picking may be furnished by increasing the number of tumblers in the lock. If, in using or operating the lock as here described, the proper key is not inserted in the lock the correct distance to bring its notches into alinement with the respective guideways of the bolt-actuator, the tumblers will engage the key and thereby lock the bolt-actuator against rotation.

By reference to Figs. 14 and 15 of the drawings it will be seen that when the proper key is inserted into the lock in the proper way and the bolt-actuator is turned thereby the tumblers will extend through the key-notches and will lock the key against withdrawal until said bolt-actuator reaches its open or closed position, thus insuring the complete locking or unlocking movement of the bolt-actuator at each operation of the key and preventing the removal of the key when the actuator is in a position intermediate to its open or closed position, which is a matter of some importance in locks of this class.

In Figs. 30 and 31 of the drawings each guideway of the bolt-actuator is shown provided with a duplex locking device comprising two practically independent tumblers or locking members, one of which is substantially the same as that shown in Figs. 13 to 22, inclusive, and is set up edgewise in said guideway, as before described, and the other of which (designated by 35) is shown in the nature of a segmental band of a width substantially equal to the width of the guideway and supported between the inner wall of the guideway and the other tumbler. In this duplex form of locking device or tumbler the locking member 35 will have a projection 35′ to engage in a notch 36, formed on the inner edge of the adjacent locking member, so as to prevent rotative movement of said member 35 relatively to the adjacent member. This construction and organization of duplex locking device furnishes the tumbler with a bearing-face of greater area, and to a considerable extent relieves the resilient locking end of the outer member from injurious stress.

In Fig. 35 the tumbler is shown having the locking ends bent outwardly to form hooks adapted to engage between the key-face and the side walls or tumbler-abutments 50 of the keyway in the actuator C, so as to lock the actuator in case a key is inserted in the

relatively remote parallel guideways, those of one set being designated by 12, 13, and 14, respectively, and those of the other set being designated by 12′, 13′, and 14′, respectively.

The two sets of guideways for the tumblers are shown in Figs. 13 and 18 separated from each other at opposite adjacent ends by keyways or key-grooves 10 and 10′, respectively, formed in opposite faces of the bolt-actuator. These keyways extend lengthwise from the outer to the extreme inner end of the actuator in planes at right angles to the planes of the tumbler-guideways and parallel to the axis of rotation of said actuator, and extend widthwise from relatively remote points at opposite sides of the axis of the actuator to, and terminate at opposite outside faces of, said actuator, said keyways being separated from each other at their inner adjacent edges by a longitudinal wall formed integral with the actuator, and which wall constitutes a key-centering support or key-positioning guide C′ Each of these keyways is of a width in excess of the depths of the guideways and is wholly located between the periphery and axis of the actuator. Said keyways 10 and and 10′ are adapted for receiving the blades 25 and 25′ of the key K′, by means of which the lock is actuated. The longitudinal wall C′ constitutes a guiding-face for the blade of the key and insures the accurate operative positioning of said key with reference to the tumblers, irrespective of any inaccuracies in fit between the bolt-actuator and its casing.

The key K′ for actuating the lock shown in Figs. 1 to 20, inclusive, has two blades 25 and 25′, in the outer side edges of which are formed notches 15, 16, and 17, and 15′, 16′, and 17′, respectively, which correspond in number, position, width, and depth, and are adapted, when the key is inserted in the lock, to register with the peripheral guideways in the bolt-actuator. The walls of the notches in the key-blades come into direct alinement and are flush with the corresponding walls of the adjacent guideway of the bolt-actuator, when the key is inserted in the lock in the manner shown in Figs. 14, 15, 19, and 20, to thereby bridge the space between the two sets of guideways and transform the two normally-separated sets of guideways practically into one set comprising a series of continuous annular guideways.

It will be understood that the construction of the bolt-actuator, in so far as it relates to the number of sets of guideways or the number and relative disposition of the guideways in each set, may be variously modified without departure from my present invention, this being simply an arbitrary matter to be determined by the requirements in each particular case. For instance, the guideway will, in practice, usually be arranged differently in different locks, for the purpose of producing the successive values or combinations required for different locks.

In Fig. 33 of the drawings, the bolt-actuator is shown having but one tumbler-guideway in the periphery thereof, which extends almost entirely around the periphery of said actuator, the opposing ends of the guide-wall being separated by one keyway. This is a primitive form of lock embodying my invention, and is adapted for use in ordinary cases where there is little danger of the lock being tampered with. With this form of lock, a key, similar to that partially shown in Fig. 34, will be used for turning the bolt-actuator, said key having but one blade.

As a means for locking the bolt-actuator C against rotation, I have provided, in connection with said bolt-actuator, improved locking mechanism embodying means for normally locking the actuator when the bolt of the lock is in its locked or unlocked position, or when the bolt-actuator is in what will be hereinafter termed its "open and closed" position, and also embodying means for locking the bolt intermediate of its opening and closed positions, when turned by anything except the proper key.

The first-mentioned means for normally locking the bolt in its open and closed positions is herein shown in the nature of a locking-detent, (designated in a general way by E,) which is shown as a spring-catch secured in the manner illustrated in Fig. 16 to the outer face of the tubular bearing 2, and having at its inner end a cam-face actuator-engaging head or projection 18, which extends through an opening 18′ in the bearing, and engages between the side walls of the longitudinal keyways 10 and 10′, alternately, as will be understood by a comparison of Figs. 9, 10, 19, and 20 of the drawings. This detent is thrown out of engagement with the actuator by means of the key, when the same is inserted into the keyways of the actuator and pushed home; and as a means for preventing the unlocking of the detent relatively to the actuator, when the form of lock and key shown in Figs. 19 and 20 is employed—unless the key is inserted right side up—one of the blades, as 25′, of the key is cut away or beveled off, as shown at 26, at the inner end thereof, so as to non-engage the cam-face of the locking-detent, when this blade of the key is inserted into the keyway into which the projection 18 of the detent extends, whereas the blade 25 has its inner end constructed to engage said projection and force the same upward, as will be understood by comparison of Figs. 20 and 19 of the drawings.

The means for locking the bolt-actuator, intermediate of its open and closed position, comprise, in the preferred form thereof herein shown in Figs. 13 to 18, inclusive, two sets of tumblers, the tumblers of one set being designated by 19, 20, and 21, and being located, respectively, in the guideways 12, 13, and 14 of the bolt-actuator, and the tumblers of the other set being designated by 19′, 20′, and 21′, and being located, respectively, in the guide-

lock which has all the characteristics for opening the lock with the exception of being too thin.

The lock may be rendered additionally secure by locating the keyways in the bolt-actuator in relatively different planes transversely of said actuator, as shown in Fig. 28, in which case a key having offset blades, as illustrated in Fig. 29, will be used.

Referring back to Figs. 1 and 2 of the drawings, the guard-plate 6′ for the lock is shown axially recessed and having a series of radially-disposed guide-slots 7′ opening into the central recess of said plate. This plate, it will be obvious, may be variously modified without departure from this invention—as, for instance, it might be made to cover and protect the end of the lock and simply have two guide-slots formed therethrough to register with the keyways of the bolt-actuator, as shown in Figs. 11 and 12. In either case it is desirable to slightly flare the outer ends of the keyways in the bolt-actuator, so that when the guide-slots of the guard-plate through which the key is inserted come in approximate registration with the keyways of the actuator the pressure naturally exerted upon the key in holding the same in the guide-slots of the guard-plate will cause the same to enter the keyway of said actuator, as will be readily understood by comparison of Figs. 1, 2, 11, and 12 of the drawings.

In the organization of locking device shown in Figs. 1 and 2, after the key is inserted in the lock, through the slots of the guard-plate, the key may be turned to actuate the lock by rotating the door-knob K.

With the construction and organization of lock herein described and shown in the drawings the key may be turned, when properly inserted in the lock, in either direction to effect a locking or unlocking movement of the bolt-actuator.

In the organization of lock mechanism shown in Figs. 3 and 4, and in detail in Figs. 5 to 8, inclusive, the bolt-actuator has secured to the inner end thereof a disk 40, carrying a bolt-actuator pin 41, the axis of which is located at one side of, and in plane parallel to, the axis of the actuator. This pin extends into a transverse elongated slot 42 in a bolt 43, fitted for sliding movement in the casing or bolt-carrier frame 44, which is secured to the lock-case B by means of screws 45, in a manner shown in Figs. 3 and 4, the pin 41 on the actuator C and the sliding bolt being so disposed that when the actuator is rotated from the position shown in Fig. 19 to the position shown in Fig. 20, the sliding bolt will be thrown outward or inward, as the case may be.

The lock proper (shown most clearly in Fig. 9) may be applied to any suitable bolt mechanism, the bolt mechanism, *per se*, constituting no essential part of my present invention.

Having now described my invention, I claim—

1. In a lock of the class specified, the combination with a suitable casing, of a bolt-actuator supported for rotation in said casing and having a key centering and guiding support extending its entire length; and one or more actuator-locking tumblers partially surrounding the tumbler-actuator and held as against rotative movement.

2. In a lock of the class specified, the combination with a suitable casing; of a rotative bolt-actuator having one or more radial keyways extending its entire length, each of which is wholly located between the periphery and the axis of the actuator; and a non-rotative tumbler supported in said casing in concentric relation with the actuator.

3. In a lock of the class specified, the combination with a suitable casing; of a bolt-actuator supported for rotation in said casing and having a peripheral guideway in concentric relation with the axis thereof, and also having a longitudinal keyway extending its entire length, which intersects the guideway and which extends widthwise from the periphery of the actuator to, and terminates at, a point between said periphery and the axis of said actuator; and a tumbler located in said guideway and held as against rotative movement.

4. The herein-described bolt-actuator for locks of the class specified, it consisting of a rotative member having a series of relatively remote parallel guideways formed in the periphery concentric to the axis thereof, and also having substantially midway of its diameter a key centering and guiding support extending the entire length of said actuator.

5. The herein-described bolt-actuator for locks of the class specified, it consisting of a substantially cylindrical member having a series of circumferential tumbler-guides and two radial keyways open at their outer edges to and intersecting the guideways, said keyways extending the entire length of said cylindrical member, and also having a key centering and guiding support located between and separating the inner adjacent ends of the keyways.

6. In a lock of the class specified, the combination with a casing and with a bolt-actuator rotatively mounted in said casing; of a key-actuated locking-detent supported on the casing for movement toward and away from the axis of the actuator and adapted for locking said actuator relatively to the casing.

7. In a lock of the class specified, a casing; a cylindrical bolt-actuator rotatively supported in said casing and having a radially-disposed keyway open at its outer edge to the periphery and terminating at its inner edge near the axis of the actuator to form a supporting and key-centering guide, and also having a parti-circular peripheral guide-groove which communicates with the keyway and is concentric to the axis of the actuator; and an actuator-locking tumbler supported for trans-

verse movement with respect to, and held as against longitudinal movement in, the guide-groove, and adapted for engaging the side walls of the keyway to lock the bolt against rotation.

8. In a lock, the combination of a suitable casing; a longitudinally and circumferentially grooved bolt-actuator rotatively supported in said casing and having a substantially central key centering and guiding support extending its entire length, adapted for holding a key against transverse movement relatively to said actuator; and a tumbler supported in the circumferential groove of the actuator.

9. In a lock, a suitable casing; a longitudinally and circumferentially grooved bolt-actuator rotatively supported in said casing and having a substantially central key centering and guiding support extending its entire length, adapted for holding a key against transverse movement relatively to said actuator; and a tumbler supported in the circumferential groove of the actuator; combined with an actuator-rotating member removably supported in and closing the longitudinal groove of the actuator and having a groove for registering with the circumferential groove of the actuator to form a bridge over which the tumbler may ride during the rotation of the actuator, and also a face coacting with the guiding-support of said actuator, whereby said actuator-rotating member is held with its circumferential groove in a precise position with respect to the circumferential groove in the actuator.

10. In a lock of the class specified, the combination with the casing and with the bolt-actuator having a circumferential tumbler-receiving groove; of a tumbler supported in said groove for movement longitudinally of the actuator; and an independent tumbler supported between the actuator and the first-mentioned tumbler for movement transversely of said actuator.

11. The combination with a rotatably-supported bolt-actuator having a keyway, of a locking device normally engaging in said keyway in position to be actuated by an inserted key.

12. In a lock of the class specified, the combination of a suitable casing; a bolt-actuator supported for rotation in said casing and having circumferential locker-guides, and also having a longitudinal keyway intersecting said locker-guides; a detent in normal engagement with and locking said bolt-actuator against rotation; actuator-locking tumblers circumferentially disposed about, and supported as against longitudinal movement in the guideways of, the bolt-actuator; and means for releasing the detent and for rotating the actuator.

13. In a lock of the class specified, the combination with the casing and with the rotative bolt-actuator having a circumferential guideway; of two independent parti-circular tumblers supported one by the other and located in the circumferential guideway between the bolt-actuator and casing.

14. In a lock of the class specified, the combination with a suitable casing; of a longitudinally and circumferentially grooved bolt-actuator supported for rotation in said casing, and having a longitudinal extension adapted for connecting with the bolt to be actuated; a series of resilient actuator-lockers supported in the circumferential groove of the actuator and held as against rotative movement, and having laterally-movable locking ends in position for engaging the walls of the longitudinal groove of the actuator; and a locking-detent fixed to the casing, and having means for engaging the bolt-actuator to lock the same at predetermined points in the rotative movement thereof.

15. In a lock, the combination with a suitable casing and with a bolt-actuator supported for rotation in said casing and having a suitable keyway therein; of a key-actuator rotatively supported on said casing and having key-engaging devices located in advance of the outer end of the bolt-actuator in position to engage a key.

16. In a lock, the combination with a bolt-actuator having a longitudinal extension for connection with the bolt to be actuated, and with the bolt-actuator casing; of a knob-like key-actuator rotatively supported on said casing and held as against longitudinal movement relatively to said casing; and means carried by said key-actuator for engaging the key when the same is inserted in the lock.

17. In a lock, in combination with a rotative bolt-actuator having an extension for connection with the bolt to be actuated, and having keyways in the outer end thereof; a non-rotative casing surrounding said bolt-actuator, and holding the same against longitudinal movement; a key-actuator rotatively supported on, and held as against longitudinal movement relatively to, the bolt-actuator casing; and a guard-plate secured to said key-actuator, and having key-slots adapted to register with the keyways of the bolt-actuator.

18. The combination with a rotative bolt-actuator, of a knob; a key; and means carried by the knob for engaging said key.

19. The combination with a knob, of a bolt-actuator casing on which said knob is normally free to rotate; a bolt-actuator within said casing; and means carried by the knob for engaging an inserted key.

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Witnesses:
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