F. SOLEY.

COMBINATION LOCK.

APPLICATION FILED APR. 5, 1907.

900,438.

Patented Oct. 6, 1908.

2 SHEETS—SHEET 1.

Fig. 1.

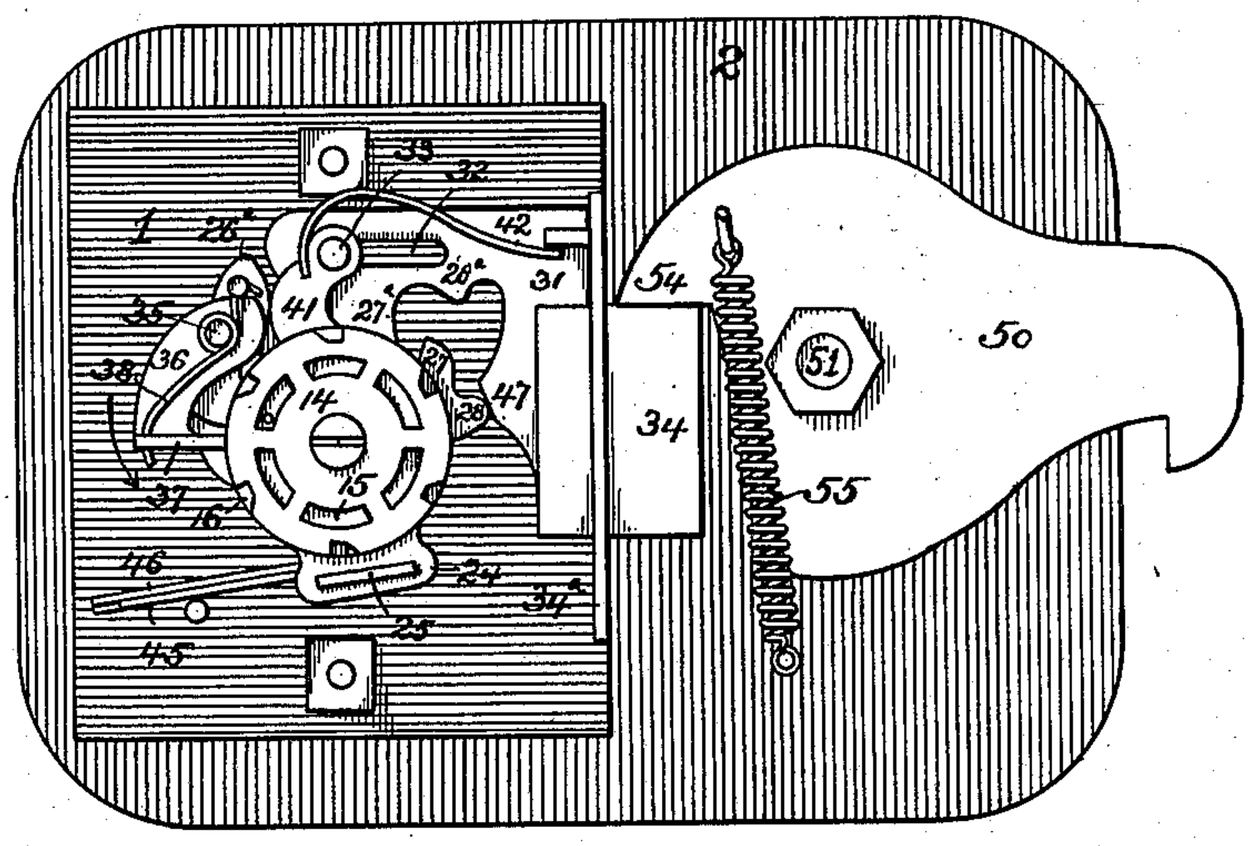
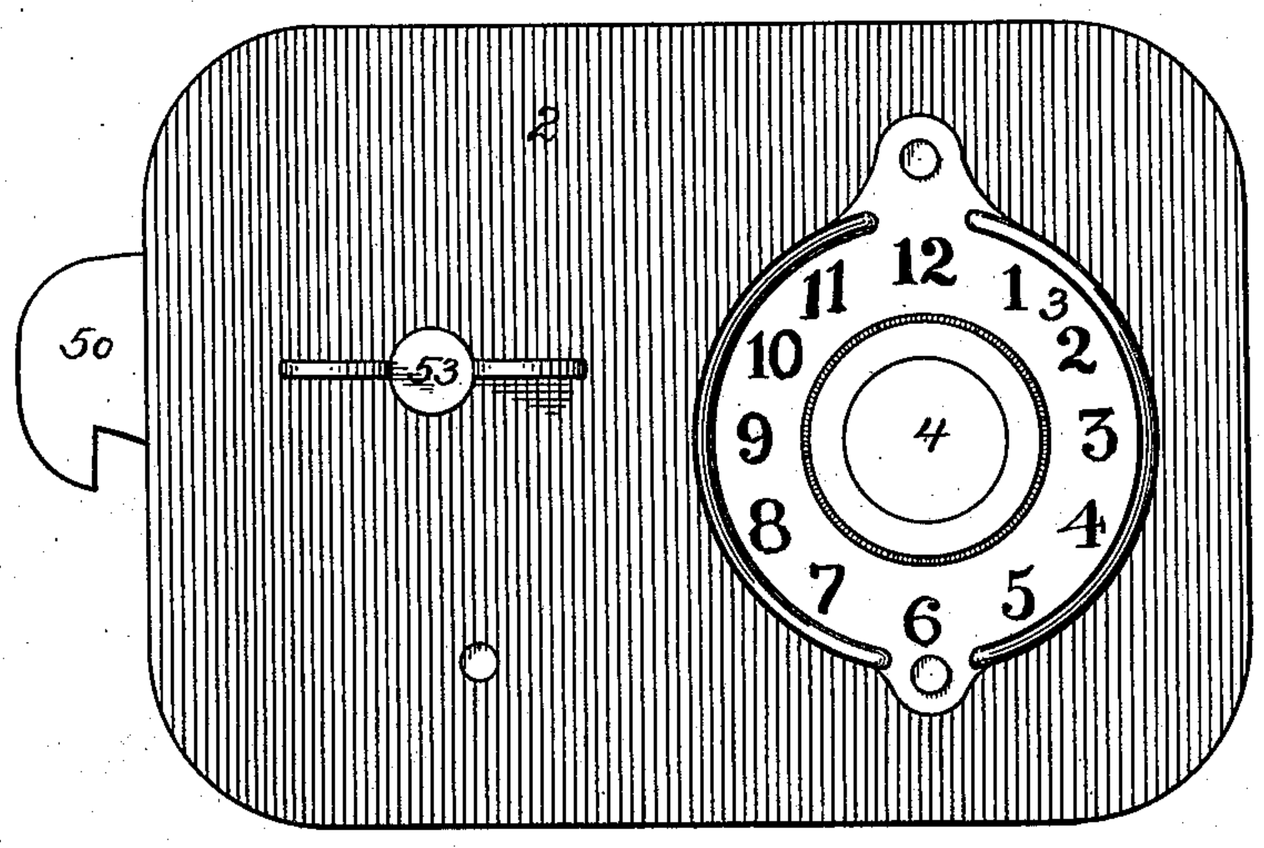


Fig. 2.



Witnesses
Hamilton D. Turner
Kate A. Beadle

Inventor
Frank Soley
by his attorneys
Smith & Lazier

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2 SHEETS—SHEET 2.

Fig. 3.

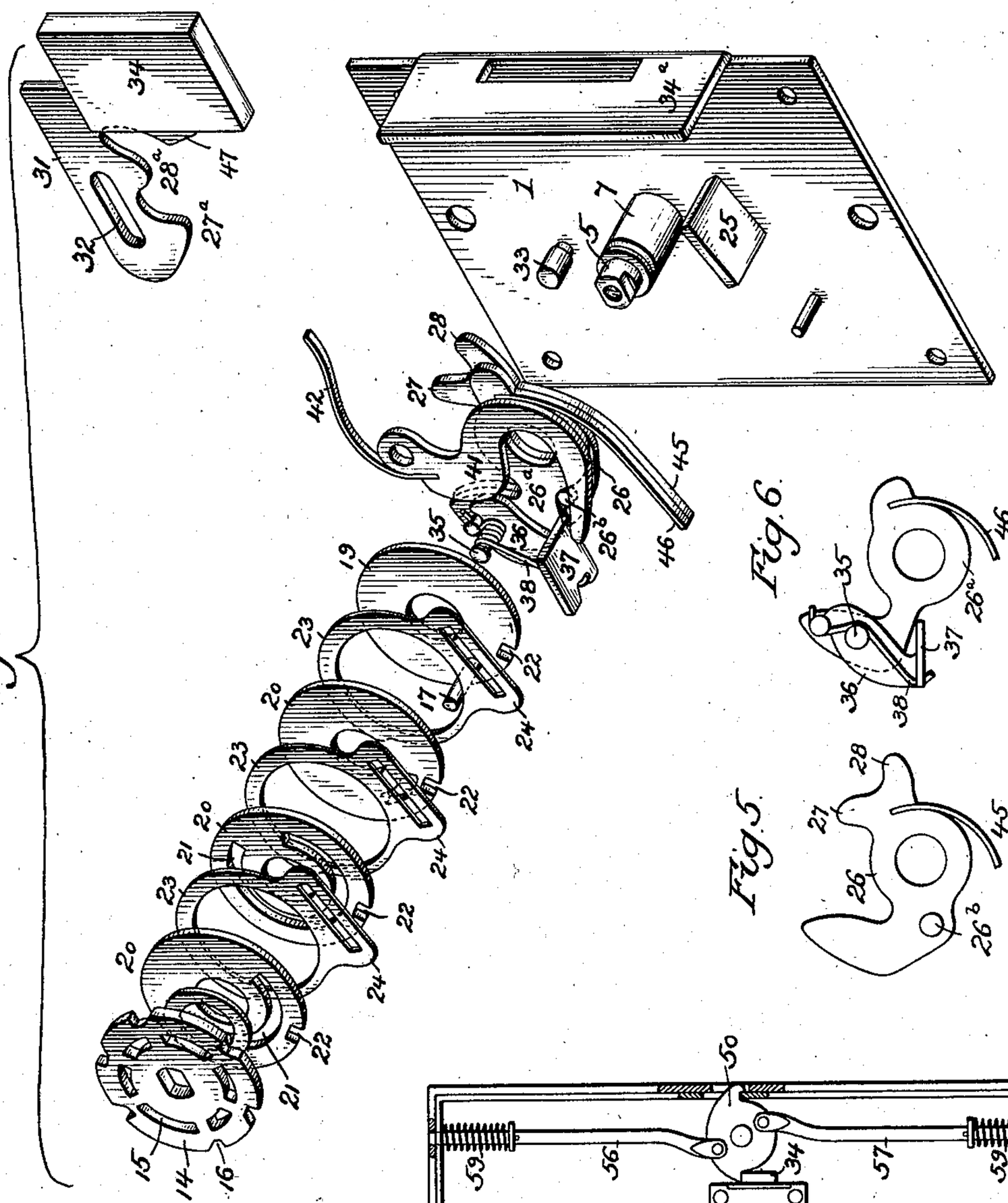


Fig. 6.

Fig. 5.

Fig. 4.

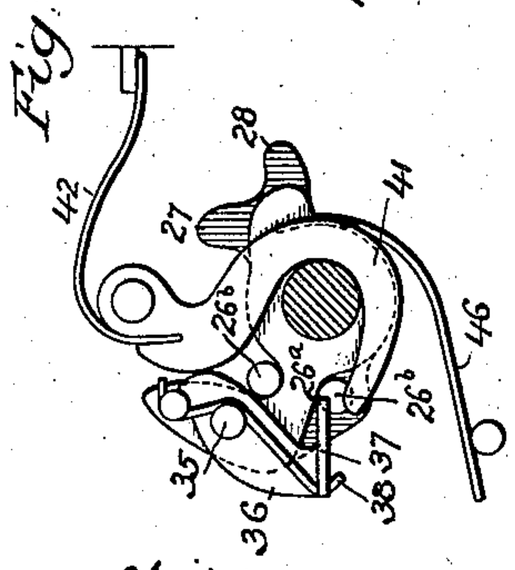
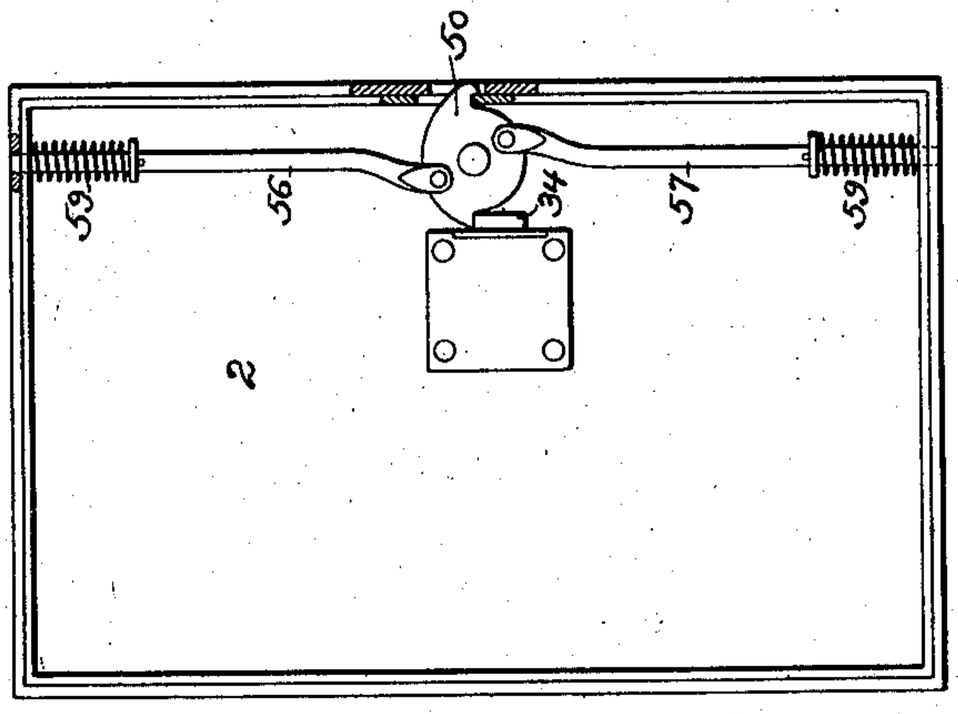


Fig. 7.



Witnesses
Hamilton D. Turner
Kate A. Beadle

Inventor
Frank Soley
by his Attorneys
Smith & Frazer

UNITED STATES PATENT OFFICE.

FRANK SOLEY, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO MILLER LOCK COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

COMBINATION-LOCK.

No. 900,438. Specification of Letters Patent. Patented Oct. 6, 1908.

Application filed April 5, 1907. Serial No. 366,590.

To all whom it may concern:

Be it known that I, FRANK SOLEY, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Combination-Locks, of which the following is a specification.

One object of my invention is to so construct a combination lock that the bolt will be projected by means of a spring, but, when projected, will be held in such projected position until the tumblers have again been reset, whereupon the bolt can be treated by means of the knob.

A further object is to so combine such a lock with an independently operated bolt that when the latter has been adjusted to locking position, the bolt of the lock will be automatically projected and caused to engage said supplementary bolt in order to prevent retraction of the same until the lock bolt has again been retracted, the necessity of operating both the lock and the supplementary bolt mechanism in order to fasten the door or other structure to which the lock is applied being thus rendered unnecessary.

In the accompanying drawings: Figure 1 represents part of the inner side of a door or other structure with locking mechanism in accordance with my invention, the cover plate of the lock being removed in order to illustrate the working parts of the same; Fig. 2 is a face view, Fig. 3 is a perspective view of the various parts of the lock detached from one another, Figs. 4, 5 and 6 are detached views of parts of the lock mechanism, and Fig. 7 is a view of a door with multiple-bolt mechanism controlled by the lock in accordance with my invention.

The lock may be constructed in general accordance with that forming the subject of my application Serial No. 324,614, filed July 3, 1906, 1 representing the face plate of the lock which is suitably secured to the inner side of the door 2, or other structure in connection with which the lock is to be used, the face of said door having a numbered dial 3, or similar indicating device, which operates in conjunction with the knob 4 of the lock, the latter having a spindle 5 which is free to turn in a tubular hub 7 projecting inwardly from the face plate 1 of the lock, as shown in Fig. 3, and these parts being so constructed, by preference, that the adjustment of the knob can be determined by the sense of sight alone, or by the senses of touch and hearing with or without the sense of sight, as fully set forth in my former application.

Mounted upon the flattened inner end of the knob spindle 5 is a driving disk 14 which has a series of slots 15 and a series of notches 16, one for each slot, and, with any of the slots 15 may engage a pin 17 projecting from a supplementary driving disk 19, which is mounted so as to be free to turn on the hub 7 of the face plate. Between the main and supplementary driving disks are interposed tumblers 20, each of which has a peripheral notch 22 and also a segmental slot 21 for the reception of the driving pin 17, the length of each slot and the relation of a peripheral notch thereto determining the adjustment of the different tumblers necessary in order to bring their notches into line in opening the lock.

The supplementary driving disk 19 also has a peripheral notch 22 and therefore acts as a tumbler in the same manner as the tumblers 20. These tumblers, like the disk 19, are free to turn on the hub 7 but are prevented by washers 23 from imparting motion one to another except through the medium of the driving pin 17, the washers being interposed between the successive tumblers and between the first tumbler and the supplementary driving disk 19 and being prevented from rotating by reason of the engagement of slotted lugs 24 thereon with a lug 25 projecting inwardly from the face plate 1.

Between the supplementary driving disk 19 and the face plate of the lock are interposed a bolt thrower 26 and a dog-carrying plate 26^a, both free to turn on the hub 7, said bolt-thrower being provided with projecting teeth 27 and 28 for engagement with corresponding teeth 27^a and 28^a on the bolt plate 31, the latter having a slot 32 whereby it is guided on a pin 33, projecting inwardly from the face plate of the lock, the bolt 34 being also guided in the slotted flange 34^a of the face plate.

Pivoted to a pin 35 on the carrier 26^a is a lever 36 provided with a dog 37, said lever being acted upon by a spring 38 in such manner that the dog 37 has a normal tendency to move inwardly or toward the axis of the knob spindle.

On the pin 33 is pivotally mounted a hooked arm 41 which partially embraces the

hub 7 and is normally maintained in contact with said hub by means of a spring 42.

The dog carrier 26ª contacts with a pin 26ᵇ projecting from the face of the bolt thrower 26, as shown in Fig. 3, whereby forward movement of the dog carrier, that is to say, movement in the direction of the arrow Fig. 1, will be imparted to the bolt thrower and the teeth of the latter, by engagement with the teeth of the bolt plate 31, will effect retraction of the bolt 34.

The bolt thrower and the dog carrier are, however, acted upon by independent springs 45 and 46, as shown in Fig. 3, and the dog carrier is free to move rearwardly, or in a direction the reverse of that indicated by the arrow in Fig. 1, without imparting movement to the bolt thrower.

When the lock is locked and the bolt projected the parts occupy the relation shown in Fig. 1, the inner end of the dog 37 resting upon the peripheries of the tumblers and driving disks, but when, by proper manipulation of the knob 4, the notches 22 of the tumblers and a notch 16 of the driving disk have been brought into line with each other and with the inner end of the dog 37, the latter will, by the action of the spring 38, be caused to enter said notches, and further movement of the driving disk will therefore be imparted to the dog and its carrier, and thence, through the medium of the pin 26ᵇ, to the bolt thrower 26 so as to effect retraction of the bolt 34.

When the dog 37 enters the notches of the driving disk and tumblers it is brought in front of the inner end of the arm 41 as shown in Fig. 4 and as the dog is moved forwardly it carries said arm 41 with it, the arm swinging on its pin 33 until, because of the different arcs of travel of the arm and dog they clear each other, whereupon the arm is immediately restored to its normal position by the action of the spring 42, thus bringing under the dog 37 the outer face of the arm 41 which is inclined in respect to the arc of travel of the inner end of said dog 37 when the latter is in engagement with the notches of the driving disk and tumblers.

The bolt will be retained in the retracted position as long as the pressure upon the knob is maintained, but as soon as said pressure is relieved the dog carrier 26ª will be moved rearwardly by its spring 46 and the dog 37 riding upon the inclined back of the arm 41 will be ejected from the notches of the tumblers, the latter will be dispersed by momentum so as to carry their notches out of line with one another and with the notch of the driving disk, and at the same time, the spring 45 will so act upon the bolt thrower as to cause projection of the bolt. The use of the automatic dog ejector is not absolutely necessary, as the dog may be ejected and the tumblers dispersed by rearward movement of the knob if desired.

When the bolt is in the projected position, as shown in Fig. 1, the tooth 28 of the bolt thrower is in engagement with a locking face 47 on the bolt plate and the bolt is locked in the projected position and cannot be forced inwardly by pressure applied to it, therefore the bolt, while projected by a spring, has, when once projected, all of the qualities of a dead bolt and can only be retracted by means of the knob after the latter has effected the proper readjustment of the tumblers.

The locking face 47 of the bolt is so beveled, that any rearward pressure upon the bolt or jarring of the lock, will have a tendency to settle the tooth 28 of the bolt thrower more firmly into locking position. While the bolt thrower 26 is moved through the medium of the dog carrier 26ª to retract the bolt, independent movement of the dog carrier in the opposite direction is permitted, hence the dog can be restored to its initial position in respect to the tumblers, whether the bolt is fully projected or not and the inability to open the lock which might occur on a partial projection of the bolt if the dog was hung directly to the bolt thrower, is thus effectually overcome.

Fig. 1 of the drawing illustrates a simple method of combining my improved combination lock with a supplementary bolt 50, intended to be operated independently of the lock itself. The bolt 50 is carried by a spindle 51, which is free to turn in the door 2 or other structure to which the lock is applied, and it has, on the outside of said structure, a knob 53, whereby the bolt 50 can be operated, said bolt having a shoulder 54 for engagement with the bolt 34 whereby it is retained in the locking position shown in Fig. 1, but being acted upon by a spring 55, which, as soon as the bolt 34 has been retracted, moves said bolt 50 to the open or unlocked position, the bolt 34 being then held in its retracted position by engagement with the periphery of the bolt 50 until the latter has been again adjusted, by means of its knob 53, to the locking position, whereupon the bolt 34 will be at once projected by the spring-actuated bolt thrower 26, and the dog carrier 26ª will be actuated by its spring so as to eject the dog and disperse the tumblers of the lock no manipulation of the knob 4 being necessary in order to complete the locking of the door, in which respect my present invention is an important advance upon that class of locks in which, after the bolt 50 has been adjusted by its knob to the locking position the lock must also be manipulated by its knob in order to secure said bolt 50 in the locked position.

In Fig. 7 I have illustrated the applica-

tion of my invention to a door having three bolts 50, 56 and 57, the latter being pivotally connected to the bolt 50 so that the operation of the latter also imparts movement to the bolts 56 and 57, the latter being acted upon by springs 59 whose tendency is to move them to the open or unlocked position.

I claim:—

1. A combination lock having tumblers, a bolt which is projected by the action of a spring, and a tumbler-controlled member having a portion for engaging the bolt and preventing retraction of the same by pressure upon it, and another portion for engaging the bolt and effecting retraction of the same.

2. A combination lock having a locking bolt and a tumbler-controlled and spring-actuated bolt thrower which engages the bolt when the latter is in the projected position and retains it in such position.

3. A combination lock comprising a tumbler-controlled and spring-actuated bolt thrower, a spring-actuated dog carrier, a series of notched tumblers, a dog for engaging the same, and means for automatically ejecting said dog from the notches of the tumblers when the bolt is projected.

4. The combination of a lock having a tumbler-controlled and spring-projected bolt, with supplementary and independently operated bolt mechanism retained in locked position by engagement with the bolt of the lock.

5. The combination of a lock having a tumbler-controlled and spring-projected dead bolt, with supplementary bolt mechanism independently operated and retained in locked position by engagement with the bolt of the lock.

6. The combination of a lock having a spring-projected bolt, with supplementary and independently operated bolt mechanism retained in locked position by engagement with the bolt of the lock, and one or more springs for automatically moving said supplementary bolt mechanism to the unlocked position when free from engagement with the lock bolt.

7. The combination, in a lock, of a series of tumblers, a dog for engaging the same, a bolt thrower, and a dog-carrier which engages the bolt thrower for retracting the bolt but has movement independent of the bolt thrower in the opposite direction.

8. The combination, in a lock, of a series of tumblers, a dog for engaging the same, a bolt thrower, a dog-carrier independent of the bolt thrower but acting to move the same in one direction, and springs for independently operating said dog-carrier and bolt thrower.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

FRANK SOLEY.

Witnesses:
HAMILTON D. TURNER,
KATE A. BEADLE.