M. S. BEAVER.

LOCK.

APPLICATION FILED OCT. 9, 1920.

1,396,550.

Patented Nov. 8, 1921.

3 SHEETS—SHEET 1.

Fig. 1.

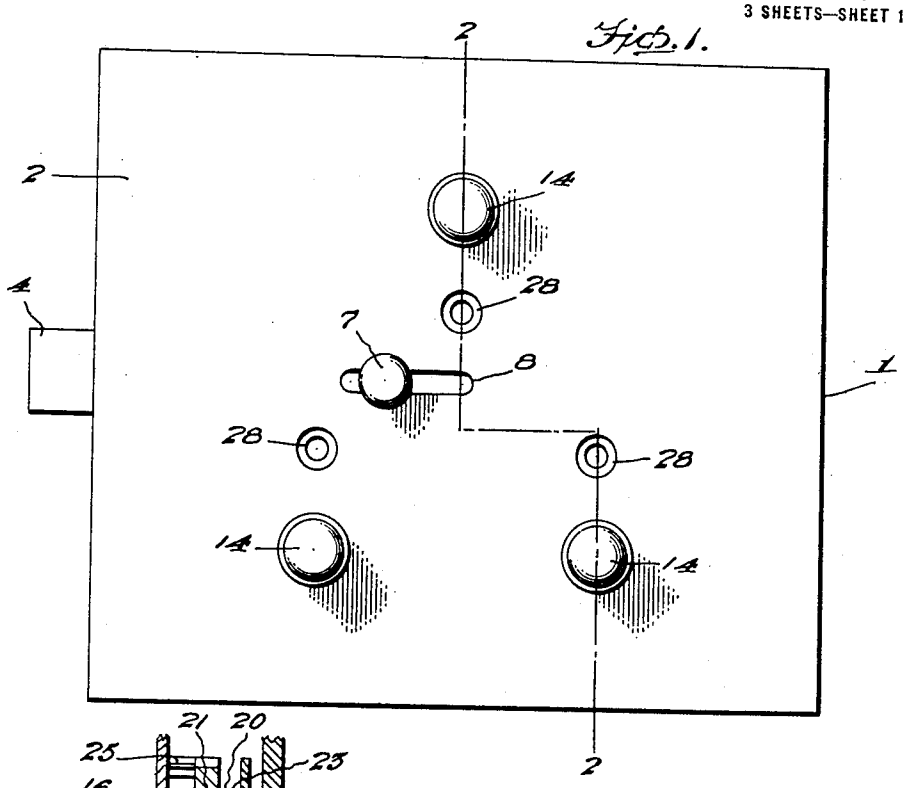


Fig. 2.

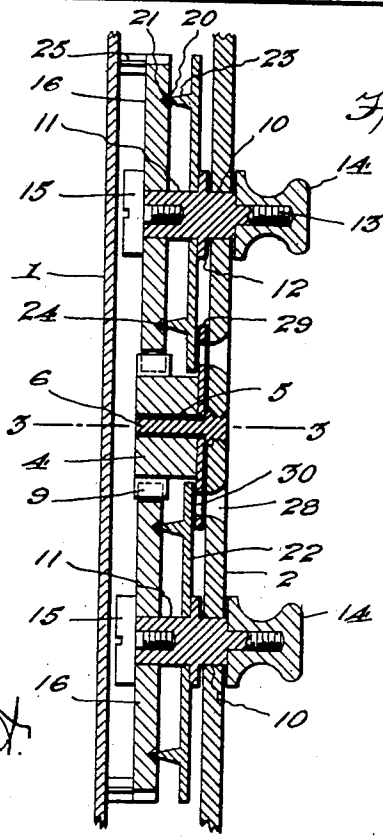
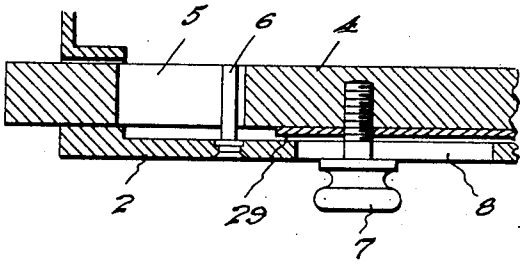


Fig. 3.



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3 SHEETS—SHEET 2.

Fig. 4.

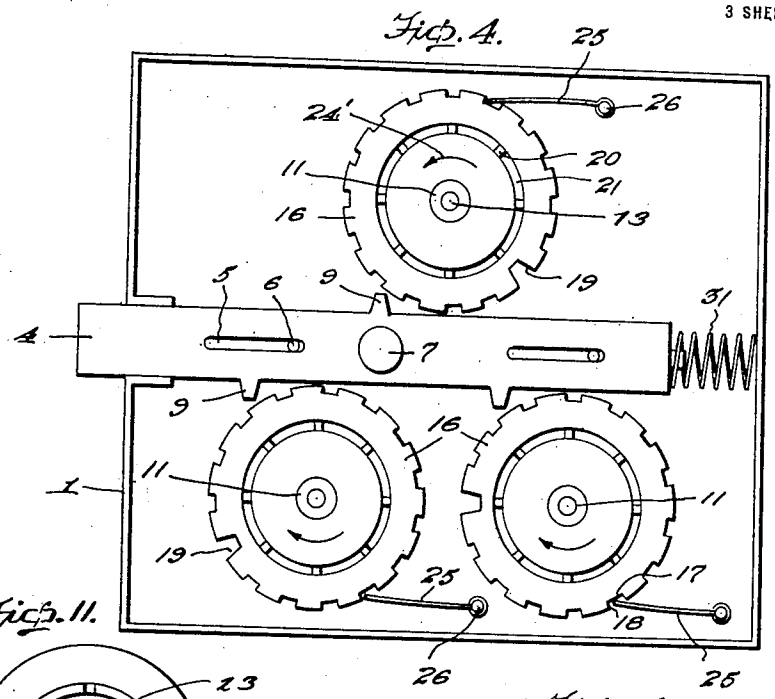


Fig. 11.

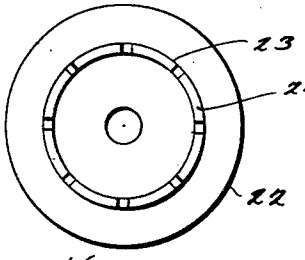


Fig. 10.

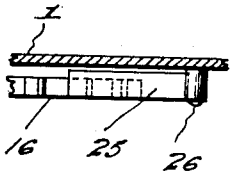
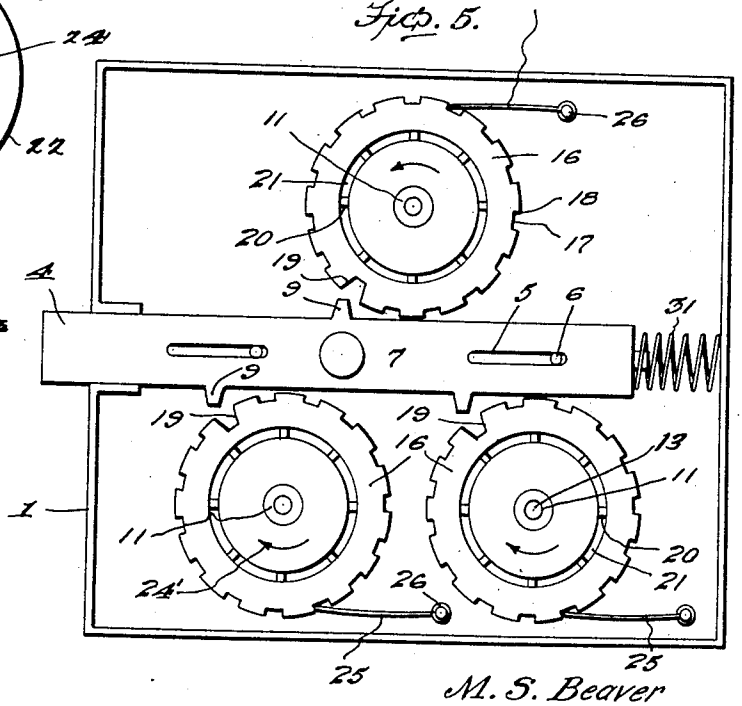


Fig. 5.



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3 SHEETS—SHEET 3.

Fig. 6.

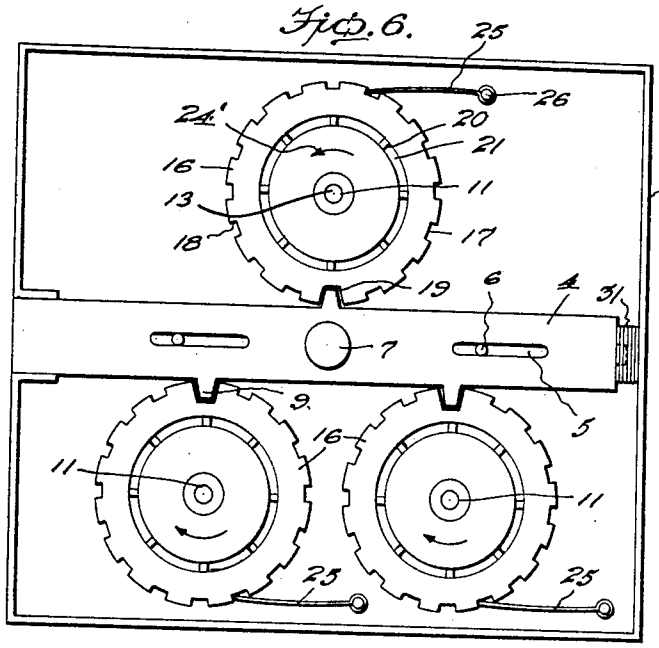


Fig. 8.

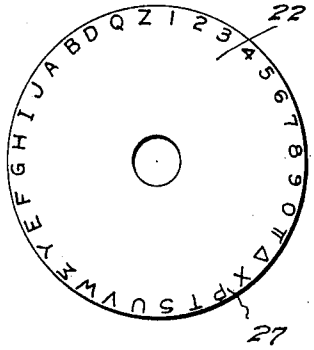


Fig. 7.

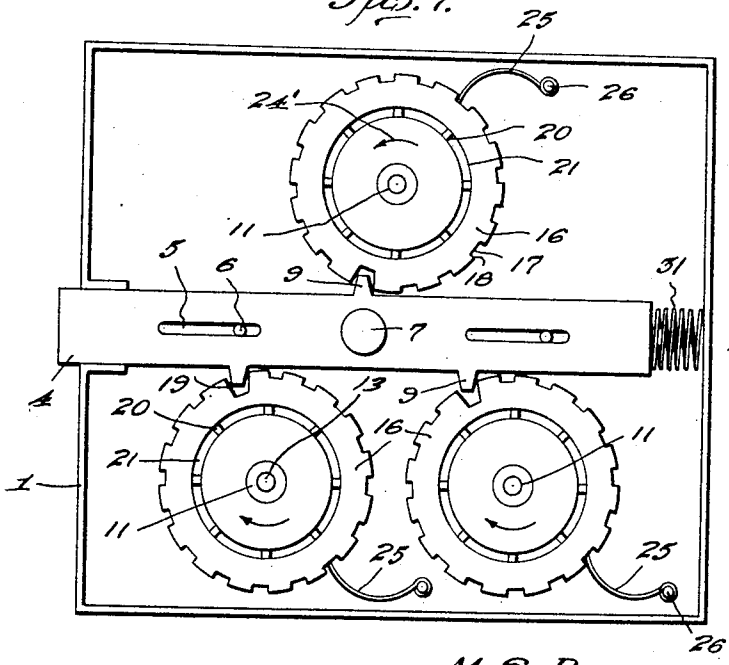
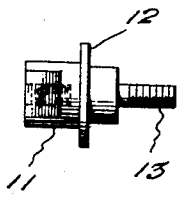


Fig. 9.



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UNITED STATES PATENT OFFICE.

MILTON S. BEAVER, OF READING, PENNSYLVANIA.

LOCK.

1,396,550. Specification of Letters Patent. Patented Nov. 8, 1921.

Application filed October 9, 1920. Serial No. 415,744.

To all whom it may concern:

Be it known that I, MILTON S. BEAVER, a citizen of the United States, residing at Reading, in the county of Berks and State of Pennsylvania, have invented new and useful Improvements in Locks, of which the following is a specification.

My present invention has reference to improvements in locks.

My object is the production of a permutation lock which shall be of a simple construction, in which the combination can be set at will, and can be only operated by a person having knowledge of the proper combination when the lock bolt is in locked position.

A further object is the production of a permutation lock which includes a slidable bolt designed, ordinarily for free sliding between the tumblers which are journaled to the adjacent edges of the bolt, said tumblers being provided with means designed to coengage with the bolt for holding the same either projected or retracted, and said tumblers being readily brought to bolt releasing position upon the manipulation thereof by a person acquainted with the proper combination.

A further object is the production of a permutation lock of this character which shall be simple in construction, embodying few parts which may be readily assembled or disassociated when repairs are required, and which positively cannot be operated, when set, except by an authorized person acquainted with the combination.

The foregoing objects, and others which will appear as the nature of the invention is better understood, may be accomplished by a construction, combination and operative association of parts, such as is disclosed by the drawings which accompany and which form part of this application.

In the drawings:—

Figure 1 is a side elevation of a permutation lock constructed in accordance with this invention.

Fig. 2 is a sectional view approximately on the line 2—2 of Fig. 1.

Fig. 3 is a sectional view approximately on the line 3—3 of Fig. 2.

Fig. 4 is an elevation, with the face plate of the lock casing removed, showing the bolt in projected position.

Fig. 5 is a similar view but showing the tumblers set to permit of the movement of the bolt to unlocking position.

Fig. 6 is a similar view showing the bolt in unlocking position, the lugs of the bolt being retained in the notches of the tumblers.

Fig. 7 is a similar view showing the bolt pushed to locked position sufficiently to permit of the lugs of the bolt being moved out of the notches of the tumblers, and showing the arrangement of the springs of the tumblers bowed to spin the tumblers to destroy the combination and to prevent the return of the bolt without the repeating of the combination.

Figs. 8 to 11 illustrate details.

Before proceeding with the description of the details of the construction, it is to be stated that any desired number of tumblers may be employed, and as all of the tumblers and the mechanisms associated therewith are of similar constructions, reference characters indicating the parts of one are to be understood as equally applicable to the remainder.

My improved permutation lock includes a casing 1 which is preferably rectangular and which has its edges flanged to provide sides and ends. The open face of the casing is closed by a plate 2.

Arranged for slidable movement through the opening in the front flange of the casing is a bolt 4. This bolt is provided with one or more longitudinal centrally arranged slots 5 that receive therethrough guide pins 6 secured to the face plate of the casing. Also the bolt is provided with a knob or handle 7, the shank of which passes through a longitudinal elongated slot 8 in the said face of the casing. By this means the bolt is properly positioned for slidable movement through the casing and is effectively guided in such movement.

The bolt has its edges formed with outstanding lugs 9, the number of the lugs corresponding to the number of the disk tumblers employed.

The face plate of the lock casing is provided with openings 10 each of which being disposed opposite the axial center of the tumblers, and shafts for the said tumblers extend through the said openings and find a bearing therein.

The shafts are each in the nature of spindles 11. Each of the spindles is pro-

vided with an annular flange 12 that is designed to contact with the inner face of the plate 2. Each of the spindles has its outer end provided with a reduced extension 13 on which is secured a knob 14. Each of the knobs has, of course, a threaded bore, and by turning the said knobs in one direction the flange 12 may be brought against the inner face of the plate 2. The inner ends of the spindles or shafts 11 have threaded bores that receive therein the threaded shanks of headed screws 15. The heads of these screws are of a greater diameter than that of the shaft or spindle 11 and bear against the inner face of the respective disk tumblers 16. Each of the disk tumblers 16 has its periphery formed with depressions that preferably define straight walls 17 and angle walls 18 and between certain of these depressions each of the disks has a transverse notch 19 of a size to snugly receive therein one of the lugs 9 of the bolt 4.

Each of the disks 16 has its inner face provided with a line of circumferentially arranged ribs 20 provided on the inner wall of an annular depression 21.

Freely mounted on each of the spindles or shafts 11, and in contacting engagement with the flange 12 thereof, is a disk 22. Each disk 22 has its inner face formed with a circumferentially arranged projecting flange 23 that has its end formed with teeth 24, the said teeth designed to engage between the ribs 20 in the depression 21. This is accomplished by adjusting the headed elements 15 which force the tumblers toward the disk, and as a consequence both the tumblers and disks are locked to their respective short shafts or spindles 11.

The disks 16 are permitted movement in the direction of the arrows, 24′, but held against such movement by the engagement of slightly arched springs 25 with the shoulders provided by the notched periphery of the said disks. The free ends of the springs are secured, as at 26 in the lock casing.

The outer face of each of the disks 22 is provided with circumferentially arranged indicating marks or figures 27 and the plate 2 is provided with openings 28 arranged opposite the said characters.

On the bolt 4 there is a plate 29 provided with sight openings 30 which, when the bolt is in projected or locked position, cover the sight openings 28 in the casing plate, so that the combination at which the tumblers are set cannot be obtained through the sight openings 28.

At the rear of the casing there is secured a compression spring 31 in the path of contact with the inner end of the bolt 4.

In Fig. 4 of the drawings, the bolt is shown in locked position. The spring 31 has exerted a tension against the bolt so that the lugs of the bolt have been brought out of binding engagement with the periphery of the tumblers. The springs 25 allow the tumblers to move in the directions indicated by the arrows, when it is desired to set the combination for opening the door to which the lock is attached.

In Fig. 5 the bolt is shown in locked position, but the tumblers have been turned by the knobs 14 so that the combination is set, that is to permit of the lugs of the bolt entering the notches of the tumblers on the retraction of the bolt. The bolt is moved inwardly by pressure against its knob against the spring 31, and the said bolt will be automatically held in its inward position by the action of the springs 25 which influence the tumblers to prevent the turning of the said tumblers in a reverse direction to that disclosed by the arrows, it being apparent that when the bolt is fully moved inward of the casing and the lugs of the bolt are fully received in the notches of the tumblers an outward movement of the bolt cannot occur unless the tumblers were permitted a clockwise movement, and this movement is prevented by the springs. Fig. 6 illustrates the position of the bolt and the tumblers when the bolt is fully retracted as just referred to.

Fig. 7 illustrates the manner in which the springs 25 are arched or tensioned by the bolt when the latter is in locking position. When the bolt has been moved sufficiently to locking position, the lugs are released from the notches of the tumblers, and the springs 25, assuming their normal position will spin the disks, thus throwing off the combination and preventing the return of the bolt without the resetting of the combination.

As each of the tumblers is provided with means whereby the notch thereof may be set at any desired position with respect to the lugs of the bolts, it will be seen that a great number of combinations can be reached. The disks 22 may be likewise turned so that different characters thereon can be brought opposite the sight openings, which adds to the great number of combinations obtainable, and it is thought that the foregoing description, when taken in connection with the drawings will amply set forth the construction, operation and advantages of the improvement without further detailed description.

Having thus described the invention, what I claim, is:—

1. In a permutation lock, a spring influenced slidable bolt, guide means therefor, operating means therefor, lugs on the edges thereof, peripherally notched tumblers revoluble in the casing, and having shafts projecting through the casing, knobs on the shafts operable to bind the shafts against the inner face of the casing, disks freely mounted on the shafts, said disks having in-

dicating characters thereon, said casing having openings in a line with said characters, an apertured plate carried by the bolt and the apertures of the said plate, when the bolt is in one position being arranged opposite the referred to openings, spring means in the casing engaging the tumblers for preventing the turning of the tumblers in one direction, and designed, when the said tumblers are partially influenced in a second direction to exert a tension against said tumblers to turn the same and the disks connected therewith.

2. A permutation lock comprising a casing having a plurality of openings therein, a slidable bolt provided with longitudinal centrally arranged slots, lugs integrally formed on the edges of said bolt, guide pins received in the slots of said bolt, an operating knob carried by said bolt a helical spring secured to said casing and engaging one end of said bolt, a plurality of shafts extending through the openings in said casing, notched tumblers mounted on said shafts, disks freely mounted on said shafts, a circumferentially arranged projecting flange integrally formed on the inner face of each of said disks designed to engage said tumblers, springs secured to the lock casing and adapted to engage said tumblers, and knobs carried by said shafts for operating said tumblers.

In testimony whereof I affix my signature.

MILTON S. BEAVER.