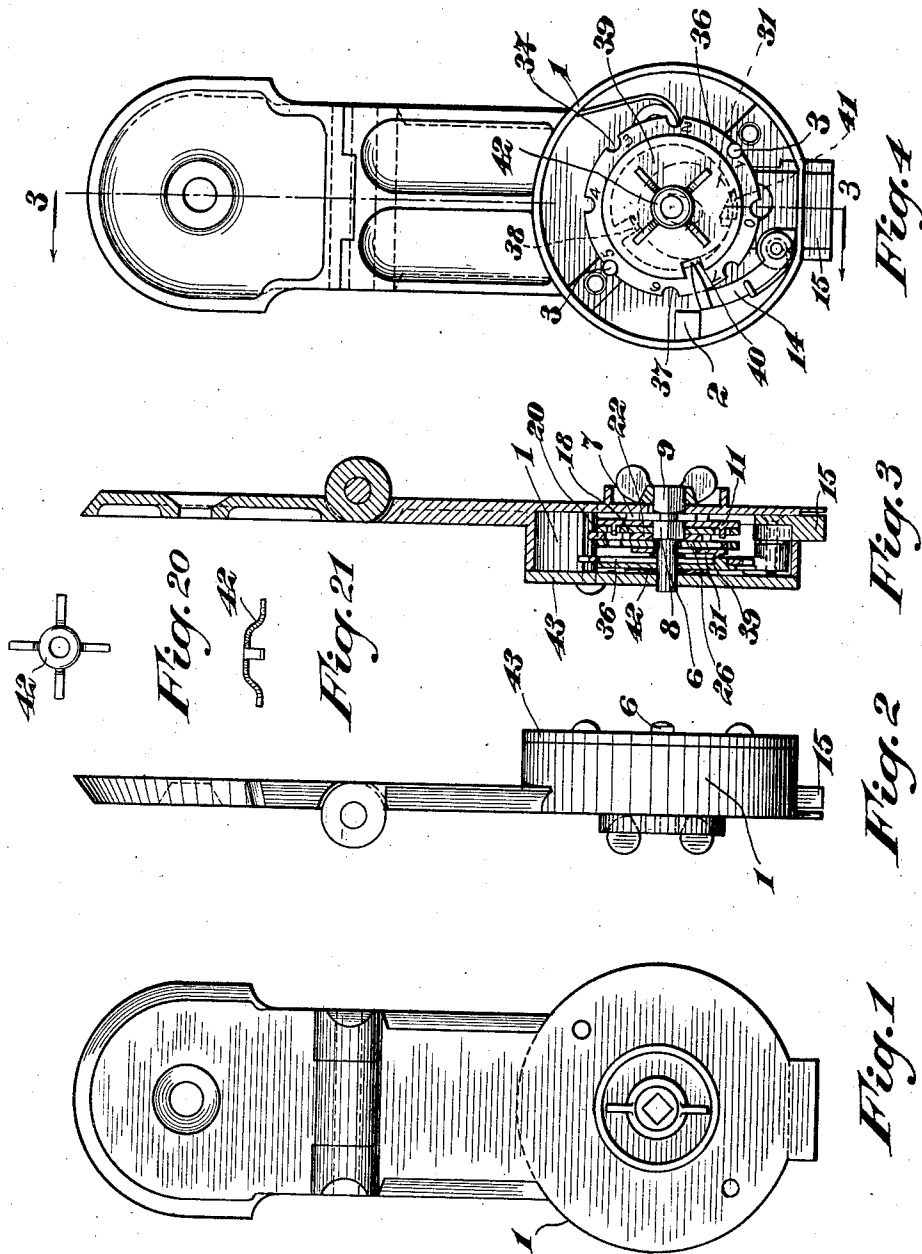


C. TURGEON.
COMBINATION LOCK.
APPLICATION FILED APR. 24, 1911.

1,058,814.

Patented Apr. 15, 1913.

3 SHEETS—SHEET 1.



Witnesses:

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E. J. Gaurin

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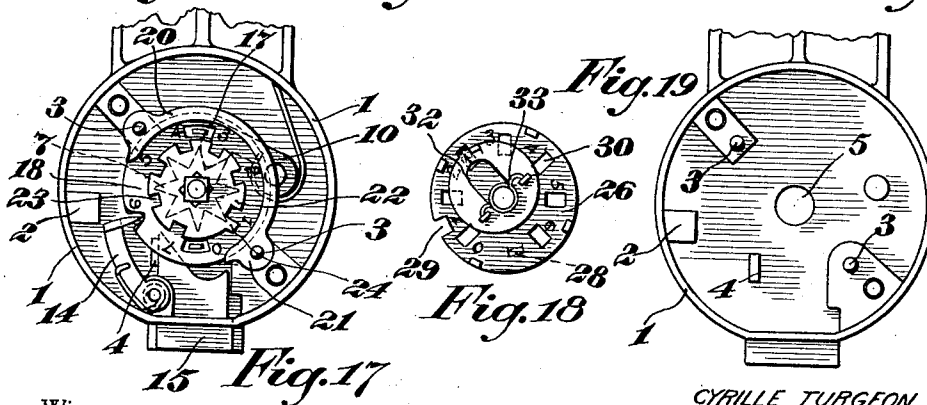
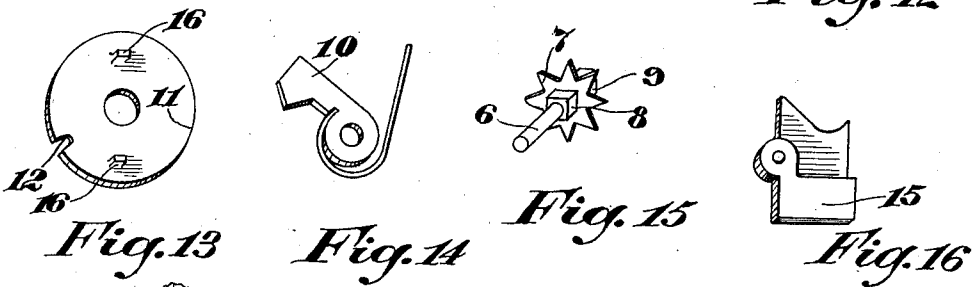
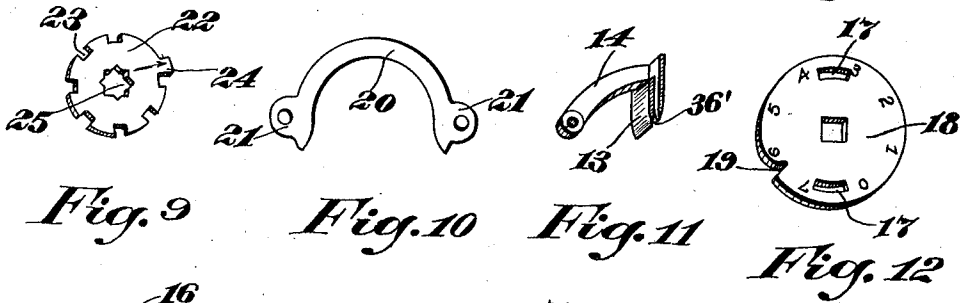
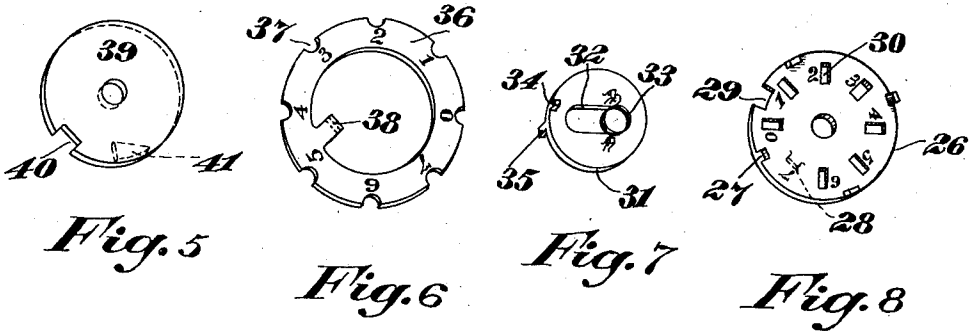
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3 SHEETS—SHEET 2.



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3 SHEETS-SHEET 3.

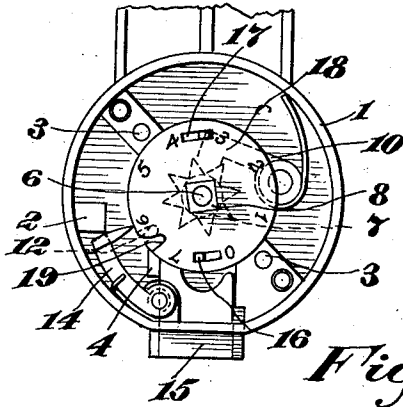


Fig. 22

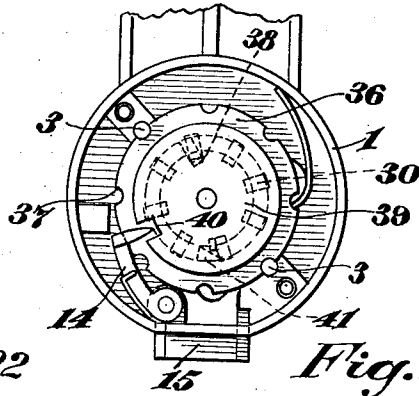


Fig. 23

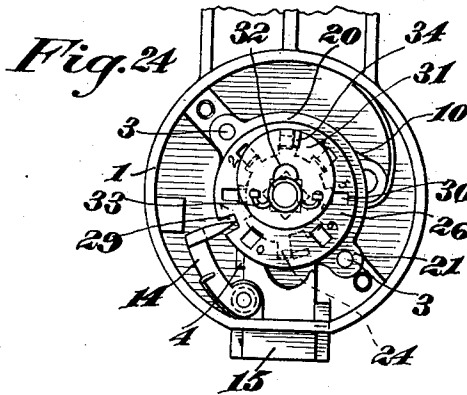


Fig. 24

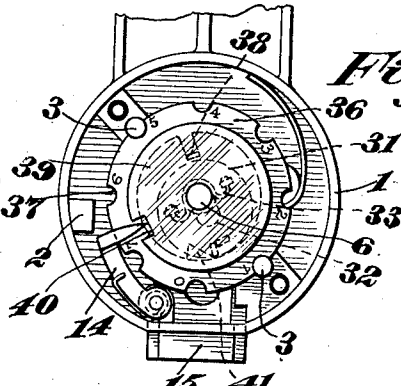


Fig. 25

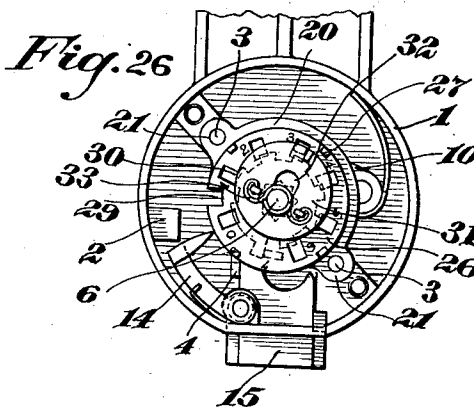


Fig. 26

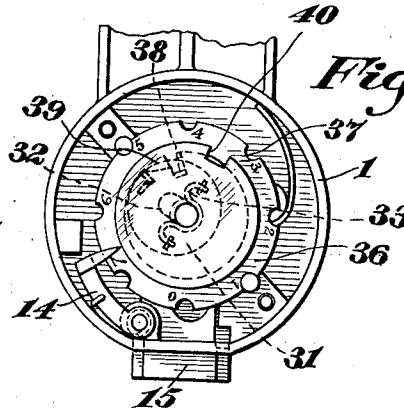


Fig. 27

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UNITED STATES PATENT OFFICE.

CYRILLE TURGEON, OF ST. CHARLES, QUEBEC, CANADA.

COMBINATION-LOCK.

1,058,814.

Specification of Letters Patent.

Patented Apr. 15, 1913.

Application filed April 24, 1911. Serial No. 622,856.

To all whom it may concern:

Be it known that I, CYRILLE TURGEON, a subject of the King of England, residing at St. Charles, county of Bellechasse, in the Province of Quebec, Canada, have invented certain new and useful Improvements in Combination-Locks; and I do hereby declare that the following is a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention to be hereinafter described relates to locks of the permutation type.

In order to more clearly disclose the construction, operation, and use of the invention, reference should be had to the accompanying drawings forming part of the present application.

Throughout the several figures of the drawings like reference characters designate the same parts.

In the drawings: Figure 1 is a front view of the lock, as applied; Fig. 2 is an edge view of the same; Fig. 3 is a cross section on line 3—3 of Fig. 4, looking in the direction of the arrows; Fig. 4 is a rear view of the lock, with the cap plate removed, showing the last coupling plate just after its lug has been forced beyond the lug of the last disk; Fig. 5 is a perspective view of the last disk of the combination; Fig. 6 is a like view of the stop ring; Fig. 7 is a like view of the last coupling plate; Fig. 8 is a like view of next to the last disk; Fig. 9 is a like view of next to the last coupling plate; Fig. 10 is a plan view of a placing yoke; Fig. 11 is a perspective of the dog for engaging the several disks; Fig. 12 is a perspective view of the first coupling plate; Fig. 13 is a like view of the first disk of the combination; Fig. 14 is a like view of the click or counter; Fig. 15 is a like view of the star wheel and shaft for operating the disks; Fig. 16 is a like view of the bolt; Fig. 17 is a rear plan view showing the relative positions of the parts shown in detail in Figs. 9 to 16, immediately prior to the first step of the unlocking movement; Fig. 18 is a rear plan view of the last coupling plate and the next to last disk in operative position; Fig. 19 is a rear plan view of the lock casing; Fig. 20 is a rear plan view of a spider spring for

pressing the parts into operative position; Fig. 21 is a side view of the same; Fig. 22 is a rear plan view of the first disk and first coupling plate, in coöperative position; Fig. 23 is a view similar to Fig. 4, just prior to engagement between the lugs, with the spider spring omitted; Fig. 24 is a rear plan view, with the spring and last disk removed, the other parts being shown at the instant that the second figure of the combination is set; Fig. 25 is a view similar to Fig. 24, including the stop ring and the last combination disk, the parts being shown at the instant that the last figure of the combination is set; Fig. 26 is a view similar to Fig. 24, showing the parts at the starting point of the combination; and Fig. 27 is a view similar to Fig. 25, showing the parts at the starting point of the combination.

Throughout the specification and claims, the term rear will refer relatively to the removable side, or open side, of the lock casing, and the term last disk will refer to the disk which is nearest to this removable side. The last figure of the combination refers to that figure which is formed by coöperation of the last disk. The other parts, elements, and figures of the combination, may be easily found by the terms used to indicate their positions or arrangements relatively to each other.

Referring to the drawings in detail, 1 indicates the usual lock casing with a stop lug 2 and two inwardly projecting pins 3. A guide lug 4 is also provided, extending inwardly and a short distance above the usual bolt opening—in such position as to engage the edge of the bolt and guide the bolt as it slides back and forth, thus preventing it from turning and becoming bound in the bolt opening. This casing is also provided with a centrally arranged opening 5 for the passage of a small operating shaft or rod 6 having a star wheel 7, an inner squared shoulder 8, and a squared head 9, for engagement of an operating handle. A spring pressed click 10 with double beveled nose is pivotally mounted on a small stud extending inwardly from the casing of the lock. The nose of this click is engaged by the successive points of the star wheel 7 and forced backwardly against its spring. As

the nose escapes the tip of each point, it will drop into the space between the points, making an audible sound or click, as it does so. In this way, each step of the rotation of the rod or shaft 6 may be accurately counted. Revolvably mounted on the shoulder 8 is the first combination disk 11, provided with a peripheral notch 12 adapted to seat the tip 13 of a spring operated dog 14 which is pivotally mounted on the inner end of the locking bolt 15. The tendency of the spring is to force the dog inwardly so that the tip will be seated in the notch 12. This inward movement also carries the dog free of the lug 2. Subsequent rotation of the disk will draw the dog with it, in a clockwise direction, with reference to Fig. 17. The disk 11 is also provided with two diametrically arranged, upwardly projecting lugs 16 adapted to fit slidably into cooperating arcuate slots 17 formed in the first coupling plate 18 which is provided with a squared opening adapted to fit snugly about the shoulder 8 so that this coupling plate will rotate with the shaft or rod 6 and not freely about it, as in the case of disk 11. In the edge of this plate is provided a peripheral notch 19 adapted to receive the beveled tip 13 of the dog 14. The notch in this coupling plate, however, is provided with one very abrupt face adapted to positively engage the cooperating face of the tip 13 and draw the dog 14 with it as it rotates, after such engagement. The other face or edge of the notch is provided with a very gradual outward curve adapted to force the tip 13 from the notch, as the coupling plate is rotated reversely. The coupling plate 18 is provided with index numbers. It will be evident that the first disk 11 will rotate only when the lugs 16 are engaged by the end walls of the slots 17, and that there will be a certain amount of lost motion between this disk and plate.

The notches 12 and 19 in the disk 11 and plate 18 are so arranged that they will be alined when the lugs 16 are midway between the end walls of the slots 17. At any other position of the lugs, the notches will not be alined. The tip 13 can not be seated in the notches, of course, unless these notches are alined. This is clear upon reference to Figs. 17 and 22. The numbers on the plate 18 are used for selecting the first figure of the combination. Thus, the disk and plate will be assembled, as in Fig. 17, with the two notches alined and the tip 13 seated in the notches. It will be readily understood that it will take a complete rotation of the plate 18 and disk 11 to again bring the notches into such position. Furthermore, on account of the slight lost motion between disk 11 and plate 18, it will be necessary to rotate plate 18 a little more than one full rotation—enough more to overcome the lost motion—and, of

course, it will be necessary to reversely rotate the plate 18 enough to counteract this additional movement. Above the plate 18 is mounted a semicircular spacing yoke 20 having perforated ears 21 at its opposite ends to slidably receive the pins 3. The inside diameter of this yoke is slightly less than the diameter of the plate 18. Consequently, when in position, the yoke rests upon the plate 18, near its outer edge. This yoke is arranged as in Fig. 17, so that its open side is toward the tip 13. This yoke acts as a spacer, as will later appear.

Mounted directly on the plate 18 is the next to last coupling plate 22. This plate is of considerably less diameter than the plate 18 and lies within the yoke 20. It is provided with a plurality of notches 23 and a single ear 24 projecting outwardly from its edge. Through its center is formed an eight cornered opening 25 adapted to fit about the squared shoulder 8 of the rod 6, in various adjusted positions. Whenever this plate 22 is in position on its shoulder 8, it will be forced to rotate with the shaft 6. Above the plate 22 and resting thereon, is the next to the last combination disk 26 provided with a plurality of peripheral spacing fingers 27 extending at right angles from one of its faces. From the opposite face extends a single stop finger or lug 28. A notch 29 is formed in the edge of this plate to receive the tip of the dog 14, and a plurality of equally spaced radial slots 30 are formed in this plate, for a purpose to be later disclosed, each slot being provided with a number. The disk 26 is mounted on the rod or shaft 6, to permit free rotary movement between the same. Consequently, as the shaft 6 rotates, it will carry the plate 22 with it and bring the ear 24 into engagement with the finger 28. Such engagement, of course, will cause the disk 26 to rotate with the plate 22.

On the disk 26 is mounted the last coupling or connecting plate 31, of considerably less diameter than the disk 26 and provided with an elliptical slot 32 the shortest diameter of which is equal to the diameter of the rod or shaft 6. Normally, the plate is held so that one end wall of slot 32 rests against one face of the shaft 6. For this purpose, a small coil spring 33 is provided, the opposite ends of the coil being secured either to the plate, or to small ears or lugs upstruck therefrom near one end of the slot. The coil of the spring surrounds the rod 6, as in Fig. 18. The result is that the normal position of plate 31, relatively to the shaft 6, is eccentric. The plate 31 is provided with two oppositely extending peripheral lugs 34 and 35, slightly spaced apart. The lug 35 is of considerably greater length than the lug 34 and is adapted to be selectively

projected through the slots 30 and to slide freely in the same. Due to its length, the lug 35 extends a considerable distance beyond the face of the disk 26. Normally, the spring 33 holds the coupling plate 31 in such position that the lug 35 will be in the outer end of its slot 30. At times, as will later appear, the plate 31 will be forced to slide on its rod 6 so that the lug 35 will approach the inner end of its slot 30. At such time, the end of the lug will seat itself in one of the notches 23 of plate 22, thus coupling plate 22, disk 26, and plate 31, all together, so that the three will rotate with the shaft 6. Such coupling may cause the disk 26 to rotate sooner than would be caused by engagement between the ear 24 and the finger 28.

Above the disk 26, and inclosing the coupling plate 31, is a ring 36 of substantially the same diameter as the spacing yoke 20. This ring is provided with a plurality of notches 37 adapted to slidably receive the pins 3. A stop finger 38 projects inwardly from the inner edge or periphery of this ring toward its center, for a purpose to be later disclosed. The ring is provided with a plurality of index numbers, one for each of the notches 37.

The tip 13 is provided with a kerf or deep narrow cut 36¹, to permit the tip 13 to receive the edge of the ring 36, as the dog is swung to operative position. This ring is supported in spaced relation on the tops of the fingers 27 of the disk 26. The result of this arrangement is that the ring 36 is spaced above the disk a distance a little greater than equal to the thickness of the plate 31 and the length of the lug 34.

Resting upon the inner portion of the ring 36, and freely revoluble on the shaft 6, is the last disk 39, provided with a peripheral notch 40 to receive the tip 13, and having a right angled triangular wedging lug 41 projecting from one face thereof. This wedge shaped lug is arranged near one edge of the disk, has one side of its right angle extending circumferentially of the disk, and projects a considerable distance from the face of the disk. The result is that when the lug 34 is brought into contact with the inclined side of this lug it will, temporarily, couple this last disk 39 with the plate 31 and cause the disk to rotate therewith. As the disk rotates, the lug 41 will engage the stop 38 so that further rotation of the disk will be absolutely blocked. At this point, continued rotation of the plate 31 will force the lug 34 up the incline of lug 41 and thus drive the plate 31 inward against the action of its spring 33. As the plate 31 reaches the inward limit of its movement, its lug 35 will engage one of the slots 23, as previously stated. As soon as the lug 34 escapes from

lug 41 (upon further rotation) the lug 35 will move out of the notch 23, as will be evident.

To keep the parts all firmly in position, spider spring 42 is provided, bearing upon the disk 39 and held under pressure by the cap plate 43.

In order to enable opening of the lock, it is necessary, of course, not only to get all of the notches in the disks 11, 26, and 39; and plate 18, in alinement, but it is also necessary to have them in alinement and in position to receive the tip 13, while in alinement. Then, when the tip is seated in the notches, as in Fig. 23, a slight further turn will withdraw the bolt and operate the lock. In order to obtain this result, a combination is necessary, of course. For this purpose, the plate 18, disk 26, and ring 36, are each provided with a set of index numbers. In this instance, the numbers are the same in each, ranging from 0 to 7. The ring 36 being held stationary on pins 3, is used as the starting point for composing the combinations. The several elements are then successively assembled, as previously described, the various index numbers on each plate or disk being so positioned, relatively to the corresponding index numbers of each of the other plates or disks as to give the desired combination. Thus, there may be a different combination for each number of the ring 36 and, also, a different combination for each different position of the other plates and disks relatively to the ring 36. For instance, suppose we wish to open the lock with the number 8: Disk 11 and plate 18 will be mounted on the shaft 6 as shown in Fig. 17. Plate 22 will then be arranged as shown in Fig. 17. Then the spacing yoke 20 will be dropped into place on its pins 3. Next, the disk 26 will be arranged as in Fig. 24, then, on disk 26 will be arranged the coupling plate 31, also, as in Fig. 24. Next, the stop ring 36 will be arranged as in Figs. 4, 25, and 27. Finally, above this coupling plate 31 is mounted the last disk 39, as in Fig. 27. To withdraw the bolt 15, the operation will be as follows: Assuming the parts to be in the position of Fig. 27, turn the rod 6, in a clockwise direction, through one complete rotation. As it rotates, the click will give the number—eight clicks being equal to one complete revolution. During this rotation, the plate 18 will rotate with the shaft, as previously mentioned. Likewise, the disk 11 will move with the plate 18, although the slight amount of lost motion between the two will make their notches fall out of alinement. Consequently, upon complete rotation of the shaft 6 from the point indicated in Fig. 27 and in a clockwise direction, the notch of the plate 18 will again fall opposite the tip 13. The notch of the

disk 11 will fall a little short of the tip. Therefore, the plate 18 must be rotated a little more than one complete rotation, and then turned back far enough to counteract this excess, as explained. As the shaft 6 rotates, the coupling plate 22 rotates with it, whereas, the disk 26 will remain stationary until coupled up by the plate 22. Due to the relative positions of the plate 22 and disk 26, in Fig. 26, the ear 24 of plate 22 will engage the finger 28 of disk 26 at the instant that the notch of disk 26 becomes alined with the notch 12 of disk 11. Thus, they will rotate together from that instant until the rotation of shaft 6 is completed. The coupling plate 31 rotates with the disk 26, as previously explained. During such rotation, the lug 34 of the coupling plate 31 will engage the inclined wall or side of the wedging lug 41, thus causing the disk 39 to rotate with the disk 26, plate 22, plate 18, and disk 11. Due to the relative positions of these disks and plates, the engagement between the lugs 34 and 41 takes place at the instant that the alined notches of the disk 26 and disk 11 fall into alinement with the notch of disk 39. Thus, continued rotation will bring all of the alined notches into position to receive the tip 13. The slight reverse rotation of shaft 6 to bring the notch 19 back into alinement does not affect the alinement of the notches of the other disks and plates, as will be evident. At the instant that the notches are all alined, the spring of dog 14 will force the tip 13 into the alined notches, as in Fig. 25. Then a slight continued rotation, in a clockwise direction, will carry the dog 14 with the disks and plates and thus effect withdrawal of the bolt. Reverse rotation will cause the gradual incline of the notch 19 to engage the tip 13 and force it outward from the alined notches. At the same time, the reverse rotation will move the notches 12 and 19 out of alinement with the other notches. From the above, it will be evident that the rod 6 must be given one complete clockwise rotation plus a distance equal to the lost motion between members 11 and 18, and then reversely rotated a distance equal to the lost motion between these two members. In this way, all notches will be brought into alinement and in position to receive the tip 13 of dog 14.

Should the shaft 6 be rotated considerably beyond a full revolution, the lug 41 will engage the stop finger 38 of ring 36 and prevent further rotation of the disk. Should rotation of the shaft 6 be continued even beyond this point, the coupling plate 31 will be forced laterally inward by the wedging action of the inclined wall of the lug 41, thus enabling the shaft and its disks and plates (except disk 39) to continue rotation. Rotation beyond the point of engagement

between finger 38 and lug 41, requires considerable force in order to overcome the tension of spring 33, as will be evident. Stopping of the disk 39 during continued rotation of shaft 36, of course, destroys the combination. After the bolt has been withdrawn, it is only necessary to reversely rotate the shaft to the same amount as it was previously rotated. For this purpose, the click is made to sound during rotation in both directions.

Various other combinations may be formed in the same general way, as will be obvious.

It is thought that the construction and operation of the invention will be clear from the preceding detailed description.

Changes may be made in the construction, arrangement, and disposition of the several parts of the invention without in any way departing from the field and scope of the same, and it is meant to include all such within this application wherein only a preferred form has been disclosed.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In combination, a casing, a bolt slidably mounted therein, a dog pivotally mounted on said bolt, a shaft journaled in said casing, a notched disk revolubly mounted on said shaft, a notched coupling plate mounted on said shaft to rotate therewith, lug and slot connections between said disk and plate, a second coupling plate mounted on said shaft to revolve therewith and provided with a peripheral ear, a second notched and slotted disk revolubly mounted on said shaft and provided with a depending finger adapted to be engaged by said ear, a third coupling plate slidably mounted on said shaft and provided with oppositely extending lugs, one being adapted to be selectively arranged in the slots of said disk; and a third notched disk revolubly mounted on said shaft and provided with a wedging lug adapted to be engaged by the remaining lug of said third coupling plate.

2. In combination, a casing, a bolt slidably mounted therein, a dog pivotally mounted on said bolt, a shaft journaled in said casing, a notched disk revolubly mounted on said shaft, a notched coupling plate mounted on said shaft to rotate therewith, lug and slot connections between said disk and plate, a second coupling plate mounted on said shaft to revolve therewith and provided with a peripheral ear, a second notched and slotted disk revolubly mounted on said shaft and provided with a depending finger adapted to be engaged by said ear, a third coupling plate slidably mounted on said shaft and provided with oppositely extending lugs, one being adapted to be selectively

arranged in the slots of said disk; a third
notched disk revolubly mounted on said
shaft and provided with a wedging lug
adapted to be engaged by the remaining lug
5 of said third coupling plate, a stop ring ad-
justably mounted between said second and
said third disks and provided with a stop
finger adapted to engage and block the lug

of the third disk, and means for preventing
rotation of said stop ring. 10

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

CYRILLE TURGEON.

Witnesses:

L. E. L. RUEL,

P. J. RUEL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."