Nov. 9, 1948. L. J. FORNWALD 2,453,505

SAFETY DOOR LOCK

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Fig. 1.

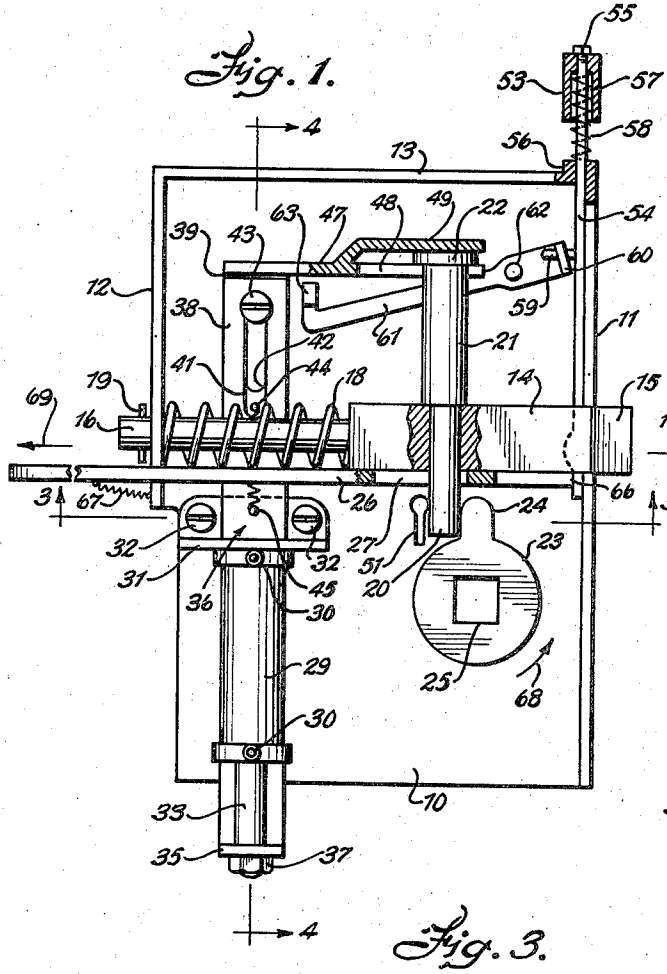


Fig. 2.

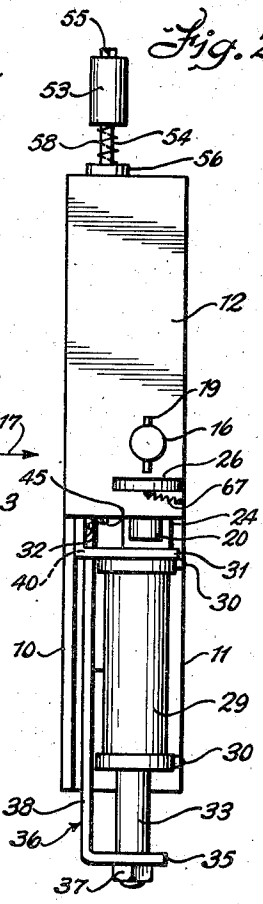
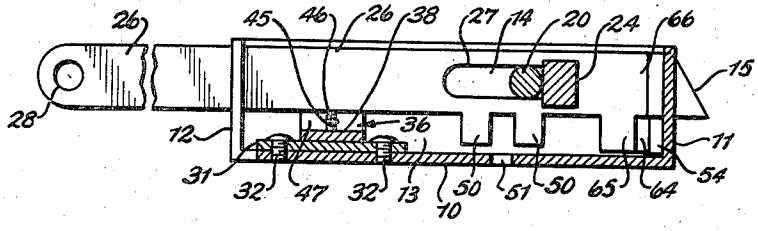


Fig. 3.



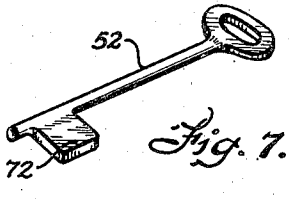


Fig. 7.

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Fig. 5.

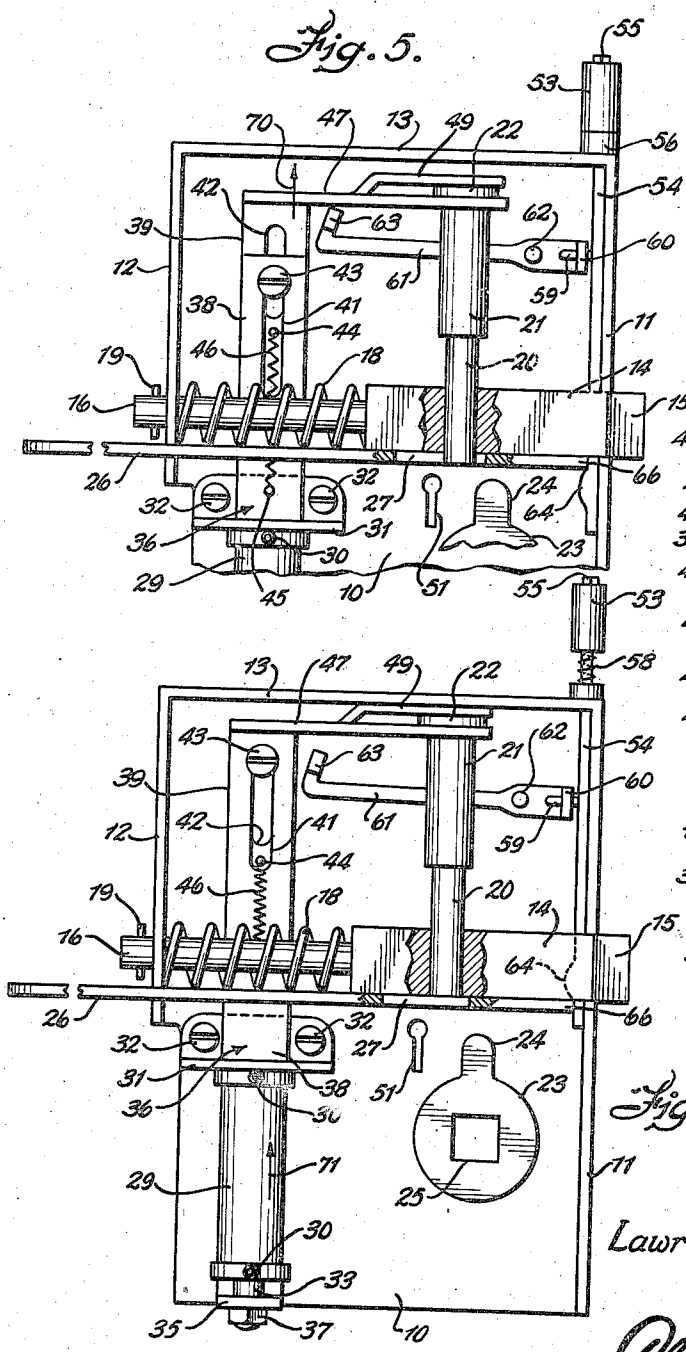


Fig. 4.

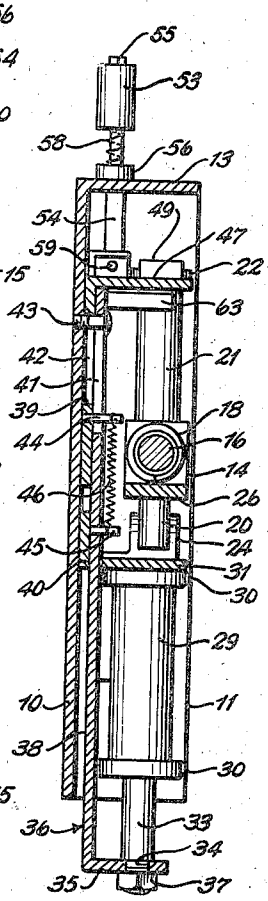


Fig. 6.

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SAFETY DOOR LOCK

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10 Claims. (Cl. 70—283)

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This invention relates to new and useful improvements and structural refinements in safety door locks, more specifically, to a device of the character herein described, such as may be effectively employed in association with doors of automobiles and the like, whereby the unlocking and opening of the same, both from the inside and out, is placed directly under the control of the driver.

It is a well-known fact that serious accidents are frequently caused by children opening the doors from the inside and falling out of the vehicle while the same is in motion. Similarly, burglars have often gained entry into the vehicle, by simply opening its doors from the outside, during the brief interval when the same has stopped for a traffic light.

It is, therefore, a further object of the invention to eliminate the above stated hazards by providing an electrically controlled door lock associated with the ignition system of the vehicle, whereby the operation of the same is under direct supervision of the driver, as aforesaid.

Another object of the invention is to provide a door lock in which the electric operation of the same does not in any way interfere with the normal functioning of the conventional door handles.

An additional object of the invention is to provide a door lock which is simple in construction, dependable in operation, and which cannot readily become damaged.

A still further object of the invention is to provide a door lock which may be readily disassembled for purposes of inspection, adjustment or repair.

With the above more important objects in view, and such other objects as may become apparent as this specification proceeds, the invention consists essentially of the arrangement and construction of parts as illustrated in the accompanying drawings, in which:

Figure 1 is a side elevation of the invention, partially broken away to reveal its construction.

Figure 2 is an end view of the same.

Figure 3 is a cross sectional view, taken in the plane of the line 3—3 in Figure 1.

Figure 4 is a cross sectional view taken in the plane of the line 4—4 in Figure 1.

Figure 5 is a fragmentary side elevation showing the invention in the manually locked position,

Figure 6 is a further side elevation, but showing the invention in the electrically locked position, and

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Figue 7 is a perspective view of a locking key used in association with the lock.

Like characters of reference are used to designate like parts in the specification and throughout the several views.

Referring now to the accompanying drawings in detail, the invention consists of a supporting plate 10, configurated substantially as shown and provided with the marginal flanges 11, 12 and 13. A slidable bolt 14, provided with the conventional beveled end 15 and with a cylindrical shank 16, is slidably positioned in the flanges 11 and 12 and is normally urged outwardly in the direction of the arrow 17 by a compression spring 18. A transversely extending pin 19 positioned adjacent the end of the shank 16 prevents excessive movement of the bolt.

A slidable actuating pin 20 extends transversely through the bolt 14, this pin being formed with a portion of enlarged diameter 21 and with a head 22. An externally operable cam 23 is rotatably positioned on the plate 10, this cam being provided with a projecting lug 24 and with a substantially square bore 25. A conventional outside door handle (not shown) provided with a squared shank, is receivable in the bore 25, for a purpose hereinafter to be set forth.

A pull bar 26 is positioned adjacently to the bolt 14 and a slot 27 is formed in this bar to accommodate the aforementioned pin 20. One end of the bar 26 protrudes through the flange 12 and is formed with an aperture 28. In this manner, the bar 26 may be connected by means of suitable linkage (not shown) to the inside door handle (also not shown) of the vehicle.

A hollow solenoid 29, provided with suitable terminals 30, is secured to a suitable angle bracket 31, this in turn, being mounted by means of the bolts 32 on the plate 10. The solenoid is equipped with a slidable armature 33, this being formed with a screw threaded portion 34, whereby it is rigidly secured to an angulated extremity 35 of a connecting rod designated generally by the reference character 36. A suitable nut 37 engaging the portion 34 is used to rigidly secure the two parts together.

Th connecting rod 36 consists of a pair of overlapped sections 38 and 39, the aforementioned extremity 35 being formed at the end of the section 38 and this section passing slidably through a slot 40 formed adjacent the base of the bracket 31. The sections 38 and 39 are also formed with the slots 41, 42, respectively, and a bolt 43 passes through these slots, to slidably secure the sections to the plate 10.

The section 39 is provided with an upstanding pin 44 which protrudes through the slot 41 of the section 38 and the latter is equipped with a further upstanding pin 45. A tension spring 46 extends between the two pins, as will be clearly apparent from the accompanying drawings.

The free end of the section 39 is upturned and extends laterally as at 47, whereupon it is slotted as at 48 and struck out to form a detent 49. The portion 21 of the aforementioned pin 20 is slidably positioned in the slot 48, with the pin head 22 engaging the detent 49.

The edge of the aforementioned pull bar 26 is also formed with a pair of spaced lugs 50 and the plate 10 is formed with a key slot 51, disposed adjacently to said lugs. The purpose of the lugs and slot will be hereinafter more fully described in association with the key 52.

An internally operable push-button 53 is secured to the end of a slidable link 54 by a suitable nut 55, the link 54 passing through a boss 56 formed on the flange 13 of the plate 10. The button 53 is formed with an enlarged bore 57 and a compression spring 58 is positioned on the link 54, between the inner end of the bore 57 and the aforementioned boss 56.

The link 54 is equipped with a laterally projecting pin 59, the latter engaging a suitable aperture provided in an upturned end portion 60 of a lever 61. This lever is pivoted at 62 to the plate 10 and its remaining end is angulated to provide an upstanding finger 63. This finger is engageable with the portion 47 of the section 39 of the connecting rod 36, as will be hereinafter more fully described.

The link 54 is formed adjacent its lower end with a cam surface portion 64, this being engageable with the adjacent edge of a downwardly extending lug 65 provided at the end 66 of the pull bar 26. A further tension spring 67 is anchored at one end to the flange 12, while its remaining end is secured to the pull bar 26.

Having thus described the constructional details of the invention, its method of operation will now be presented.

The invention is shown in the unlocked position in the accompanying Figure 1. In this position, turning of the outside door handle (not shown) will rotate the cam 23 in the direction of the arrow 68 and the lug 24 will act upon the pin 20, so that the associated bolt 14 is withdrawn from the catch (not shown) in the door frame, to permit opening of the door. It will be noted, that during this action, the bar 26 will remain stationary and the pin 20 will simply slide in the slot 27. Similarly, the head 22 will slidably engage the detent 49 and the portion 21 will slide in the slot 48.

When the outside door handle is released, the spring 18 will automatically return the bolt 14 to its original position.

While still in the unlocked position, the door may be opened by manipulating the inside door handle (not shown), whereby the pull bar 26 will be slid in the direction of the arrow 69. During this action the end of the slot 27 will engage the pin 20 and slide the same, together with the associated bolt 14, to permit the opening of the door. It will be noted that the cam 23 will remain stationary and the portion 21 will again slide in the slot 48.

The invention may be locked manually in the conventional manner by depressing the button 53, as is illustrated in the accompanying Figure 5.

During this action, the pin 59 will actuate the lever 61 so that the finger 63 engages the portion 47 and lifts the section 39 upwardly in the direction of the arrow 70. Simultaneously the pin 20 will be lifted upwardly and out of engagement with the lug 24, whereupon the outside door handle may be actuated without sliding the bolt 14. It will be noted, however, that a portion of the pin 20 still projects beyond the bolt 14 and remains in engagement with the slot 27. It is thus possible to unlock the door from the inside, while such unlocking from the outside is prevented.

It should be noted that while the section 39 is being lifted upwardly, the section 38 will remain stationary. This is facilitated by the movement of the pin 44 in the slot 41 and by corresponding stretching of the spring 46, as the distance between the pins 44 and 45 increases.

As the link 54 is pushed downwardly, the cam 64 which heretofore was disposed above the end 66 of the bar 26, will engage the adjacent edge of the lug 65 and force the bar 26 against the resiliency of the spring 67. After the cam 64 passes the lug 65, the spring 67 will return the bar 26 to its original location and thus retain the button 53 in its depressed position. The button may be released from this position by simply lifting the same upwardly or alternatively, by actuating the inside door handle to pull the bar 26 and thus release the cam. The button will then be automatically returned to its normal position by the resiliency of the spring 58.

Referring now to the accompanying Figure 6, the lock may be electrically controlled by connecting the terminals 30 of the solenoid 29 in series with the ignition system of the vehicle. As the ignition switch is turned on, the solenoid 29 will be energized and will draw the armature 33 inwardly, in the direction of the arrow 71. Simultaneously, the section 38 will be forced upwardly and as the lower end of the slot 41 contacts the pin 44, this upward movement will be imparted also to the section 39. This action will be accompanied by a corresponding sliding of the pin 20, this eventually assuming the position illustrated in Figure 6. The lower end of the pin 20, while in this position, will be flush with the lower surface of the bolt 14 and it will be noted that both rotation of the cam 23 and sliding of the bar 26 will be ineffective in sliding the bolt for the purpose of opening the door. It will thus be impossible to unlock the door from both the inside and out, as long as the ignition switch remains turned on and current passes through the solenoid 29. The advantages of the invention thus become readily apparent.

During the electrical locking operation, the lever 61 and the button 53 will remain stationary.

When the ignition switch is turned off, the solenoid 29 will release the armature 33 from its magnetic effect and the rod 36 together with the associated pin 20 will return to their original unlocked positions under the action of gravity.

To further increase the utility of the invention, and referring again to the accompanying Figure 5, the invention may be unlocked from the outside after being locked manually by the push button 53. This is accomplished by inserting the key 52 through the keyhole 51 so that the lug 72 thereof engages between the lugs 50. Thereupon, by turning the key, the bar 26 will be slid together with the associated bolt 14. It will be apparent that this action is equivalent to opening the door by means of the inside door handle.

While in the foregoing there has been shown and described the preferred embodiment of this

invention it is to be understood that minor changes in the details of construction, combination, and arrangement of parts may be resorted to without departing from the spirit and scope of the invention as claimed.

What I claim as my invention is:

1. A safety door lock comprising in combination, a supporting plate, a spring pressed bolt slidable on said plate, an actuating pin extending transversely through said bolt, an externally operable element and an internally operable element engaging said pin, and solenoid actuated means for disengaging said pin from said elements.

2. A safety door lock comprising in combination, a supporting plate, a spring pressed bolt slidable on said plate, a slidable actuating pin extending transversely through said bolt, an externally operable cam and an internally operable pull bar engageable with said pin, and solenoid actuated means for disengaging said pin from said cam and from said bar.

3. A safety door lock comprising in combination, a supporting plate, a spring pressed bolt slidable on said plate, a slidable actuating pin extending transversely through said bolt, an externally operable cam, an internally operable bar formed with a slot, one end of said pin extending through said slot and engaging said cam, a head at the remaining end of said pin, a solenoid on said plate, a slidable armature in said solenoid, a connecting rod secured at one end thereof to said armature, an angulated portion formed with a slotted detent at the remaining end of said connecting rod, said head slidably engaging said detent, and an internally operable push button for sliding said pin independently of said solenoid.

4. The device as defined in claim 3, in which said connecting rod comprises a pair of overlapped sections, said sections being resiliently connected together and relatively slidable, a slidable link, said button being mounted on said link, a lever pivoted to said plate, one end of said lever being connected to said link and the remaining end of said lever being engageable with one section of said connecting rod, the remaining section of said rod being connected to said solenoid.

5. The device as defined in claim 3, together with externally operable means for actuating said pull bar, said means comprising a pair of spaced lugs on said pull bar adapted to receive a key therebetween, said plate being formed with a keyhole to facilitate the insertion of said key.

6. A safety door lock comprising in combination, a supporting plate, a spring pressed bolt slidable on said plate, a slidable actuating pin extending transversely through said bolt, an externally operable cam and an internally operable pull bar engageable with said pin, and internally operable means for disengaging said pin from said cam.

7. A safety door lock comprising in combination, a supporting plate, a spring pressed bolt slidable on said plate, a slidable actuating pin extending transversely through said bolt, an externally operable cam and an internally operable pull bar engageable with said pin, internally operable means for disengaging said pin from said cam, and solenoid actuated means for disengaging said pin from said cam and from said bar.

8. In a safety door lock including a slidable bolt, a slidable pull bar disposed adjacent said bolt, a pin extending transversely through said bolt and through said bar, a cam engageable with said pin for sliding said bolt independently of said bar, and means for sliding said bar in unison with said bolt independently of the actuation of said cam.

9. A safety door lock comprising in combination, a supporting plate, a spring pressed bolt slidable on said plate, an internally operable pull bar slidably disposed adjacent said bolt, a slidable actuating pin extending through said bolt and through said bar, an externally operable cam engageable with said pin for sliding said bolt independently of said bar, means for sliding said bar in unison with said bolt independently of the operation of said cam, an internally operable push button for sliding said pin out of engagement with said cam, and solenoid actuated means for disengaging said pin from said cam and from said bar.

10. The device as defined in claim 9, together with means for locking said pin out of engagement with said cam upon the actuation of said push button, said means being releasably engageable with said bar.

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