

May 5, 1953

R. C. GAONA

2,637,578

ELECTRICALLY CONTROLLED LOCK

Filed May 28, 1951

3 Sheets-Sheet 1

Fig. 1.

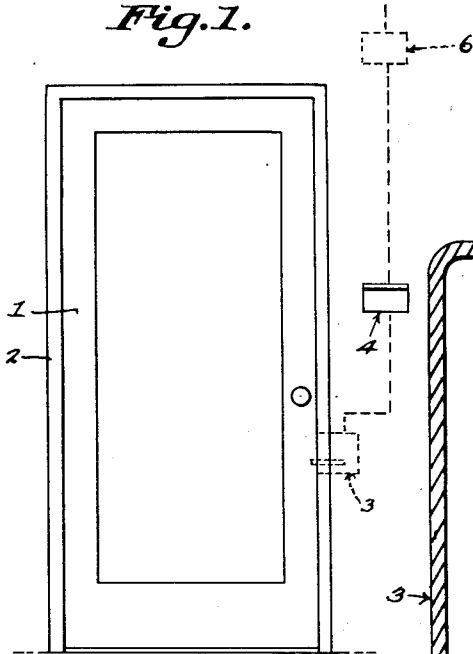


Fig. 2.

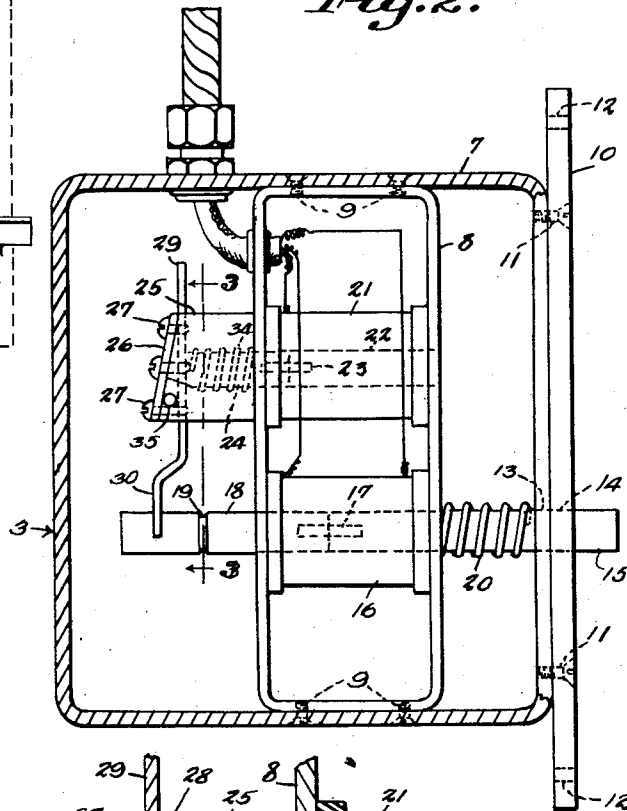
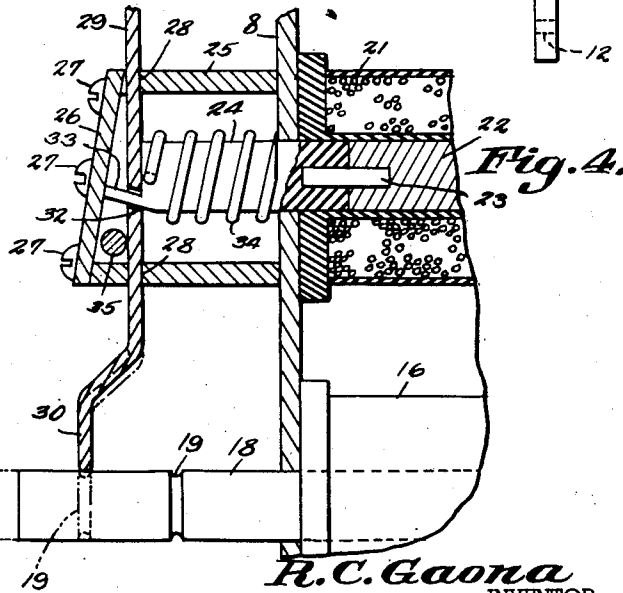
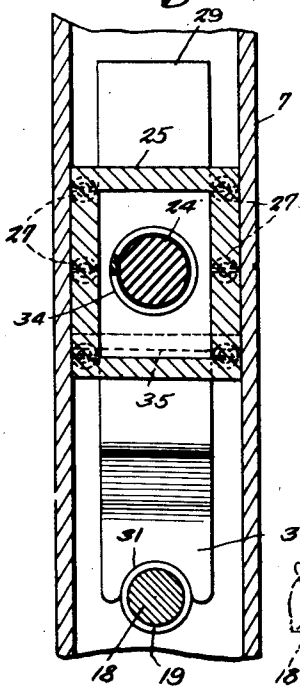


Fig. 3.



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Fig. 5.

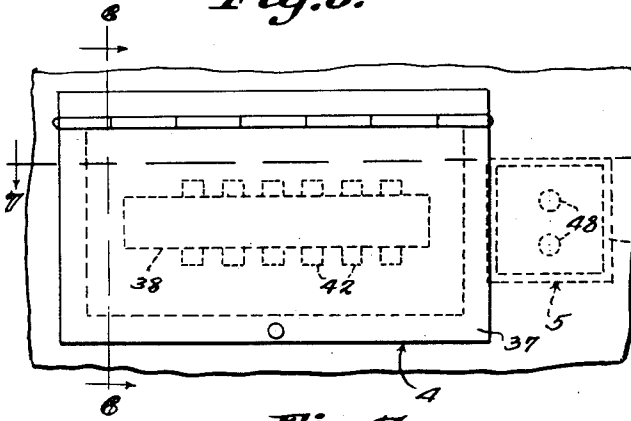


Fig. 6.

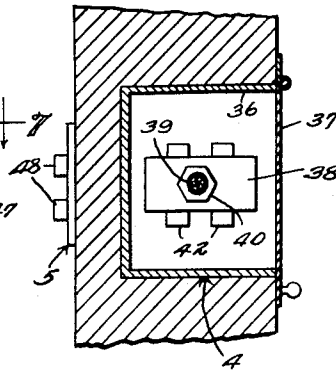


Fig. 7.

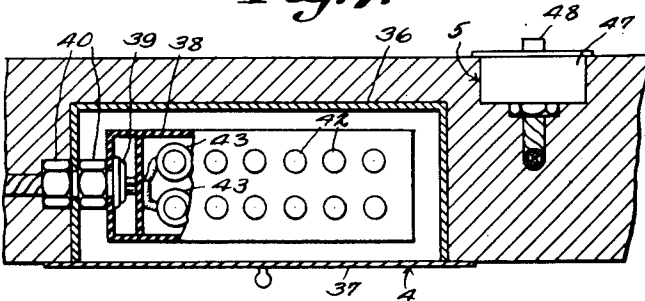


Fig. 8.

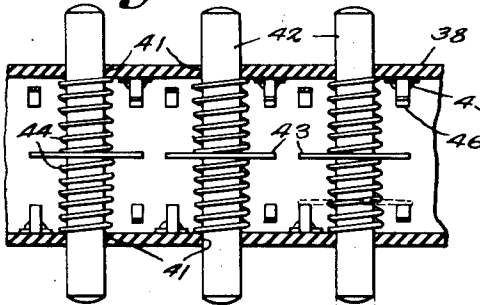


Fig. 9.

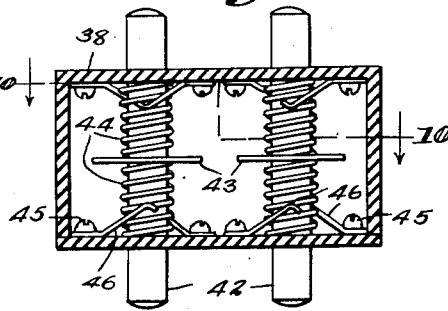
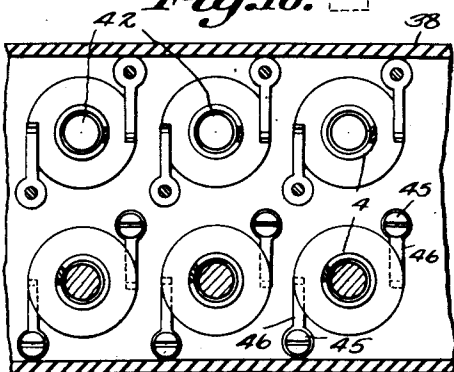


Fig. 10.



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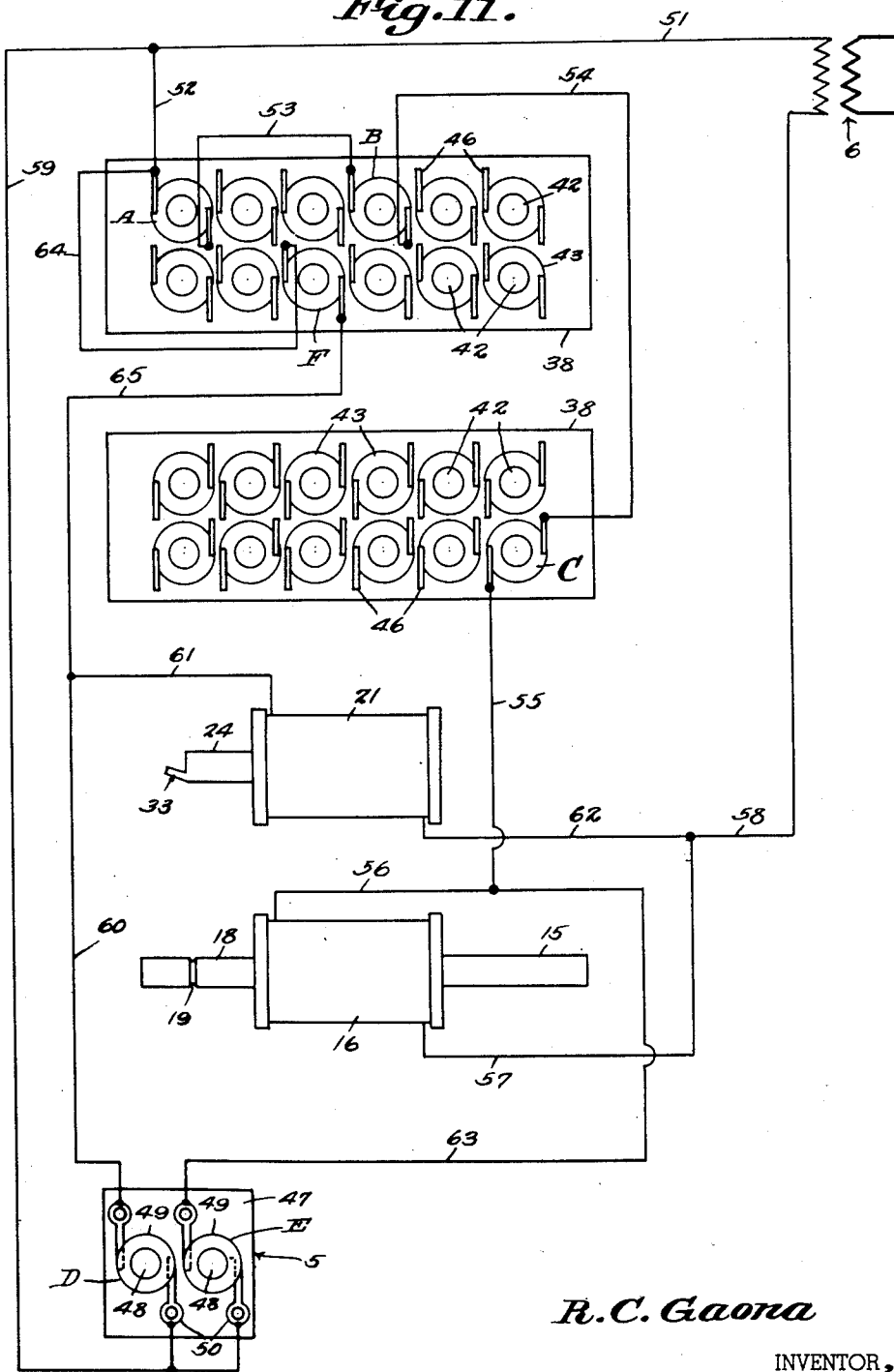
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Fig. 11.



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UNITED STATES PATENT OFFICE

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ELECTRICALLY CONTROLLED LOCK

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Application May 28, 1951, Serial No. 228,550

1 Claim. (Cl. 292—144)

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This invention relates to a combination lock, of the electrically actuated type, for closures.

An important object of the present invention is to provide a lock of the character described novelly designed in a manner to permit it to be wired for any of a large number of combinations, while still being kept to a compact size and simple form that will enable its manufacture in quantity and at low cost.

Another important object is to provide a combination lock as described that can be mounted in association with a closure, with speed and facility.

Still another object is to provide a combination lock assembly of the electrically actuated type that can be mounted in structures already built, as well as in new construction.

Yet another object is to provide a combination lock assembly in which a selected combination of buttons, which can vary in number as desired, are used to unlock the closure from the outside, in which other buttons are used to lock and unlock the closure from the inside, and in which another combination button is used to lock the closure from the outside.

Still another object is to provide a novel form of electrically actuated latch which, when energized for unlocking, will remain in its unlocking position until electrically actuated once again for the purpose of locking the closure once again.

Another object is to provide a combination button housing in which a plurality of reciprocating buttons is employed, and in which the successful use of the combination will require not only selection of the proper buttons, but will also require knowledge as to whether the individual button selected must be pushed down, or up.

With the foregoing and other objects in view which will appear as the description proceeds, the invention consists of certain novel details of construction and combinations of parts, hereinafter more fully described and pointed out in the claim, it being understood that changes may be made in the construction and arrangement of parts without departing from the spirit of the invention as claimed.

Referring to the drawings,

Fig. 1 is a front elevation of a closure showing, somewhat diagrammatically, the several components of the combination lock assembly.

Fig. 2 is an enlarged vertical section through the latch.

Fig. 3 is a section, still further enlarged, taken on line 3—3 of Fig. 2.

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Fig. 4 is a vertical section, in the same scale as Fig. 3, through the electrically actuated latching means of said latch assembly.

Fig. 5 is a front elevational view of the combination switch button housing, a wall in which said housing is mounted being shown fragmentarily.

Fig. 6 is a section taken substantially on line 6—6 of Fig. 5.

Fig. 7 is a section taken substantially on line 7—7 of Fig. 5.

Fig. 8 is an enlarged fragmentary vertical section taken longitudinally of the combination switch button housing.

Fig. 9 is a transverse section through said housing.

Fig. 10 is a section taken substantially on line 10—10 of Fig. 9.

Fig. 11 is a circuit diagram of the invention.

Referring to the drawings in detail, a closure 1 to be controlled by the mechanism is illustrated in Fig. 1, and in the present instance, but not necessarily, is a house door mounted in a door frame 2. A latch assembly generally designated 3 is mounted in the jamb, and is wired in circuit with a combination switch button assembly generally designated 4 that controls the latching and unlatching of closure 1 from the outside. An inside switch button housing generally designated 5 (see Fig. 5) controls the latching and unlatching of the door or closure 1 from the inside and is in circuit with the assemblies previously listed, as well as with a transformer generally designated 6.

Referring first to the latch assembly 3 (Figs. 2-4), this includes a case 7 in which is vertically mounted a rectangular frame 8 secured to the top and bottom of the case by screws 9. A latch plate 10 is secured by screws 11 to the front wall of the case 7, and would be recessed in the face of the door jamb 2. Openings 12 are formed in the latch plate, receiving screws, not shown, whereby the latch assembly is fixedly mounted in the door jamb.

Registering openings 13 and 14, formed in the front wall of the casing and in the latch plate 10, receive a sliding bolt 15, which bolt comprises the armature of a solenoid 16, which can be termed the unlatching solenoid. A dowel 17 secures to the inner end of the bolt 15 a coaxial extension 18, that projects continuously, in any position of the bolt, from the solenoid interiorly of the case 7. The extension 18 has an annular groove 19.

When the bolt 15 is extended as in Figs. 1 and 2, it projects into an opening formed in the

edge of the closure 1, to latch the closure and prevent opening thereof both from the inside and outside.

A compression spring 20 surrounds the bolt 15 within the case 7, abutting at one end against the frame 8, and secured at its other end to the bolt. The spring 20 normally urges the bolt outwardly into closure latching position. Withdrawal of the bolt to unlatch the closure is accomplished by energizing the unlatching solenoid 16.

The solenoid 16 is mounted in the lower portion of the frame 8. In the upper portion of the frame is a solenoid 21 which will be termed the latching solenoid. This has an armature 22 connected by a dowel 23 (Fig. 4) to a coaxial non-conductive extension 24 projecting rearwardly from the solenoid into an inner casing 25 of rectangular cross section mounted fixedly upon the rear wall of the frame 8.

The outer end of the inner casing 25 is closed by an inclined plate 26 secured to the inner casing by screws 27. Adjacent said plate 26, the top and bottom walls of the inner casing are formed with vertically aligned transversely extended slots 28 in which is vertically slidable a detent 29 formed from flat bar material, and integral at its lower end with an offset tongue 30 the bottom edge of which is formed (Fig. 3) with a semi-circular notch 31.

The detent 29, being freely slidable in the slots 28, normally gravitates to a position in which it is supported upon the rear extension 18. When the bolt 15 is drawn backwardly into the housing by energization of the solenoid 16, the groove 19 will be brought into register with the notch 31, causing the detent to drop down into the groove and hold the bolt 15 withdrawn, against the action of the spring 20 even after the unlatching solenoid 16 is de-energized.

Formed in the upper portion of the detent is a transverse slot 32, into which extends a flat inclined cam finger 33 formed on the outer end of the extension 24. A spring 34 is secured at one end to the extension 24, and abuts at its other end against the rear wall of the frame 8, so as to normally urge the extension 24 rearwardly or to the left in Fig. 4.

When, however, the latching solenoid 21 is energized, the armature 22 thereof pulls the extension 24 to the right in Fig. 4, so that the cam finger 33 bears against the top wall of the slot 32, causing the detent 29 to be elevated, thus to disengage the detent from the groove 19. The spring 20, expanding, will as a result shift the extension 18 and bolt 15 to the right in Fig. 2, to latching position.

A cross pin 35 extending transversely of the inner casing 25 bears against the detent 29, so as to assure its exact vertical movement.

Referring now to the combination switch button assembly, this is mounted in the wall of the structure, exteriorly of the space entered through the closure 1. Thus, the combination switch button assembly controls the latching and unlatching of the closure from the outside.

Said assembly is illustrated in Figs. 5-10 and includes a box 36 recessed in the structure's wall, access to the interior of the box being provided through the medium of a hinged lid 37.

Mounted centrally in the box 36 is switch housing 38 hollow and rectangular in form and made of insulating material. This is supported within the box by a tubular mounting bolt 39 extending

inwardly from one end of the box and fixed in position by nuts 40.

In the top and bottom walls of the switch housing, I form parallel rows of openings 41. The openings of the top surface register with the openings of the bottom surface for reciprocation, in the respective registering openings, of switch buttons 42. The opposite ends of the respective buttons project above and below the switch housing. Rigid with the respective buttons and located medially between opposite ends thereof within the housing, are circular bridges 43. On each button is provided a pair of springs 44 one of which abuts at opposite ends against the bridge and top surface of the switch housing, the other abutting against the bridge and bottom surface. Thus the buttons are held normally in centered position. When the top end of one button is pushed downwardly, one of the springs will return the button to normal position. When the bottom end of the button is pushed upwardly, the other spring will return it to normal position.

Associated with each switch button are two pairs of terminal screws 45. One pair secures diametrically opposed spring contacts 46 to the bottom surface of the switch housing, while the other pair secures similar spring contacts to the top surface. Thus, when a button is pushed downwardly, the bridge 43 thereof is depressed into engagement with the lower pair of spring contacts to permit a circuit to be closed there-through. Similarly, when the button is pushed upwardly, the bridge will engage the upper pair of spring contacts for the same purpose.

Referring to the inside switch assembly 5, this includes a rectangular housing 47 recessed in the interior surface of the building wall and covered by a face plate through which project a pair of inside switch buttons 48. These are provided with bridges 49 adapted to bridge contacts 50 (Fig. 11).

Referring now to the circuit diagram of Fig. 11, it will be assumed that the door is locked and is to be opened from the outside. Previously, the combination switch button assembly will have been so wired as to bring into the unlatching circuit a selected grouping of buttons, and a selected pair of contacts associated with the selected buttons, so that said buttons will be operated by pushing down thereupon or by being pressed upwardly, as desired.

For example, in the circuit diagram illustrated by way of example in Fig. 11, the buttons selected have been designated A, B, and C. A and B are operated by being depressed, the top panel of buttons in Fig. 11 being the upper surface of the switch housing, while the bottom panel is the bottom surface. Thus, button C is capable of closing the circuit only when pressed upwardly. In any event, it will be assumed that buttons A and B are pressed downwardly simultaneously with the upward pressing of button C. This closes a circuit through the transformer from the ordinary house supply, through a lead 51, and lead 52, through closed switch A, lead 53, closed switch B, lead 54, closed switch C, lead 55, lead 56, solenoid 16, lead 57, and lead 58 and thence back through the house supply.

It will be seen that this energizes the unlatching solenoid 16, which retracts the bolt 15 and unlocks the door. Energizing of the unlatching solenoid 16 causes the bolt to be held in retracted position even after the buttons A, B, and C are released and the solenoid de-energized. This is so because retraction of the bolt 15 will

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have engaged groove 19 and notched lower end 30 of detent 29.

It will be assumed that the user, having entered the structure through the unlatched door, and arriving inside the room, desires to latch the door from the inside. He presses switch button designated D in Fig. 11, this being one of the buttons 48, and this causes a circuit to be closed through lead 51, lead 59, button D, lead 60, lead 61, latching solenoid 21, lead 62, lead 58 and then back through house supply.

This causes the energizing of the latching solenoid 21, which causes, in turn, elevation of the detent 29. As a result, bolt 15 is freed and is forced outwardly to latching position under the action of the spring 20.

It will be assumed that having locked the door from the inside, the user desires to unlock the door from the inside. To do this, he presses button E, this being the other one of the buttons 48. This causes a circuit to be closed through lead 51, lead 59, switch E, lead 63, lead 58, solenoid 16, lead 57, and lead 58.

It will be assumed that having passed through the door to the outside, the user desires to lock the door from the outside. To do this, he presses another of the buttons 42, the button F being illustrated as an example. A circuit is thus closed through lead 51, lead 52, lead 64, switch button F, lead 65, lead 61, solenoid 21, lead 62, and lead 58.

In this connection, it will be noted that any of a large number of combinations can be set for unlocking the door from the outside. In the illustrated combination, three buttons are used, two being pressed downwardly and one upwardly. However, all could be pressed downwardly or all could be pressed upwardly as desired. Further, instead of three buttons, two, four, or any other desired number of buttons can be brought into the combination, up to eleven. It will be further noted that some of the buttons can be operated by being pressed downwardly, while others can be operated by being pressed upwardly. In any event, the combination is readily established by connecting the selected pairs of contacts in circuit, and the combination can be changed whenever desired merely by rewiring the circuit to include other, different contacts.

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It will be further appreciated, and is an important characteristic of the invention, that the construction is extremely simple, both as to the mechanical formation thereof and the wiring arrangement, and is capable of being readily installed in buildings already standing as well as in new construction.

What is claimed is:

In a door lock an elongated bolt mounted to move longitudinally, yielding means mounted adjacent and engaging the bolt for projecting it, electro-magnetic means surrounding said bolt for retracting it against the effort of the yielding means, said bolt having a groove extending therearound and opening through the periphery thereof, a keeper mounted above the bolt to move by gravity into the groove and hold the bolt retracted against the effort of the yielding means, said keeper having an opening extending there-through, an elongated plunger mounted above the bolt to move longitudinally in parallel relation to the bolt, yielding means mounted adjacent and engaging the plunger for projecting it, electro-magnetic means encircling the plunger for retracting it against the effort of the second mentioned yielding means, and an inclined finger carried by the plunger and projecting longitudinally therefrom through the opening in the keeper for engaging a wall of said opening and lifting the keeper when the plunger is moved longitudinally against the effort of the second mentioned yielding means.

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