(No Model.) 2 Sheets—Sheet 1.

S. P. STEIN.

LOCK.

No. 457,677. Patented Aug. 11, 1891.

Fig. 1.

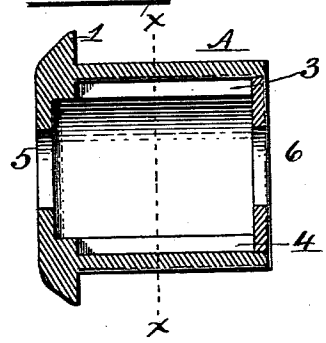


Fig. 2.

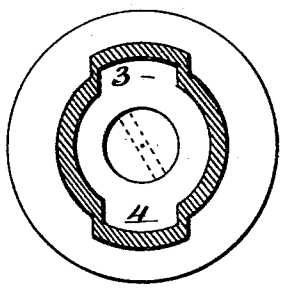


Fig. 3.

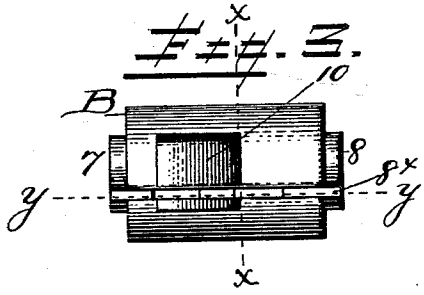


Fig. 4.

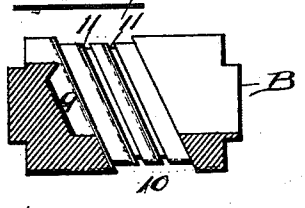


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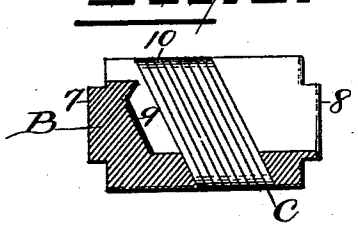
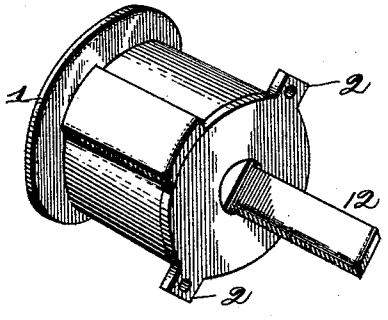


Fig. 6.



WITNESSES:

Albert B. Blackwood

F. M. McElroy

INVENTOR

Samil P. Stein

BY

A. G. Heylmun

ATTORNEY.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

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LOCK.

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Fig. 7.

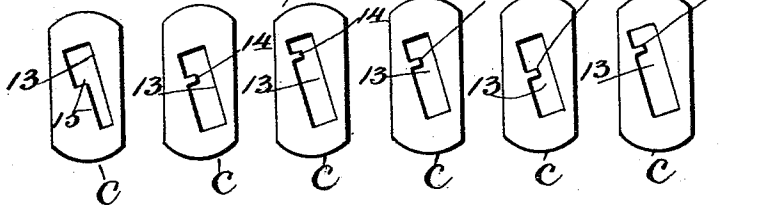


Fig. 8.

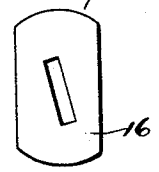


Fig. 9.

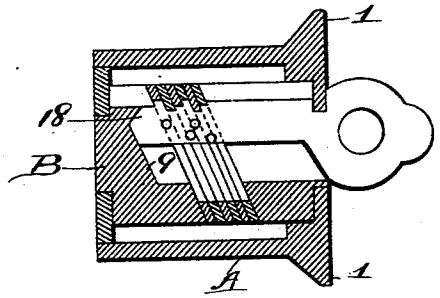


Fig. 10.

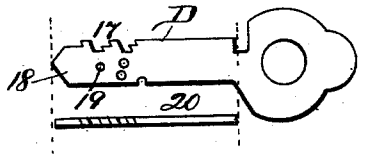


Fig. 11.

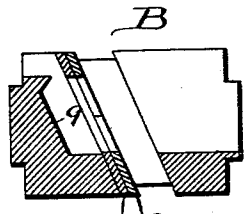


Fig. 12.

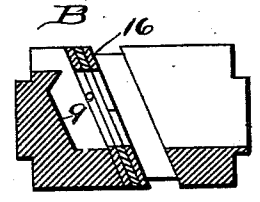
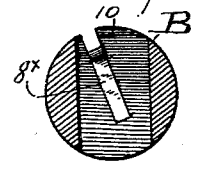


Fig. 13.



WITNESSES:

Albert D. Blackwood

F. D. McCleary.

INVENTOR

Samuel P. Stein

BY

A. G. Hoffmann

ATTORNEY.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

SAMUEL P. STEIN, OF MILTON, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO THOMAS B. GOULD AND FREDERICK M. KELLY, BOTH OF SAME PLACE.

LOCK.

SPECIFICATION forming part of Letters Patent No. 457,677, dated August 11, 1891.

Application filed January 28, 1891. Serial No. 379,354. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL P. STEIN, a citizen of the United States of America, residing at Milton, in the county of Northumberland and State of Pennsylvania, have invented a new and useful Lock, of which the following is a specification.

My invention has relation to improvements in locks for doors and similar closures where it is required to secure them subject to entrance only by authorized persons; and the object is to provide a lock for the purposes to which such a device may be applied, which is simple in construction, secure, and durable.

The invention or novelty of the present device is particularly laid in the claims hereto, and is hereinafter fully described, so as to comply with the official and legal requirements.

I have fully and clearly illustrated my invention in the accompanying drawings, wherein—

Figure 1 is a central longitudinal section of the casing, showing the construction of the end of the key-slot and one wall of the tumbler-slot. Fig. 2 is a transverse section of the casing on the line *x x* of Fig. 1, showing the recesses for the tumbler ends. Fig. 3 is a view of the tumbler-cylinder. Fig. 4 is a transverse section of the tumbler-cylinder on the line *y y* of Fig. 3, showing the inclined back wall of the tumbler-seat. Fig. 5 is a similar view with the tumblers inserted. Fig. 6 is a perspective of the lock with the bar in the end of the tumbler-cylinder to connect the lock to the latch. Fig. 7 is a detail of the tumblers. Fig. 8 is a detail of one of the false tumblers or guards. Fig. 9 is a sectional view with the key inserted. Fig. 10 is a view of the key. Fig. 11 is a view in transverse section showing a shouldered tumbler in place of a pin-tumbler and a false tumbler or guard behind it. Fig. 12 is a similar view with the false tumbler or guard arranged in front. Fig. 13 is a transverse section on line *x x* of Fig. 3.

A designates the casing, consisting of a hollow cylindrical shell having a rim-flange 1 to fit in a seat formed in the door or other surface, or to be secured simply against the surface surrounding the mortise or hole made for the casing and on the inner end having lugs 2 with screw-holes, through which fastening-screws may be passed to secure the casing in the mortise from the opposite side to the facing. In the casing opposite to each other are formed grooves or channels 3 4, which receive the ends of the tumblers when they project in either direction beyond the perimeter of the tumbler-cylinder. These grooves or channels in the casing are arranged at a different angle from that given to the key-slot of the tumbler-cylinder, and so that the ends of the tumblers will enter the grooves. In the face-plates of the casing are formed bearing-holes 5 6, in which the journals or projecting ends of the tumbler-cylinder rest and turn.

B designates the tumbler-cylinder consisting of a cylinder having the ends 7 8 formed to constitute journals to fit in the bearing-holes in the ends of the casing. In this cylinder is a key-slot $8^{\times}$ of such depth as to bring the steps and pin-holes of the key in proper relation to the key-holes of the tumblers when the latter are in locked position. The metal at the inner end of the key-hole is inclined at the lower portion, as shown at 9, to be engaged by a corresponding incline on the end of the key and serves to lift or carry the key up on the incline and take the tumblers with it, thus withdrawing the tumblers from the locked position in the channel of the casing. The key-slot, it will be perceived, is arranged at a right angle to the axis of the cylinder, and consequently at a different angle to that of the tumbler slot or seat. In the tumbler-cylinder is formed a tumbler slot or seat 10, directed, as indicated, through the tumbler-cylinder at an incline transversely to the key-slot and vertical radius of the cylinder and also inclined in longitudinal direction in the cylinder. In the better class of locks grooves 11 are formed in the side walls of the tumbler-seat, in which false tumblers or guards are secured, as hereinafter specified. In the rear spindle of the tumbler-cylinder is secured the connecting-bar 12, which in use has its outer end secured to the spindle of the lock.

C designates the tumblers. These consist of plates fitted to slide freely in the doubly-inclined tumbler-slot in the cylinder and to

engage with either end in the grooves of the casing. Normally the tumblers fall by gravity into locked position in the lower groove in the casing and are raised therefrom in positive movement by the action of the key. In each tumbler is a key-slot 13, made longer and substantially twice the width of the thickness of the key. The key-hole is made on an incline from the lines of the sides of the tumblers and at the same angle as that of the key-slot, and consequently different from the angle of the side walls of the tumbler-slot in the tumbler-cylinder. This construction and arrangement complicate the relations of the parts and increase their efficiency and the security of the lock. In certain of the tumblers is a pin 14, projected from the edge of the key-hole, which is intended to enter a pin-hole in the key. In others of the tumblers the key-hole is formed or may be formed with a shoulder 15, which is the equivalent of the pin and serves the same purpose as a pin if projected at a line with the shoulder to enter a notch in the edge of the key. Between the movable tumblers may be disposed false tumblers or guards 16, which have key-holes arranged at the same angles as the key-holes of the sliding movable locking-tumblers. These guards 16 are disposed in grooves in the side walls of the tumbler-slots of the tumbler-cylinder and are stationary in their position. The key-slots in these guards are made of the same width as the stem or blade of the key, or about one-half the width of the key-slots in the locking-tumblers. The office and purpose of these guards are to give additional security to the lock against unwarranted intrusion, and this is accomplished by making the slots narrower than the slots of the locking-tumblers, which construction places the edge of the guards adjacent to the pin-edge of the locking-tumblers, and thus leaves the pins standing normally behind and not projecting beyond the line of the edges of the guards, so that no impression can be taken to make a false key and no wire or blade can reach the pins to draw them in releasing position for the locking-tumblers.

D designates the key, consisting of a flat plate having notches or seats 17 in its edge of different depths to engage and move the different tumblers in unlocked alignment when the key is fully in position in the lock. The end of the key has an upwardly-inclined part 18, which engages the incline in the end of the key-slot and rises up thereon, carrying the key upward or in direction to lift the tumblers from their seat in the casing. The key lodges in this upward movement against the metal above the incline 18, and is thus prevented from carrying the tumblers above the opening in the tumbler-cylinder and relocking the parts together. In the key is a number of pin-holes 19, and in the edge opposite to the tumbler-notches may be a notch or notches 20, in which engage the shoulders or pins of tumblers arranged below the edge of the key when at rest in locked position. The tumbler-seats in the key are arranged at a backward incline and directed angularly across the key, and the pin-holes and notches in the edge of the key are at an angle through the blade, in order that when the tumblers are shifted they may be drawn freely in their angular inclined directions without sticking or lodging in the seats or holes. A key with seats and holes directly across it will not work in the lock.

The tumblers slide easily in the tumbler-slot, and are moved into and out of locked position by positive action of the key, as when the key is inserted it moves to its limit without disturbing any of the tumblers and until it reaches the inclined end of the key-slot, when it is lifted and carries the tumblers upward in engagement with their respective seats in the key. The tumbler-seats in the key are made at an incline on the plane of the backward incline at which the tumblers are arranged, as shown in the drawings.

The parts are assembled as follows: The tumblers are arranged in the tumbler-slot of the cylinder and the cylinder then placed in the casing and the end plate secured in place, when the key may be applied.

The operation is as follows: It will be observed that the tumbler-slot is at a double incline or inclines in two directions—that is, it has a lateral incline from the plane of the key-slot and an incline backward—and that the key-holes in the tumblers are inclined in opposite directions to that of the tumbler-slot in the cylinder and in direction align with the key-slot, so that as the key is lifted to lift the tumblers the key-slot at the upper end must be wide enough to permit the lateral shift of the tumblers, and as this movement takes place the pins in the key-slots are moved to engage in their respective pin-holes in the key. The key being inserted and pushed to its limit lifts the tumblers to their respective limits and into alignment, and the tumbler-cylinder is free to be turned, and when the key is withdrawn the tumblers are carried down into the groove in the casing and the parts are locked. If the guards or false tumblers are used, the action is the same, as stated, the interposition of the guards serving only to increase the security of the lock against being picked or otherwise tampered with internally. The tumblers may be made without pins; but for greater security they are essential.

Having thus described my invention and specified the manner of making, constructing, and using it, as prescribed by the statute, and explained the principle and the application thereof, so as to distinguish it from other inventions in the art, I now particularly point out and distinctly claim the parts, improvements, and combinations which I claim as my invention, to wit:

1. In a lock, the combination of a cylindrical hollow casing having interior longitudinal

grooves oppositely-arranged to take the ends of the tumblers, a tumbler-cylinder within the casing, having a key-slot terminating in an inclined inner end and formed with a tumbler-slot arranged at a lateral incline to the key-slot, tumblers in the tumbler-slot, having key-holes in them in alignment to the key-slot and wider than the thickness of the key, and a key to shift the tumblers, substantially as described.

2. In a lock, the combination of a cylindrical hollow casing having interior longitudinal grooves oppositely arranged, a tumbler-cylinder within the casing, having a key-slot terminating in an inclined inner end and formed with a tumbler-slot arranged at backward and lateral inclines, false tumblers or guards fixed in the tumbler-slot, having key-holes in alignment with the key-slot, shifting tumblers in the tumbler-slot, having key-holes to take the key, and a key to lift the shifting tumblers, substantially as described.

3. In a lock, the combination of a cylindrical hollow casing having interior longitudinal grooves oppositely arranged, a tumbler-cylinder within the casing, having a key-slot terminating in an inclined inner end and formed with a tumbler-slot arranged at backward and lateral inclines, shifting tumblers in the tumbler-slot, formed with key-holes having a pin projected from one edge thereof, and a key to shift the tumblers and formed with apertures to take the pin of the tumblers, substantially as described.

4. The tumbler for a lock herein described, consisting of a plate having parallel edges, and a key-hole arranged at an angle to the edges and provided with a pin projected from one edge of the key-hole, as specified.

5. In a lock, the combination of a cylindrical casing having interior opposite channels or grooves, a tumbler-cylinder in the casing, having a key-slot, and a tumbler-slot arranged transversely to the key-slot and at a lateral incline thereto, tumblers in the slot to engage the grooves of the casing and having key-holes through them, false tumblers or guards fixedly interposed between the tumblers, having key-holes through them substantially one-half the width of the key-holes in the tumblers, and a key to shift the tumblers, substantially as described.

6. In a lock, the combination of a casing, a tumbler-cylinder in the casing, having a key-slot and a tumbler-seat, tumblers in the seat, having key-holes formed with projections on one of the edges, and a key to shift the tumblers and formed with openings to take the projections of the tumblers, substantially as described.

7. A key consisting of a plate formed with an inclined end, transversely-inclined tumbler-seats, and one or more holes arranged at an inclination corresponding to the inclination of the tumbler-seats, substantially as set forth.

In witness whereof I have hereto set my hand in the presence of two attesting witnesses.

SAMUEL P. STEIN.

Attest:
A. G. HEYLMUN,
WM. H. BATES.