April 29, 1947. R. SABOR 2,419,659

ELECTRICAL TIME CONTROLLED RELEASE ACTUATOR

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Fig. 4

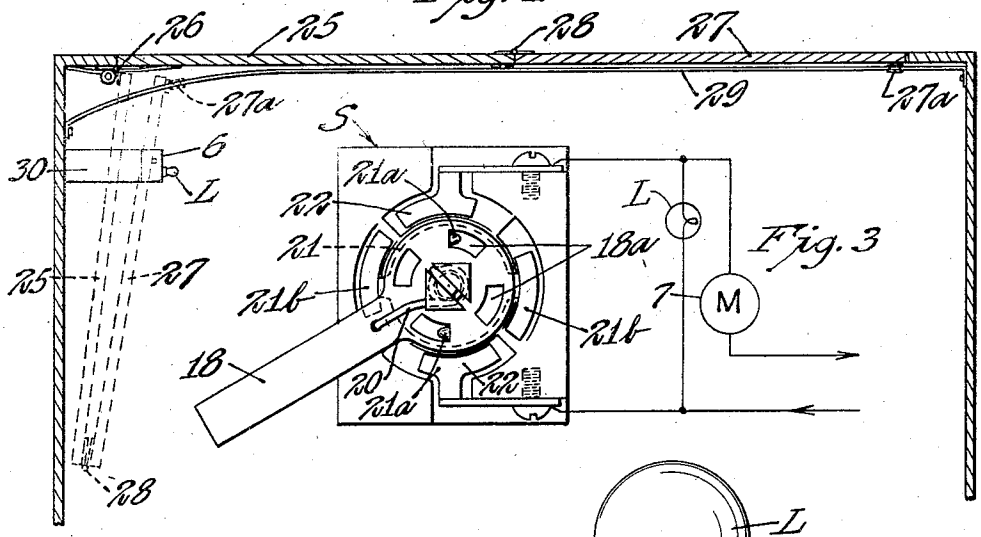


Fig. 3

Fig. 2

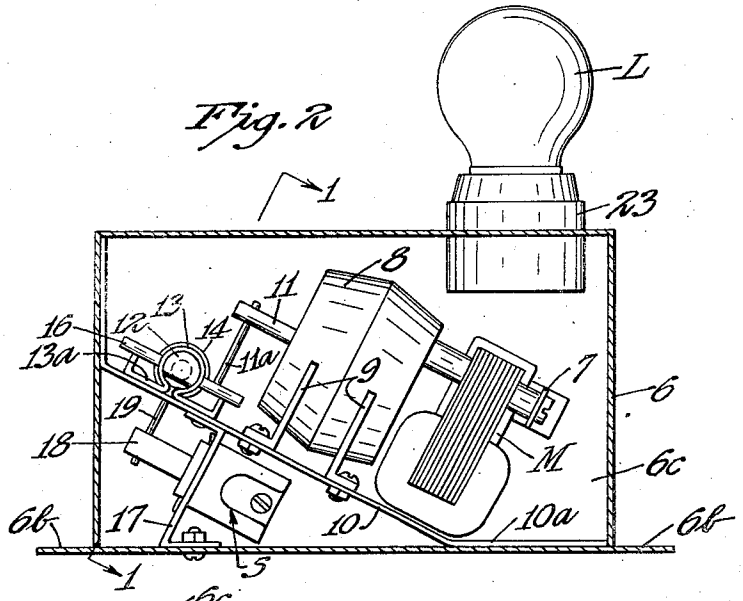
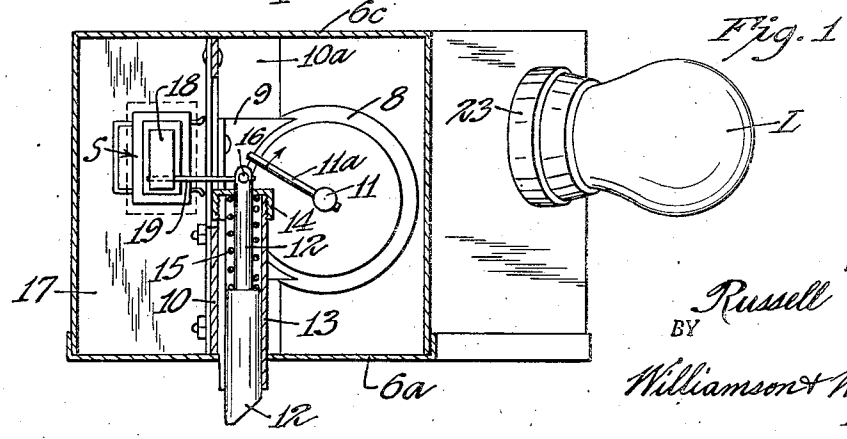


Fig. 1



INVENTOR.
Russell Sabor
BY
Williamson & Williamson
ATTORNEYS

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ELECTRICAL TIME CONTROLLED RELEASE ACTUATOR

Russell Sabor, Minneapolis, Minn.

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8 Claims. (Cl. 161—1)

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This invention relates to electrically operated, time controlled mechanism for retaining and releasing various mechanical devices.

It is an object of my present invention to provide a comparatively simple, compact and highly efficient mechanism controlled and operated by an electrical motor for momentarily retracting and releasing a retaining element such as a bolt or latch member at the end of a predetermined time period.

A further object is the provision of mechanism of the class described wherein the timing mechanism will be set or started through closing of a motor circuit by mechanical action of the device which it controls when said device is normally operated to be positioned in one of a plurality of predetermined positions.

More specifically, it is an object to provide an electrical, time controlled retaining and release actuator adapted to retain a movable device in a predetermined position for a predetermined time and adapted to release such device for moving or shifting of position or operation and adapted to be started or set for timing operation by the movement of the associated device in one of its operation stages.

My improved mechanism is adapted to be widely used in controlling the operation or actuation of various mechanical devices where release or unlocking of a movable member is desired or where a movable member is urged by power means in one direction and time controlled mechanism is desired for retaining said movable member for a predetermined time, before release, for power actuation.

My improved mechanism comprises essentially a releasable retaining member adapted to be mechanically retracted by camming or wedge action and normally urged to protracted retaining position in combination with a motor-driven actuating element movable through a revolution or other cycle of operation, to momentarily retract said retaining member and to simultaneously open the motor circuit at the end of a predetermined time period.

The foregoing objects and advantages of my invention will be more apparent from the following description made in connection with the accompanying drawings, wherein like reference characters refer to the same parts throughout the several views and in which:

Fig. 1 is a horizontal cross section through an embodiment of my improved mechanism looking upwardly from the bottom of the device;

Fig. 2 is a vertical section taken diagonally through one end of the casing of the device and showing the retaining element in protracted position with the actuating element having just completed its tripping and retraction of the retaining element;

Fig. 3 is a somewhat diagrammatic view illustrating the type of two-cycle switch employed and the diagram of the electrical circuit; and

Fig. 4 is a somewhat diagrammatical top plan view showing my mechanism applied to a folding sectional door actuated for closing by torsional springs.

In the form of my invention illustrated, the working mechanism is very compactly arranged and mounted within a box-like casing 6 having a removable bottom plate 6a provided with a rear wall 6b having projecting attachment flanges at the lateral ends thereof.

A motor M is rigidly mounted by attachment brackets 7 to one of the inside walls of housing G having its armature shaft as shown, disposed diagonally of the top wall 6c of the casing and the power take-off end of said armature shaft is extended into a gear reduction housing 8 which as shown, is fixed by a pair of rigidly attached brackets 9 to a diagonally disposed mounting plate 10 having angled attachment feet 10a and 10b respectively which may be welded or otherwise secured to one of the end walls and the rear wall of casing 6. Suitable transmission mechanism comprising preferably reduction gears (not shown) are mounted within the transmission or gear reduction housing 8 driven by the armature shaft of motor M and the last gear of the train having fixed thereto, an actuating shaft 11 which projects, as shown, from the face of the gear housing opposite from motor M.

A retractable retaining element 12 in the form of a sliding latch bolt extends as shown, perpendicularly to the bottom 6a of the casing and spaced a short distance from the end of actuating shaft 11. Retaining bolt 12 is slidably mounted in a sleeve 13 which as shown, is exteriorly screw threaded at its inner end for connection with a cup-shaped member 14 which closes the inner end of sleeve and acts as an abutment for a coil protraction spring 15 surrounding the diminished inner portion or shank 12a of the retaining bolt and having its outer end reacting against the annular shoulder provided by the head of bolt 12. Sleeve 13 may be conveniently formed from an integral plate cylindrically bent at its medial portion to provide the sleeve and having out-turned attachment strips 13a which may be welded or otherwise fixed to the diagonal mounting plate 10.

Retaining bolt 12 has fixed to the inner end or shank thereof, a cross-arm 16 disposed parallel with the axis of actuating shaft 11. This cross-arm 16 is preferably constructed of circular cross-section in the form of a rigid pin or rod and is positioned in the path or orbit of an actuator arm 11a, rigidly affixed to the outer end of actuating shaft 11 and extending radially thereof.

A two-cycle, tumbler actuated, electrical switch, designated as an entirety by the letter S is mounted rearwardly of the mounting plate 10, fixed to the central portion of a Z-shaped bracket 17, the feet of which are connected respectively to mounting plate 10 and the rear wall 6b of the casing. The type of switch illustrated, which is quite conventional, has an elongated tumbler arm or lever 18 pivoted for reciprocating swinging along an axis extending perpendicularly to retaining bolt 12. A switch actuating arm 19 underlies the tumbler arm 18 of the switch and is rigidly connected with the inner end of retaining bolt 12 as shown by direct connection with the cross-arm 16 fixed to the inner end of bolt 12. The switch operating tumbler arm 18 thus rides the switch actuating arm 19 and a torsion spring 20 disposed within the switch construction urges tumbler arm 18 downwardly against the actuating arm 19.

In Fig. 3 a satisfactory type of conventional two-cycle switch is illustrated, the view being a plan view with the top of the switch box removed. The switch as shown, comprises the tumbler or lever arm 18, pivoted to the box or frame of the switch and having a circular portion provided with four circumferentially spaced, lug engaging, arcuate slots. Mounted below the circular portion of the tumbler lever 18 is a spanning contact disc 21 having diagrammatically opposed spaced, depending contacts 21b at its lower side, adapted to engage fixed contacts 22, mounted on the block of the switch. The disc 21 also carries a pair of upstanding lugs 21a which are adapted to engage the arcuate slots 18a of the tumbler lever member and to be actuated thereby for progressing the disc, through one cycle in each reciprocating movement of the tumbler lever 18. Thus, the spanning contacts 21b complete a circuit in one cycle of movement by wiping engagement with the fixed contacts 22 and in the next cycle of operation are disposed at a position of 90 degrees from the circuit making position and do not engage any contacts.

The circuit, as illustrated diagrammatically in Fig. 3 includes the motor M and an electric lamp L, for illuminating purposes which is connected in parallel with the motor and switch, this lamp being mounted in a suitable socket 23, fixed to the front wall of casing 6.

Operation

From the foregoing description, it will be seen that when the retaining bolt 12 is cammed by mechanical action or otherwise inwardly, into retracted position, the switch actuating arm 19 swings the tumbler lever 18 during such retraction, thereby progressing the disc 21 through 90 degrees and thereby, closes the circuit through the motor M and lamp L. Retaining bolt 12 is immediately thereafter, projected into locking or retaining position by the coil spring 15, thus completing the cycle of operation of the switch S and motor M, operates through its cycle of operation driving through the gear reduction mechanism in case 8 the actuating shaft 11. During the cycle of operation of shaft 11, the actuating or striker arm 11a engages the cross shaft or pin 16 at the inner end of retaining bolt, lifting the same and thereby again retracting the retaining bolt, and in so doing, again actuating the tumbler lever 18 of the switch and thereby breaking the circuit through the motor and lamp at the time the retaining bolt is released.

It will thus be seen that the initial retraction of bolt 12 sets the mechanism in operation and that the device is timed for a predetermined period to leave the bolt in its protracted or retaining position and to thereafter, momentarily retract the bolt and break the circuit.

The uses of my improved mechanism are of course, manifold the device being in general adapted for any use where it is desired to release a retaining element or latch after a predetermined time interval from the setting of the device.

In Fig. 4 one particular use of the device is illustrated in connection with the closing operation of a garage door. Fig. 4 is a somewhat diagrammatical plan view taken just above the upper edge of a conventional type of two-sectional, collapsible folding door. The left hand door section 25 is hinged at its vertical edge to the jam of the doorway and a strong torsion spring 26 is disposed vertically with one of its ends fixed to the doorway and the other end fixed to the marginal edge of the door whereby the spring is tensioned in the open swinging of the door to thereafter exert an influence to close the door. The outer door section 27 is hinged to the first section 25 by suitable hinge elements 28 and has, adjacent its free edge, an upstanding element or strap carrying a small roller 27a which is adapted to ride a horizontal track 29 disposed inwardly of and slightly above the upper edge of the door, said track diverging at its inner end to guide the marginal edge of section 27 so that folding action of the door takes place in conventional manner when the outer section 27 is slid inwardly toward the jam and inner section 25. Such doors are quite conventional and if provided with the torsion spring 26, will be closed by tension of the spring when the sections are released.

With this structure, I employ an embodiment of my mechanism, the casing 6b suitably supported from an overhanging horizontal bracket 30 and being mounted in position for the bevelled retaining bolt 12 to engage a striker plate at the upper edge of the outer door section 27 to cam the retaining bolt 12 upwardly in the opening movement of the door, whereby the door will be held in collapsed position against the action of torsion spring 26 and retained behind the bolt 12.

Thus, in the adaptation of my invention shown in Fig. 4, the door is manually operated by ordinary sliding and folding movement of the door at the end of its opening operation, actuating my mechanism by retraction of bolt 12 and setting the motor and time mechanism in operation. The door will thus be held open with the lamp L illuminated, for a period of time and thereafter, when the retaining bolt 12 is tripped, will release the sectional door for closing actuation through the medium of the torsion spring 26.

From the foregoing, it will be seen that I have provided a simple, compact and highly efficient mechanism for accomplishing the purposes enumerated herein. The electric motor utilized, may be small and if desired, of the inexpensive induction type since its speed is materially reduced and

its power multiplied by the reduction gear trains housed in case 8.

It will of course, be understood that various changes may be made in the form, details, arrangement and proportions of the parts without departing from the scope of my invention.

What is claimed is:

1. An electrical, time controlled, release mechanism having in combination, an electric motor, transmission mechanism for reducing the speed and multiplying the power of said motor, said transmission mechanism having a rotary power take-off shaft provided with an actuating element, a retractable retaining member, means for urging said retaining member to protracted position, an actuated element connected with said retaining member and adapted to be actuated to retract said retaining member during a small portion of the cycle of operation of said power take-off shaft said retaining member being also retractable by mechanical pushing action against the outer end thereof and an electrical switch for controlling said motor circuit and connections between said retaining member and said switch for opening said switch each time said power take-off shaft completes a full cycle of operation.

2. An electrical, time control, release mechanism having in combination, an electric motor, transmission mechanism for reducing the speed and multiplying the power of said motor, said transmission mechanism having a rotary power take-off shaft, a retractable retaining member, means for urging said retaining member to protracted position, an actuated element connected with said retaining member, an actuating element connected with said power take-off shaft and adapted to actuate said actuated element during a small portion of the cycle of said power take-off shaft, said retaining member being also retractable by mechanical camming action against the retaining end thereof, a two-cycle electrical switch for controlling said motor circuit and mechanical connections between said retaining member and said switch for producing a full cycle operation of said switch, each time said retaining member is retracted.

3. An electrical, time controlled, release mechanism having in combination an electric motor, speed reduction mechanism connected with the armature shaft of said motor and having a rotary power take-off shaft, a retractable retaining member, movable in a path disposed substantially perpendicular to the axis of said power take-off shaft means for urging said retaining member to protracted position, said retaining member being also retractable by mechanical pushing action against the outer end thereof, operating connections between said power shaft and said retaining member for retracting said retaining member during a small portion only of the revolution of said power shaft, an electrical switch for controlling said motor circuit and connections between said retaining member and said switch for opening said switch, each time said power shaft completes a predetermined turning operation.

4. The structure set forth in claim 3, wherein said operating connections comprise a laterally extending, actuating arm connected with said power take-off shaft and a striker member connected with said retaining member and disposed in the path of revolution of said arm.

5. In folding, sectional closure construction, a multi-section closure with hinges between at least a pair of said sections, one of said sections having hinged connection at one of its edges, permissive of swinging action of that section and the section attached thereto, a second section hingedly connected with the opposite edge of said first mentioned section for folding movement relatively thereto and having a slidable connection at its opposite edge, torsional means associated with said hinged connection for normally urging said sections into out-spread, closed position and an electrical time controlled, retaining and release device comprising a retractable retaining element disposed substantially perpendicular to the general path of movement of said closure sections and having a bevelled end for producing retraction thereof upon striker action of one of said sections in the closure opening movement, means for normally urging said retainer member to protracted position, time controlled means having a revolving actuating element and a striker element connected with said retaining member and positioned in the orbit of said actuating element to be engaged and lifted momentarily during the revolution of said actuating element, thereby momentarily retracting said retainer element.

6. The structure set forth in claim 5 wherein said time controlled means includes an electric motor and a switch for controlling said motor circuit and of the type requiring a cycle of operation to close the circuit and another similar cycle of operation to open the circuit and mechanical connections between said retaining element and said switch for producing a full cycle operation of said switch, each time said retaining element is retracted.

7. An electrical, time controlled, release mechanism having in combination an electric motor, speed reduction mechanism connected with the armature shaft of said motor and having a rotary power take-off shaft, a retractable retaining member, movable in a path disposed substantially perpendicular to the axis of said power take-off shaft and having a bevelled outer end for producing retraction thereof, means for urging said retainer member to protracted position, a substantially radial actuating arm fixed to said power take-off shaft, a striker element connected with the inner portion of said retaining member and positioned in the orbit of said actuating arm and a switch for controlling said motor circuit and connections between said switch and said retractable retaining member for alternately closing and opening said motor circuit upon successive retractions of said retaining member.

8. The structure set forth in claim 7 wherein said switch comprises a movable contact carrying member progressible from a circuit closing to a circuit opening position and a reciprocable lever for progressing said contact carrying member through one step during each reciprocation and a switch actuating element carried by said retaining member for actuating said lever each time said retaining member is retracted.

RUSSELL SABOR.

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