Jan. 3, 1956 A. L. PELCIN 2,729,089

SOLENOID-CONTROLLED DOOR LOCK

Filed Feb. 8, 1952 2 Sheets-Sheet 1

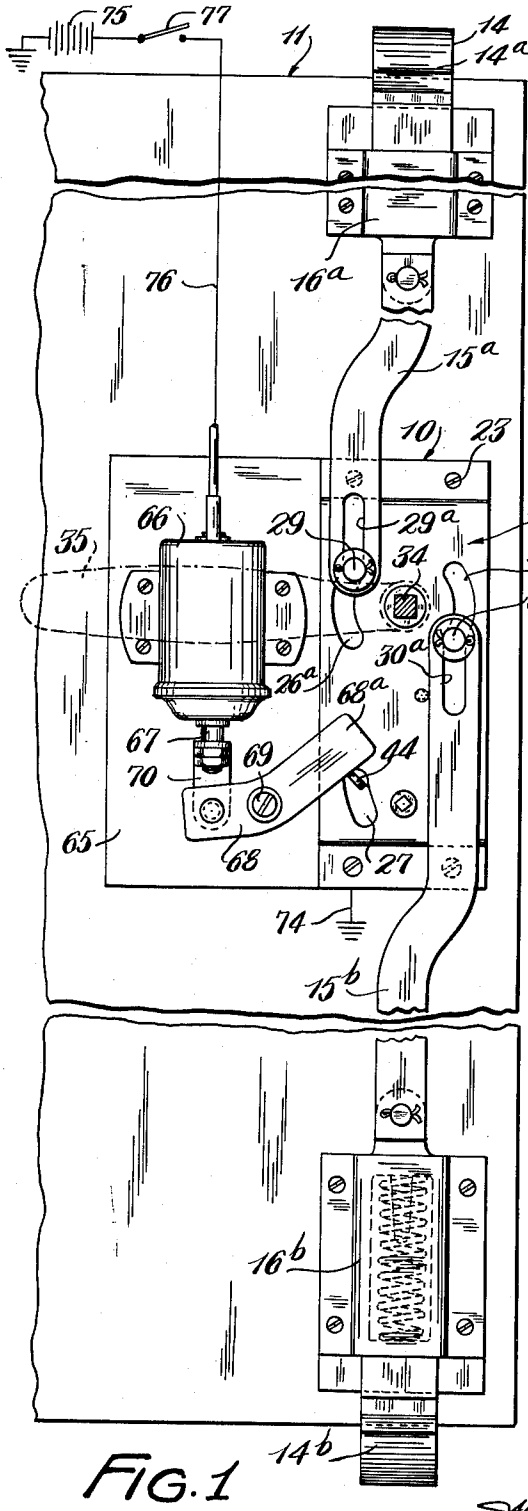


FIG. 1

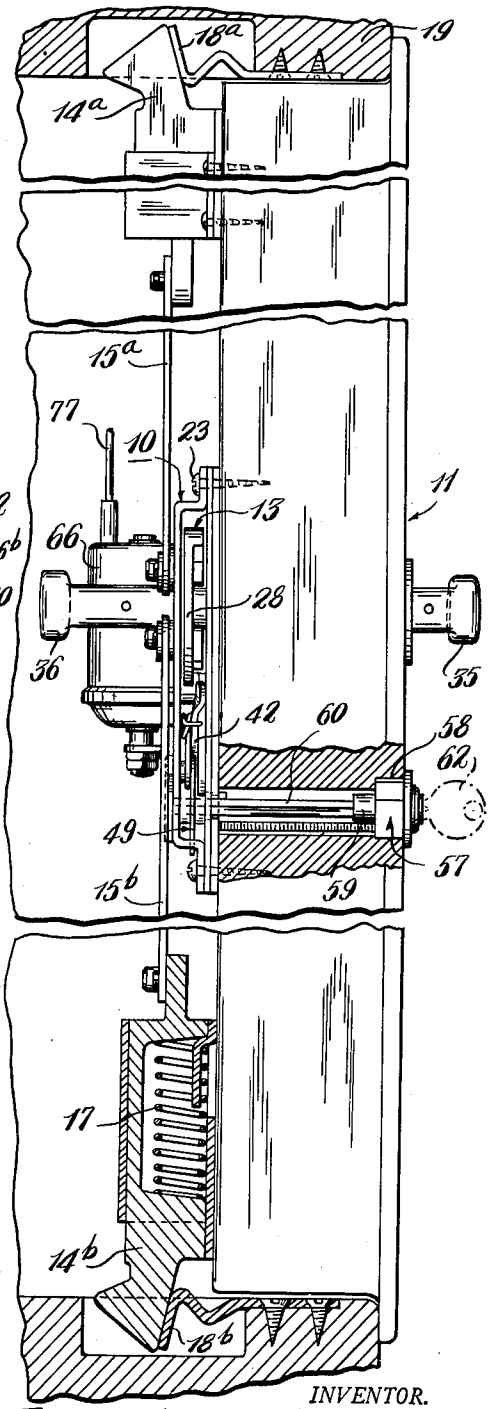


FIG. 2

INVENTOR.
ALBERT L. PELCIN
BY Hudson, Boughton, Williams, David & Hoffmann
ATTORNEYS

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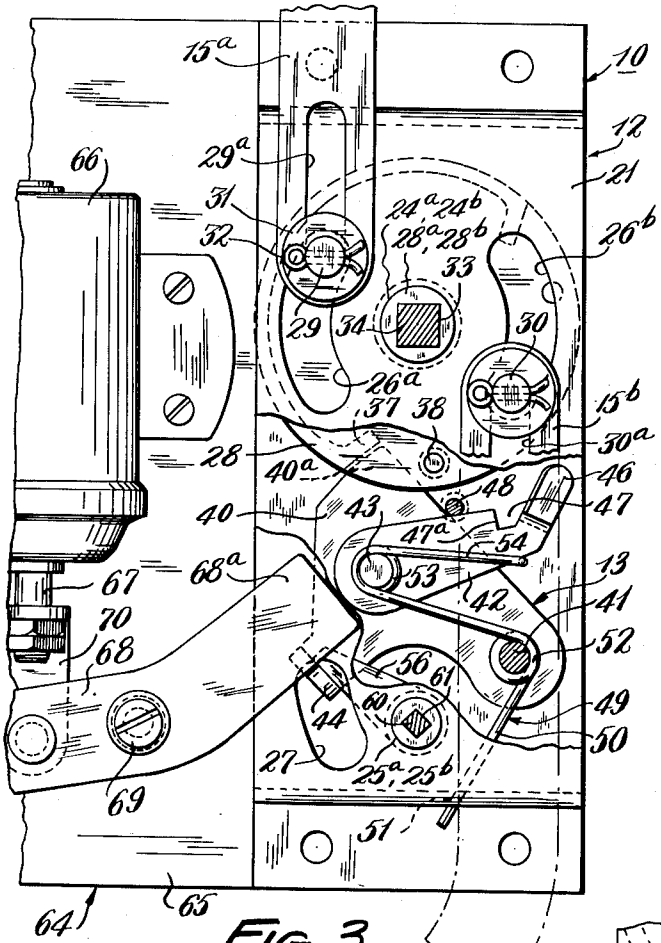


FIG. 3

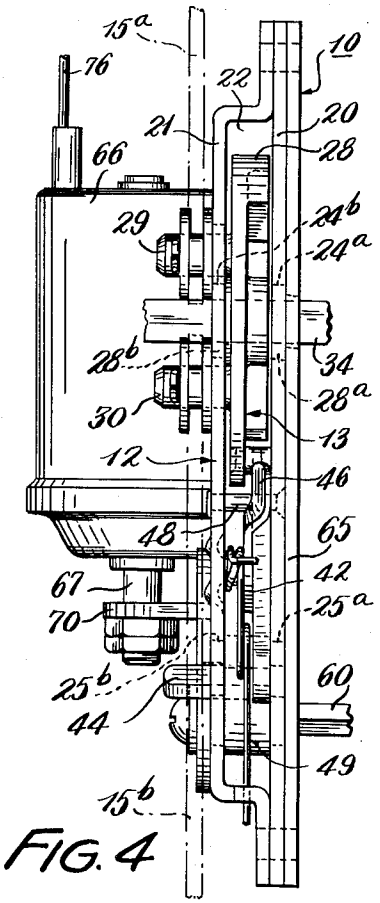


FIG. 4

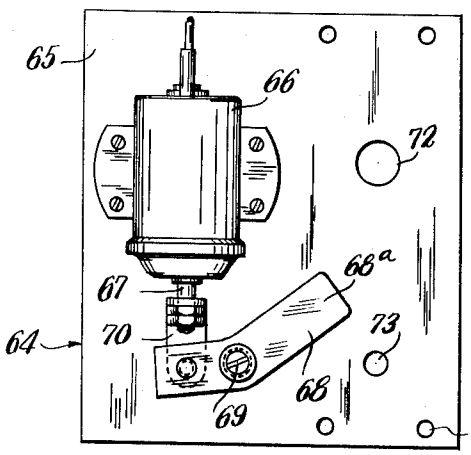


FIG. 6

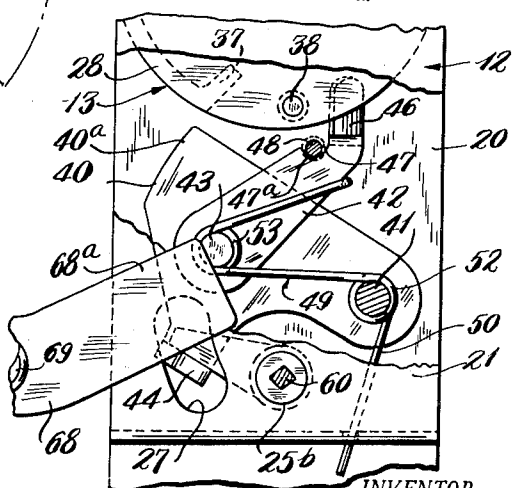


FIG. 5

INVENTOR.
ALBERT L. PELCIN
BY Hudson, Boughton, Williams, David & Hoffmann
ATTORNEYS

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SOLENOID-CONTROLLED DOOR LOCK

Albert L. Pelcin, Maple Heights, Ohio, assignor to The Eastern Malleable Iron Company, Cleveland, Ohio, a corporation of Connecticut

Application February 8, 1952, Serial No. 270,629

8 Claims. (Cl. 70—151)

This invention relates to door locks and, as its principal object, aims to provide a solenoid controlled door lock which is of a relatively simple and practical construction and which can be released by the actuation of a conveniently located electric switch.

Another object of the present invention is to provide an electrically controlled door lock in which the lock mechanism is of the self-locking type and is adapted to be released either by the action of a solenoid means or by means of a key.

One of the problems with which this invention is concerned is that of unlocking the access door of the package space of a delivery vehicle in a more convenient and practical manner than has been possible heretofore. During the use of a delivery vehicle as in a residential area for delivering store purchases to customers, it is desirable that the access door to the package space be maintained closed and locked at all times except when the driver is about to remove a package after stopping his vehicle at a given delivery address.

The most expeditious way of making such deliveries has been by following a procedure in which the driver brings his vehicle to a stop at a delivery address; then approaches the access door, usually by leaving the driver's cab and walking to the rear of the vehicle, and removes his key from his pocket and unlocks the access door; next he removes the package for that address from the package space; then slams the door shut and causes locking thereof; next he carries the selected package to the customer's home; and then returns to the cab and drives the vehicle to the next delivery address where the same cycle is repeated.

Because of the delay and inconvenience involved in removing his key from his pocket and unlocking the access door at each delivery stop, the driver frequently unlocks the door at the first stop and then leaves the same unlocked until all of the deliveries have been completed. This is especially prone to occur during winter weather when the driver is wearing gloves which would need to be removed for extracting his key and unlocking the door. Such an unlocked condition of the door is undesirable because it leaves the remaining packages exposed to theft during the time interval when the driver is away from the vehicle.

Accordingly, the present invention further provides an improved electrically controlled door lock by which this disadvantage is overcome and with which a performance cycle can be readily carried out which will be very convenient for the driver of the vehicle and which will prevent the access door of the package space from being left in an unlocked condition.

Yet another object is to provide an electrically controlled door lock of the character mentioned in which the lock is of the self-locking type and embodies a releasing or unlocking finger and in which a solenoid device controlled by a switch, preferably located in the driver's cab, cooperates with the control finger for releasing the lock for a single or "one trip" opening of the door.

Additionally this invention provides a solenoid device as an adapter means to be applied to a previously installed door lock.

The invention can be further briefly summarized as consisting in certain novel combinations and arrangements of parts hereinafter described and particularly set out in the claims thereof.

In the accompanying sheets of drawings:

Fig. 1 is an elevation showing electrically controlled lock mechanism embodying the present invention, the view being taken as looking at such lock mechanism installed on the inside of an outwardly swinging door;

Fig. 2 is an elevation representing an edge view of the door with the electrically controlled lock mechanism thereon, minor portions of the door and lock mechanism being shown in section;

Fig. 3 is an elevation showing the lock body assembly and the electric control means on a larger scale and with portions of the lock housing broken away;

Fig. 4 is an elevation representing an edge view of the lock body assembly and the electric control means on such larger scale;

Fig. 5 is a fragmentary elevational view corresponding with a portion of Fig. 3 but showing the released or unlocked condition of the lock mechanism; and

Fig. 6 is an elevation showing the solenoid adapter unit in detached relation.

As one practical embodiment, the accompanying drawings show the electrically controlled door lock **10** of the present invention mounted on the inner surface of an outwardly swinging door **11**. By way of example, the door **11** can be the rear access door to the package compartment of a delivery vehicle or can be any other swinging door to which it might be desirable to apply the electrically controlled lock of the present invention.

The door lock **10** comprises in general, a housing **12** containing lock mechanism **13** and projecting bolt means **14** which is here shown as comprising a pair of oppositely extending upper and lower bolts **14a** and **14b** connected with the mechanism **13** by pull rods **15a** and **15b**. The lock mechanism **13** and the bolt means **14** represent one form of lock apparatus to which the electric control means can be applied and will be described first.

The bolts **14a** and **14b** are slidable in upper and lower guide casings **16a** and **16b** which are located adjacent the upper and lower edges of the door **11**, such that in their extended position the bolts project beyond these edges of the door as shown in Figs. 1 and 2. Compression springs **17** contained in the casings **16a** and **16b** are effective on the bolts **14a** and **14b** to normally urge the same outwardly of the casings to their extended position. In the closed position of the door, as shown in Fig. 2, the bolts **14a** and **14b** engage behind upper and lower keepers **18a** and **18b** which are secured to the door frame structure **19**.

The housing **12** comprises connected front and rear plate members **20** and **21** which define therebetween a space or lock chamber **22** in which the lock mechanism **13** is located. The housing **12** is mounted on the door **11** with the front plate member **20** presented toward the inner surface of the door and can be secured in this position by suitable attaching means such as the screws **23**. For a purpose to be presently explained, the front and rear plate members **20** and **21** are provided with pairs of substantially aligned openings **24a**, **24b** and **25a**, **25b**. The rear plate member **21** is also provided with a pair of openings **26a** and **26b** extending arcuately around the axis of the aligned openings **24a** and **24b**. Additionally, the rear plate member **21** is provided with a clearance opening **27**.

The lock mechanism **13** comprises an actuating member **28** of a generally disk-like shape and having oppo-

sitely extending central hollow stem portions 28a and 28b journalled in the aligned openings 24a and 24b of the housing members 20 and 21. The actuating member 28 is also provided with a pair of crank pins 29 and 30 which project rearwardly therefrom through the arcuate slots 26a and 26b of the housing member 21. The pull rods 15a and 15b of the bolts 14a and 14b have their adjacent ends connected respectively with the crank pins 29 and 30 and are retained thereon by suitable washers 31 and cotter pins 32. For a purpose to be explained hereinafter, the pull rods 15a and 15b are connected with the crank pins 29 and 30 by being provided with longitudinal slots 29a and 30a through which these crank pins extend.

The actuating member 28 is also provided with a substantially square opening 33 extending therethrough and in which actuating shaft 34 of a corresponding square cross-sectional shape is disposed. A pair of outer and inner actuating handles 35 and 36 are mounted on the outer and inner ends of this actuating shaft. When the shaft 34 is rotated in a counter-clockwise direction as seen in Figs. 1 and 3, by manual manipulation of one of these handles, a pulling force will be applied to the bolts 14a and 14b through the pull rods 15a and 15b to retract the bolts against the force of the springs 17. For a purpose to be presently explained, the actuating member 28 is also provided with a substantially radial abutment member 37 and a trip pin 38, both of which are located on the lower segment of the actuating member and adjacent its arcuate outer edges.

The lock mechanism 13 also comprises, a swingable latch member 40 fulcrumed on a fixed pivot pin 41 mounted in the housing members 20 and 21, and a pawl 42 swingable on a floating fulcrum pin 43 carried by this latch member. The latch member 40 is provided with a releasing finger 44 which projects therefrom in angular relation and extends outwardly through the clearance opening 27 of the housing member 21. The pawl 42 is carried by the latch member 40 as just mentioned, but is movable relative thereto by swinging on the fulcrum pin 43 and has a lug extension or finger 46 which is shiftable into the path of movement of the trip pin 38 of the actuating member 28. The pawl 42 also has a recess 47 therein adjacent the base of the lug 46 and a shoulder 47a forming a side wall of this recess.

As shown in the drawings, the lock mechanism 13 also includes a stop pin 48 mounted in the housing members 20 and 21 and which is engaged by the latch member 40 and by the pawl 42 when the latter members occupy the positions which are explained hereinafter and illustrated in Fig. 3. The lock mechanism 13 further includes a wire spring 49 of an irregular shape and which is effective on the latch member 40 and on the pawl 42 for urging these members into the position engaging the stop pin 48, as shown in Fig. 3.

The spring 49 includes an anchor portion in the form of an arm 50 extending through an opening 51 of the housing member 21 and coil portions 52 and 53 which are disposed, respectively, in surrounding relation to the fixed and floating fulcrum pins 41 and 43. This spring also includes an arm portion 54 which bears against the pawl 42 at a point substantially opposite the recess 47 thereof. When the latch member 40 is held against the stop pin 48 by the spring 49, as shown in Fig. 3, the end portion 40a of the latch member projects beneath the disk portion of the actuating member 28 and extends into the path of movement of the abutment 37. This is the locking position of the latch member 40 in which it is engaged by the abutment 37 to prevent retraction of the bolts 14a and 14b and establishes the locked condition of the lock 10.

The lock mechanism 13 also includes a releasing lever 56 which is swingable in the chamber 22 of the housing 20 by having hollow stem portions 56a journaled in the aligned openings 25a and 25b of the housing members 20 and 21. The releasing lever 56 engages the releasing finger 44 of the latch member 40 such that by swinging of the releasing lever in a counter-clockwise direction, as seen in Fig. 3, it will swing the latch member 40 in opposition to the spring 49 and retract the end portion 40a from its position of holding engagement with the abutment 37 of the actuating member 28. This releases the actuating member 28, such that it can be rotated by the handle shaft 34 to thereby retract the bolts 14a and 14b and permit opening of the door.

A key-actuated lock unit 57 is shown in Fig. 2 as being mounted in a recess 58 of the front surface of the door 11 and includes a rotatable cylinder member 59 having a rearwardly extending square shaft 60. The shaft 60 extends into a square opening 61 of the stem portion 56a of the lever 56, such that the above-mentioned swinging of the lever 56 in a direction to retract the latch member 40, can be produced by the rotation of a key 62 which has been inserted into the lock unit 57.

When the latch member 40 is being withdrawn from engagement with the abutment 37 of the actuating member 28, the pawl 42 will move with the latch member causing the upper edge of the pawl to slide against the stop pin 48 until the recess 47 comes opposite this stop pin. Thereupon, the spring arm 54 swings the pawl 42 upwardly to cause the recess 47 to embrace the stop pin 48 and also engage the shoulder 47a against this stop pin. The engagement of the shoulder 47a with the stop pin then holds the latch member 40 in its retracted position, as shown in Fig. 5, and this represents the released or unlocked condition of the lock 10.

This movement of the pawl 42 into such holding engagement with the stop pin 48 also moves the trip lug 46 of the pawl into the path of movement of the trip pin 38 of the actuating member 28, as shown in Fig. 5. The same counterclockwise rotary movement of the actuating member 28 which retracts the bolts 14a and 14b, also causes the trip pin 38 to engage the lug 46 and trip the pawl 42 by disengaging the shoulder 47 thereof from the stop pin 48. This disengagement of the pawl from the stop pin 48 permits the spring 49 to swing the latch member 40 toward its effective or locking position of Fig. 3.

At the time that the pawl 42 is tripped by the trip pin 38, the actuating member 28 will have been rotated a distance such that a side face of this member will be presented downwardly and will be engaged by the latch member 40 during the return movement thereof. The return of the latch member 40 to its locking position is therefore temporarily delayed, but when the handle 35 is released and the springs 17 thereupon cause the outward movement of the bolts 14a and 14b and the return rotary movement of the actuating member 28, the latch member will then be free to move in behind the abutment 37.

From the construction and operation of the lock mechanism 13 as above described, it will be seen that the door lock 10 is of the so-called "one trip" self-locking type, such that whenever the lock mechanism has been released by a force applied to the releasing finger 44, the handle shaft 34 can be rotated to retract the bolts 14a and 14b, but this same unlocking movement of the handle shaft will also result in a change in the setting of the mechanism, such that the lock mechanism immediately thereafter reassumes its locked condition. Assuming that the door 11 was swung to its open position immediately following the bolt retracting movement of the actuating member 28 by the handle shaft 34, the release of the handle will automatically result in the lock mechanism resuming its locked condition. The door can be slammed shut while the mechanism 13 is in its locked condition because the slots 29a and 30a of the pull rods 15a and 15b will permit inward movement of the bolts 14a and 14b during the travel of the latter past the door frame 19 and the keepers 18a and 18b.

In accordance with its main feature, the present inven-

tion provides electric control and actuating means for the release finger 44 and which electric means will now be described. This electric control and actuating means is in the form of a solenoid unit 64, which is located adjacent the housing 12 and cooperates with the release finger 44. The solenoid unit 64 comprises a support plate 65 and a solenoid 66 mounted on such plate and having an axially movable plunger 67. The solenoid unit 64 also comprises a lever 68 mounted on a pivot pin 69 projecting from the plate 65 and having one end thereof connected with the plunger 67 as by means of a bracket 70.

The mounting plate 65 of the solenoid unit 64 is insertable beneath the housing 12 of the lock mechanism 10 and has suitably located openings 71 therein, such that the solenoid unit can be secured in place by means of the same screws 23 as are used to attach the housing 12 to the door 11. The mounted plate 65 of the solenoid unit 64 is also provided with suitably located openings 72 and 73 to accommodate the handle shaft 34 and the shaft 60 of the key-actuated lock unit 57.

The magnet winding of the solenoid 66 has one end thereof grounded on the vehicle structure as by means of the ground connection 74 and has its other end connected with a source of energizing current, such as the storage battery 75 of the vehicle, through a conductor 76 and a normally open push button switch 77. The push button switch 77 is located at some desired point on the vehicle, such as in the driver's cab.

When the solenoid unit 64 is located in its assembled position adjacent the housing 12, as above described, the lever 68 will be disposed with its free end 68^a in engagement with the release finger 44. When the solenoid 66 is energized by the closing of the push button switch 77, the lever 68 will be rocked in a clockwise direction to thereby apply an actuating force to the release finger 44 for swinging the latch member 40 to its retracted position as explained above. Upon the release of the push button switch 77, it assumes its open position thereby deenergizing the solenoid 66 and causing the lever 68 to swing back to its initial position shown in Figs. 1 and 3.

From the foregoing description and the accompanying drawings, it will now be readily seen that this improved solenoid controlled lock mechanism makes possible the carrying out of the cycle of operation which was explained at the beginning of this specification and which is very convenient and especially suitable and safe for use on a delivery vehicle from which packages are being distributed to individual purchasers living at different addresses. It will now also be seen that this invention provides a novel solenoid unit for application to previously installed door locks of the type having a releasing finger.

Although the improved lock mechanism and the novel solenoid unit of this invention have been illustrated and described herein to a somewhat detailed extent, it will be understood of course, that the invention is not to be regarded as being limited correspondingly in scope, but includes all changes and modifications coming within the terms of the claims hereof.

Having thus described my invention, I claim:

1. In a door lock of the character described, a housing, bolt means movable relative to said housing for projection into and retraction from a door locking position, spring means effective to releasably hold said bolt means in its projected position, manually operable handle means, mechanism in said housing responsive to movement of said handle means for retracting said bolt means, latch means in said housing and cooperating with the handle actuatable mechanism for limiting the movement of said mechanism to a single actuation in the direction to retract said bolt means, said latch means comprising a movable latch member having one position locking said mechanism and a retracted position releasing said mechanism and a pawl carried by and movable relative to said latch member, a stop means located to be releasably engaged by said pawl for holding said latch member in said retracted position, other spring means effective on said latch member and pawl and urging said latch member toward its locking position and said pawl toward engagement with said stop means, said pawl being releasable from said stop means by releasing movement imparted to said pawl by said mechanism during said single actuation of the latter, key actuatable means operable to move said latch member to its retracted position, solenoid means operable to move said latch member to its retracted position, and switch controlled circuit means for energizing said solenoid means.

2. In a door lock of the character described, a housing, bolt means movable relative to said housing for projection into and retraction from a door locking position, spring means effective to releasably hold said bolt means in its projected position, manually operable handle means, mechanism in said housing responsive to movement of said handle means for retracting said bolt means, latch means in said housing and cooperating with the handle actuatable mechanism for limiting the movement of said mechanism to a single actuation in the direction to retract said bolt means, said latch means comprising a movable latch member having a locking position locking said mechanism and a retracted position in which said mechanism is in a released condition and a pawl carried by and movable relative to said latch member, a stop means located to be releasably engaged by said pawl for holding said latch member in said retracted position, other spring means effective on said latch member and pawl and urging said latch member toward its locking position and said pawl toward engagement with said stop means, said pawl being releasable from said stop means by releasing movement imparted to said pawl by said mechanism during said single actuation of the latter, means connected with said latch member and providing a finger portion projecting from said housing, solenoid means adjacent said housing and having a movable member engageable with said finger portion for moving said latch member to its retracted position, and switch controlled circuit means for energizing said solenoid means.

3. In a door lock of the character described, a housing, bolt means movable relative to said housing for projection into and retraction from a door locking position, spring means effective to releasably hold said bolt means in its projected position, manually operable handle means, mechanism in said housing responsive to movement of said handle means for retracting said bolt means, latch means in said housing and cooperating with the handle actuatable mechanism for limiting the movement of said mechanism to a single actuation in the direction to retract said bolt means, said latch means comprising a movable latch member having a locking position locking said mechanism and a releasing position in which said mechanism is in a released condition and a pawl carried by and movable relative to said latch member, a stop means located to be releasably engaged by said pawl for holding said latch member in said releasing position, other spring means effective on said latch member and pawl and urging said latch member toward its locking position and said pawl toward engagement with said stop means, said pawl being releasable from said stop means by releasing movement imparted to said pawl by said mechanism during said single actuation of the latter, a lug connected with said latch member and having a finger portion projecting from said housing, key actuatable means extending into said housing and engageable with said lug for moving said latch member to its releasing position, fastening members engaging said housing for attaching the same to a door, a mounting member adapted to be secured in fixed relation to said housing by said fastening members, and a solenoid device having movable means engageable with said finger portion for causing shifting of said latch member to its releasing position, said solenoid device

being carried by said mounting member and located thereby relative to said finger portion.

4. A door lock as defined in claim 1 in which said handle actuatable mechanism includes a pivoted disk member having an abutment thereon and a trip pin carried by said disk member, and in which the releasing movement of said pawl is produced by engagement of said pawl by said trip pin during said single actuation of said mechanism.

5. In a door lock of the character described, a housing, bolt means movable relative to said housing for projection into and retraction from a door locking position, spring means effective to releasably hold said bolt means in its projected position, manually operable handle means, mechanism in said housing responsive to movement of said handle means for retracting said bolt means, latch means movable in said housing between a holding position in holding engagement with the handle actuatable mechanism for preventing movement of the latter in the direction to retract said bolt means and a retracted position releasing said handle actuatable mechanism for a single actuation of the latter in the direction to retract said bolt means, a second spring means urging said latch means toward said holding position, retaining means adapted to retain said latch means in said retracted position including a pawl engageable by said mechanism for causing said retaining means to release said latch means in response to said single actuation of said mechanism, key actuatable means operable to move said latch means to its retracted position, solenoid means operable to move said latch means to its retracted position, and switch controlled circuit means for energizing said solenoid means.

6. In a door lock of the character described, a housing, bolt means movable relative to said housing for projection into and retraction from a door locking position, spring means effective to releasably hold said bolt means in its projected position, manually operable handle means, mechanism in said housing responsive to movement of said handle means for retracting said bolt means, latch means movable in said housing between a holding position in holding engagement with the handle actuatable mechanism for preventing movement of the latter in the direction to retract said bolt means and a retracted position releasing said handle actuatable mechanism for a single actuation of the latter in the direction to retract said bolt means, a second spring means urging said latch means toward said holding position, retaining means adapted to retain said latch means in said retracted position including a pawl engageable by said mechanism for causing said retaining means to release said latch means in response to said single actuation of said mechanism, and key actuatable means operable to move said latch means to its retracted position.

7. In a door lock of the character described, a housing, bolt means movable relative to said housing for projection into and retraction from a door locking position, spring means effective to releasably hold said bolt means in its projected position, manually operable handle means,

mechanism in said housing responsive to movement of said handle means for retracting said bolt means, latch means in said housing and cooperating with the handle actuatable mechanism for limiting the movement of said mechanism to a single actuation in the direction to retract said bolt means, said latch means comprising a movable latch member having one position locking said mechanism and a retracted position releasing said mechanism and a pawl carried by and movable relative to said latch member, a stop means located to be releasably engaged by said pawl for holding said latch member in said retracted position, other spring means effective on said latch member and pawl and urging said latch member toward its locking position and said pawl toward engagement with said stop means, said pawl being releasable from said stop means by releasing movement imparted to said pawl by said mechanism during said single actuation of the latter, and key actuatable means operable to move said latch member to its retracted position.

8. In a door lock of the character described, a housing, bolt means movable relative to said housing for projection into and retraction from a door locking position, spring means effective to releasably hold said bolt means in its projected position, manually operable handle means, mechanism in said housing responsive to movement of said handle means for retracting said bolt means, latch means in said housing and cooperating with the handle actuatable mechanism for limiting the movement of said mechanism to a single actuation in the direction to retract said bolt means, said latch means comprising a movable latch member having one position locking said mechanism and a retracted position releasing said mechanism and a pawl carried by and movable relative to said latch member, a stop means located to be releasably engaged by said pawl for holding said latch member in said retracted position, other spring means effective on said latch member and pawl and urging said latch member toward its locking position and said pawl toward engagement with said stop means, said pawl being releasable from said stop means by releasing movement imparted to said pawl by said mechanism during said single actuation of the latter, said mechanism comprising a pivoted disk member having an abutment means thereon engageable with said latch member and a trip pin carried by said disk member, the releasing movement of said pawl being produced by engagement of said pawl by said trip pin during said single actuation of said mechanism, and key actuatable means operable to move said latch member to its retracted position.

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