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T. F. PETERS
DOOR LOCKING SYSTEM

3,243,216

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2 Sheets-Sheet 1

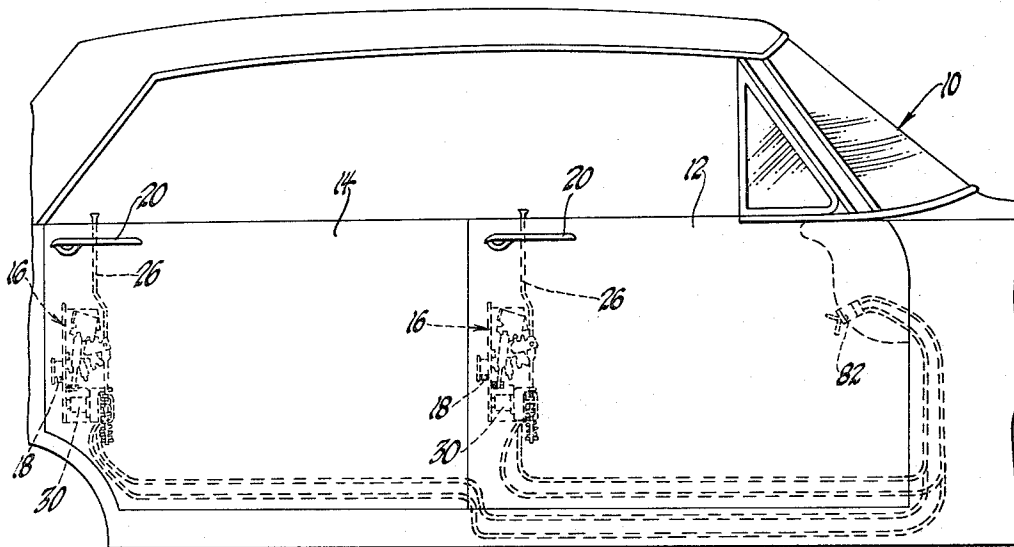


Fig. 1

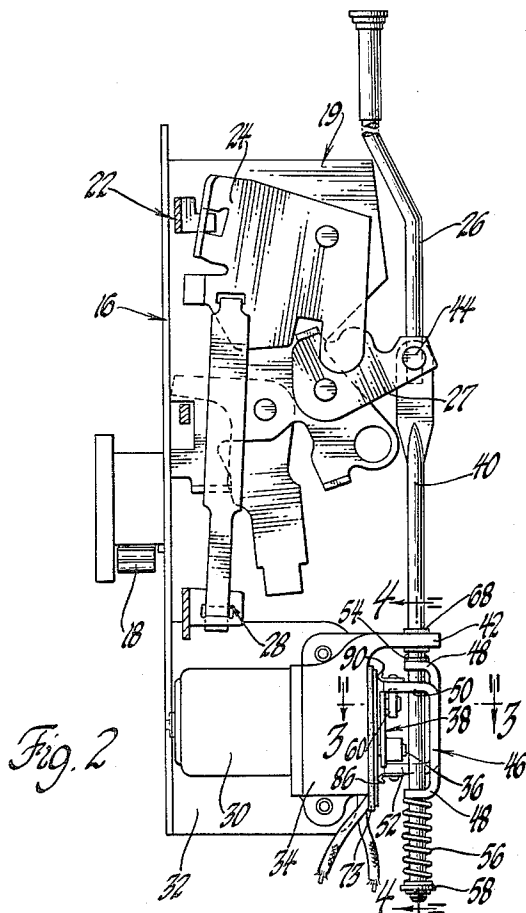


Fig. 2

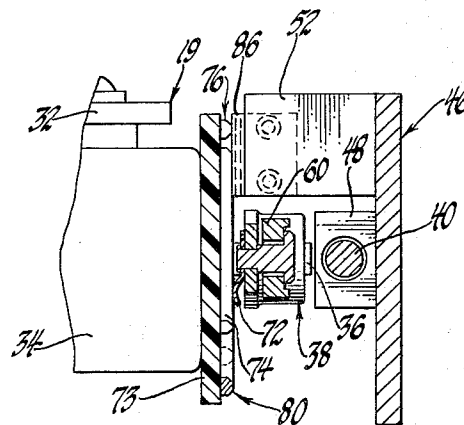


Fig. 3

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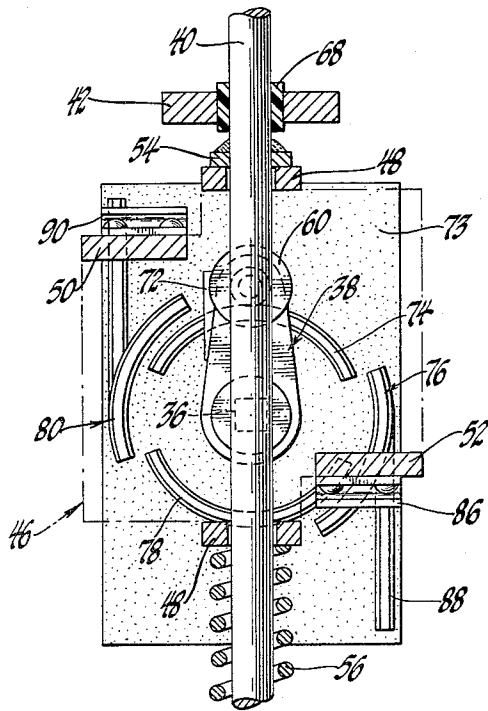


Fig. 4

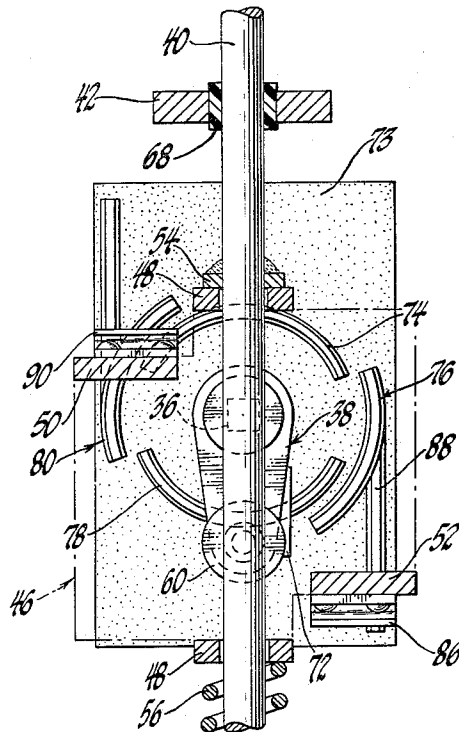


Fig. 5

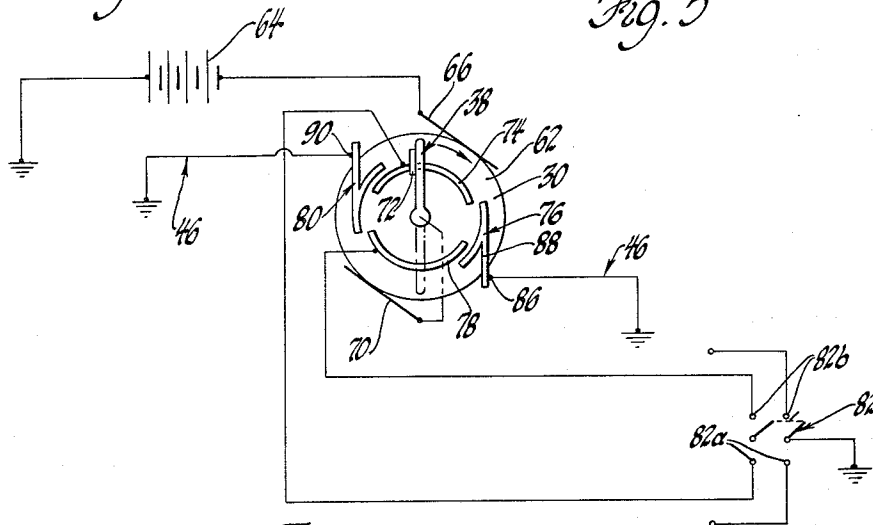


Fig. 6

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3,243,216

DOOR LOCKING SYSTEM

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5 Claims. (Cl. 292—201)

This invention relates to vehicle body door locks, and more particularly to vehicle body door locking systems.

One feature of this invention is that it provides a new and improved vehicle body door locking system. Another feature of this invention is that it provides in combination with a door latch for each of the various vehicle body doors power-operated means including a single small unidirectional electric motor for accomplishing power locking and unlocking of the latch. A further feature of this invention is that the power-operated means are provided in conjunction with manually operable locking means for the latch, together with means for automatically resetting the power-operated means into proper phase with the latch and the manually operable means should the latch be manually locked or unlocked independently of operation of the power-operated means. Certain other features of the invention reside in the arrangement of control circuit switch means for energizing and resetting the power-operated means over half-cycle revolutions corresponding to the locked and unlocked condition of the latch.

These and other features and advantages of the invention will be readily apparent from the following specification and drawings wherein:

FIGURE 1 is a fragmentary side elevational view of a vehicle body including a door locking system according to this invention;

FIGURE 2 is an enlarged elevational view of a portion of the system;

FIGURE 3 is an enlarged sectional view taken generally along the plane indicated by line 3—3 of FIGURE 2;

FIGURE 4 is an enlarged sectional view taken generally along the plane indicated by line 4—4 of FIGURE 2, showing parts in unlocked position;

FIGURE 5 is a view similar to FIGURE 4 showing the parts in locked position; and

FIGURE 6 is a schematic representation of a circuit for the system.

Referring now particularly to FIGURE 1 of the drawings, a vehicle body 10 includes front and rear doors 12 and 14 respectively hingedly mounted adjacent their forward edges on the body for swinging movement between open and closed positions. A door latch, designated generally as 16, is provided in each door 12 and 14 to hold the doors in closed position. Although the door locking system of this invention is equally well-adapted for use with many known types of door latches, the description will proceed with reference to a particular type of door latch as disclosed in Patent No. 2,852,296, issued September 16, 1958, to B. D. Priestman. Further, since the components and operation of the system are identical with respect to either door 12 or 14, this description will proceed with particular reference to front door 12 only.

As shown in FIGURE 2, and as particularly described in Priestman, a toothed bolt 18 rotatably mounted on the frame 19 of the latch is engageable with suitable striker means on the body 10 when door 12 is closed. A detent, not shown, normally prevents rotation of the bolt relative to the striker means in an opening direction to hold the door latched. The detent is adapted to be released through suitable linkage by an outside push button handle assembly 20, and by an inside handle, not shown. Assembly 20 is selectively prevented from releasing the detent by locking means, shown and described in Priestman and indicated at 22, which locking means are

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adapted to be placed in locked and unlocked condition by a locking lever 24 movable between a locked position, not shown, and an unlocked position as shown. Such movement of lever 24 is accomplished by manual shifting movement of a garnish locking rod 26 operating a bell-crank 27, or by operation of mechanism, indicated at 28, associated with a cylinder lock mounted on the outside of the door 12.

Referring now to FIGURES 2 through 5 of the drawings, power-operated means for selectively placing locking means 22 in either locked or unlocked condition includes a small unidirectional electric motor 30 mounted on a lateral flange 32 of latch frame 19. Motor 30 operates through suitable reduction gearing 34 to drive an output shaft 36 nonrotatably mounting one end of a cam rotor 38. A shiftable actuating rod 40 is slidably mounted in an extension 42 of the casing of the reduction gearing 34 and is connected at its upper end by a pin and slot connection 44 to bell-crank 27. Slidably mounted on rod 40 below extension 42 is a cam follower member 46 receiving the rod 40 through apertures in central upper and lower bent flanges 48 thereof, and having upper and lower bent cam follower flanges 50 and 52 which are respectively located to the left and to the right of rod 40, as shown in FIGURES 4 and 5. Member 46 is located on rod 40 by a locating shoulder 54 welded to the rod and by a relatively stiff compression spring 56 seated between a shoulder 58 on rod 40 and the lower central flange 48 of member 46.

As seen best in FIGURES 4 and 5, cam flanges 50 and 52 are engageable upon clockwise rotation of rotor 38 by a cam roller 60 rotatably mounted on the free end of the rotor 38. Assuming now that locking lever 24 is located in unlocked position, rod 40, and member 46 through spring 56, are located in a corresponding unlocked position as shown in FIGURE 4, wherein cam flange 50 is located out of the path of rotation of roller 60, and cam flange 52 is located in such path. When motor 30 is energized, rotor 38 is rotated clockwise from a generally upward or unlocked position so as to engage the roller 60 thereof with cam flange 52 and move member 46 and rod 40 to a lowered or locked position, as shown in FIGURE 5. Bell-crank 27 is thus rotated clockwise so as to move locking lever 24 to locked position to lock latch 16. After this locking of latch 16 is accomplished, motor 30 is deenergized so that the rotor 38 is located in a second generally downward or locked position, shown in FIGURE 5, whereupon, should it be desired that the latch 16 be unlocked, motor 30 may again be energized to rotate rotor 38 further clockwise toward its unlocked position to engage cam flange 50 and move member 46, rod 40, and locking lever 24 to their original unlocked positions.

It will be understood, that by virtue of a lack of interference by rotor 38 in the normal locked and unlocked positions thereof to independent movement of member 46, the locking and unlocking operation of locking lever 24 may be accomplished in a normal manner by manual movement of garnish locking rod 26 or by mechanism 28 independently of any operation of motor 30.

Referring now to FIGURES 4, 5 and 6 of the drawings, control circuit means for operating the motors 30 in both doors 12 and 14 will be described, again, having particular reference only to the latch 16 in front door 12. Motor 30 is preferably of the single-field-winding or unidirectional D.C. type, and one side of the armature 62 thereof is connected to a battery power source 64 through brush means 66. The entire unit of motor 30 and reduction unit 34 is insulated by suitable means from the grounded latch frame 19 and from rod 40 by an insulative bushing 68. The other brush means 70 for armature 62 is electrically connected through output shaft 36, which is insu-

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lated from brush 66, to a slide-contact 72 mounted on the inward face of rotor 38. A set of elongated arcuate contact bars 74, 76, 78 and 80 are mounted on an insulative board 73 secured to the casing of reduction gearing 34, and located so as to be engageable by contact 72 during rotation of rotor 38. As seen in FIGURE 6, contact bar 74 is adapted to be connected to ground across one side 82a of a double-throw switch 82. Contact bar 78 is adapted to be connected to ground across the other side 82b of switch 82. The switch may be located on the instrument panel of body 10 for convenient operation by driver or passenger.

Referring now to FIGURE 4, should member 46 and rod 40 be initially located in unlocked position, contact 72 of rotor 38 is in engagement with contact bar 74. Switch 82 may then be thrown to 82a to connect contact bar 74 to ground and the motor 30 is energized, rotating rotor 38 into engagement with cam flange 52. Prior to such engagement, contact 72 leaves contact bar 74 and immediately engages contact bar 76 which is grounded to the vehicle body 10 through member 46 and rod 40 by a contact 86 on the cam flange 52 engaging a tangential extension 88 of contact bar 76. Contact bar 76 is thus grounded in all positions of cam flange 52 and motor 30 is maintained energized until contact 72 disengages from contact bar 76, the latch 16 in the meantime having been placed in locked condition. The inertia of motor 30 and reduction gearing 34 locates rotor 38 in the generally downward locked position thereof after motor 30 is deenergized, FIGURE 5.

With rotor 38 in locked position, contact 72 is in engagement with contact bar 78, and if it is desired to energize motor 30 to unlock latch 16, switch 82 is thrown to 82b to connect contact bar 78 to ground. Motor 30 is thus energized to rotate contact 72 of rotor 38 over contact bar 78 and then into engagement with contact bar 80, which is grounded by a contact 90 on cam flange 50 which operates similarly to contact 86 of cam flange 52. After contact 74 of rotor 38 disengages from contact bar 80, latch 16 has been unlocked, motor 30 is deenergized and the rotor is located by inertia in the original unlocked position, ready for repeated locking operation by closing of contact bar 74 to ground through switch 82.

The door locking system of this invention includes means for automatically resetting rotor 38 into its proper locked or unlocked position should locking lever 24, and thus rod 40 and member 46, be manually moved by locking rod 26 or mechanism 28 independently of operation of motor 30.

Referring again to FIGURES 4 and 5, and assuming that all parts are initially in unlocked position, should locking rod 26 be depressed to lock latch 16, rod 40 and member 46 are moved into locked position. Rotor 38 has in the meantime remained undisturbed, but contact 90 of cam flange 50 has been located in engagement with contact bar 74 so that this contact bar is grounded to the body 10 through member 46 and rod 40 to energize motor 30 and rotate rotor 38 over contact bar 74 and grounded contact bar 76 to the locked position thereof. Motor 30 is then ready to be operated to unlock the latch upon closing of contact bar 78 to ground through switch 82. This same resetting sequence obtains should the locking rod 26 be used to move the parts from locked to unlocked position independently of energization of motor 30, in this case causing grounding of contact bar 78 through contact 86 of cam flange 52, to rotate rotor 38 over this contact bar and the grounded contact bar 80.

It is to be noted that spring 56 provides a safety feature in that should there be some interruption of power from battery 64 causing rotor 38 to be located in a position immediately above cam flange 52 when in the locked position thereof, and should locking rod 26 be used to manually move the parts into unlocked position, the consequent forced engagement of the cam flange 52 with roller

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60 will not cause breakage of the parts, but rather spring 56 will yield sufficiently to prevent such breakage.

Although, as seen in FIGURE 1, switch 82 controls only the latches 16 for doors 12 and 14, it will be understood that the door locking system of this invention immediately adapts to a so-called fully coincidental door locking system wherein one double-throw-multi-pole switch, located preferably adjacent the driver's side of the vehicle body, is operative to control all of the various vehicle body door latches.

Thus a new and improved door locking system is provided.

I claim:

1. In a door locking system including a latch and locking means therefor movable between locked and unlocked positions, manually operable means for moving said locking means between said positions thereof, motor means movable between first and second positions corresponding respectively to said locked and unlocked positions of said locking means and associated therewith for moving said locking means between said positions thereof, a source of power, first selectively operable switch means for energizing said motor means by said source of power to move said locking means between said positions thereof, and second switch means responsive to manual movement of said locking means for energizing said motor means by said source of power to move said motor means to either of the said positions thereof corresponding to the manually located position of said locking means.

2. In a door locking system including a latch and locking means therefor movable between locked and unlocked positions, manually operable means for moving said locking means between said positions thereof, an electric motor, a rotatable operating member driven by said motor between first and second positions corresponding respectively to said locked and unlocked positions of said locking means, said member being engageable with said locking means to move said locking means between said positions thereof, a source of power, first selectively operable switch means for energizing said motor by said source of power to move said locking means between said positions thereof, and second switch means responsive to manual movement of said locking means for energizing said motor by said source of power to move said member to either of the said positions thereof corresponding to the manually located position of said locking means.

3. In a door locking system including a latch and locking means therefor movable between locked and unlocked positions, a unidirectional electric motor, rotatable means driven by said motor between first and second positions corresponding respectively to the locked and unlocked positions, a unidirectional electric motor, rotatable means being engageable with said locking means to move said locking means between said positions thereof, a source of power, stationary contact means, and second contact means mounted on said rotatable means and engageable during said movement thereof with said stationary contact means, and manually controlled means for selectively connecting said stationary contact means to said source of power to energize said motor and move said locking means between said positions thereof.

4. In a door locking system including a latch and locking means therefor movable between locked and unlocked positions, manually operable means for moving said locking means between said positions thereof, a unidirectional electric motor, rotatable means driven by said motor and rotatable between first and second positions corresponding respectively to said locked and unlocked positions of said locking means, said rotatable means being engageable with said locking means to move said locking means between said positions thereof, a source of power, first and second stationary contact means, third contact means mounted on said rotatable means and engageable during said movement thereof with said first and said second stationary contact means, manually controlled means for

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selectively connecting said first stationary contact means to said source of power to energize said motor and move said locking means between said positions thereof, said second stationary contact means connecting said motor to said source of power upon manual movement of said locking means to energize said motor and move said rotatable means to either of the said positions thereof corresponding to the manually located position of said locking means.

5. In a door locking system including a latch and locking means therefor movable between locked and unlocked positions, manually operable means for moving said locking means between said positions thereof, a unidirectional electric motor, a rotatable member driven by said motor for rotation between first and second positions corresponding respectively to said locked and unlocked positions of said locking means, said rotatable member being engageable with said locking means during said movement thereof to move said locking means between said positions thereof, a source of power, first stationary contact means, second stationary contact means connected to said source of power, third contact means mounted on said rotatable member and engageable during said movement thereof with said first and second contact means, manually controlled means for selectively connecting said first contact means to said source of power, said third contact means engaging said first stationary contact

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means in either of said positions of said rotatable member so as to initially energize said motor upon operation of said manually controlled means, said third contact means engaging said second contact means upon initial movement of said rotatable member from either of said positions thereof to continue energization of said motor to move said rotatable member to the other of said positions thereof, and means responsive to manual movement of said locking means to engage said first, second and third contact means to energize said motor independently of operation of said manually controlled means to move said motor from either of said positions to the position thereof corresponding to the manually located position of said locking means.

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