No. 883,415. PATENTED MAR. 31, 1908.

F. M. MERRILL.

DOOR LOCK.

APPLICATION FILED JUNE 4, 1907.

2 SHEETS—SHEET 1

Fig. 1.

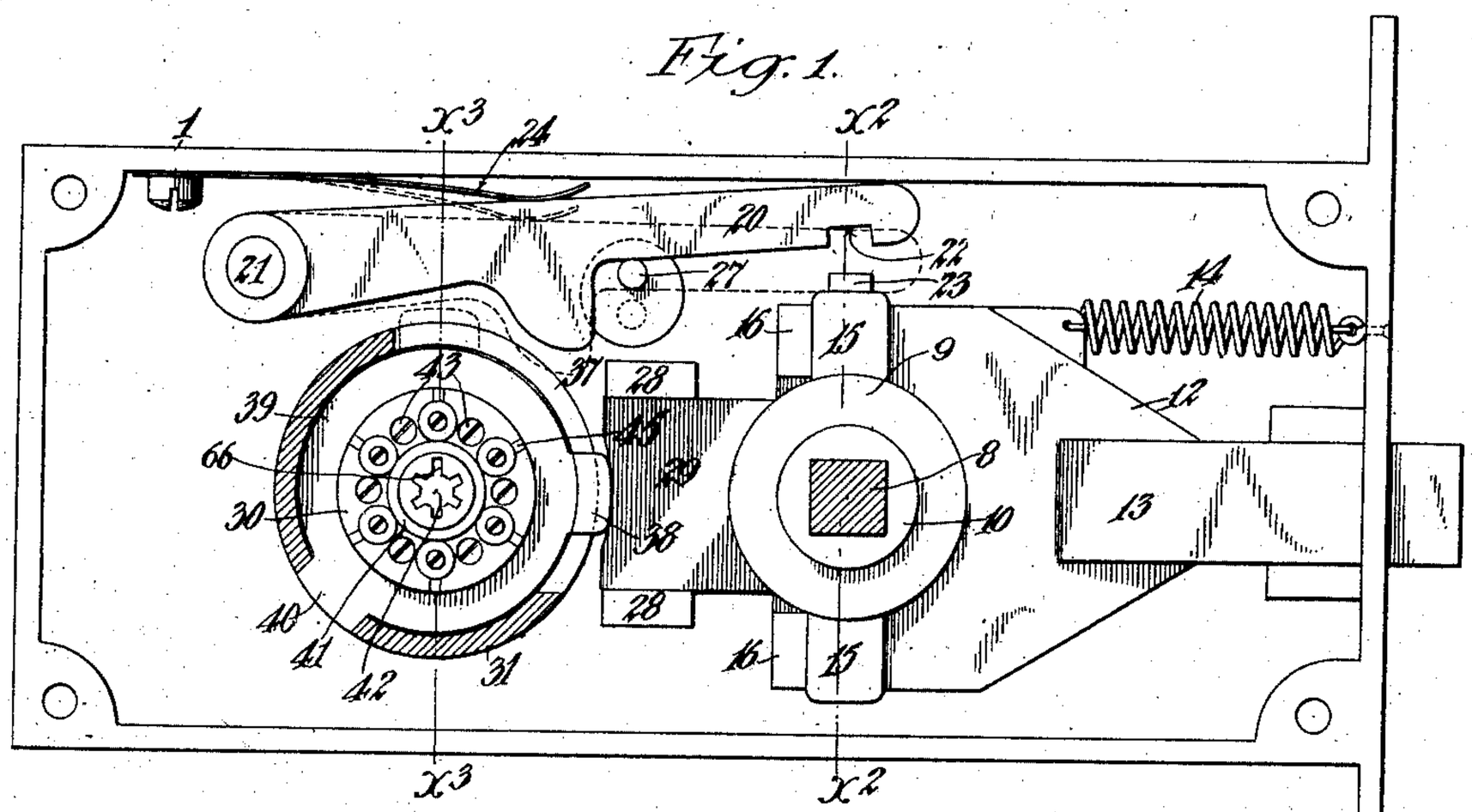


Fig. 2.

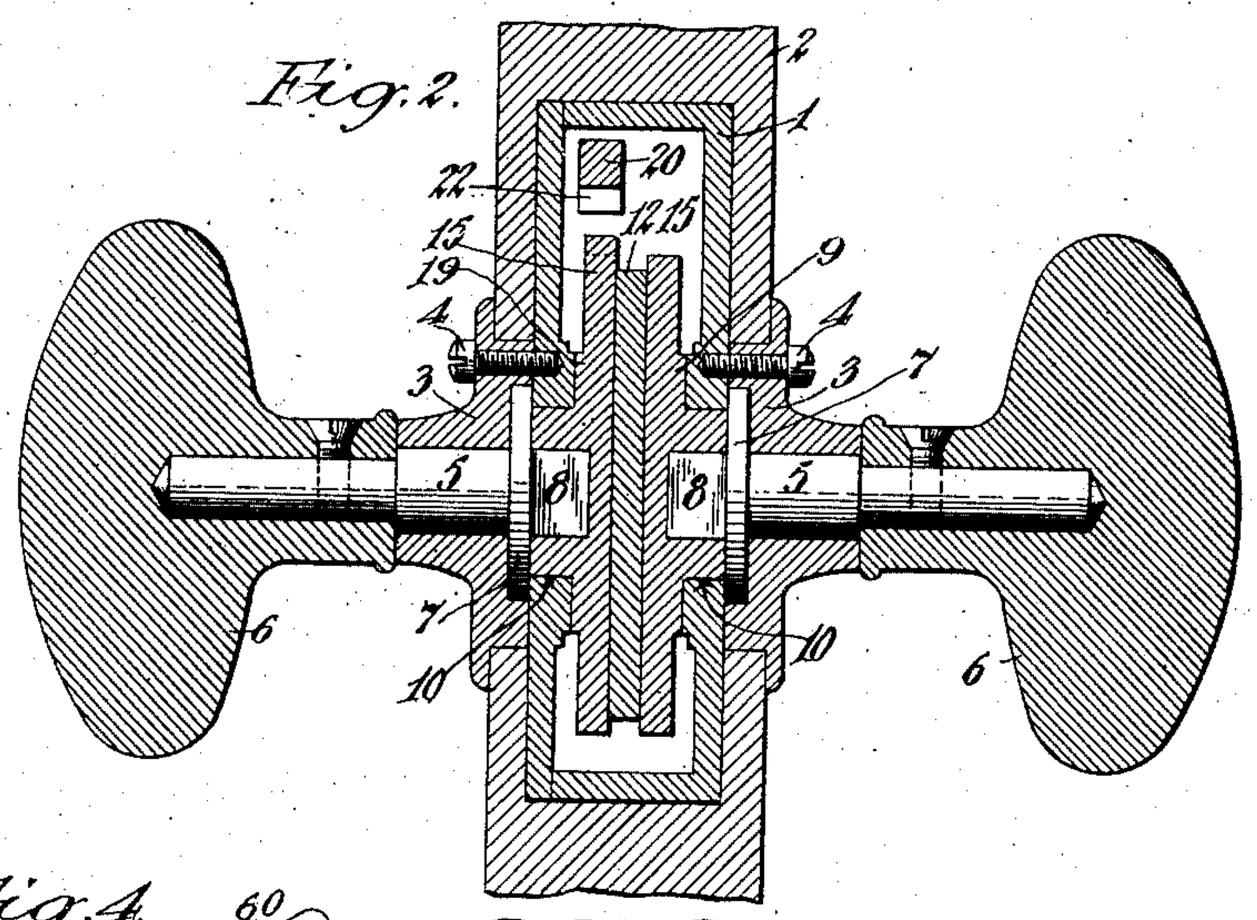


Fig. 4.

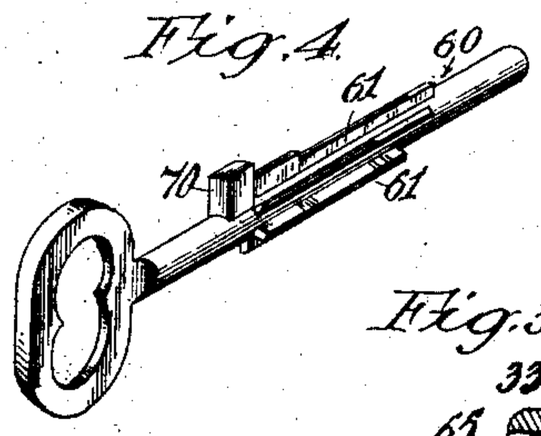
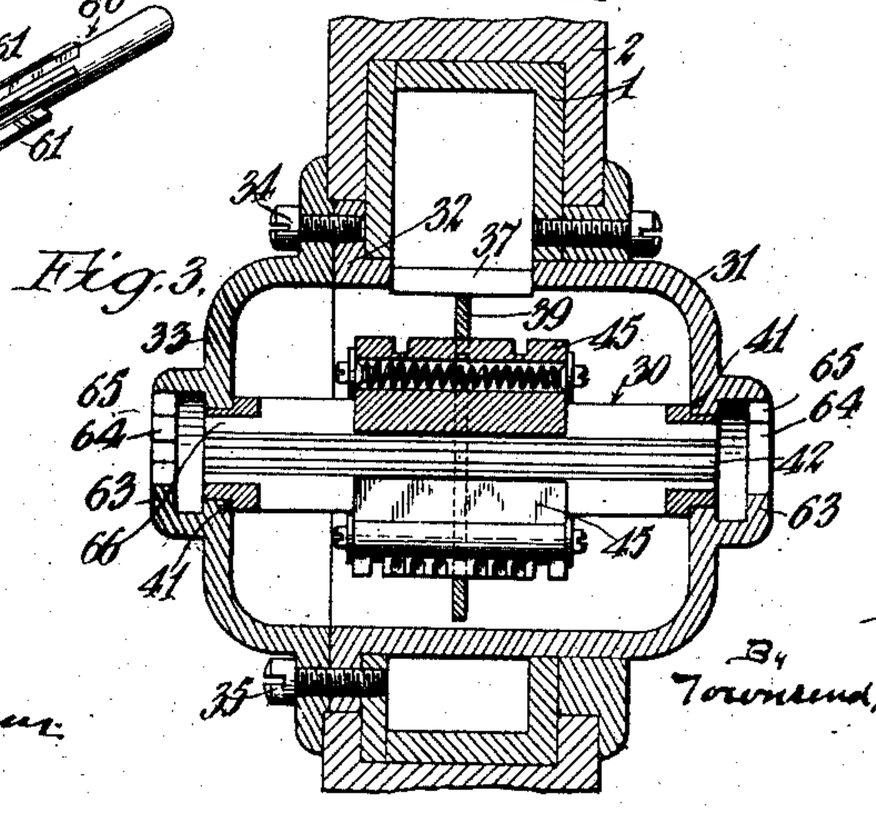


Fig. 3.



Witnesses:
Louis W. Gratz.
Frank L. A. Graham.

Inventor
Frank M. Merrill
By Townsend, Lyon, Hardley & Knight
his Attys

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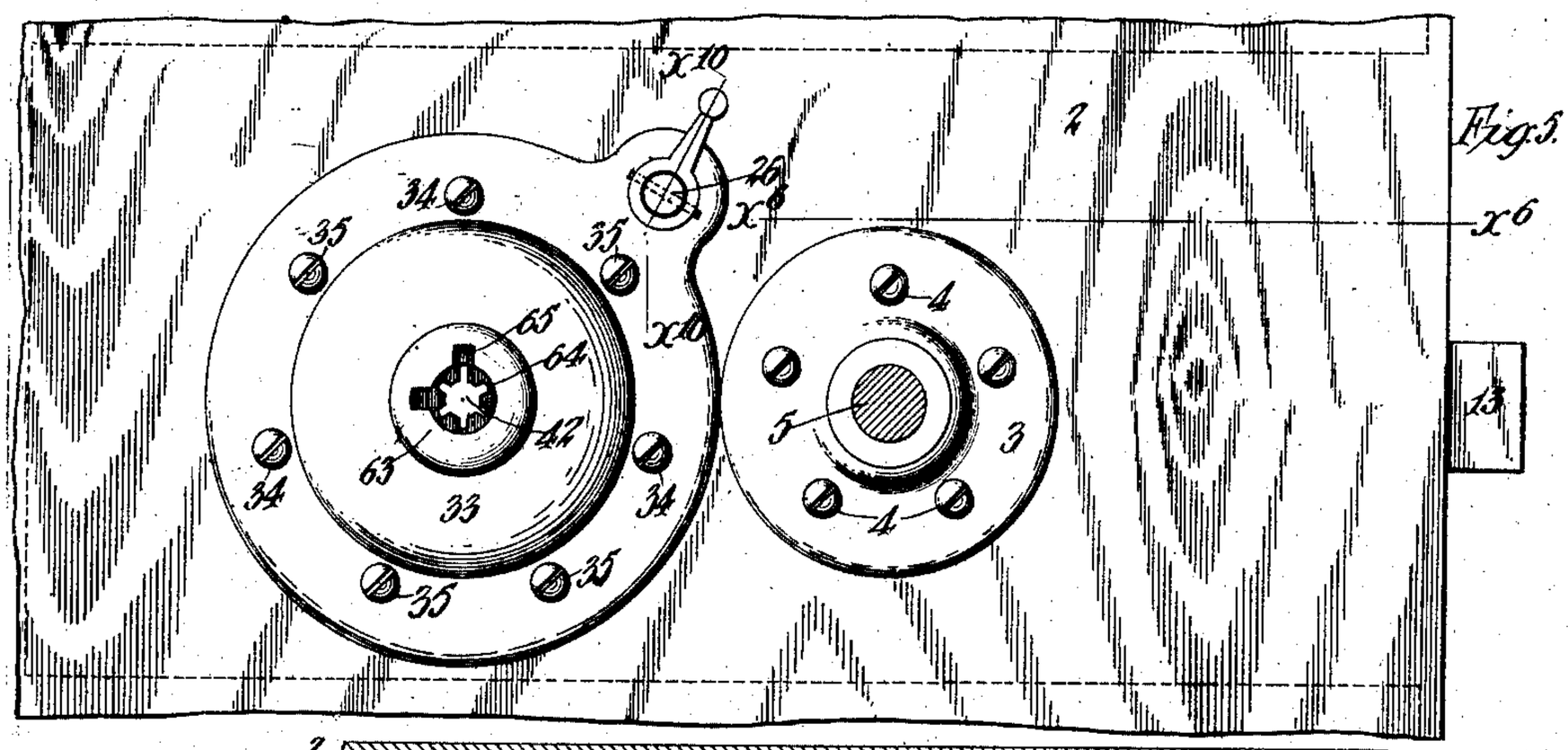
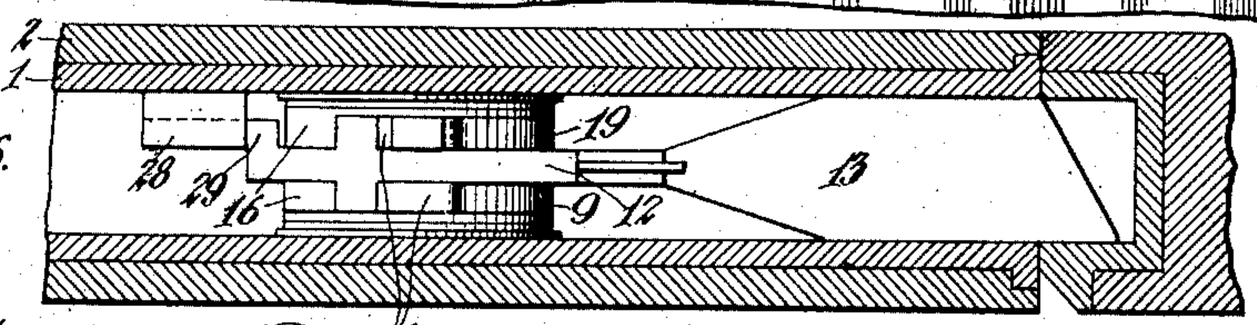
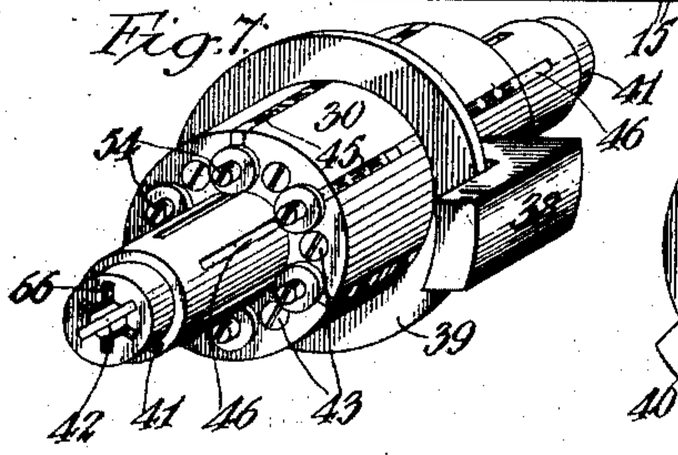
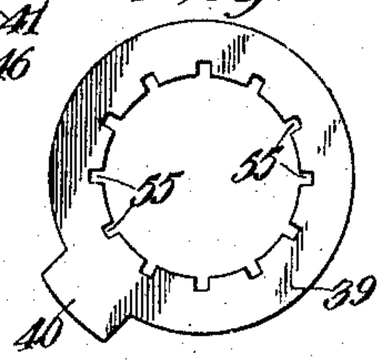
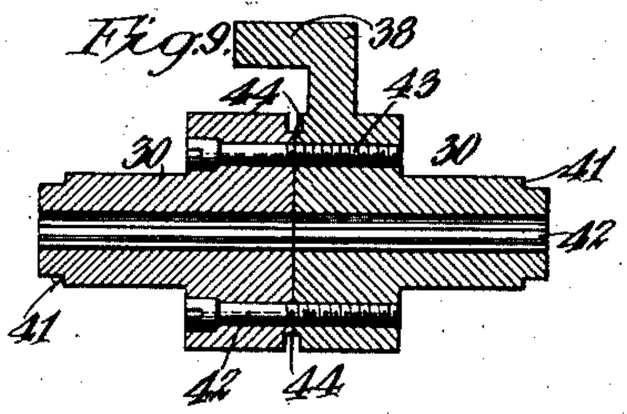
2 SHEETS—SHEET 2.

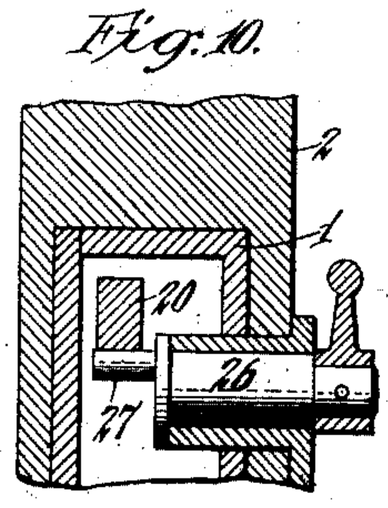


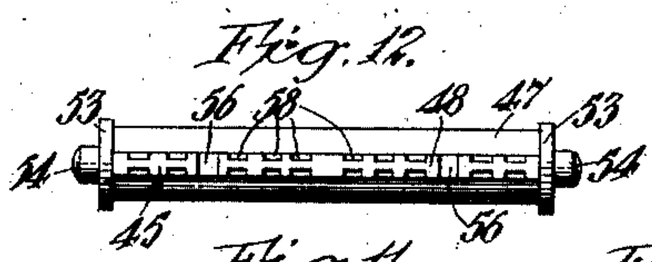


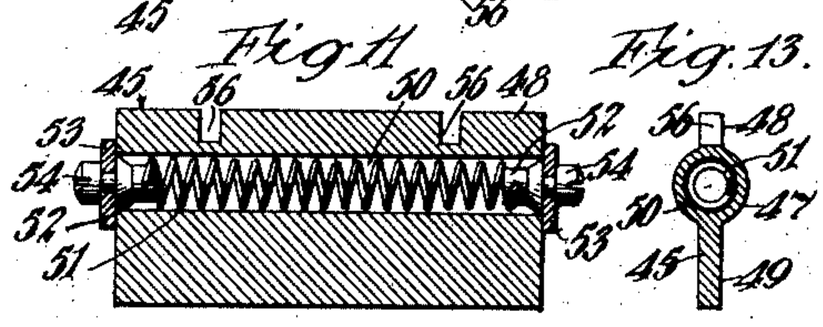


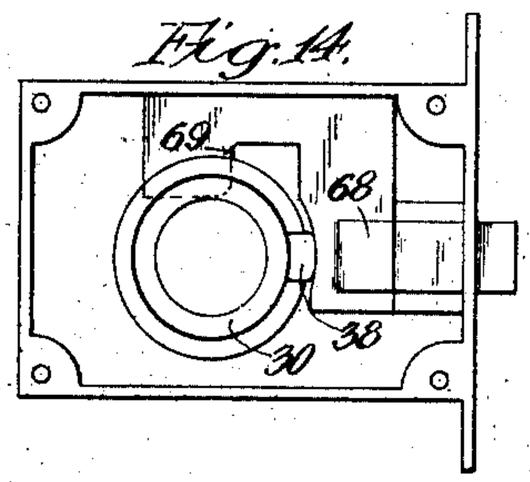












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Inventor
Frank M. Merrill.
By
Fennemore, Dyer, Hendricks & Knight
his attys.

UNITED STATES PATENT OFFICE.

FRANK M. MERRILL, OF LOS ANGELES, CALIFORNIA.

DOOR-LOCK.

No. 883,415. Specification of Letters Patent. Patented March 31, 1908.

Application filed June 4, 1907. Serial No. 377,248.

To all whom it may concern:

Be it known that I, FRANK M. MERRILL, a citizen of the United States, residing at Los Angeles, 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 the class of door locks wherein the keys of any one series of locks are of similar shape and are distinguished by permutative differences in the controlling parts thereof.

The main object of the invention is to provide a lock of this character in which a large number of permutations of differentiations can be secured with a relatively small number of parts.

A further object of the invention is to provide a clock of this character, simple in construction and economical in manufacture.

Another object is to provide means for safeguarding the lock from picking.

The invention comprises in combination with a bolt and its retracting means, of a key-controlled member provided with slides to be operated by the key in a selective manner, the position of the slides as controlled by the key determining the operation of the bolt, and an object of my invention in this connection is to provide a lock of this character which can be operated from either side of the door.

In the accompanying drawings:—Figure 1 is a vertical section of the lock, in a form wherein the operation of the key controls but does not operate the bolt. Fig. 2 is a transverse section on the line x^2—x^2 in Fig. 1. Fig. 3 is a transverse section on the line x^3—x^3 in Fig. 1. Fig. 4 is a perspective of the key. Fig. 5 is a side elevation with an operating spindle in section. Fig. 6 is a section on line x^6—x^6 in Fig. 5. Fig. 7 is a perspective of the key-operated rotative member. Fig. 8 is an elevation of the ring which normally holds the said key-operated member from rotation. Fig. 9 is a longitudinal section of the key-operated member. Fig. 10 is a section on the line x^{10} in Fig. 5. Fig. 11 is a longitudinal section of one of the tumbler slides, Fig. 12 a plan thereof, and Fig. 13 an end elevation thereof. Fig. 14 is a section of a form of the invention wherein the operation of the key causes operation of the bolt.

1 designates the lock case which is set into the door 2, being preferably mortised therein. At each side of the door there is provided a plate 3 which is secured to the lock case 1 by screws 4 and is bored to receive the shank 5 of the operating knobs 6 at each side. Said shank has a flange 7 engaging on the outside of the bolt case and has a square or non-circular projection 8 extending into a similar seat or socket in a disk 9 or 19 at each side of the case, each disk 9 or 19 having a journal stud 10 whereby it is journaled in that side of the case. The two disks 9 and 19 are sufficiently separated to provide for the passage between them of the bolt shank 12 which is formed as a plate extending rearwardly from the bolt 13, said bolt sliding through the front plate of the case and having a beveled end to engage with the usual retainer on the jamb of the door. Said bolt is normally protracted by a spring 14 attached thereto and to the front of the case and is retracted by the knobs 6, the disk 9 or 19 attached to each of said knobs being provided with diametrically opposite arms 15 which engage with lugs 16 extending from opposite sides of the bolt shank plate 12 in either direction of rotation of either knob.

In order to prevent the door from being normally opened from the outside by operation of the knob thereat, a latch 20 is provided, pivoted at 21 and having a notch 22 to engage with a projection 23 on one of the arms 15 of the actuating disk 19 at that side, a spring 24 normally forcing the latch downwardly into such engagement as shown in dotted lines in Fig. 1. An arbor 26 rotatably mounted in the case 1 has an eccentric pin 27, whereby on rotating the said arbor the said pin will engage the latch 20 to raise the same out of engagement with the projection 23 aforesaid and enable operation of the bolt by the knob at either side.

At the rear of the bolt shank 12 is provided an extension 29 thereon which slides and is guided between the projections 28 on the case and which engages with the key-operated means to control the retraction of the bolt. Said key-operated means comprises a barrel or cylinder 30 rotatably mounted within the cylinder 31 fixed or formed in the lock case, said cylinder 31 extending through the lock case from side to side and closed at one end and having an outturned flange 32 at the other end and provided with a cap member 33 closing the other end of said cylinder, the

said cap member being secured to the body member by screws 34 and the said body member being secured to the lock case by screws 35.

The cylinder 31 has a segmental slot 37 for the passage therethrough of the bolt-controlling arm 38 of the barrel 30. A ring 39 extends within the cylinder 31 and has an arm 40 projecting into engagement with the said cylinder to prevent rotation of said ring. The barrel 30 is rotatably seated at its ends in the ends of the cylinder 31 and is shouldered as at 41 to prevent endwise movement of the barrel. Said barrel member has a longitudinal bore 42 for the passage of the key, said bore having radial slots to receive key fins as hereinafter described. Said barrel is preferably formed in two portions fastened together by screws 43 as shown in Fig. 9, the barrel being enlarged toward the center or at the inner end of each portion and there being formed in the enlargement, at the joint, an annular groove 44 to receive the ring 39 aforesaid so that the barrel can turn within the ring, except as prevented by the ward devices, but the parts are retained against relative longitudinal motion.

In the barrel 30 are provided a plurality of tumbler slides 45, for example six, each adapted to slide longitudinally in a corresponding longitudinal slot 46 in the barrel. Each tumbler slide comprises a cylindrical portion 47, an outer rib or fin 48, and an inner rib or fin 49, the slot 46 in the barrel for receiving the same being correspondingly formed. The cylindrical portion 47 of the tumbler slides has a longitudinal bore 50, within which is placed a tensile helical spring 51 attached at each end to a head 52 having a flange or collar 53 attached thereto to extend over and engage the outer end of the slide. The said collar is removably attached by a screw 54 at one or both sides to facilitate assembling of the parts. The function of the spring 51 is to tend to draw the slide to normal position where it is centralized relatively to the barrel. Ward ring 39 has notches 55 to receive and engage these slides, so as to normally prevent the tumbler barrel 30 from turning, and the outer rib of each slide has two notches 56, so that on pushing the slide longitudinally from either direction, the lock will be brought into register with the ward ring, freeing the barrel from engagement with the ward ring as far as this slide is concerned. The inner ribs or flanges of the tumbler slides extend within the radial slot 46 of the barrel so as to lie in the path of the controlling means of the key. The positions of the notches 56 in the different tumbler slides are variant for the different slides in each lock and in different locks these variations giving the permutative changes that differentiate the locks. The notches in any one lock may be so arranged that the same key may be used on either side of the lock, or they may be so arranged that different keys are required for the two sides of the lock.

To protect the lock from picking, each tumbler slide is provided with means for simulating the openings or notches 56 at various points along its length. For example, as shown in Fig. 3, the upper rib 48 of the slide is provided on each side with depressions or notches 58 which extend only part way through and are therefore not effective in releasing the slide from a non-rotative engagement with the ward ring, but are effective in allowing the slide to yield a little to the pressure of the lock pick, thereby throwing any person, who has attempted to pick the lock, off his guard. These depressions or blind notches 58 are preferably spaced at more or less irregular distances, which is different in the different slides in any lock and in the different locks.

The longitudinal position of the notches 56 being different in the different slides, to provide for differentiation of the locks from one another, and the shoulders or heads of the inner ribs 49 which are engaged by the key, being similarly situated in all the slides, it is necessary that the key should have operating means which will press the slides longitudinally in different distances so as to bring the controlling notches 56 in each slide in register with the ward ring. Such a key is indicated at 60 in Fig. 4, having a plurality of fins or flanges 61 of different lengths, corresponding to the different positions of the notches in the tumblers, one of said fins being higher than the others, each end of the lock cylinder 31 being provided with a key-receiving guard flange 63 having a key-receiving opening 64 with radial notches 65 receiving a lug 70 on the key to insure full turn of the key, and the barrel 30 having notches corresponding to the key fins, one of said notches, indicated at 66, being deeper than the others to receive the higher key fin, and thus insure that the key is inserted in proper angular position.

Instead of merely controlling or dogging the bolt, the key-operated member or barrel 30 may, by its arm 38, operate directly on the bolt, as shown in Fig. 14, when the bolt 68 is provided with shoulder 69 engaged by said arm to retract the bolt when the barrel 30 is turned.

What I claim is:—

1. The combination with a lock case, of a barrel rotatably mounted therein, a lock bolt controlled by the rotative movement of said barrel, a ward ring in the case provided with means for preventing rotation thereof, said ward ring having notches, slides movable longitudinally in the barrel and extending into said notches, said barrel having a longitudinal bore with slots radiating therefrom and receiving the slides, each slide having

notches on opposite sides of the ward ring, the distance of the notches from the ward ring being different in different slides.

2. The combination with a lock case, of a barrel rotatably mounted therein, a lock bolt controlled by the rotative movement of said barrel, a ward ring in the case provided with means for preventing rotation thereof, said ward ring having notches, slides movable longitudinally in the barrel and extending into said notches, said barrel having a longitudinal bore with slots radiating therefrom and receiving the slides, each slide having notches on opposite sides of the ward ring, the distance of the notches from the ward ring being different in different slides, and spring means for each slide for returning the same to normal position on displacement thereof in either longitudinal direction.

3. The combination with a lock case, of a barrel rotatably mounted therein, a lock bolt controlled by the rotative movement of said barrel, a ward ring in the case provided with means for preventing rotation thereof, said ward ring having notches, slides movable longitudinally in the barrel and extending into said notches, said barrel having a longitudinal bore with slots radiating therefrom and receiving the slides, each slide having notches on opposite sides of the ward ring, the distance of the notches from the ward being different in different slides, and spring means for each slide for returning the same to normal position on displacement thereof in either longitudinal direction and the said slides having depressions on each side acting as blind notches to guard the ward releasing notches.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 23rd day of May 1907.

FRANK M. MERRILL.

In presence of—
ARTHUR P. KNIGHT,
FRANK L. A. GRAHAM.