United States Patent [19]

Ring

[11] **3,722,238**

[45] **Mar. 27, 1973**

[54] **REMOTELY OPERATED ELECTRICAL COMBINATION LOCK**

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[22] Filed: **July 29, 1971**

[21] Appl. No.: **167,209**

[52] **U.S. Cl.** **70/278,** 70/313, 200/43, 317/134, 340/274

[51] **Int. Cl.** **E05b 49/04**

[58] **Field of Search** ...70/277, 278; 200/43; 317/134; 340/274

[56] **References Cited**

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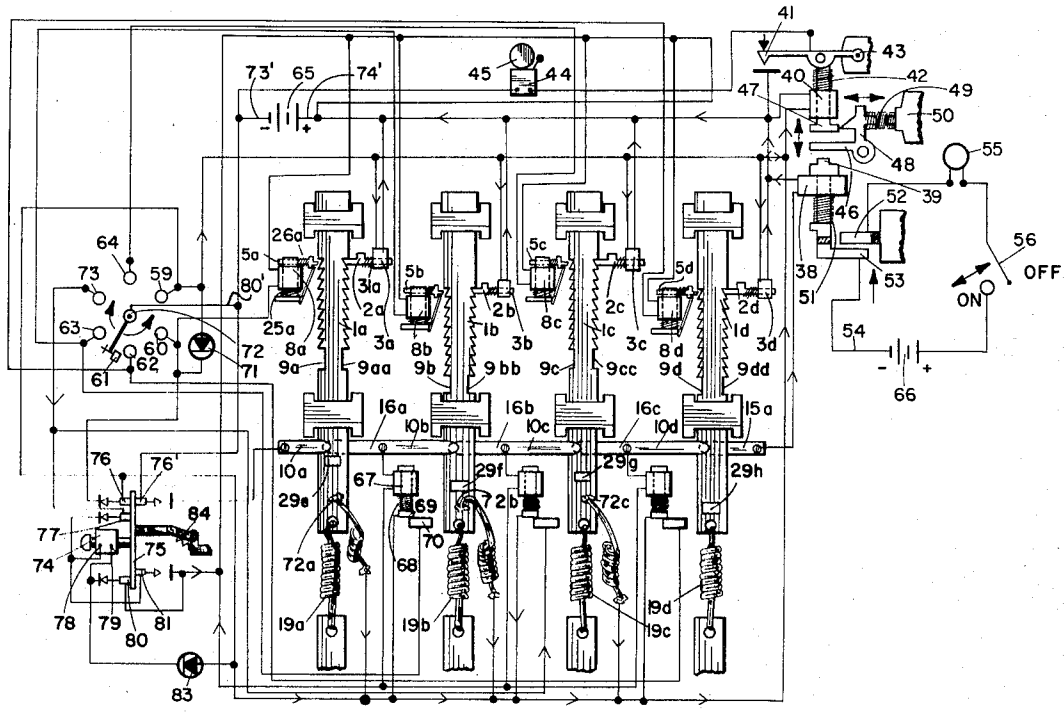
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Primary Examiner—Albert G. Craig, Jr.
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[57] **ABSTRACT**

An electrical combination lock in which the lock is in a preferred embodiment a door latch, safe lock, or a switch for actuating a motor, or the like, having a plurality of separate combination switches each switch of which requires a predetermined number of actuations in order to activate the respective switch, each succeeding switch being connected to reset itself and all preceding switches and concurrently to set off an alarm if the actuation member is actuated prior to the closing of all preceding ones of the combination switches, as well as there being a separate actuation member for resetting all of said switches, substantially all combination switches each including a means to reset and to actuate an alarm whenever the predetermined number of actuations for the respective switch is exceeded by a predetermined degree, once actuated the alarm remaining actuated until reset by the opening of the lock by correctly dialing the total combination of the several switches, and a separate actuation switch for opening the circuit connecting the first combination switch actuation means with the alarm circuit and for simultaneously closing the activation circuits of the plurality of combination switches, and for concurrently opening the circuit between the actuation means for the first combination switch and the actuation means for the separately actuatable reset.

18 Claims, 12 Drawing Figures



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SHEET 1 OF 5

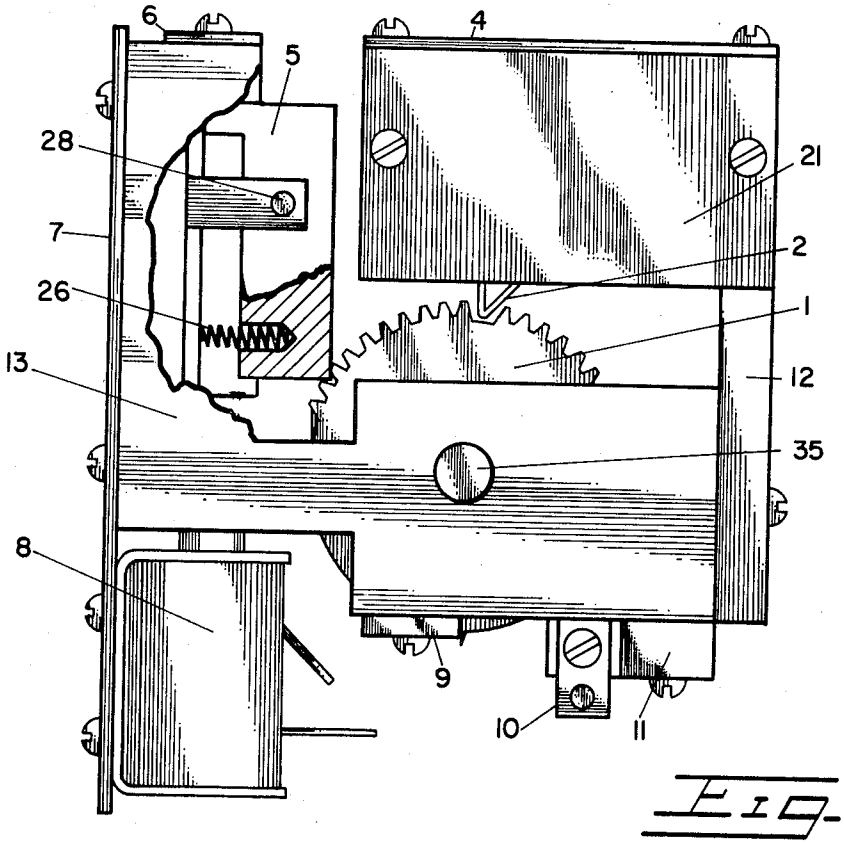


Fig. 1

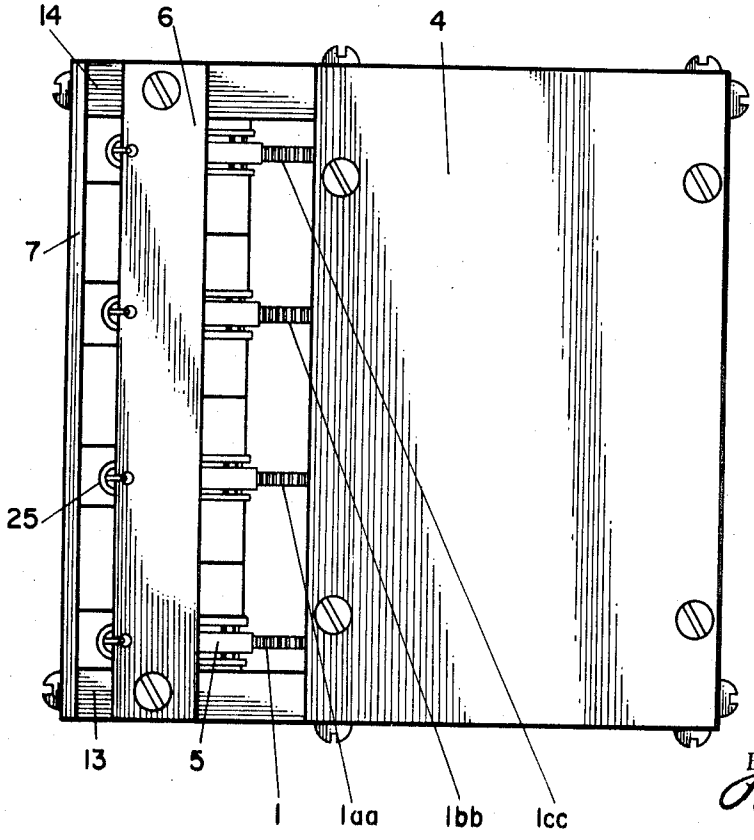


Fig. 2

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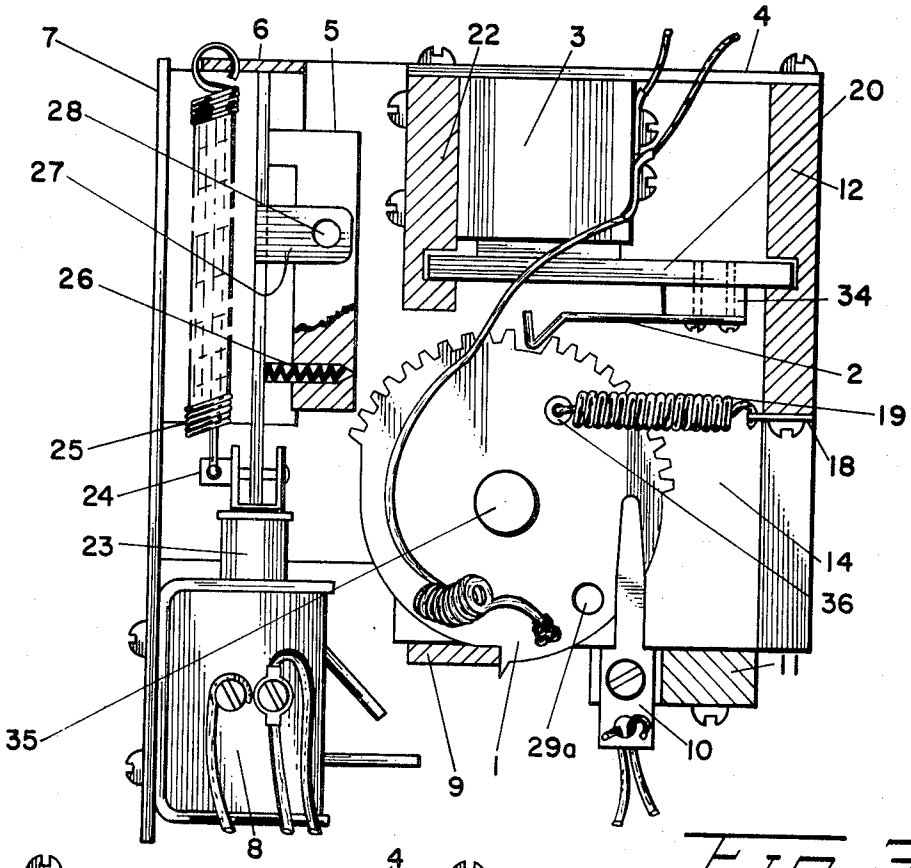


Fig. 3.

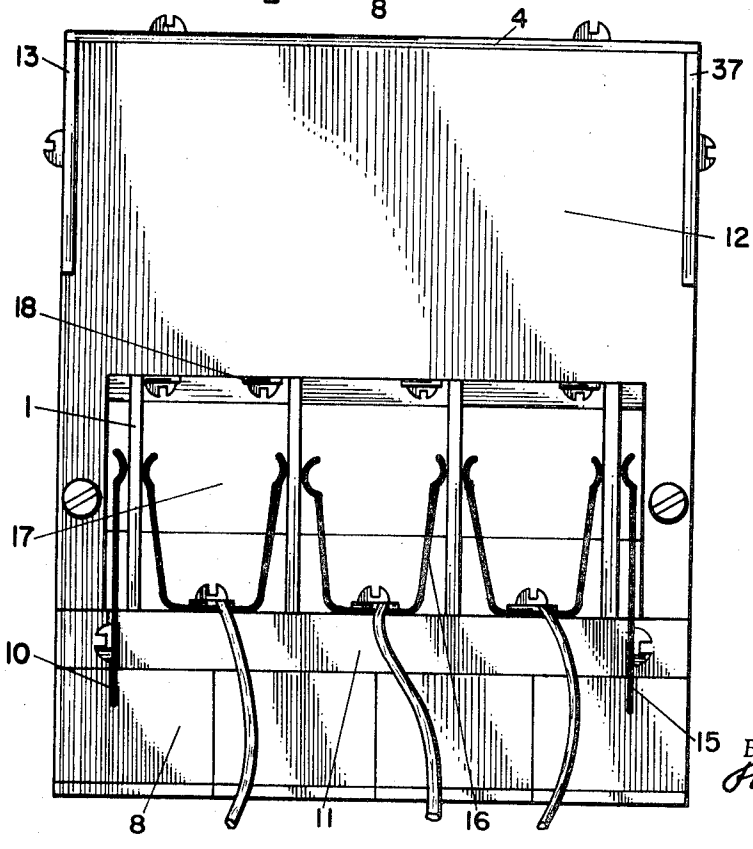


Fig. 4.

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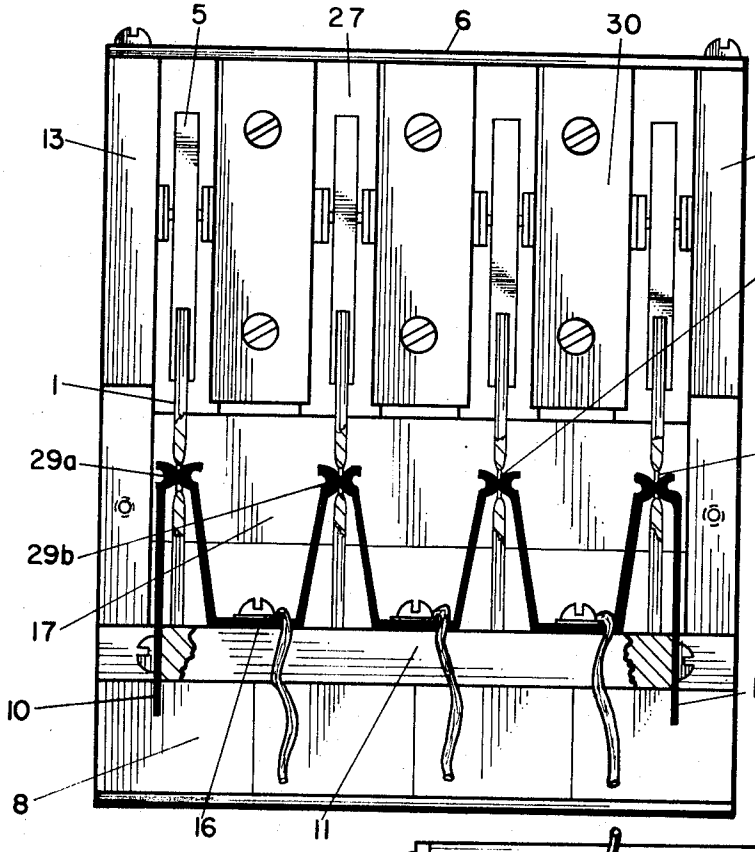


Fig. 5.

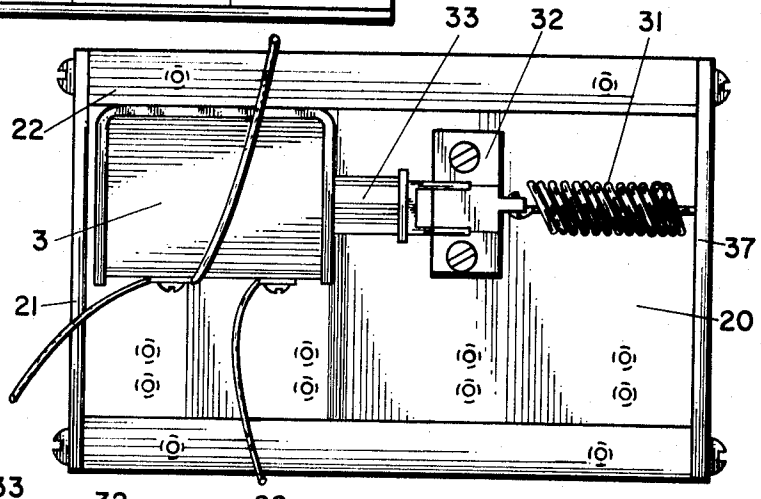


Fig. 6.

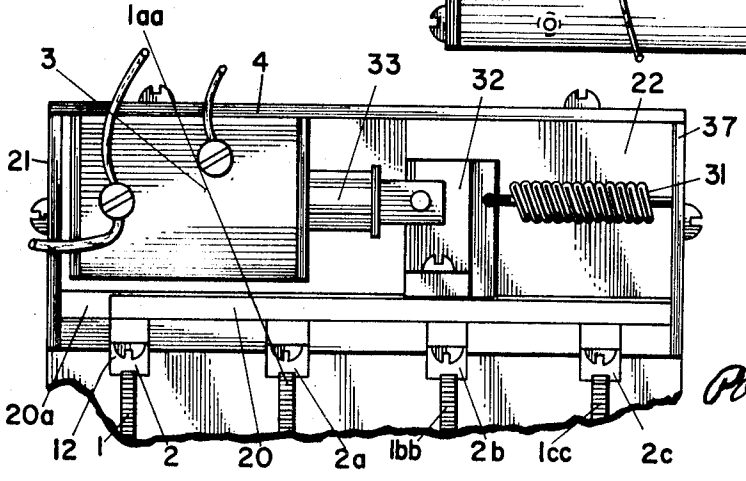


Fig. 7.

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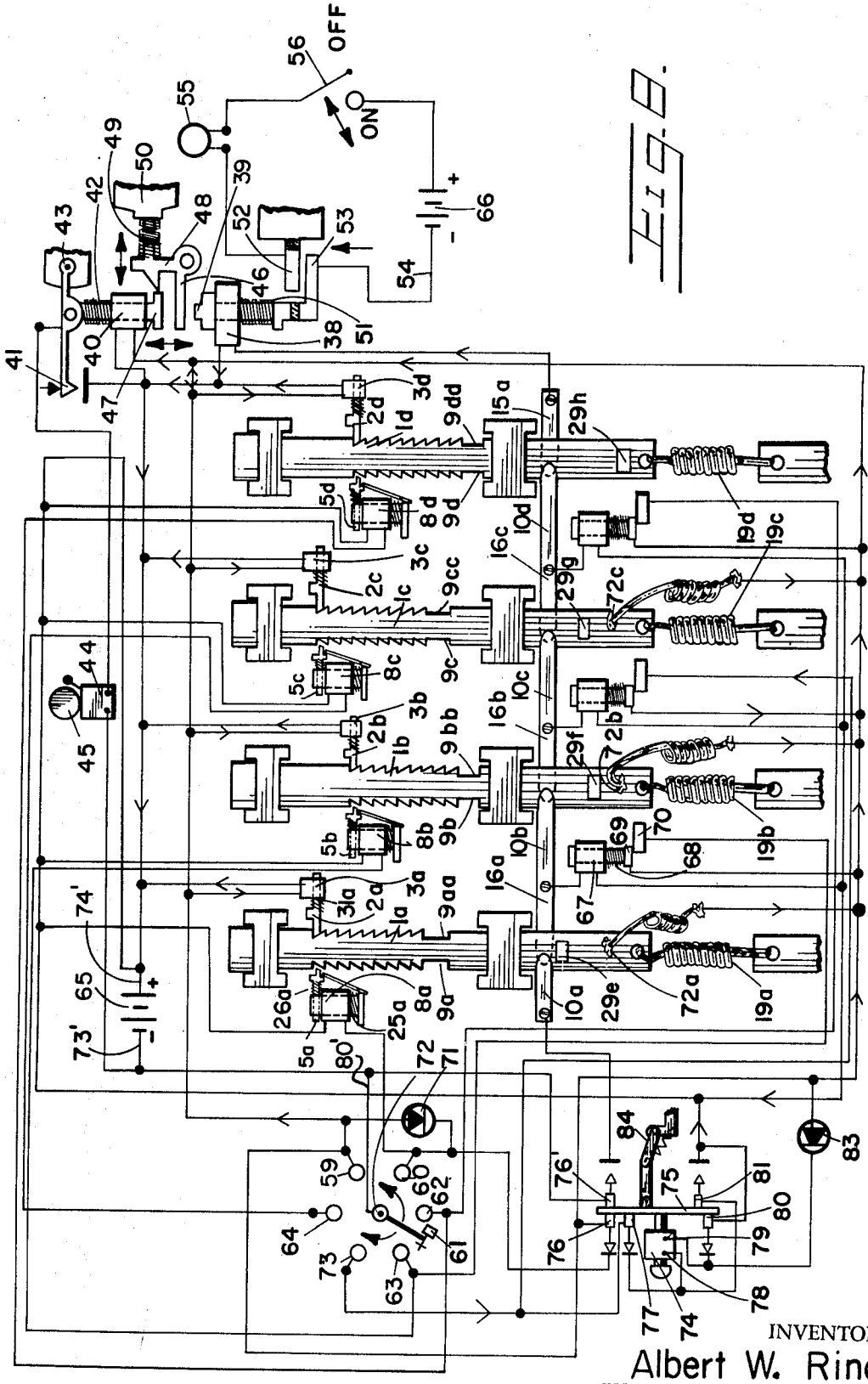

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FIG. 8.

Fig. 8a.

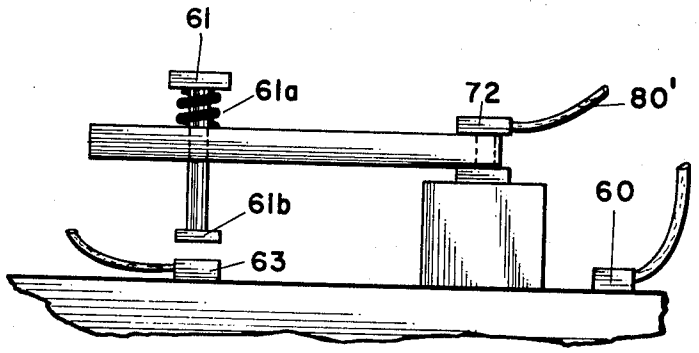


Fig. 8b.

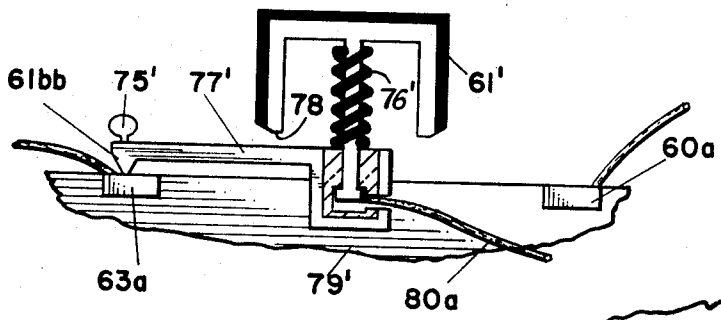
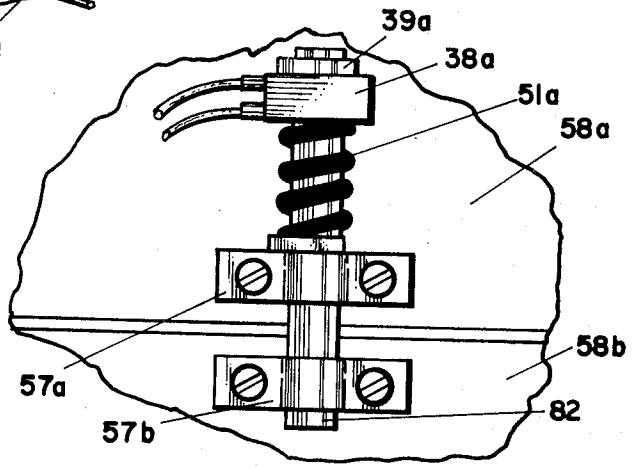


Fig. 8c.



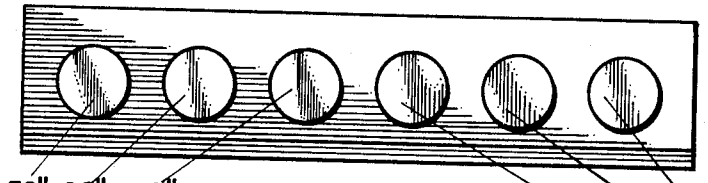


Fig. 9.

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REMOTELY OPERATED ELECTRICAL COMBINATION LOCK

This invention relates to a remotely controlled electrical combination lock.

BACKGROUND

Prior to this invention there have existed remotely controlled electrical combination locks. However, there have existed with these locks typically problems such as the complexity of parts required and of the circuitry as well as the possibility of breaking the combination without a great amount of difficulty in doing so.

SUMMARY OF THE INVENTION

Objects of this invention include the overcoming of problems of the type discussed above as well as the achieving of novel advantages heretofore unavailable with the prior electrical combination locks as well as with other types of combination locks. Other objects become apparent from the preceding and following disclosure.

One or more of the preceding objects are obtained by one or more of the embodiments of this invention as described below.

Although in a preferred embodiment of this invention the electrical combination lock includes a special actuation means for actuating the several combination switches and preferably includes an electrical or other remotely controlled actuation means, the basic principles of the electrical combination lock which are disclosed herein may be employed without accessory elements. The basic improvements may be a combination of any one or more improvements which serve unitary purposes such as increasing the difficulty of breaking the combination. Similar to some prior art inventions, the present invention includes a plurality of separate switches each of which serves to complete the circuit which opens the lock. Each combination switch has its own individual combination and the dialing of that combination may be by any desired or suitable or conventional method such as a dial, a lever, a pushbutton or the like any of which actuation means may be either mechanical or electrical in nature. Also as is present in some of the prior combination locks, there is a reset means for each switch for returning the respective switch to the zero point. Novel additions include a switch between any two adjacent combination switches which serves to convert the succeeding switch into a reset actuation switch in the event that the succeeding switch is activated prior to the dialing of the combination on the combination switch immediately preceding. Another novel feature is the provision on a combination switch that when the predetermined correct dial number is exceeded by a predetermined degree, the reset is automatically triggered. Another novel feature is a reset mechanism which requires solely a single reset solenoid which when actuated mechanically resets all of the combination switches. Another novel feature is a preferred embodiment having a practical simple structure with a minimum of parts making the lock commercially feasible. Another novel feature is an alarm system actuatable concurrently by any resetting signal. Another novel feature is an alarm actuation switch which when actuated may be thereafter turned off solely by a proper dialing of the combination of all switches. Another novel feature is a combination whereby the opening of the combination lock automatically disconnects the perpetual alarm switch and concurrently resets the perpetual alarm switch for future actuation by any lock-combination resetting signal. Another novel feature is a control actuation switch means which includes a circuit connecting the first combination switch actuation means to the separate actuation reset means when the control actuation switch means is off and which connects the control actuation switch to the solenoid circuit thereof when the switch is off and breaks the circuit when the switch is on, and which when the control actuation switch is off connects the solenoid of the control switch actuation means to the electrical feedback circuit to the power source. Another novel feature is a circuit connection between the several reset circuits and the control actuation means solenoid whereby when in the on position the control switch is turned off thereby requiring a repeat actuation of the control actuation means prior to the dialing of any one or more of the combination lock switch actuation means.

The invention is better understood by reference to the figures.

THE FIGURES

FIG. 1 illustrates a side elevation view of a preferred combination lock mechanism of this invention.

FIG. 2 illustrates a top plan view of the unit illustrated in FIG. 1.

FIG. 3 illustrates an elevation plan view of the unit of FIG. 1 except with a main side bracket removed to allow a better view of the mechanism.

FIG. 4 illustrates an elevation front view of the unit of FIG. 1.

FIG. 5 illustrates an elevation front view of the unit of FIG. 4, except with the reset solenoid assembly removed.

FIG. 6 illustrates a top plan view of the unit of FIG. 1 with the top plate removed in order to allow a better view.

FIG. 7 illustrates an elevation front view of the unit of FIG. 1 shown in part with the mounting plate removed in order to allow a better view of the mechanism.

FIG. 8 illustrates an alternative embodiment having separate solenoid reset switches for each of the combination switches, but otherwise illustrative of the circuit in a preferred embodiment which may be utilized with the preferred embodiment of FIGS. 1 through 7.

FIG. 8*a* illustrates a plan side view of a rotary switch mechanism rotatable to any one of the actuation contacts of the several combination lock switches and rotatable to the control actuation switch contact and rotatable to the separate reset actuation contact, and the illustrated rotatable switch having a pushbutton actuation means for repeated consecutive actuations of any particular actuation switch contact.

FIG. 8*b* is an alternative rotatable switch embodiment particularly substitutable for that of FIG. 8*a* embodiment.

FIG. 8*c* illustrates an in-part elevation plan view of a solenoid actuatable door latch which may be substituted for the motor switch illustrated in FIG. 8.

FIG. 9 illustrates an elevation plan view of a dial panel having separate actuatable buttons such as typically six different buttons any one of which might be the control actuation button or might be any one of the consecutive combination locks or might be the reset button.

DETAILED DESCRIPTION OF THE INVENTION

For a clearer understanding of the invention, FIG. 8 is first described in detail since the circuitry illustrated therefor is adaptable to any of the electrical combination locks disclosed whether or not preferred embodiments.

With reference to FIG. 8, there are a series of movable members 1*a*, 1*b*, 1*c*, 1*d*, for example, each of these members having one or more sets of teeth or the like which when moved act coordinately with a locking device 2*a*,2*b*, 2*c*,2*d*, for example, the locking device serving to prevent the movable member 1*a*, 1*b*, etc. from returning to the zero point —the zero point being the point at which the member was located prior to any of the actuations. The spring such as 19*a*, 19*b*,19*c*,19*d* or the like serves to cause the movable member to return to its zero point whenever the lock key such as 2*a* is retracted. The movable member 1*a*, as typical of the other movable members, includes either a metal disk extending therethrough or a hole in the member such as aperture 29*e* which permits the contact 10*a* to transmit an electrical signal to the contact 16*a* on the opposite side or opposite face of the movable member 1*a*. It is of course, possible to have alternative arrangements which would be the equivalent of this contact mechanism, such as for example, the contacts 10*a* and 16*a* being on the same side and merely contacting opposite ends of a metal placed at the position of the aperture 29*e*. Accordingly it is to be understood that the particular specific mechanisms illustrated have many possible alternative equivalents. Solenoid 8*a* as actuated by pushbutton 61 making contact with contact 60 moves the movable member 1a one step or notch per actuation. When the contact 60 has been actuated a predetermined number of times sufficient to bring the perforation 29*e* opposite contact 10*a*, the signal is transmitted from contact 10*a* to contact 16*a*. When the correct dialings have been completed for each of the series of combination switches, the signal is transmitted to the contact member 15*a* which serves to activate the solenoid 38 to thereby move the contact 53 into contact with the contact 52 so long as the combination locks continue to remain at their proper dial positions; however, when any one or more of these switches is reset or moved such as to break the circuit therethrough, the spring 51 immediately returns the lock to its open position as well as the resetting phenomenon which caused the breaking of the contact serving to reset all of the locks to their zero positions. On all except the last of the movable members, there is a contact such as 72*a* which if the movable member 1a is moved for a predetermined distance beyond the predetermined proper dialing — as determined by the location of the aperture 29*e* on the movable member, and also is determined by the particular location of the contact 72*a* which may vary from one site to another by predetermination, when the contact 10*a* comes into contact with the contact 72*a*, the signal transferred and communicated to contact 72*a* serves to reset all mechanisms as well as to set off the alarm 45 by activation of the solenoid 44. Although for purposes of illustration, the embodiment of FIG. 8 illustrates separate solenoids 3*a*, 3*b*,3*c*,3*d*, and the like, in a preferred embodiment such as that illustrated in FIGS. 1 through 7 there is a single solenoid which when actuated serves to move a single member mechanically connected with the plurality of keys such that movement of the single member causes all of the keys to be moved sufficiently sideward such that the several movable members all return to their respective zero positions; the only consequential change in the circuitry where the single solenoid is employed is that instead of having a series of parallel circuits leading to the several solenoids as illustrated, there would be a single circuit leading to the single solenoid.

Before the first combination switch movable means 1*a* can be actuated by the actuation contact 60, it is necessary to activate the activation control contact 73. If prior to the activation of the contact 73 the contact 60 were activated, the signal from the activated contact 60 would be transferred through the closed switch 76 to the separate reset contact 59 circuit which would reset and would set off the alarm. In another connecting circuit between the separate reset contact 59 and the contact 60, transistor 71 causes the solenoid 8*a* to be activated so that even though the contact 59 when activated resets as well as sets off an alarm, the activation of the solenoid 8*a* will cause a certain noise in the nature that would be caused if contact 59 were a contact normally used to dial the combination; by virtue of this connection, the noise effect would mislead a burglar or robber into believing that this reset 59 contact was in fact one of the dial switch contacts. When the control switch has been activated, and thereafter contact 60 is activated, the one way transistor 71 prevents the passing of current to the reset contact 59 circuit. Activation of contact 60 closes switch 76′ of circuit 73′. After the initial activation of control contact 73, the circuit for the contact 73 is broken whereby the contact 73 becomes a useless button until reset. The contact 73 is reset by reverse actuation of the solenoid 74 receiving an input signal from a reset signal resetting the combination locks and/or setting off the alarm feeding into circuit 74′. Unidirectional elements 83 prevents setting-off the alarm when contact 63 is activated.

As to the specific designation of parts in FIG. 8, 1*a* is a movable member; 2*a* is a solenoid retractable key for holding the movable member 1*a* into its last situated position. Solenoid 3*a* is the reset solenoid for resetting the movable member 1*a* to its zero position by retracting the key 2*a*. The notch 9*a* and the notch 9*aa* represent toothless sections preventing the member 1*a* from being further raised even though the solenoid 8*a* may be repeatedly actuated additionally. Contact 10*a* serves to deliver the signal from the closed circuit of the control actuator switch to the movable member. The contact 15*a* receives the final signal from contact 10*d* when the lock is opened by virtue of moving the movable member 1*d* to the appropriate position whereby contact 10*d* through aperture 29*h* contacts the contact 15*a*. Spring member 19*a* returns the movable member 1*a* to its zero point beginning position.

Spring 25*a* returns the solenoid movable arm to its original position whereby the key 5*a* thereof is slipped down to the next lower tooth notch by virtue of the spring action provided by spring 26*a*. Movable shaft 39 is controlled by the actuation of the solenoid 38 upon completion of the signal through the contact 15*a*. Solenoid 40 upon activation by reset signal directed to the several (or sole reset solenoids) solenoids causes the switch 41 pivoted at pivot point 43 against spring 42. When the solenoid 40 is activated, the member 47 moves toward member 46 such that the lock mechanism 48 biased by spring 49 catches behind the member 47 thereby preventing the return of member 47 to the open switch position of switch 41 until such time as the actuation of the solenoid 38 causes the movement of member 39 against the element 46 which thereby releases the element 47 to return to its original position by virtue of the spring 42 causing the switch 41 to reopen. Mounting member 50 supports a mounting position for the spring 49 acting against the movable lock 48. Spring 51 retains the contact 53 normally in the open position except such times as the solenoid 38 remains activated. When contacts 52 and 53 are brought into contact with each other, the circuit 54 is closed thereby activating the motor 55 except for the possibility of switch 56 being in the off position.

FIG. 8A illustrates a rotary switch such as that graphically illustrated in FIG. 8, disclosing the button 61, spring 61*a*, the contact 61*b*, contact 63, the axis of rotation 72, the circuit connection 80', and the contact 60. In FIG. 8 there is disclosed the power source 65, and an additional power source 66 for the motor. Normally the power source for the motor 55 would be of considerably greater voltage than that of the power source 65 for the electrical combination lock.

FIG. 8B illustrates an alternative switch means in which the handle 75' guides the rotatable arm 77' with its contact 61*bb* in continuous contact with the surface and the respective separate contacts 63*a* and 60*a*,for example embedded in the face of the surface, with the button 61' being repeatedly actuatable against the spring 76' for making contact between the contact surface 78' and the contact surface 63*a*. Space 79' permits the depression of the button 61'. Connecting lead 80*a* completes the circuit of actuation whenever the button 61' is depressed.

FIG. 8C illustrates an alternative embodiment of FIG. 8 in which the open switch contacts 52 and 53 are replaced by a bolt 39*a* and its locking end 82 held normally in the closed position by spring 51*a* acting against the bolt which is retracted by action of the solenoid 38*a* which is mounted on a door frame 58*a* to which the door is bolted by the receiving member 57*b* on the door 58*b*.

In the light of the preceding disclosure, FIGS. 1 through 7 of a preferred embodiment of this invention are more readily understood. In reference to FIG. 1, there is disclosed movable member 1, retaining key member 2, top plate 4, drive cam 5, retaining bar 6, unit back plates 7, zero point index stop 9, left contact spring terminal 10, contact spring mounting base 11, mounting plate reset solenoid release assembly 12, main side bracket (L.H.) 13, end plate (L.H.) reset solenoid release assembly 21, spring 26, pivot axis 28, and axle shaft 35.

FIG. 2 illustrates the movable members 1, 1*aa*, 1*bb*, 1*cc*, and the like, top plate 4, drive cam 5, retaining bar 6, unit back plate 7, main side bracket (L.H.) 13, main side bracket (R.H.) 14, and drive cam assembly return spring 25.

FIG. 3 illustrates additionally the drive solenoid 8, slidable element 20 on which the spacer block 34 has mounted the key spring member 2, bar 6, back plate 7, whereby the solenoid 3 when actuated causes the slide element 20 to slide sideward sufficiently to remove the key 2 from its retaining position whereby the spring maintained returns the movable member 1 to its zero point beginning position illustrated in this FIG. 3. Also illustrated are the back plate of the reset solenoid assembly —back plate 22, drive solenoid core piece 23, drive solenoid pin 24, return spring 25, cam assembly slide plate 27 and spring mounting stud 36.

FIG. 4 additionally illustrates the right contact spring terminal 15, the contact spring 16, the spacer 17 for the cam of the reset gear, the return spring retaining lug 18,. and the end plate (R.H.) 37 of the reset release assembly.

FIG. 5 additionally illustrates the cam assembly slide plate 27, the guide plate 30 for cam assembly slide plate, the aperture 29*a*, 29*b*, 29*c*, 29*d*, and the like, the contact 10, the contact 16, and the right contact spring terminal 15.

FIG. 6 additionally illustrates the back plate 22 of the solenoid release assembly, the reset solenoid core piece 33, the slide plate spring bracket 32, the spring 31, slide plate 20*a*, and the end plate (R.H.) — of the reset release assembly.

FIG. 7 illustrates in part better how the slide element 20 serves to move the spring key 2, 2*a*, 2*b*, and 2*c* sidewardly (to the left) out of contact with the movable members 1, 1*aa*, 1*bb*, and 1*cc*.

In FIG. 8, selenoid 67 is activated by flow of current from conductor 16*a* when conductor 10*a* contacts conductor 16*a* through hole 29*e*, to thereby open contacts 69 and 70; as long as contacts 69 and 70 are closed, the activation of key 63 sets off the alarm and also activates the selenoids 3*a*, 3*b*, 3*c*, and 3*d* — the effect being to return the arm 1*a* to its original un-dialed position if arm 1*a* had previously been activated a number of times insufficient to make contact between conductors 10*a* and 16*a* through hole 29*e*, and accordingly every subsequent initiation button — such as 63, 64, and 62 continuing to be an alarm and a reset button each respectively until the prior jacking selenoid — such as selenoid 8*a* is prior to selenoid 8*b* — has (have) been correctly dialed. Thus activation of selenoid 67 retracts shaft (69) to open contacts 69 and 70. Also, if after all of contacts 10*a*, 16*a*, and 16*b* are electrically connected a prior button such as 60 or 63 should again be activated to thereby break the electrical continuity through contacts 10*a*, and 16*a*, the selenoid 67 no longer is activated whereby the spring-biased contact by spring 68 closes the contacts 69 and 70 to thereby actuate the alarm and to reset arms 1*a* and 1*b*.

Before arm 1*a* can ever be initially moved by actuation of key 60, the electrical contacts of switch 76' must be closed by prior actuation of key 73 which by switch 77 actuates selenoid 74 to flip toggle arm 84 to thereby close the contacts of switch of switch 76'. When the selenoid 74 is activated by key 73, current is

flowable from switch contacts **77** through lead **78** into selenoid **74** and out of lead **79**, whereas when the switch **76'** contacts are in a closed position and button key **59** is activated the current flows into lead **79** into selenoid **74** and out of lead **78** to thereby flip-back the toggle switch **84** to open switch **76'** and close contacts of switch **76, 77, 80**, etc.

In the panel of FIG. **9**, any one or more of the buttons — which may vary in number — may be the reset button or may be the actuating button or may be simply an alarm button or any one of the combination dial buttons, for example; in the illustrated embodiment, purely for purposes of clarity, the first button is typically designated button **59''** which would correspond to reset button **59** of FIG. **8**, the button number two being typically the first dial button **60''** corresponding to the FIG. **8** dial contact **60**, and the like.

Toggle switch **84** holds the element **75** in the actuation position when actuated and in the off position when off.

It is within the scope of this invention to make such modifications and substitutions as would be obvious to a person of ordinary skill and/or as are known in the prior art. Accordingly, the embodiments and figures disclosed herein are intended merely to illustrate the generic invention hereafter claimed.

What is claimed is:

1. An electrical combination lock comprising in combination an electrical circuit and a first switch means controlled by said circuit, a plurality of separately actuatable second switch means in series in said circuit, each second switch means including openable and closable opposing contacts, a movable member having a circuit completing means in a predetermined location such that when said movable member is moved from a zero point to a predetermined position said opposing contacts become closed such that electrical current is conductable one to the other, a reset means for resetting each of closed opposing contacts of said plurality to an open position, actuation switch means for separately intermittently actuating each said movable member to intermittently move from said zero point a predetermined number of units of distance and for causing said movable member to move a predetermined number of said units per actuation, and a separately actuatable reset means for returning each moved member to its respective zero point, said reset means being actuatable by moving said movable member for a predetermined distance beyond said predetermined position, and an actuation switch for each second switch means and for said reset means.

2. An electrical combination lock according to claim **1**, in which each succeeding one of said plurality of second switch means includes an openable closed third switch which in the closed position connects the succeeding switch to said reset means, each said third switch being operable by a movement of the movable member of a next preceding one of said plurality said predetermined distance.

3. An electrical combination lock according to claim **2**, in which said predetermined distance is different for at least two of said plurality of second switch means.

4. An electrical combination lock according to claim **3**, in which said reset means includes a single solenoid connected to mechanical means such that when said solenoid is actuated, movement thereby of said mechanical means causes all movable members of said plurality of second switches to return to said zero point.

5. An electrical combination lock according to claim **3**, including a fourth relay switch means connected to be concurrently actuatable with said reset means and in electrical series with an electrical alarm means such that actuation of said fourth relay switch means closes said alarm means circuit.

6. An electrical combination lock according to claim **5**, in which activation of said first switch results in a mechanical reopening of said alarm means' circuit of said fourth relay switch means.

7. An electrical combination lock according to claim **6**, including a unidirectional transistor tube connected in electrical circuit between said reset means' activation switch and at least one of said second switch means' activation switch such that at least one of said second switch means is activated concurrently with activation of said reset means' activation switch.

8. An electrical combination lock according to claim **7**, in which activation of said first switch closes a motor circuit gate.

9. An electrical combination lock according to claim **7**, in which activation of said first switch withdraws a latch end.

10. An electrical combination lock according to claim **1**, in which said reset means includes a single solenoid connected to mechanical means such that when said solenoid is actuated, movement thereby of said mechanical means causes all movable members of said plurality of second switches to return to said zero point.

11. An electrical combination lock according to claim **1**, including a fourth relay switch means connected to be concurrently actuatable with said reset means and in electrical series with an electrical alarm means such that actuation of said fourth relay switch means closes said alarm means circuit.

12. An electrical combination lock according to claim **1**, including a unidirectional transistor tube connected in electrical circuit between said reset means' activation switch and at least one of said second switch means' activation switch such that at least one of said second switch means is activated concurrently with activation of said reset means' activation switch.

13. An electrical combination lock according to claim **1**, in which activation of said first switch closes a motor circuit gate.

14. An electrical combination lock according to claim **1**, in which activation of said first switch withdraws a latch end.

15. An electrical combination lock comprising in combination an electrical circuit and a first switch means controlled by said circuit, a plurality of separately actuatable second switch means in series in said circuit, each second switch means including openable and closable opposing contacts, a movable member having a circuit completing means in a predetermined location such that when said movable member is moved from a zero point to a predetermined position said opposing contacts become closed such that electrical current is conductable one to the other, a reset means for resetting each of closed opposing contacts of said plurality to an open position, actuation switch means for

separately intermittently actuating each said movable member to intermittently move from said zero point a predetermined number of units of distance and for causing said movable member to move a predetermined number of said units per actuation, and a separately actuatable reset means for returning each moved member to its respective zero point, an activation switch for each second switch means and for said reset means, and said reset means including a single solenoid connected to mechanical means such that when said solenoid is actuated, movement thereby of said mechanical means causes all movable members of said plurality of second switch means to return to their respective zero points.

16. An electrical combination lock comprising in combination an electrical circuit and a first switch means controlled by said circuit, a plurality of separately actuatable second switch means in series in said circuit, each second switch means including openable and closable opposing contacts, a movable member having a circuit completing means in a predetermined location such that when said movable member is moved from a zero point to a predetermined position said opposing contacts become closed such that electrical current is conductable from one to the other, a reset means for resetting each of closed opposing contacts of said plurality to an open position, actuation switch means for separately intermittently actuating each said movable member to intermittently move from said zero point a predetermined number of units of distance and for causing said movable member to move a predetermined number of said units per actuation, and a separately actuatable reset means for returning each moved member to its respective zero point, an activation switch for each second switch means and for said reset means, and including a fourth relay switch means connected to be concurrently actuatable with said reset means and in electrical series with an electrical alarm means such that actuation of said fourth relay switch means closes said alarm means circuit.

17. An electrical combination lock comprising in combination an electrical circuit and a first switch means controlled by said circuit, a plurality of separately actuatable second switch means in series in said circuit, each second switch means including openable and closable opposing contacts, a movable member having a circuit completing means in a predetermined location such that when said movable member is moved from a zero point to a predetermined position said opposing contacts become closed such that electrical current is conductable one to the other, a reset means for resetting each of closed opposing contacts of said plurality to an open position, actuation switch means for separately intermittently actuating each said movable member to intermittently move from said zero point a predetermined number of units of distance and for causing said movable member to move a predetermined number of said units per actuation, and a separately actuatable reset means for returning each moved member to its respective zero point, an activation switch for each second switch means and for said reset means, and including a unidirectional transistor tube connected in electrical circuit be between said reset means' activation switch and at least one of said second switch means' activation switch such that at least one of said second switch means is activated concurrently with activation of said reset means' activation switch.

18. An electrical combination lock comprising in combination an electrical circuit and a first switch means controlled by said circuit, a plurality of separately actuatable second switch means in series in said circuit, each second switch means including openable and closable opposing contacts, a movable member having a circuit completing means in a predetermined location such that when said movable member is moved from a zero point to a predetermined position said opposing contacts become closed such that electrical current is conductable one to the other, a reset means for resetting each of closed opposing contacts of said plurality to an open position, actuation switch means for separately intermittently actuating each said movable member to intermittently move from said zero point a predetermined number of units of distance and for causing said movable member to move a predetermined number of said units per actuation, and a separately actuatable reset means for returning each moved member to its respective zero point, an activation switch for each second switch means and for said reset means, and in which each succeeding one of said plurality of second switch means includes an openable closed third switch which in the closed position connects the succeeding switch to said reset means, each said third switch being openable by movement of the movable member of a next preceding one of said plurality said predetermined distance.

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