

W. H. THOMAS.

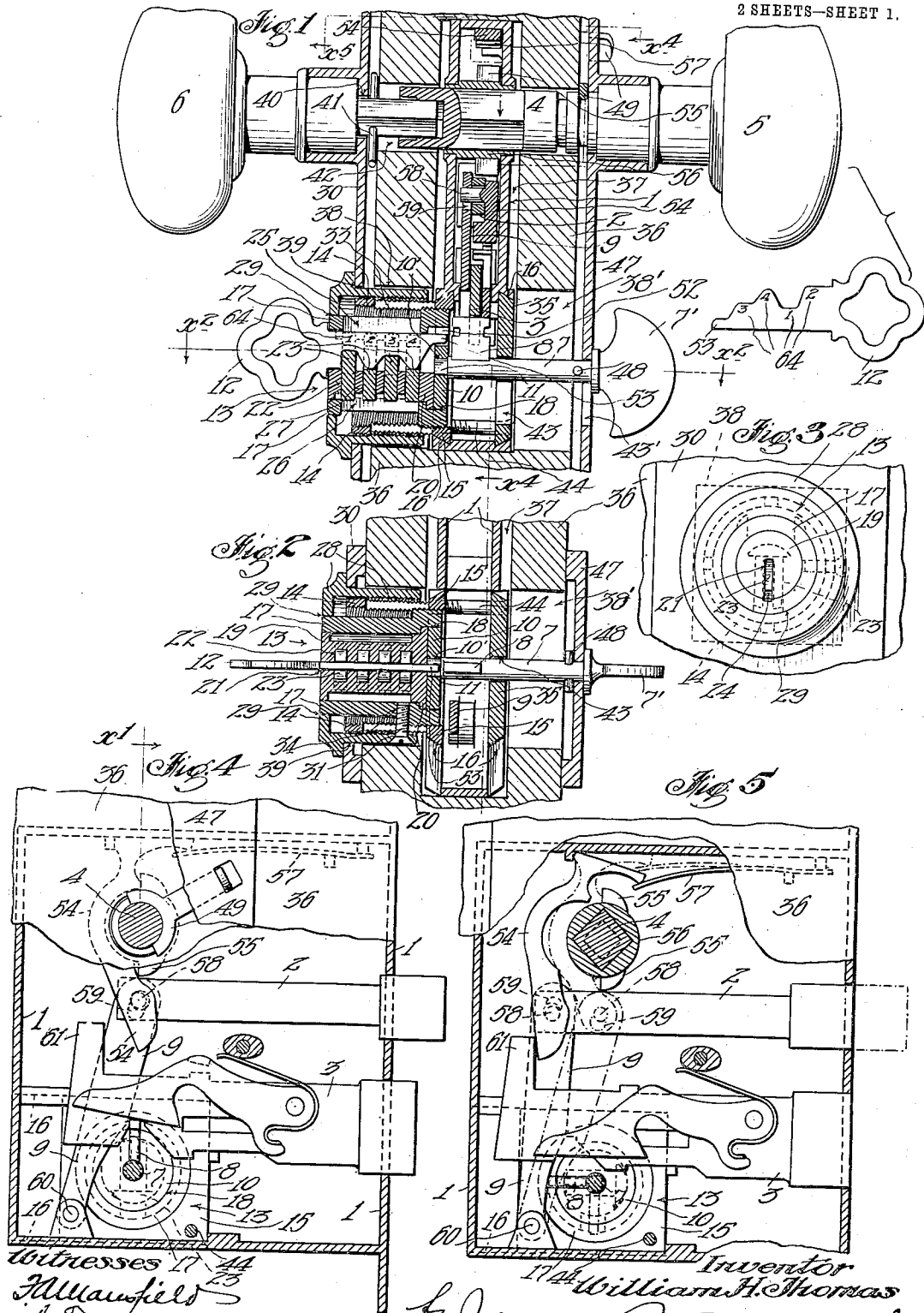
DOOR LOCK.

APPLICATION FILED SEPT. 10, 1906.

946,523.

Patented Jan. 11, 1910.

2 SHEETS—SHEET 1.



Witnesses
H. Maunfield
J. Townsend.

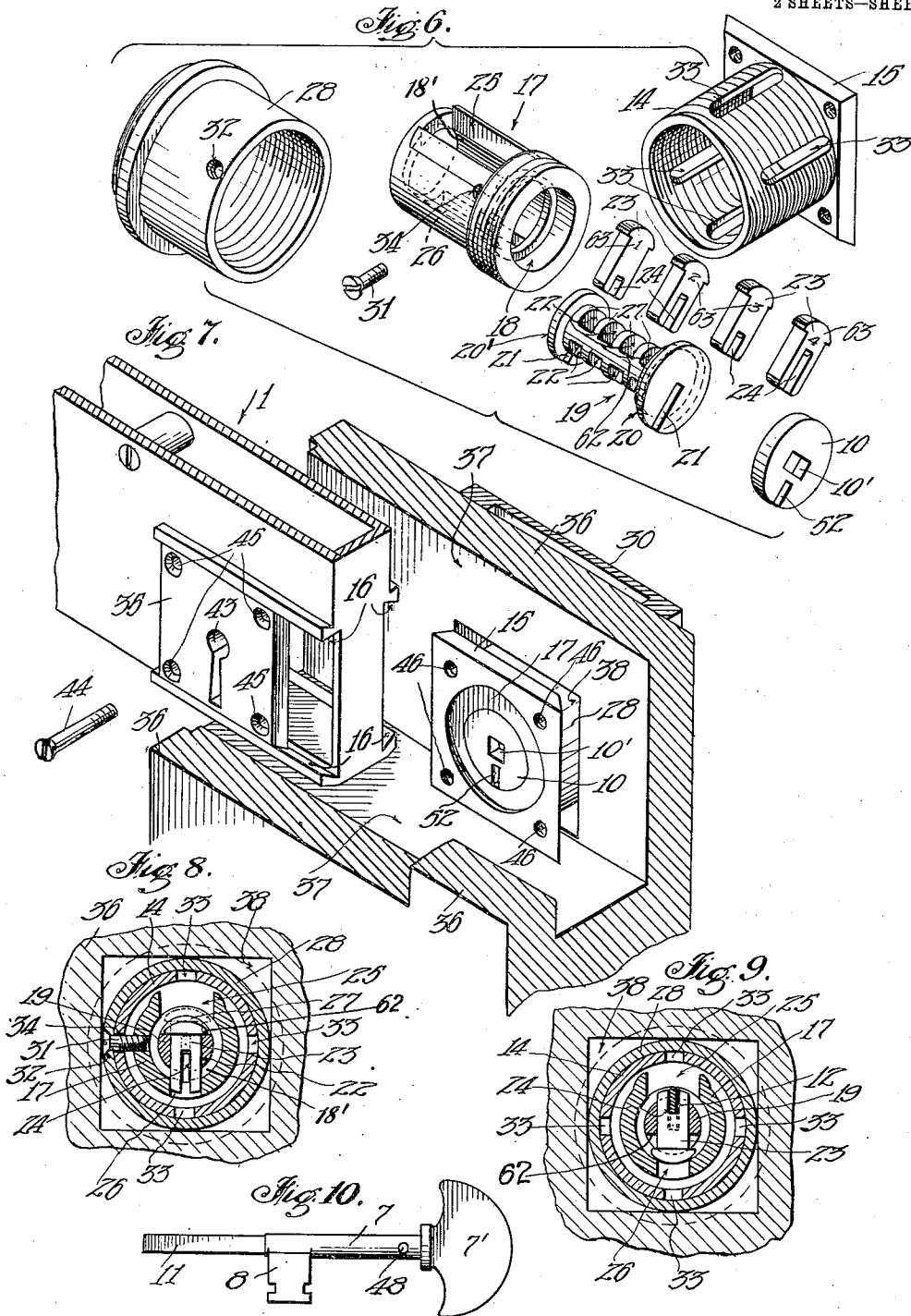
Inventor
William H. Thomas
by James R. Townsend
his Atty.

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2 SHEETS—SHEET 2.



Witnesses
M. A. Langfield
J. Townsend.

Inventor
William H. Thomas
By James R. Townsend
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UNITED STATES PATENT OFFICE.

WILLIAM H. THOMAS, OF WHITTIER, CALIFORNIA.

DOOR-LOCK.

946,523.

Specification of Letters Patent.

Patented Jan. 11, 1910.

Application filed September 10, 1906. Serial No. 334,044.

To all whom it may concern:

Be it known that I, WILLIAM H. THOMAS, a citizen of the United States, residing at Whittier, in the county of Los Angeles and State of California, have invented a new and useful Door-Lock, of which the following is a specification.

This invention relates to a lock having a dead-bolt and a latch-bolt with a guard locked by tumblers that are preferably actuated by gravity, and among other features, comprises improvements upon the door locks shown in my applications for door locks filed in the United States Patent Office as follows: Serial No. 287,490, filed November 15, 1905; Serial No. 296,266, filed January 16, 1906.

It is of the objects of this invention:

(1)—To provide a simple form of combined cylinder and mortise lock having the advantages of the locks shown in said former applications, and having an improved double-locking and secure arrangement of simpler form, being also reversible.

(2)—To provide a superior cheap and durable cylinder lock for a door-lock.

(3)—To provide an extensible cylinder lock for a door-lock.

(4)—To provide a wide range of play for the tumblers that guard the dead-bolt operating means.

(5)—To provide an improved tumbler-locked barrel or cylinder.

(6)—To maintain the gravity-actuated tumblers in operative position.

This invention includes a novel feature in lock construction; viz.,—a new form of tumbler which, for lack of a better name, I shall term a pin tumbler. Said tumbler is in the nature of a pin tumbler, and is carried in a slot in a rotating barrel, and is preferably slotted to receive the outside key which is in the form of a pin-tumbler key, but owing to the peculiar construction of these novel tumblers, the key may be provided with a very great range of variation in the notches or teeth for the purpose of adjusting the tumblers to their unlocking position.

Other objects are:

(7)—To provide a pin-tumbler lock that can be easily, readily and conveniently taken apart and reassembled.

(8)—To provide a pin-tumbler lock in which the combination can be readily changed and reassembled by one unskilled in locks.

(9)—To provide a novel pin-tumbler lock which admits of the use of large size pin-tumblers without requiring a relatively large construction of the other parts of the lock, so that the lock may be made entirely of bronze and can be plated throughout while assembled, thus avoiding all liability of corrosion or rust.

(10)—To provide a reversible pin-tumbler mortise-lock that may be readily fastened securely in, and readily removed from the door while the door is open, and that cannot be removed in whole or in part while the door is closed.

Some of the novel features of this invention by which the improvements herein enumerated are effected may be mentioned as follows, viz.,—providing slotted tumblers that lock on opposite sides of the barrel; providing a new form of key-cylinder or barrel; providing a slotted double-threaded sleeve constructed so that the lock is adapted to any thickness of door without undue thickness of lock; mounting a key-rotatable disk and a pin-tumbler containing a key-barrel, coaxially of each other, both in one case, and providing each with an eccentric key-hole, so that if, by any means, the disk is turned relative to the barrel no one can fully insert a key into the barrel or any instrument into the key-hole of the disk, thus absolutely guarding the works of the lock from being reached or tampered with.

The accompanying drawings illustrate the invention.

Figure 1 is a fragmental vertical mid-section of my newly-invented lock on line x^1 , Fig. 4, showing the lock installed in a door and the latch-key and main key in position and turned to partially withdraw the dead-bolt. The tumblers are in unlocking position. Fig. 2 is a fragmental plan section on line x^2 , Fig. 1, showing the keys intact. Fig. 3 is a view of the cylindrical portion of the lock from the left of Fig. 1 after the key has been withdrawn. The tumblers in locked position are shown in dotted lines. Fig. 4 is a fragmental section on line x^4 , Figs. 1 and 2, looking left, and

showing the dead-bolt half unlocked. Fig. 5 is a fragmental section corresponding to Fig. 4, except that the knob-shank of the door is cut on line x^5 , Fig. 1, and the keys are turned to fully withdraw both bolts. Fig. 6 is a view showing the parts of the cylindrical portion of the lock disassembled. Fig. 7 is a fragmental perspective view showing the lock in the process of inserting the same into a mortise in a door. Fig. 8 is a fragmental sectional view near the screw 31 in Fig. 2, showing the parts in position before the key is turned. Fig. 9 is a fragmental section corresponding to Fig. 8 with the key turned as shown in Figs. 1 and 2. Fig. 10 is a view of the main key as it is provided for the trade.

1 is a lock-frame or case, 2 a latch bolt, and 3 a dead-bolt. The latter is adapted to lock the former and also both knobs by contacting with the hub-lever when the dead-bolt is in locking position.

4 is a shank for operating the latch-bolt; the same being provided with a constant knob 5 for invariably operating the latch-bolt when the dead-bolt is not in locking position, and with a releasable knob 6 which may, in the manner hereinafter set forth, be disengaged from the shank or the shank operating means to rotate without operating the latch-bolt.

7 is a dead bolt operating key having a web 8 inside the case to move the bolts 2 and 3 out of locking position, and to positively move the dead-bolt into locking position.

9 is a pivoted arm or lever operable by the web 8 of the key and slidably connected to operate the latch-bolt 2 when the dead-bolt is in unlocked position. Rotatable internal means in the form of a disk 10 having an angular hole 10' to receive the angular stem 11 of the key 7 is provided for rotating said key from the side of the lock opposite the thumb-piece or handle 7'.

12 is a pin-tumbler outside key adapted to rotate the cylinder lock and to engage and rotate the internal key-rotating means 10 from the side of the case opposite the key 7.

13 is a rotatable extensible guard in the nature of a cylinder lock. The same forms part of the lock to guard the internal key-rotating means 10 from operation by the pin tumbler key, which comprises a slotted externally and internally threaded sleeve 14 having an equilateral dove-tail base 15 adapted to reversibly seat in a dove-tail way 16 in the lock-case.

17 is a slotted, threaded barrel-case or sleeve screwed into the sleeve 14 and having a bore 18' and provided with an enlarged counter-bore 18 in its inner end.

19 is a recessed and slotted tumbler-barrel in the slotted barrel-case 17. The same is provided with a flange-head 20 in the coun-

ter-bore 18 and with a flange-head 20' in the bore 18', and provided with a longitudinal key-hole slot 21 that extends through the barrel from end to end; said tumbler barrel is also provided with transverse tumbler recesses 22 that extend entirely through the barrel across the same.

23 designates forked pin tumblers, each of a length approximately equal to the diameter of the bore 18' that contains the barrel. Each of said forked tumblers has a key-slot 24 open at one end of the tumbler and extending from such end toward the other end of the tumbler and adapted to admit a pin-tumbler-key 12. The heads and forked ends of said tumblers are adapted to project from opposite sides of the reduced portion of the barrel 19 which is between the flanges 20 and 20' of said barrel, to enter the oppositely arranged slots 25, 26, in the slotted barrel-case or sleeve 17 when the barrel 19 is in locking position, and to be wholly removed from said slots when the appropriate pin-tumbler key 12 is properly inserted to act on the bridges of the pin-tumblers to bring said tumblers into exact alinement with the periphery of the barrel.

28 is a cylindrical external guard-case which is internally screw-threaded to screw on to the double-threaded sleeve 14. The same is provided with a circular opening 29 in which the barrel 19 and case 17 terminate at the outside of the lock. 27 designates partitions between the slots 22. The guard-case 28 is flanged at its outer end and fits over the escutcheon 30 of the lock, and said guard-case is fastened against rotation by means of a screw 31 screwed through a hole 32 in the guard-case and through one of the slots 33 of the externally and internally threaded sleeve 14, and thence into a screw-threaded hole 34 in the barrel-case 17, thus rigidly securing the guard-case 28, the slotted and threaded sleeve 14, and the barrel-case 17 together, so that when the dove-tailed base 15 is in its dove-tailed way 16 in the lock-case the parts above named are fixed against rotation, and also against withdrawal from the case 1.

For the purpose of adapting the lock to be mounted on either a right or left swinging door, the lock-case is provided on each side with a dove-tail way 16, and a key-hole plate 35 is provided to slide in either way 16 on the side of the lock-case opposite the pin-tumbler case.

In order to install a lock, the door will be provided with a mortise 37 in which the lock-case may be inserted, and a hole 38 will be provided through one side of the door on either the right or left side of said mortise 37,—according to whether the door is hung to open to right or left,—to admit the dove-tail base-plate 15 and to accommodate the guard-case 28 on such side, and an extension

38' of the hole is provided to admit the key 7 on the other side. Said extension 38' will be of sufficient size to admit the key 7.

The escutcheon-plate 30 is provided with a circular hole 39 into which the body of the guard-case 28 fits snugly, and the guard-case will be inserted through said hole while the escutcheon-plate is detached and before the contents of the guard-case are assembled therein. Then the assembling of said contents is accomplished, and after the internally-threaded sleeve 14 with its dove-tail base 15 has been brought into place and secured by the screw 31, the shank of knob 6 will be inserted through the hole 40 therefor in the escutcheon-plate and will be secured by suitable means as pin 41. Then the disk 10 will be placed in the counter-bore 18, and then the case 28 and the stem of the knob 6 will be inserted through the hole 38 and 42 provided in the door therefor, and brought into position with the dove-tail edges of the base 15 in vertical position, as shown in Fig. 7. Then the case of the lock will be slid into the mortise 37 as indicated in Fig. 7, until the dove-tail way 16 on one side of the lock fully seats the dove-tail base 15, thus bringing the key-hole 43 of the key-hole plate 35,—which has previously been inserted into the dove-tail way on the opposite side of the lock,—into line with the socket 10' and the key-slot 21 of the barrel. Said key-hole-plate 35 will then be fastened in place by a screw 44 inserted through the square hole 38' and passed through one of the four holes 45 in the plate 35 and screwed into one of the holes 46 in the base 15. By this construction and arrangement, the cylindrical portion or guard of the lock, if desired, can be brought to the proper position to cause the tumblers to operate by gravity with their heads or bridges uppermost.

The key 7 may be permanently secured to the escutcheon-plate 47 by a pin 48, and then said escutcheon-plate may be brought into position and secured in the usual way by screws not shown, whereupon the shank 4 of the knob 5 may be inserted through the escutcheon-plate 47 and secured by the usual lock 49, and thereupon the lock is ready for use. By releasing the lock 49 the shank 4 may be again withdrawn from the shank of knob 6 to disengage the same and allow knob 6 to rotate freely.

It is to be understood that the lock-case will be secured in the mortise by the usual screws 50 passed through the face-plate 51. The lock is adjusted as to the thickness of the door by means of the several screw-threaded parts of the pin-tumbler guard or cylindrical portion 13. This will be understood by reference to Figs. 8 and 9 as compared with each other.

The stem 11 of the main key 7 may be of suitable length, to enter the socket 10' of the

disk under the different adjustments of the lock, and at the time for installing the lock the surplus portion of the stem may be cut off, thus adapting said key for the thickness of the door in which the lock is installed. This will be understood by reference to Figs. 10, 1 and 2.

When the shank 4 is rotated it operates the latch-bolt 2. When the key 7 is rotated it acts upon the pivoted lever 9 and also upon the usual lock mechanism.

It is apparent that the tumblers may be moved by springs in the usual way, but I prefer to depend upon gravity for returning the pin tumblers to normal locking position, and it is for that reason that the internally-threaded thimble 14 is provided with the equilateral base 15 and the case is provided with the way 16 to fit said base, for thereby the base may be withdrawn and turned in different positions as may be required to bring the width of the longitudinal key-hole slot 21 into a vertical position, so that the pin-tumblers 23 will normally fall by gravity to bring the bridges 27 of the tumblers across the key-slot or pin-tumbler key-way, and also to project into the transverse tumbler slots 22. Said slots 22 form recesses in which the pin-tumblers engage.

52 is the disk key-hole into which the point 53 of the outside key inserts to allow the key to enter fully home to properly lift the tumblers and to turn the disk to operate the lock from the outside. The key 12 when inserted into the lock in the act of locking or unlocking will enter the hole 52, and when fully inserted and turned will rotate the disk, and through it the inner key 7 and web 8 and the lock mechanism, as herein-after set forth. It is to be noted that whenever the inner key is turned to bring the key-hole 52 out of line with the key-slot 23 it becomes impossible to insert the outer key, for the reason that the projecting point 53 prevents the key from going home so as to lift the tumblers out of locking position.

The tumblers 23 are somewhat in the nature of pin tumblers, but are distinctive, in that they are adapted to project alternately from either of two opposite sides of the barrel, and each is complete in itself and operable without the use of plungers in the case. They are preferably constructed, as shown of a flat form, as plates or slabs, plain at their sides, each having a head that forms projections at the edges of one end, and they are slotted in their lower ends opposite the head ends to receive the key which is to operate them. The advantages of this construction are numerous and among them may be noted their adaptability to operate by force of gravity, since each can be made of considerable weight, thereby doing away with all springs. This feature is made available in connection with the adjustabil-

65 suitable length, to enter the socket 10' of the

ity of the lock to the thickness of the door, by so constructing the lock, as hereinbefore explained, that the heads of the tumblers may always be brought uppermost when the lock is finally installed.

By slotting the tumblers, making them equal in length to the diameter of the bore that contains the barrel, and dispensing with springs, the greater portion of the entire length of each tumbler is made available for variation in length of slot, to allow great variation in the key. The tumblers can be made much longer than the ordinary pin-tumblers, and therefore allow a greater number of changes in the key. The outermost tumbler may be provided with a very short slot and may serve as a curtain or closure for the greater extent of the key-hole, so that when the key is out of the lock the outermost tumbler will exclude the inner tumblers from view until said outermost tumbler is raised; and by making the slots of the inner tumblers longer than those of the outer tumblers the head of the outermost tumbler will invariably enter the upper slot and rock the barrel from rotation by any instruments which would lift the inner tumblers out of their locking position.

By reference to Figs. 8 and 9 it will be seen that when the tumblers are free and their heads up, they are held by gravity in the slot 26, thus preventing the barrel from being turned. As the slot of the inner tumbler is so much longer than the outer tumbler, when any instrument is inserted through the slot of the outer tumbler and made effective to raise an inner tumbler, it will lift the outer tumbler sufficiently to bring its head into the slot 25 and thereby lock the lock.

The tumbler slots 24 are preferably somewhat wider than the key-slot 21 in the barrel, thus to prevent the tumblers from being operated upon by pressing against them sideways with any instrument that may be inserted through the key-hole slot. The length of the tumblers corresponds to the diameter of the bore of the slotted sleeve 17, so that unless the tumbler is brought exactly to the right position it will either lock with said sleeve at the head or the foot of the tumbler. The heads of the tumblers are longer than the width of the foot-slot 26, so that the heads will not catch in the foot-slot while the barrel is being turned. Not only does the outermost tumbler serve as a curtain for all of the other tumblers, but a third tumbler may be provided with a short slot which will serve as a curtain for the last tumbler. In the drawings such construction is clearly shown in Fig. 6.

In order that adjustment to the different thicknesses of doors may be made to a very fine degree,—say the one-hundredth part of an inch,—the screw threads of the portions

14 and 28 may be twenty-five to the inch and the double-threaded sleeve 14 may be provided with a suitable number of slots, four being shown, so that the screw 31 may be passed through one of said slots and into the screw-hole therefor at each quarter turn of the parts relative to each other, so that the sleeve may be extended or contracted and securely fastened a quarter of a turn at a time, thus giving an adjustment to one-hundredth of an inch. The barrel is notched at the top being cut away at the sides of the slots, as at 62, between its heads 20 and 20' to let the heads of the tumblers fall down, so that when the barrel is in position with the notches 62 uppermost, and the tumblers are brought to rest, the slotted ends of said tumblers invariably engage in slot 26 and lock the barrel. The combination of the lock may be changed by simply changing the relative positions of the tumblers. For convenience each tumbler may be provided with a designating mark as shown at 63 and each key may have a series of corresponding designating marks, as shown at 64.

54 is the hub lever of the knobs, operable in the usual way by the arms 55 on the hub 56 of the knob and held in latching position by the spring 57.

58 is a pin on the hub lever, for connecting the same with the latch lever 2 and the pivoted lever 9 which has a slot 59 to accommodate the pin and is pivoted at 60 below the level of the key web 8 and extends into the path of said web so as to retract the latch 2 against the pressure of spring 57. By this arrangement the latch bolt 2 may be a plain straight bolt perforated to receive the pin 58 and may be reversed to form a right or left lock by simply turning over.

61 is an arm on the rear end of the dead bolt 3 to lock the latch bolt through the medium of the hub lever 54 as indicated in Fig. 7. When the dead-bolt is locked the knobs are both locked except in case the outer one has been detached from the shank of the inner one. The latch bolt is likewise positively locked at the same time. But when the key is turned either by the inside handle or thumb-piece 7', or the outside or right key 12, the web 8 contacting with the lever 9 unlocks the latch bolt 2 although the knobs are normally locked. The right key unlocks both bolts.

By providing the forked tumblers 23 having the slots 24 thereof arranged axially of the tumblers as shown in the drawings, a greater range of play for said tumblers is given for the reason that a greater portion of the tumbler is made available for locating the key-engaging face thereof; that is to say, by this construction the width of the key may be extended to nearly the full diameter of the bore of the barrel, and all of

the space between the middle of the head 63 and the other end of the tumbler may be utilized for variations in the tumblers and consequently for variations in the key.

5 By employing tumblers as shown, operable exclusively by the force of gravity instead of by the tension of springs, a greater range of variation and movement of the tumbler is made available.

10 I claim:—

1. In a lock, the combination of a barrel, slotted tumblers in said barrel adapted to extend alternately on either side of the barrel, and having one end larger than the 15 other, a case provided with slots to receive the large and small ends of said tumblers respectively, one of said slots being smaller than the larger ends of the tumblers, the said barrel being adapted to be rotated by a 20 key adapted to adjust the tumblers.

2. The combination of a lock frame, an extensible cylinder lock fastened to one side of the frame, rotatable means free from said lock for turning a key, and a key ad- 25 justably connected with said rotatable means.

3. A barrel lock provided with a barrel, a case therefor and tumblers free in said barrel and adapted to move under the force 30 of gravity toward diametrically opposite sides of said barrel as the barrel is rotated.

4. In a lock, the combination of a barrel having a reduced slotted portion, the slots of which extend diametrically therethrough, 35 a slotted case therefor, tumblers in the slots of said barrel, carried by and revoluble with said barrel and adapted to project through the barrel on both sides thereof and to engage the slots of the case, and a key for ad- 40 justing said tumblers to bring all their ends simultaneously flush with the interior of the case.

5. A lock comprising a key-guard having a barrel provided with flanged ends, and a 45 reduced intermediate body transversely slotted from side to side to receive guard tumblers, tumblers in said transverse slots, each adapted to project from either side of the barrel and provided with a slot to register 50 with the key-way and also provided with a head to engage the reduced portion of the barrel, and a plurality of keys, each diverse from the other and adapted to adjust the tumblers in the lock when arranged in a de-

termined order, and having numbers on the 55 key and corresponding numbers on the tumblers to indicate the tumbler-way in which the tumbler must be mounted in order to be adjusted to unlocking position by the key.

6. In a lock, the combination of a barrel 60 having slots extending diametrically there-through, a slotted containing case, tumblers in the slots of said barrel carried by and revoluble with said barrel and adapted to project through said barrel on both sides there- 65 of and to engage slots in the case, and a key for adjusting said tumblers to bring all their ends at the same time flush with the inner surface of said case.

7. In a lock provided with a dead bolt, an 70 extensible cylinder-guard on one side provided with key-slot and movable pin tumblers and a pin-tumbler-key to move said pin-tumblers, in combination with an engaging key on the other side, said engaging key 75 being adapted to lock the dead-bolt and to render the pin-tumbler-key inoperable.

8. In a lock provided with a slotted containing-case and a barrel, tumblers provided with gravity-operated forked and headed 80 ends acting transversely in the barrel and constructed to engage slots in the containing case so that a key to operate the same may be provided with a greater range of variation in its notches than is usual. 85

9. In a lock, a barrel, free, gravity-operated forked and headed tumblers acting in the transverse slots of the barrel, in combination with a slotted containing case, a key adapted to operate said tumblers, and an 90 auxiliary means for locking the dead-bolt independently of said key and preventive of the operation of said key.

10. In a lock, the combination of loose, free-moving tumblers having stop-lugs and 95 forked slots in opposite ends designed to pass through a slotted barrel in its revolution and to engage by means of the forked ends, slots in an enveloping case, by means of a notched key whose notches correspond 100 to the depth of the forks in said tumblers.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 4th day of September 1906.

W. H. THOMAS.

In presence of—

JAMES R. TOWNSEND,
JULIA TOWNSEND.