(No Model.)

5 Sheets—Sheet 1.

E. C. SMITH.

CYLINDER LOCK.

No. 474,348. Patented May 3, 1892.

Fig. 1.

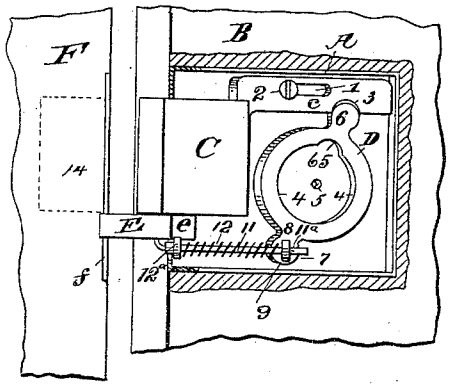


Fig. 3.

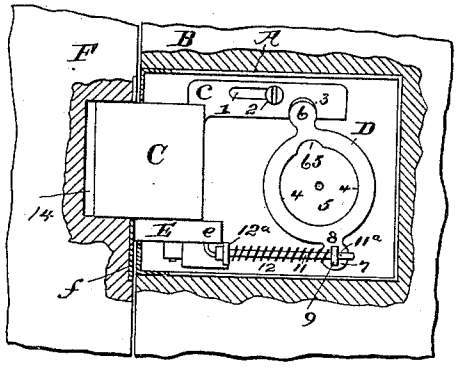


Fig. 2.

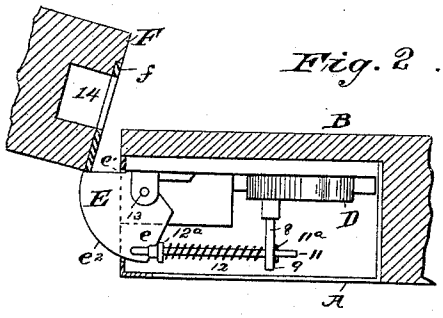


Fig. 4.

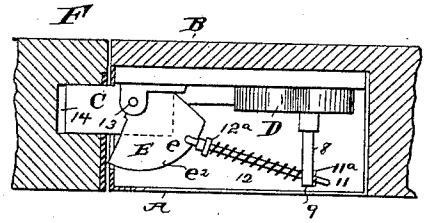
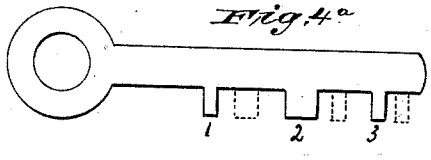


Fig. 4a.



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M. E. Finley

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Eugene C. Smith
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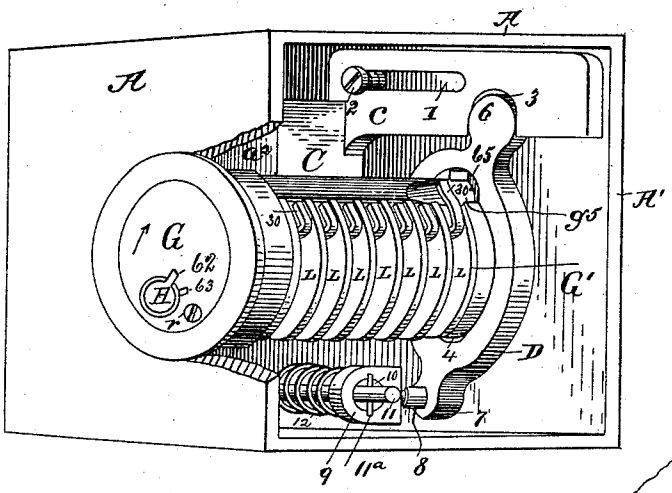
Fig. 5.



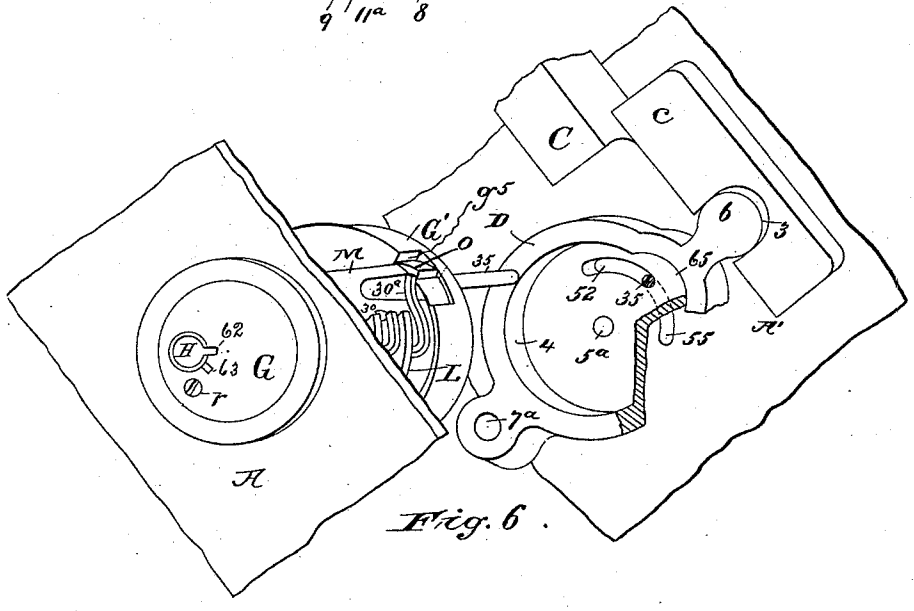


Fig. 6.

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Fig. 7.

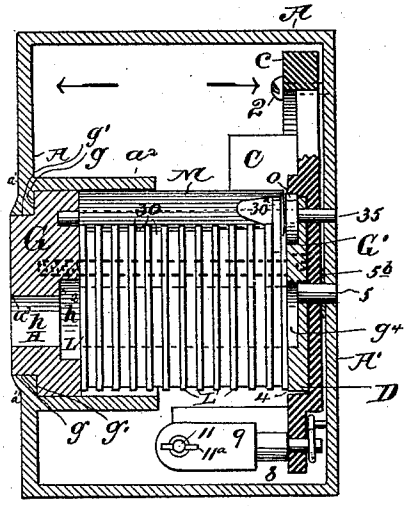


Fig. 8.

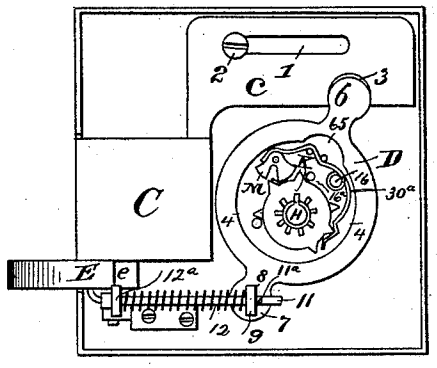


Fig. 9.

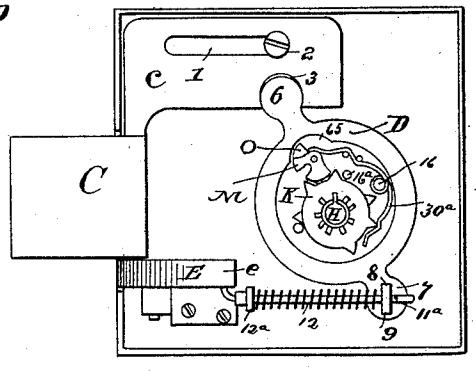


Fig. 11.

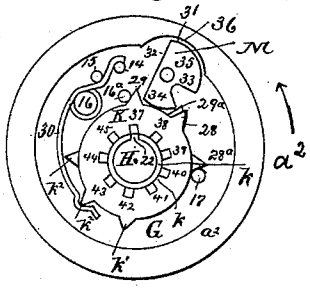


Fig. 12.

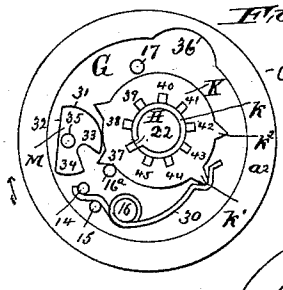


Fig. 10.

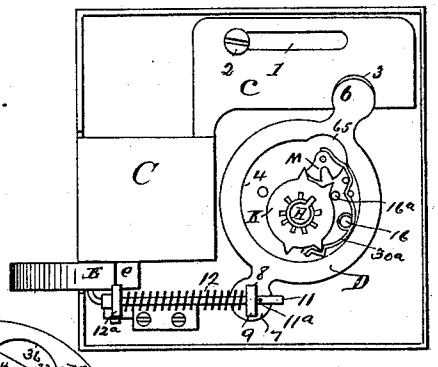
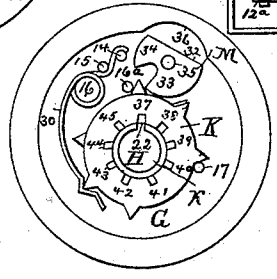


Fig. 11a.



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(No Model.) 5 Sheets—Sheet 4.

E. C. SMITH.

CYLINDER LOCK.

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Fig. 13.

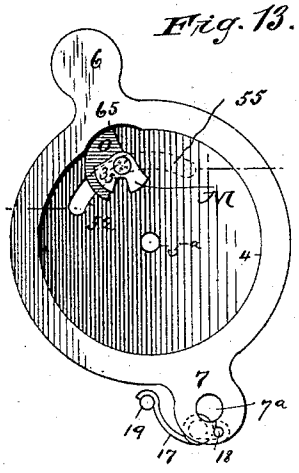


Fig. 14.

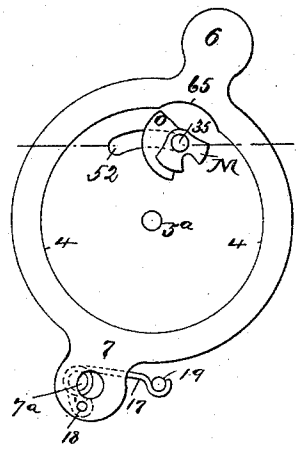


Fig. 15.

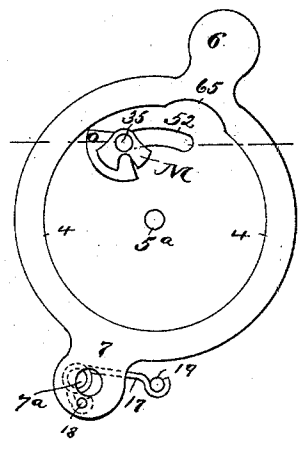


Fig. 16.

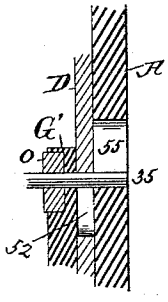


Fig. 17.

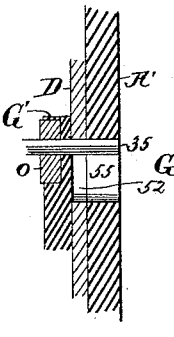


Fig. 18.

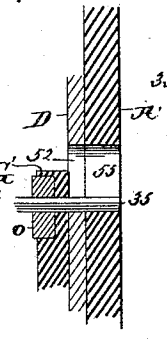


Fig. 19.

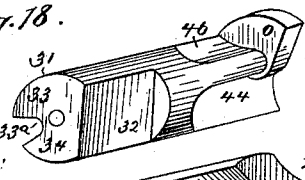


Fig. 20.

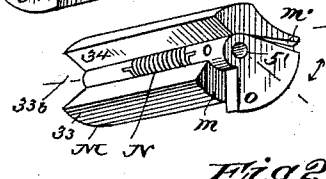


Fig. 21.

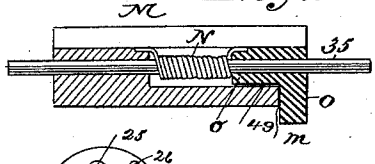


Fig. 22.

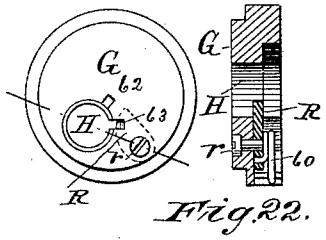
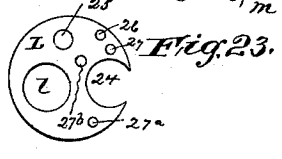


Fig. 23.



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(No Model.) 5 Sheets—Sheet 5.

E. C. SMITH.

CYLINDER LOCK.

No. 474,348. Patented May 3, 1892.

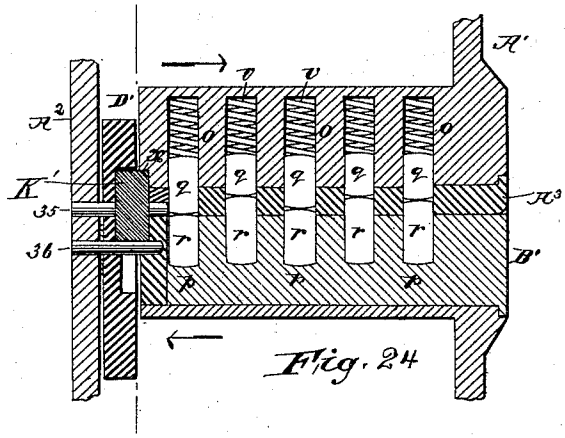

Fig. 24

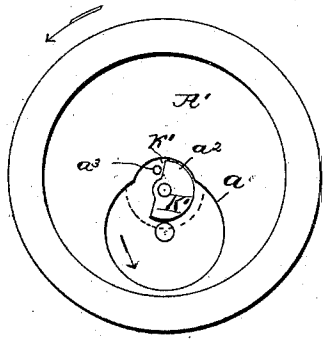

Fig. 25

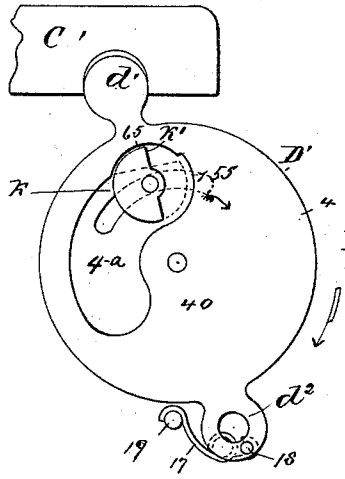

Fig. 26.

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Inventor;
Eugene C. Smith
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his attorney

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UNITED STATES PATENT OFFICE.

EUGENE C. SMITH, OF NEW YORK, N. Y., ASSIGNOR TO THE UNIVERSAL LOCK COMPANY, OF SAME PLACE.

CYLINDER-LOCK.

SPECIFICATION forming part of Letters Patent No. 474,348, dated May 3, 1892.

Application filed September 1, 1891. Serial No. 404,411. (No model.)

To all whom it may concern:

Be it known that I, EUGENE C. SMITH, a citizen of the United States of America, residing at New York, in the county and State of New York, have invented certain new and useful Improvements in Cylinder-Locks, of which the following is a specification.

My invention relates to improvements in the kind of locks known as "cylinder-locks;" and the purpose of the invention is to adopt the lock-cylinder to be used with means for automatically projecting the bolt by the closing of the door, drawer, &c., to which the lock is applied. I effect this adaptation by combining, for the first time in the history of the art, a lever (which I term an "idler") with the lock-cylinder in such manner that the idler is, on the one hand, capable of motion independently of the lock-cylinder and, on the other hand, is adapted to be engaged by it for the purpose of moving the bolt through the agency of the cylinder. The said idler is connected with the bolt and also with the strike-lever, by which the bolt is projected when the door is closed, and the motions of the bolt are effected through the idler. The combination has the great advantage that it allows of the use of the cylinder type of locks with automatically-closing mechanism and square-ended bolts, which cannot be pressed back by inserting thin plates in the socket in the door-jamb. Since my idler is adapted to be used with any kind of lock-cylinder, I hereinafter show it applied, first, to a locking-bar cylinder-lock similar to that shown in my application for United States Patent, Serial No. 364,177, filed September 6, 1890, and now pending in the Patent Office, and, second, to the common pin-cylinder lock.

My invention also relates to details of construction, which will be hereinafter described and explained.

Referring now to the drawings which accompany this specification, Figure 1 is a plan view of the idler, strike-lever, bolt, and their connections when the bolt is drawn back and the door opened. Fig. 2 is a view of the same as seen from below. Fig. 3 is a view of the same parts as in Fig. 1; but the bolt is shown projected and the strike-lever pushed back. Fig. 4 is a view of the same as seen from below. Fig. 4ª is an enlarged view of a key of my locking-bar cylinder-lock. Fig. 5 is a perspective view of the interior of a lock, showing the idler applied to my locking-bar cylinder. Fig. 6 is a perspective view of the same, but with the idler separated from the cylinder and broken away to show its sectional form. Fig. 7 is a longitudinal section of the lock, but the key-cylinder and locking-bar are shown in elevation. Figs. 8, 9, and 10 are plan views of the idler and tumblers, looking toward the right end of Fig. 7 and showing, first, the bolt drawn back, but tumblers locked; second, bolt shot forward and tumblers locked; third, bolt drawn back and tumblers unlocked. These views show the idler as seen when one looks into the lock and toward the right end of Fig. 7. Figs. 11, 11ª, and 12 are views of the tumblers enlarged and as seen by one looking into the lock toward the left end of Fig. 7. Fig. 11 shows the tumblers locked; Fig. 11ª, the tumblers unlocked, but the cylinder not yet rotated; and Fig. 12 the tumblers unlocked and the cylinder rotated. Fig. 11 corresponds to Figs. 8 and 9, and Fig. 12 to Fig. 10. Figs. 13, 14, and 15 are plan views of the idler, with the locking-bar and cam, and show the idler, first when the bolt is shot forward, second when the bolt is drawn back and the lock-cylinder is toward the right, and third when the bolt is drawn back and the lock-cylinder is toward the left. Figs. 16, 17, and 18 are sections on the line $x\,x$ of Figs. 13, 14, and 15, respectively. Figs. 19 and 20 are perspective views of the back and front, respectively, of the locking-bar much enlarged, and Fig. 21 is a longitudinal section of the same. Fig. 22 is a plan and section of the front cap of the cylinder, looking toward its under side and showing the device for changing the combinations. Fig. 23 is the plan view of a washer. Figs. 24, 25, and 26 show the idler applied to a pin-cylinder lock. The figures show, first, a longitudinal section; second, a plan (from the left) of the end of the cylinder and the cam; third, a plan view of the idler, looking from the right. The idler is enlarged.

Describing first the idler and its connec-

tions with the bolt and strike-lever and which are applicable to any cylinder-locks A is the lock on the door B.

C is the bolt, guided by the pin 2 in the slot 1 of the bolt-tail *c*.

D is the idler, which is in effect a lever, pivoted on a pin 5, so as to oscillate freely, and having a knob 6, which engages a socket 3 in the bolt-tail C, and also an arm 7 opposite to said knob 6, in which, with easy working fit, is set the pin 8, projecting at right angles from the idler and having a flat head 9, with a hole 10, through which passes, with easy fit, one end of a connecting-rod 11, which is pivoted at its other end in the face *e* of the strike-lever E. A spring 12 is coiled around the connecting-rod 11 between the head 9 of pin 8 and the shoulder 12^a of said connecting-rod. Said strike-lever E is pivoted to the case at 13, and has a cam-face *e'*, which normally projects through a slot in the front of the lock-case and so as to be engaged by the strike-plate *f* of the door-jamb F when the door B is closing. The other face E^2 of said strike-lever E is struck as an arc of a circle from the pivot 13 as a center. Now, the strike-lever E projecting, the bolt C drawn back, and the idler D inclining to the right, as in Fig. 1, suppose the door B is closing. Then the strike-plate *f* will push back the strike-lever E to the position of Fig. 4, thereby compressing the spring 12 and tending to incline the idler D to the left and project the bolt C; but the bolt cannot project until it comes exactly in line with the socket 14 in the door-jamb F. When so opposite, the bolt C immediately shoots into said socket 14, the idler takes the position of Fig. 3, and the door is locked. To open the door, assume that the idler D is turned to the right by the lock mechanism acted on by the proper key in the manner hereinafter explained. Thereby the idler will again come to the position of Fig. 1 and the bolt C will be drawn back by said idler. At the same time the spring 12 will be compressed and will tend to project the strike-lever E to the position of Fig. 2; but the strike-lever E cannot so project until the door B is sufficiently opened to bring the strike-lever E clear up the strike-plate *f*. When the door is so opened, the strike-lever E immediately flies out to the position of Fig. 2 and the door is ready to be again closed.

To energize the motion of the idler D, a coiled spring 17 is employed, having its one end freely set on a pin 18, that is fixed in the back of the idler D, and its other end set on a pin 19, that is fixed in the lock-case in line with the midway position of the idler D. Thus as the idler D approaches the middle position it compresses the spring 17, and as the idler moves to either the right hand or the left hand of the middle position the spring 17 impels it to the full limit of its throw.

Figs. 5 to 23, inclusive, are views of a lock, wherein my said idler is applied to my locking-bar cylinder-lock. Describing the same, the bolt C, strike-lever E, and their connections with the idler D are as hereinbefore explained, and the idler D is preferably of cylindrical shape, with a deep circumferential rim 4, Fig. 6, in which is a socket 65 for the locking-bar cam O, as will be hereinafter described. The idler D is pivoted freely on the pivot 5, which is fixed in the back lock-plate A', passes up through the hole 5^a in the idler D, and serves, also, as a pivot of the cap G' of the lock-cylinder. On said pivot 5 is a washer 5^b to separate the idler D from the plate A'. In said idler D is a through-and-through slot 52, which is struck on the arc of a circle from the pivot 5 as a center, and coincides when the idler is inclined to the right, Figs. 14 and 15, with a similar slot 55 in the plate A', Figs. 16, 17, and 18. The length of said slots 52 and 55 is equal to the throw of the idler D between its extreme positions.

The lock-cylinder consists of the cylindrical caps G and G', which are rigidly connected together by the screw 16 (indicated by heavy dotted lines in Fig. 7) and placed to one side out of the way of the tumblers K. Said caps G G' are held a proper distance apart by the longitudinal pins 14 15 16 16^a 17, which have their one end threaded into the cap G and their other end entering a proper distance into corresponding sockets in cap G'. The pins 14 15 and the screw 16 serve as supports for the tumbler-springs 30, and the pins 16^a and 17 as stops to limit the motion of the tumblers K.

In the cap G is a key-slot 62, by which the key is to be inserted to unlock the lock, and also another slot 63, through which the key is to be withdrawn and a new key to be inserted when the combination is to be changed, as will be hereinafter described. The slot 63 is normally covered by a plate R in a socket 75 in the under side of the cap G. A key-cylinder H, slotted at 22 in the ordinary manner, traverses the space between the caps G G' and turns freely by reason of its neck *h* fitting loosely in the hole a^3 in cap G and its rear end fitting loosely the hole g^4 in cap G', and said key-cylinder H has a fixed ring h^2, which prevents its displacement. Said key-cylinder H is also the axis of the tumblers K, whereof there are usually twelve in each lock, and each of said tumblers is made of sheet metal, preferably of circular shape and perforated with the central round hole K, which fits easily over the key-cylinder H. The arc of oscillation of said tumblers K is made an aliquot part of a circumference, as forty degrees, or the ninth part of a circumference, and around said central hole K are nine slots 37 38 39 40 41 42 43 44 45, spaced at an angular distance apart equal to the arc of oscillation of the tumblers. If the arc of oscillation of the tumblers was, say, a tenth or twelfth part of a circumference, then would there be ten or twelve slots around the central hole R, and so on, according to the oscillation of the tumblers. The angular distance between the

slots is always equal to the arc of oscillation of the tumblers. Now, the tumblers having been originally placed with all the slots 37 coinciding, it is evident that if any tumbler be moved through forty degrees its slots will still exactly register with the slots of the other tumblers, and consequently when some of the tumblers are locked and some unlocked the slots will give no indication of which tumblers are in the one or the other position. Each of said tumblers K has a projection 29 (represented in the locked tumblers by 29^a, Figs. 11 and 12) to actuate the locking-bar M and also a projection 28 (represented by 28^a in the locked tumblers) to prevent moving the locking-bar, as has been fully described in my application for Letters Patent of the United States, Serial No. 342,693, filed March 5, 1390, and each tumbler also has projections K′ K^2, on the one or the other of which press the ends of said springs 30, according to the position of the tumblers. There is one of said springs 30 for each tumbler, and the end 30^a of the innermost spring, or that to the right in Fig. 7, is extended, and serves, also, as a spring for the locking-bar M. Said tumblers K are placed on the key-cylinder H, as aforesaid, and with a washer L between each pair of tumblers K, and the washers L are of thin brass, of circular shape, and of larger diameter than the tumblers K, so as to form spaces between each pair of washers, in which are guided the springs 30. Each washer L has a central hole, which slips over the key-cylinder and is of greater diameter than the sweep of the bits of the key, and also has the segmental hole 24, through which passes the locking-bar M, also the hole 25 for the screw 16 and the holes 26 27 27^a 27^b for the said pins 15 14 17 16^a, respectively. Said locking-bar M is pivoted adjacent to and so as to be engaged by the tumblers K on the pin 35, which passes through the lengthwise hole 51 in said locking-bar M and projects beyond the cap G′ and so as to pass through the slot 52 in the idler D and enter the slot 55 in the plate A′. Said locking-bar M traverses the space between the caps G G′, is straight longitudinally, and in cross-section is a bent lever having arms 33 34 and the space 33^a between the arms. The front end of said locking-bar, or that to the left, is formed with a round side 31, which is adapted to enter a socket 36 in the cylindrical sleeve a^2 of the front plate A, Figs. 5 and 7, and with a flat side 32, which will not enter said socket 36, and the rear or right end of the locking-bar M is fashioned with the angular surfaces 44 46, Fig. 19, on one or the other of which surfaces the spring 30^a presses, according to the positions of the locking-bar. The purpose of said spring 30^a is to energize the movement of the locking-bar M and insure that said locking-bar M shall rotate to the full limit of its throw in either direction. In the right end of the said locking-bar M the hole 51 is enlarged into a cylindrical cavity 49 to receive a coiled spring N and also the sleeve *o* of the cam O, and the right end of said locking-bar M is also cut away on one side to form the depressed plane surface *m* and the shoulder *m′*; but in place of the shoulder *m′* the end of the locking-bar M may be a plane surface, with a pin as a substitute for the said shoulder. One end of said spring N is fixed in the locking-bar M and the other end is fixed in the sleeve *o* of said cam O, and the spring N is so coiled that its tension tends to turn the cam O against the shoulder *m′*, so that the cam O projects beyond the locking-bar M, as seen in Figs. 13 and 19, also in Fig. 9. Said cam O is formed as a flat segment of a circle, and has, as said, the pivotal sleeve *o*, which fits easily into the hole 49 of the locking-bar M, and said sleeve *o* has a hole through which the axial locking-bar pin 35 passes, as seen in Fig. 21.

It will be understood that when the lock is assembled the end of the locking-bar M and the cam O will enter freely within a socket g^5 in the cap G′, Fig. 6, and that the cap G′ will fit within the rim 4 of the idler D, so that the cam O is also within said rim, Figs. 5 and 7, the pin 35 will pass through the slot 52 in the idler D and into the slot 55 in the plate A′, and that the cylindrical sleeve a^2 of the plate A will pass easily over the cap G and also over the left end of the locking-bar M, said locking-bar and tumblers being first in the unlocked position of Figs. 11 and 11^a. Before the lock is used, and usually before it leaves the factory, it is set on some one combination by locking it with a proper key, which key is inserted through the key-slot 63 and turned back to the slot 62, as will be hereinafter explained. Thus the certain combination of tumblers and the locking-bar M are turned to the locked position of Fig. 11, (corresponding to Fig. 8,) wherein the round side 31 of the locking-bar M enters the socket 36 in the sleeve a^2, and thereby prevents turning the cylinder until the lock is opened by the same key as set the combination.

The operation is as follows: Suppose the lock to be on a door, drawer, &c., and that the bolt is drawn back and the strike-lever projected, as in Fig. 2, the certain combination of tumblers and locking-bar being locked, as in Fig. 11 or Fig. 8, and the idler D inclined to the right, so that the socket 65 is not in line with the cam O. Consequently the rim 4 of the idler D holds in cam O, so that the spring N cannot project said cam beyond the locking-bar. Now the door, &c., is closed, thereby forcing back the strike-lever E and projecting the bolt C, as hereinbefore described, and at the same time turning the idler D to the left, as in Figs. 9 and 13, so that the socket 65 is in line with the cam O. Immediately the spring N turns the said cam into the socket 65, and thus locks the idler D and prevents the forcing back of the bolt until the cam O is drawn down out of the socket 65 by the proper key, as will be hereinafter described. The door is now locked. To unlock it, the

key that was used to set the combination of tumblers, or its exact duplicate, is inserted in the key-cylinder H by the slot 62 in the cap G and turned in the direction of the arrow in Fig. 11. Its bits, as 1 2 3, Fig. 4ª, will engage the slots 37 of the locked tumblers and will turn the said tumblers in the direction of the arrow, and at the same time the projections 29ª of said locked tumblers will turn the locking-bar M to the position of Fig. 11ª, so that the round side 31 passes down out of the socket 36 and the cylinder will be free to turn. At the same time the shoulder *m'* of the locking-bar M has turned the cam O down out of the socket 65. Now, continuing to turn the key in the same direction, the said tumblers cannot turn further, because their said projections bear against the pin 16ª. Consequently the cylinder turns as a whole and the pin 35 being at the right end of the slot 52, but at the left end of the slot 55, (see Figs. 13 and 16,) it rotates the idler D in the same direction until the motion of the cylinder is stopped by the pin 35 coming against the right end of the slot 55 in the plate A'. The idler D while so turning has drawn back the bolt C, so that the door B can be opened, and has compressed the spring 12, which again projects the strike-lever E as soon as the door B is sufficiently opened, as hereinbefore described. The tumblers and locking-bar are now in the position of Figs. 12 or 10, the cam O being as shown in Fig. 14. The lock is now opened and the key is in line with the slot 63 in cap G; but the key cannot be withdrawn because the slot 63 is covered by the plate R, Fig. 22. Consequently the key is turned backward, tending to turn the certain combination of tumblers backward; but the tumblers cannot turn, because the flat side 32 of the locking-bar M immediately comes against the sleeve a^2. Therefore the cylinder turns backward as a whole until further motion is prevented by the pin 35 coming against the left end of the slot 55. While so turning, the pin 35 has moved freely through the slot 52 in the idler D without moving the idler. The cylinder is now in the position of Fig. 11ª, wherein the locking-bar is directly in line with the socket 36 in the sleeve a^2. Therefore by still turning the key in the same direction the certain combination of tumblers corresponding to the bits of the key will be moved and their projections 29 29ª will turn the locking-bar to the position of Fig. 12, so that its round side 31 enters the socket 36 in the sleeve a^2 and locks the cylinder. At the same time the turning of the locking-bar winds up the spring N, the cam O not being able to turn, because it is held in by the rim 4 of the idler D. The mechanism is again in the position of Figs. 8 and 11, the key is in line with the slot 62 in the cap G, and is taken out of the lock, which is now ready for another closing of the door.

It is evident that there may be as many combinations of tumblers as there are combinations of things mathematically possible from a number of things equal to the number of tumblers, that for each combination there will be a separate key, and that only that key will open the lock which originally locked the combination of tumblers. The combination can be changed in the following manner: Besides the slot 62 through the cap G', there is a second slot 63, placed, as stated, in line with the slot 37 when the tumblers are unlocked and in the position of Fig. 11ª. This slot 63 is covered by the plate R, which is inserted loosely in the socket 75 in the under side of the cap G, and is fixed on the pivot *r*, which passes through a hole in the cap G and has a slot in its head for a screw-driver. The plate R is of such size and cam-shaped that it can cover the slot 63, but not the slot 62, and there is a spring 60, which normally presses the plate R across the slot 63. Now to change the combination, some combination of tumblers and the locking-bar M being in the locked position of Fig. 11, the proper key is inserted and turned in the direction of the arrow until the tumblers and locking-bar are in the unlocked position of Fig. 11ª. The arrival of the tumblers at this position is perceptible to one turning the key, so that the key being now in line with slot 63 he stops turning and by a screw-driver inserted in the pivot *r* turns the plate R, so as to uncover the slot 63. The key is now taken out and a new key, with a different combination of bits, as indicated by the dotted lines, Fig. 4ª, is inserted through the slot 63 and turned back, thereby setting a new combination of tumblers in the locked position of Fig. 11, the side 31 of the locking-bar M at the same time again turning up into the socket 36. The new key is now taken out, leaving the lock set on a new combination.

As my idler is applicable to other cylinder-locks, I show it in Figs. 24, 25, and 26, applied to Yale pin-cylinder locks. It will be understood that the lock C and strike-lever E (not shown in said figures) and their connections with the idler are as hereinbefore described, and that the idler D' oscillates on the axial pin 36, which is set in the rear lock-plate A^2 and passes up through a central hole in the idler D' and enters a central hole in the end of the cylinder A^2. The idler D' oscillates and assumes positions corresponding to those shown in Figs. 13, 14, and 15; but since the motion of the idler has been hereinbefore fully described I now show only the position of Fig. 26 corresponding to the position of Fig. 13, wherein the bolt is understood to be shot forward and the door locked and the strike-lever pushed back. The said pin-cylinder lock consists, as is well understood, of the fixed external case A', in which revolves the cylinder A^3. B' is the key-cylinder, and *q r* are the well-known pins pressed down by the springs V V, so as to hold the cylinder A^3 from turning to draw back the bolt until the proper key has raised the pins. Now I apply my idler to this pin-cylinder lock in the following manner: The idler D' is,

as before, preferably of circular shape, with the knobs d' d^2 for connection with lock and strike-lever, respectively, is pivoted, as aforesaid, on the pin 36, and is formed with a circumferential rim 4 and depressed surface 4^a. In the rim 4 is a socket 65 for engagement with the cam K'. Said cam K' is pivoted on the pin 35, which is set in the end of the cylinder A^3 and passes through the slot 52 in the idler D' and enters the slot 55 in the plate A^2. Said slots are struck on arcs of circles from the pivot 36 as a center, are in length equal to the throw of the idler, and are in all respects similar to the corresponding slots 52 and 55 in my locking-bar lock hereinbefore described. Said cam K' sets within the rim 4 of the idler D' and also within a circular depression a' in fixed case A'. In the wall of said depression a' is a socket a^2, into which the cam K' turns in certain positions of the cylinder A^3. Said cam K' is shaped on one side k as an arc of a circle struck from the pin 35 as a center, and the other side may be straight, as at K'. In the case A' and within the limits of the socket a' is a pin a^3 for engagement with the straight side k' of the cam K. The aforesaid sockets a^2 and 65 are shaped on arcs of circles to correspond with the shape of the cam K', and the socket a^2 is so placed in the case A' as to be exactly in line with the socket 65 in the idler D' when the bolt is shot and the door locked, and the pin a^3 and cam K' are so positioned that when the cylinder A^3 is turned to unlock the door in the direction of the arrow, Fig. 25, the flat side k' of the cam K' will be pressed against the pin a^3. There is a spring (not shown, but arranged in a manner as will be well understood by lock-makers) which tends to turn this cam K' up into the socket a^2.

The operation is as follows: Suppose the door locked, the cylinder A^3 being locked by the pins q r, and that the idler D' is inclined to the right, as in Fig. 15, and that consequently the socket 65 in said idler D' is to the right of the cam K', said cam K' will therefore be in the position indicated by the dotted lines in Fig. 25, wherein its round side k cannot turn up into the socket a^2 in the case A', because its straight side k' will be pressing against the rim 4 of the idler D'. Now the door is closed, the strike-lever projecting the bolt and inclining the idler D' to the right, so that its socket 65 is in line with the cam K', it being understood that the idler D' turned freely because the curved slot 52 in said idler passed freely along by the pin 35. Now the cam K' will be immediately turned up into the sockets 65 in the idler by reason of the cam-spring and will prevent the pushing back of the bolt. At the same time, also, the cam K' enters the socket a^2 in the case A'. The pin 35 is now at the right end of the slot 52, Fig. 26, and the door is locked. To unlock it the proper key is inserted in the key-cylinder B', whereby the pins q r are lifted, so that the cylinder A^3 can revolve. Now by turning the key the said cylinder is revolved in the direction of the arrow, Fig. 25, and thereby the straight side k' of the cam K' is pressed against the pin a^3, whereby the cam K' is revolved so that its round side k passed down out of the socket a^3, and also, of course, down out of the socket 65 in the idler D'. As the cylinder revolves the pin 35 carries the idler D' in the same direction until further motion is stopped by the said pin 35 coming against the right end of the slot 55 within the plate A^2. The idler is now inclined to the right and the bolt is drawn back, so that the door is opened and the strike-lever projects to be ready for another closing of the door, as has been hereinbefore described; but, as will be understood by those acquainted with pin-locks, the key cannot be withdrawn until the cylinder A^3 has been turned back to its first position. Consequently the key is so turned backward, thereby revolving the cylinder A^3 to its first position, the pin 35 meantime returning freely through the slots 52 and 55 without moving the idler D'. The key is now taken out of the lock, and all is ready for a second operation.

Now, having described my improvement, I claim as my invention—

1. In cylinder-locks, and in combination with a bolt and a strike-lever, an idler pivoted to move independently of the cylinder, and devices for connecting the idler with the cylinder, so that the idler may be moved by the cylinder.

2. The combination, in cylinder-locks, of shiftable tumblers, a shiftable locking-bar actuated by the tumblers, and an idler pivoted so as to move independently of the cylinder and having a socket adapted to be engaged by a spring-cam on the locking-bar.

3. The combination, in cylinder-locks, of a locking-bar actuated by tumblers and having a cam adapted to enter a socket in the fixed case of the lock and also having a spring-actuated cam to enter a socket in an idler that is pivoted to move independently of the cylinder.

4. The combination of a lock-cylinder carrying a shiftable cam and an idler pivoted to move independently of the cylinder and having a socket to be engaged by the cam.

5. The combination, in a lock, of a lock-cylinder, a bolt, a strike-lever, an idler connected with the bolt and the strike-lever and pivoted to move independently of the lock-cylinder, and devices for connecting the idler with the lock-cylinder.

6. In cylinder-locks, a lever connected with the lock and with devices for throwing the lock by the closing of the door, and said lever pivoted to move independently of the cylinder, and devices for connecting the lever with the cylinder.

7. In locks, a locking-bar adapted to be

actuated by tumblers, a spring-cam pivoted on the locking-bar, and a shoulder on the locking-bar to engage the cam, as described.

8. In a lock, the combination of a cylinder and an idler adapted to move independently of the cylinder, and devices connecting the cylinder with the idler, so that the cylinder can move the idler.

In witness whereof I have hereunto set my hand this 7th day of August, 1891.

EUGENE C. SMITH.

Witnesses:
M. E. FINLEY,
W. G. FINLEY.