Oct. 30, 1956 R. T. DAVIES 2,768,853

ELECTRICALLY CONTROLLED VEHICLE DOOR LOCK

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Fig. 1.

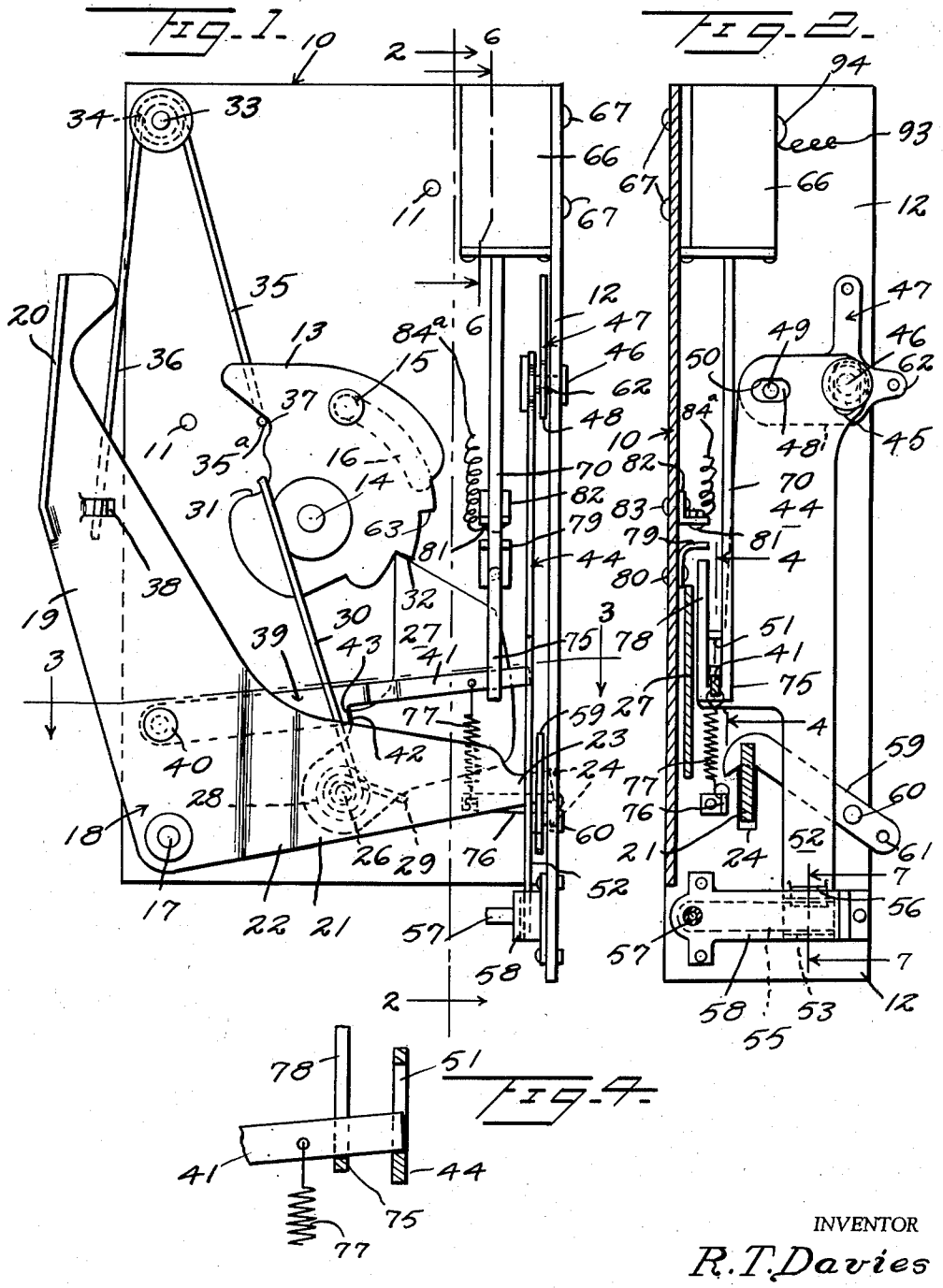


Fig. 2.

Fig. 4.

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FIG. 3

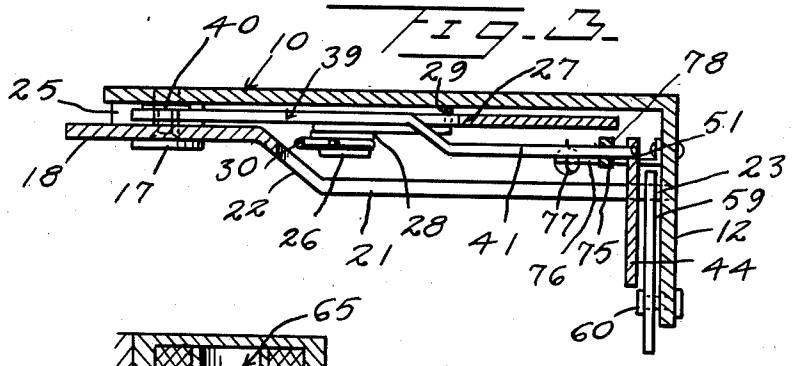


FIG. 6

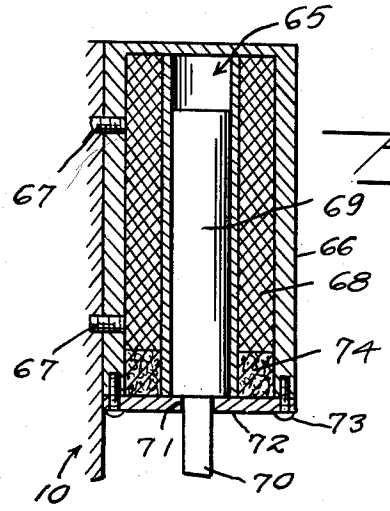


FIG. 7

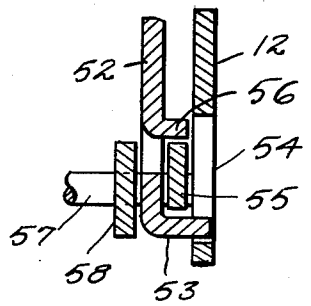
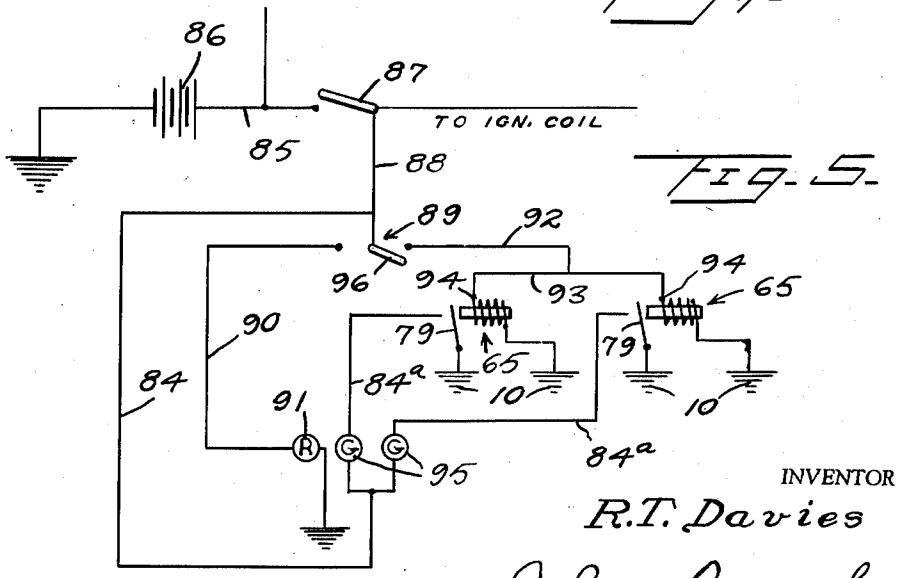


FIG. 5



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ELECTRICALLY CONTROLLED VEHICLE DOOR LOCK

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Application November 21, 1955, Serial No. 547,944

5 Claims. (Cl. 292—229)

This invention relates to an electrically controlled locking means adapted to be utilized with a conventional type of door lock and latch structure of a motor vehicle, such as an automobile, by means of which a vehicle door can be locked in such a manner as to prevent opening thereof from either the inside or outside of the vehicle.

More particularly, it is an object of the present invention to provide a unit of extremely simple construction capable of being utilized with conventional motor vehicle door locking and latching structures to enable vehicle doors to be locked in a manner to positively prevent children from opening the doors while the vehicle is in motion and which will additionally function to prevent an intruder from opening the vehicle door from either the inner or outer side thereof, while the vehicle is momentarily stopped.

A further object of the invention is to provide a unit of extremely simple construction capable of being employed with conventional vehicle door locking and latching structures with substantially no modification of the conventional structure, so that the electrical controlling unit may be either installed as an attachment or made a part of the lock and latch mechanism as initially manufactured.

A further object of the invention is to provide an electrically controlled lock for vehicle doors which is so constructed that a group of such locks may be readily connected in a simple electric circuit so that all of the electrical locking units associated with all of the doors of a vehicle will be controlled by a single switch.

Various other objects and advantages of the invention will hereinafter become more fully apparent from the following description of the drawings, illustrating a presently preferred embodiment thereof, and wherein:

Figure 1 is a side elevational view of a substantially conventional vehicle door locking and latching mechanism equipped with an electrically controlled locking unit;

Figure 2 is a sectional view, partly in elevation, taken substantially along a plane as indicated by the line 2—2 of Figure 1;

Figure 3 is an enlarged transverse sectional view, taken substantially along a plane as indicated by the line 3—3 of Figure 1;

Figure 4 is an enlarged fragmentary detailed longitudinal sectional view, taken substantially along a plane as indicated by the line 4—4 of Figure 2;

Figure 5 is a diagrammatic view illustrating one preferred form of electric circuit for the electrically controlled lock and showing two of the locks interposed in the circuit;

Figure 6 is an enlarged fragmentary longitudinal sectional view, taken substantially along a plane as indicated by the line 6—6 of Figure 1; and

Figure 7 is an enlarged detailed sectional view, taken substantially along a plane as indicated by the line 7—7 of Figure 2.

Referring more specifically to the drawings, a conventional vehicle door locking and latching mechanism is illustrated including a plate 10 which is adapted to be disposed along the free edge of a motor vehicle door and to be secured therein by fastenings, not shown, which extend through openings 11. The plate 10 is provided with a flange 12 which projects at substantially a right angle from one longitudinal edge thereof. The flange 12 is adapted to be disposed adjacent the inner side of the door and to extend inwardly from the plate 10, relative to the door, not shown. A latch bolt carrying element 13 is turnably mounted on the inner side of the plate 10 by a pivot 14 which is anchored to said plate. One end of a latch bolt 15 is anchored in the element 13 at a point spaced from the pivot 14. The latch bolt 15 extends outwardly through an arcuate slot 16 of the plate 10 and is adapted to engage a conventional keeper, not shown, mounted in the door jamb, not shown.

A headed pivot pin 17 is anchored in the plate 10 near the bottom edge thereof and remote from the flange 12 and, like the pivot 14, extends from the inner side of the plate 10. A substantially L-shaped lever 18 is journalled on the pin 17, adjacent the apex thereof, and has an upwardly extending end or arm 19. The outer edge of the upper portion of the arm 19 has an outturned flange 20, for a purpose which will hereinafter be described. The other, lower leg 21 extends from the pivot 17 toward the flange 12 and is offset adjacent said pivot in a direction away from the plate 10, as best illustrated at 22 in Figure 3. The distal end of said lower lever arm 21 is reduced in width, as seen at 23, and loosely engages in a longitudinally elongated slot 24 of the flange 12, which is of a length substantially greater than the width of said distal end 23. A spacing element 25 is mounted on the pivot 17 between the plate 10 and lever 18 and cooperates with the head of the fastening 17 to maintain the lever 18 spaced a desired distance from and substantially parallel to the inner face of the plate 10.

A headed pivot pin 26 is anchored in and projects from the inner side of the plate 10, between the pivot 17 and flange 12, and is disposed between said plate 10 and the outwardly offset portion of the lower lever arm 21. A pawl 27 is pivotally mounted adjacent one end thereof on the pivot pin 26 and is disposed adjacent the inner face of the plate 10, as best seen in Figures 2 and 3. A spring 28 has a portion wound on the pivot pin 26, on the outer side of the pawl 27 and has one end 29 which is bent to engage around a portion of the bottom edge of the pawl 27, for urging said pawl to swing counterclockwise toward the latch element 13, as seen in Figure 1. The other leg or end 30 of the spring 28 extends upwardly and engages in a recessed portion 31 of the latch bolt supporting element 13, above the pivot 14, for urging said element 13 and the latch bolt 15 to swing clockise, as seen in Figure 1. The spring end 29 normally retains the free end of the pawl 27 in engagement beneath a downwardly facing shoulder 32 of the latch bolt supporting element 13 to prevent said element 13 from turning clockwise under the biasing action of the spring leg 30, from its position of Figure 1.

A headed pin 33 is anchored in and projects from the inner side of the plate 10 near its upper edge and remote from the flange 12. The intermediate portion of a spring 34 is wound about the pin 33. The spring 34 has depending legs 35 and 36 which are spring biased in opposite directions. The spring leg 35 has an outturned lower

end 35*a* which engages in a recessed upper portion 37 of the latch bolt supporting element 13, above and adjacent the recessed portion 31. The spring leg 35 cooperates with the spring leg 30 for urging the latch bolt supporting element 13 to rotate clockwise as seen in Figure 1 about its pivot 14. A lower portion of the other spring leg 36 is disposed on the inner side of the lever arm 19 and engages between said lever arm 19 and a tongue 38 which is struck inwardly therefrom for urging the lever 18 to turn counterclockwise, as seen in Figure 1, about its pivot 17. The distal end 23 of the lever 18 by moving into contact with the upper end of the slot 24, prevents the lever 18 from swinging counterclockwise past its position of Figure 1.

A bar 39 is pivotally connected at one end thereof to the upper lever arm 19 by a pivot element 40 which engages said bar end and the arm 19. Said end of the bar 39 is disposed on the inner side of the lever arm 19 and extends from the pivot 40 toward the flange 12. The bar 39 has a free end portion 41 of reduced width and which is outwardly offset from the inner side of the plate 10 and from the pawl 27. Said first mentioned pivoted end of the bar 39 is disposed substantially coplanar with the pawl 27, as best seen in Figure 3 and is provided with a shoulder 42, located adjacent the inner end of the offset bar portion 41, which faces away from the pivot 40 and is disposed to abut a shoulder 43 of the pawl 27 which faces in the opposite direction, as seen in Figure 1.

As best seen in Figure 2, a hanger bar 44 has a vertically elongated slot 45 at the upper end thereof which loosely engages the shank of a headed pin 46. The pin 46 is fixed to and projects from the inner side of the flange 12. A lever 47 is pivotally mounted on the pin 46 and includes a laterally projecting arm 48, which extends toward the plate 10. A pivot pin 49 projects outwardly from the arm 48 loosely through an opening 50 of the bar 44, which opening 50 is laterally spaced from the slot 45. The bar 44 is provided with a vertically elongated slot 51 which is disposed substantially below the opening 50, in which the distal end of the bar portion 41 loosely fits, as seen in Figures 2 and 3.

The bar 44 has a lower end portion 52 of restricted width provided with an outturned terminal portion 53 which engages a longitudinally elongated slot 54 in the flange 12, as seen in Figure 7. A lever 55 extends transversely across the bottom portion of the inner side of the flange 12 and has a free end disposed on the inner side of said bar portion 52 between its outturned end 53 and an outturned struck out tongue 56 of the portion 52. The other end of the lever 55 is fixed to an elongated actuator element 57, between portions thereof which are journalled in the flange 12 and a cover plate 58, which plate is disposed over the lever 55 and is secured to the flange 12. The other end, not shown, of the actuator 57 is disposed adjacent the left-hand edge of the plate 10, as seen in Figure 1, and is adapted to be connected to any suitable key actuating means which is operated by a key inserted into the vehicle door from the outer side thereof, for turning the actuator element 57 and the lever 55 counterclockwise as seen in Figure 2.

A pawl 59 is pivotally mounted near one end thereof on the inner side of the flange 12 by a pivot element 60 and has an end portion which is disposed remote to the pivot 60 and which engages over the upper edge of the distal end 23 of the lever 18, said pawl being swingably disposed between the flange 12 and bar portion 52. A conventional door handle disposed on the inner side of the door, is adapted to be connected in a conventional manner to the other end 61 of the pawl 59 for rocking the pawl counterclockwise as seen in Figure 2. The lever 47 has an outwardly extending end 62 which is adapted to be connected by a suitable linkage, not shown, to a conventional pushbutton lock on the inner side of the door for rocking the lever 47 clockwise as seen in Figure 2 about the pivot 46.

The parts previously described are of conventional construction and the conventional operation thereof will now be described. When the pawl 59 is rocked counterclockwise, as seen in Figure 2, the lever 18 will be rocked clockwise on its pivot 17, as seen in Figure 1, for displacing the bar 39 from left to right of Figure 1. As the bar 39 moves to the right the shoulder 42 thereof will engage the shoulder 43 to swing the pawl 27 clockwise on its pivot 26, so that the upper end of the pawl will move out of engagement with the downwardly facing shoulder 32 and to sufficiently therebeyond to clear an intermediate stop shoulder 63 of the element 13, so that the spring arms 30 and 35 can rotate the element 13 and the latch bolt 15 clockwise about the pivot 14, until the bolt 15 engages the lower end of the slot 16. The latch bolt 15 is thus released to permit opening of the door from the inside by operation of the conventional inside door handle, and said bolt is held thus released by the spring arms 30 and 35 until the door is again closed, at which time the bolt 15 is cammed back to its position of Figure 1, in a conventional manner by the latch keeper. When this occurs, the bolt carrying element 13 is swung counterclockwise, and since the lever 18 will have been returned by the spring arm 36 to its position of Figure 1, as soon as pressure was released on the pawl 59, the shoulder 42 will have moved sufficiently to the left and away from the flange 12, so that the pawl 27 can be returned by the spring end 29 back to its position of Figure 1 to engage under the shoulder 32.

When the lever 47 is rocked clockwise as seen in Figure 2, by the pushbutton lock, not shown, which is connected to the lever end 62, the pin 49 will be swung upwardly to lift the bar 44, thus causing the bar 39 to be rocked upwardly, so that its shoulder 42 will clear the shoulder 43. In this manner the door is locked from the inside so that clockwise swinging movement of the lever 18, as seen in Figure 1, will not cause the pawl 27 to be swung out of engagement with the shoulder 32, as just previously described. This same locking of the mechanism may also be accomplished by a key inserted from the exterior of the door and by which the element 57 is turned to turn the lever 55 counterclockwise as seen in Figure 2 and which will also displace the bar 44 upwardly for effecting the same upward swinging movement of the actuator bar 39.

The push button or other exterior latch actuator of the door not shown, engages the flange 20 so that when the outside door actuator is operated a pressure is exerted against the flange 20 to swing the lever 18 clockwise, as seen in Figure 1, for moving the bolt 15 to an unlatched position in the same manner as previously described by operation of the pawl 59. The foregoing description of the operation and locking of the mechanism is conventional.

The electrically controlled device constituting the invention, includes an electromagnet, designated generally 65. The electromagnet 65 includes a housing or casing 66 which is secured by screw fastenings 67 to the plate 10 and flange 12. The housing or casing 66 contains a winding 68 which is disposed around the core 69 of the electromagnet. The core 69 has a restricted extension 70 at its lower end forming a hanger rod which extends slidably through an opening 71 of a plate 72. The plate 72 constitutes the detachable bottom of the casing 66 and is retained in an applied position by fastenings 73. The lower portion of the casing 66 contains a filler 74 which is preferably formed of a nonmagnetic material such as fiber. The plate 72 is likewise preferably formed of a nonmagnetic material. The hanger 70 has a turned back lower end, as best seen in Figure 2, which engages under the bar portion 41 and which loosely straddles said bar portion. The hanger 70 is spaced outwardly from the bar 44, as best seen in Figure 1, and the hook portion 75 thereof is spaced outwardly from the pawl 27, as best seen in Figure 2. A bracket arm 76 is fixed to the

flange 12 and extends from the inner side thereof, below the bar portion 41 and between the plate 10 and the lever arm 21. The lower end of a pull spring 77 is anchored to the arm 76 and the upper end of said spring is connected to the bar portion 41 for urging the bar 30 to swing downwardly about its pivot 40 and for retaining the core 69 in the lower end of the casing 66, as seen in Figure 6, when the electromagnet is de-energized.

The upwardly extending inner leg 78 of the hook portion 75 terminates below and adjacent the inturned upper free end of a resilient electrical conductor strip 79, as seen in Figure 2, when the winding 68 is de-energized The lower end of the conductor strip 79 is secured to the inner side of a portion of the plate 10 by a fastening 80. The upper unsecured inwardly extending end of the strip 79 is disposed beneath and normally spaced from a fixed electrical contact 81. The contact 81 is supported on the inner side of and in electrical insulated relation to the plate 10 by being attached to one leg of an angular bracket 82 which is formed of electrical insulating material, and the other leg of which is secured by a fastening 83 to the plate 10. When the winding 68 is magnetized to draw the core 69 upwardly, the leg 78 moves upwardly into contact with the resilient conductor strip 79 and deflects said conductor strip upwardly into engagement with the contact 81 so that a conductor wire 84*a* which leads to the contact 81, will be grounded through said contact and the conductor strip 79 to the plate 10.

An electric circuit through the use of which any desired number of the electromagnets 65 may be controlled is illustrated in Figure 5. The circuit includes a conductor wire 85 leading from the positive terminal of a grounded electric current source 86, such as a conventional storage battery of an automobile, to one terminal of a conventional ignition switch 87. A conductor 88 extends from the other terminal of the switch 87 to an intermediate terminal of a double switch 89, which has one grounded terminal and lead 90 in which a preferably red telltale lamp 91 is interposed. A conductor 92 leading from the other terminal of the switch 89 is shown provided with two branch conductors 93 which are connected to the posts 94 of two electromagnets 65. This circuit as illustrated in Figure 5 could be readily employed for a two door automobile, and it will be readily apparent that four branch conductors 93 could equally well be provided for electrically controlling all four doors of a four door automobile and wherein four electromagnets 65 would be employed. The housing 66 is formed of electrical conducting material, so that a single wire type circuit is provided with the windings 68 of the electromagnets being grounded to the vehicle frame through the plates 10, which which are electrically connected to the vehicle frame through the doors in which said plates are mounted.

A telltale light 95, which is preferably green, is provided for each electromagnet 65 and is wired around the switch 89 by a conductor wire 84 which leads from the conductor 88 and which has the branch conductors 84*a* which connect with the switch contacts 81 and in which the telltale lights 95 are interposed.

The telltale lights 91 and 95 are preferably mounted on the instrument panel of the vehicle in a position readily visible to the driver. The switch 89 is also preferably mounted on the instrument panel, to the left of the steering post so as to be accessible only to the driver. When the ignition switch 87 is closed and the switch arm 96 of the switch 89 is in engagement with the switch contact of the conductor 90, the red telltale light 91 will be energized to indicate that the electromagnets 65 are de-energized and in their positions as illustrated in Figures 1, 2 and 6, so that the door locking and latching mechanism may be operated in the conventional manner as previously described.

To employ the electrical control, the vehicle driver merely moves the switch arm 96 into engagement with the contact of the conductor 92 so that the windings of

the electromagnets 65 will be energized and magnetized to draw the cores 69 upwardly in the casing 66 against the action of the weak springs 77. The hangers 70 including the hook portions 75 thereof will be raised with the cores 69 to cause the bars 39 to be swung upwardly about their pivots 40 and so that the shoulders 42 thereof will assume positions to clear the shoulders 43 of the pawls 27. In this manner, the levers 18 will be disconnected from the pawls 27 to the same extent as occurs when the bars 44 are displaced upwardly either by the levers 47 being rocked clockwise or by the levers 55 being swung counterclockwise, as seen in Figure 2 and as previously described. Thus, upward displacement of the hook portions 75 will move the bars 39 to inoperative positions in the same manner as this is accomplished by upward displacement of the bars 44.

Additionally, as the cores 69 and hangers 70 are drawn upwardly, the upwardly extending legs 78 of the hook portions 75 will move upwardly to contact and displace the spring contacts 79 into engagement with the stationary contacts 81 for grounding the circuits containing the telltale lights 95 to the plate 10, so that said lights 95 will be illuminated to indicate to the vehicle driver that the doors are effectively locked against being opened from either the inside or the outside of the vehicle.

The spring 77 is only of sufficient strength to maintain the distal end of the bar portion 41 in the lower end of the slot 51 and does not possess sufficient tension to pull the bar 44 downwardly when said bar is elevated. However, the spring 77 will assure that the bar 39 is disposed so that its shoulder 42 is positioned to engage the pawl shoulder 43, when the bar 44 is in its lowered position of Figures 1 and 2 and the electromagnet 65 is de-energized, as seen in these views and in Figure 6. The electromagnet 65 is of adequate strength to lift the bar 39 and overcome the tension of the spring 77. However, when the electromagnet is de-energized, the spring 77 is of sufficient strength to return the bar 39 and the hanger 70 to the position of these parts as illustrated in Figures 1 and 2. The slot 51 permits this upward and downward movement of the bar 39 and hanger 70 relative to the bar 44 which is not affected by the electromagnet being energized or de-energized. In a like manner, when the electromagnet is de-energized, the bar portion 41 may swing upwardly and downwardly when actuated by the bar 44 and spring 77, respectively, by movement of the bar portion 41 freely between the legs of the hook portion 75.

It will be readily apparent that when the electromagnet 65 is energized so that the bar 39 is lifted sufficiently so that its shoulder 42 is above the level of the shoulder 43, that clockwise movement of the lever 18 about its pivot 17, as seen in Figure 1, will not affect the other parts and the pawl 27 will remain engaged with the shoulder 32 to prevent clockwise rotation of the latch bolt carrying element 13.

It will also be apparent that the switch arm 96 may be moved to engage the contact of the conductor 92 so that when the ignition switch 87 is closed the doors will be automatically electrically locked by the electrical control as said doors are closed and irrespective of whether the individual doors are mechanically locked from the inner or outer side thereof, and the doors will be maintained locked by the electrical control irrespective of mechanical unlocking of the doors from either side thereof, since the bars 39 will be held in raised positions by the electromagnets 65 being energized.

Various modifications and changes are contemplated and may obviously be resorted to, without departing from the spirit or scope of the invention as hereinafter defined by the appended claims.

I claim as my invention:

1. In combination with a vehicle door locking and latching mechanism including a frame, a latch bolt, an element turnably supported on the frame and carrying

said latch bolt, a first spring means urging said element to rotate in one direction for swingably moving the latch bolt to a released position, a detent swingably supported on the frame, a second spring means urging said detent into engagement with the latch bolt carrying element to prevent rotation of said element under the biasing action of said first spring means for retaining the latch bolt in a latching position, a lever swingably supported on the frame, a bar pivotally connected at one end thereof to said lever at a point spaced from the axis of swinging movement of said lever for substantially axial movement of said bar when the lever is swingably moved, said bar having a portion slidably movable into engagement with the detent for swinging the detent to a position out of engagement with the latch bolt carrying element upon swinging movement of said lever in one direction, said first spring means having a portion engaging and urging said lever to swing in the opposite direction for disengaging said bar portion from the detent; an electrically controlled locking unit comprising an electromagnet having a casing supported by said frame, said electromagnet including a core slidably disposed in said casing, a rod element extending from and secured to an end of said core and having a free end portion engaging said bar at a point spaced from the bar pivot and relative to which the free end portion of the bar is slidably movable, said core and rod element being disposed at an angle to the axis of said bar when the bar is positioned to engage the detent, said rod element being movable with the core, when the electromagnet is energized, in a direction at an angle to the direction of sliding movement of the bar and in a plane substantially coinciding with the plane of swinging movement of the bar relative to the lever, whereby said free end portion of the rod element will engage and rock the bar in a direction to move said bar portion to a position to clear said detent, when the lever is rocked in the first mentioned direction, to prevent said detent being displaced out of engagement with the latch bolt carrying element by movement of the bar with the lever, and a third spring means connected to said bar for swingably moving the bar back to a position to engage and actuate the detent when said electromagnet is de-energized, said third spring means urging said rod element and core to move in the same direction as the direction of swinging movement of said bar.

2. In combination with a vehicle door locking and latching mechanism including a frame, a latch bolt, an element turnably supported on the frame and carrying said latch bolt, a first spring means urging said element to rotate in one direction for swingably moving the latch bolt to a released position, a detent swingably supported on the frame, a second spring means urging said detent into engagement with the latch bolt carrying element to prevent rotation of said element under the biasing action of said first spring means for retaining the latch bolt in a latching position, a lever swingably supported on the frame, a bar pivotally connected at one end thereof to said lever at a point spaced from the axis of swinging movement of said lever for substantially axial movement of said bar when the lever is swingably moved, said bar having a portion slidably movable into engagement with the detent for swinging the detent to a position out of engagement with the latch bolt carrying element upon

swinging movement of said lever in one direction, said first spring means having a portion engaging and urging said lever to swing in the opposite direction for disengaging said bar portion from the detent; an electrically controlled locking unit comprising an electromagnet having a casing supported by said frame, said electromagnet including a core slidably disposed in said casing, a rod element extending from and secured to an end of said core and having a free end portion engaging said bar at a point spaced from the bar pivot and relative to which free end portion the bar is slidably movable, said core and rod element being disposed at an angle to the axis of said bar when the bar is positioned to engage the detent, said rod element being movable with the core, when the electromagnet is energized, in a direction at an angle to the direction of sliding movement of the bar and in a plane substantially coinciding with the plane of swinging movement of the bar relative to the lever, whereby said free end portion of the rod element will engage and rock the bar in a direction to move said bar portion to a position to clear said detent, when the lever is rocked in the first mentioned direction, to prevent said detent being displaced out of engagement with the latch bolt carrying element by movement of the bar with the lever, said bar being pivotally mounted about substantially a horizontal axis and being swung upwardly by movement of said rod element when the electromagnet is energized, said bar being supported by said free end portion of the rod element, when the electromagnet is de-energized, in an operative position to engage and move the detent when said lever is swung in the first mentioned direction of movement thereof, and a mechanically actuated part slidably supported by the frame and adapted to be mechanically displaced upwardly, said part having a portion engaging under a terminal portion of said bar for raising the bar relative to said rod element to an inoperative position.

3. In a vehicle door locking and latching mechanism as in claim 2, said rod element constituting a hanger depending from a lower end of the core and having an upwardly opening hook shaped lower portion, constituting said free end portion.

4. In a vehicle door locking and latching mechanism as in claim 3, and a third spring means engaging said bar for swinging the bar downwardly to an operative position when the electromagnet is de-energized.

5. In a vehicle door locking and latching mechanism as in claim 4, said hook portion including spaced substantially parallel legs between which a part of the bar engaged by the hook portion is swingably movable relative to the core and hanger.

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