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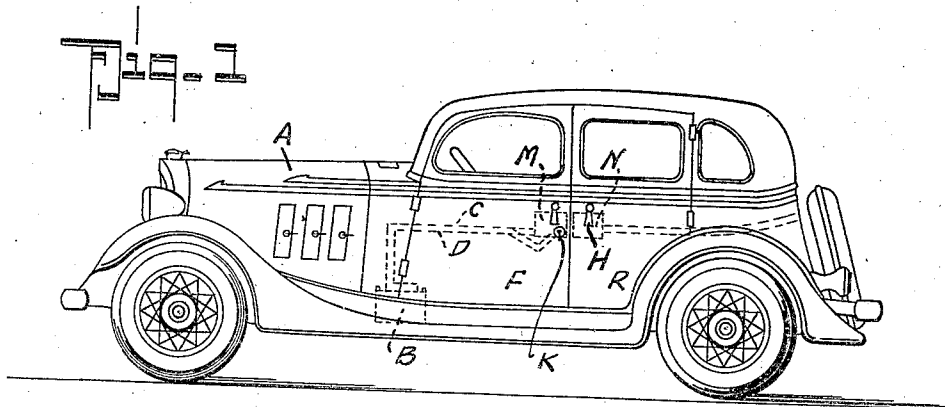
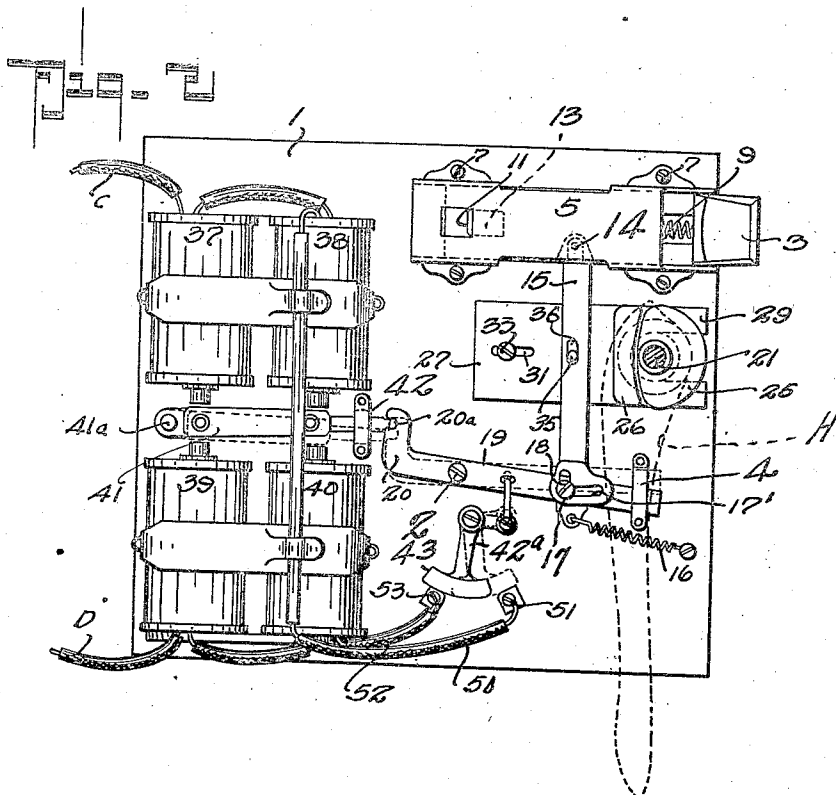
J. G. LOVELL

1,970,807

ELECTROMAGNETIC CONTROL SYSTEM

Filed Sept. 8, 1933

2 Sheets-Sheet 1



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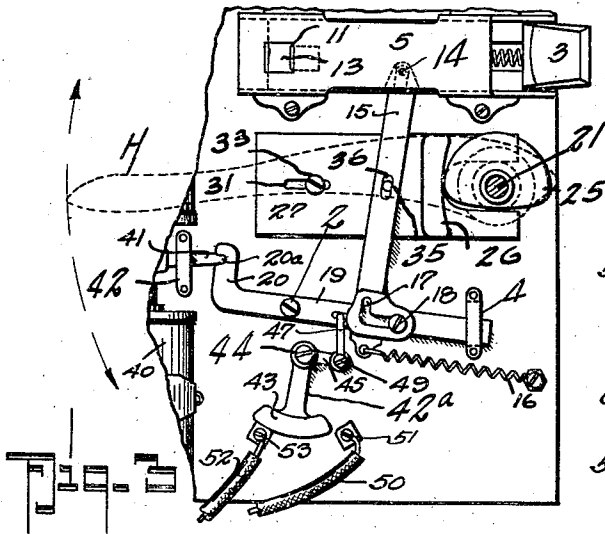
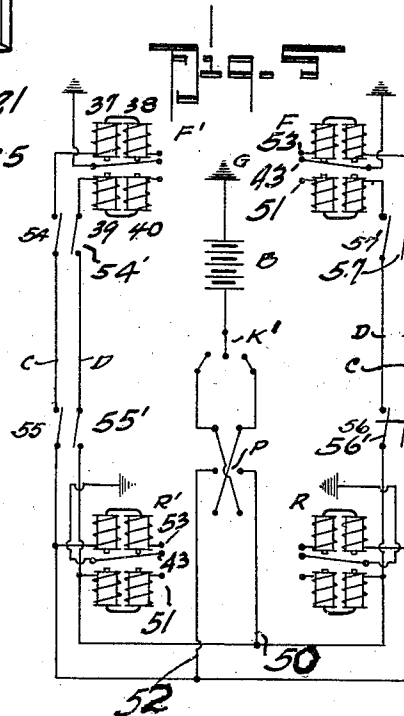
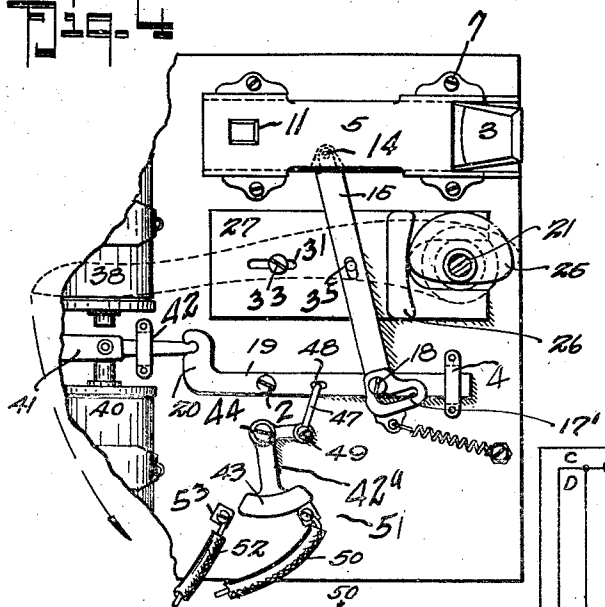
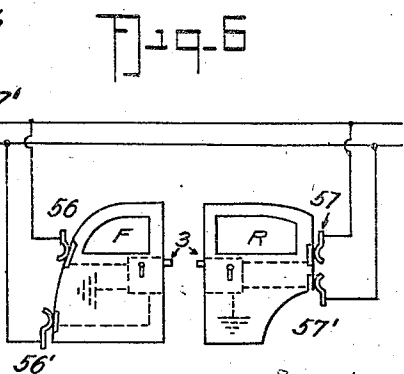
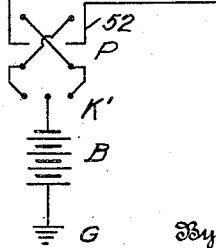
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UNITED STATES PATENT OFFICE

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ELECTROMAGNETIC CONTROL SYSTEM

John G. Lovell, Spokane, Wash.

Application September 8, 1933, Serial No. 688,657

2 Claims. (Cl. 70-50)

My present invention relates to improvements in electromagnetic control systems of the type adapted for use with one or more doors having disconnectible handles and in connection with the latching mechanism of the door or latching mechanisms of a number of doors.

As an exemplification of the utility of my invention I have illustrated the electro-magnetic controlling system, in connection with the latching means of the four doors of an automobile. The several doors of the automobile are provided with individual latching and locking means of the usual type, and may be opened and closed according to the usual custom. In addition to the usual latching function of the latching mechanism, I provide the car with an electro-magnetic control system whereby the several latch-bolts, remain in latched position, while the usual handle for unlatching, the door or doors is at the same time disconnected and rendered ineffectual for unlocking or unlatching the door.

The electro-magnetic control system is operative from the interior of the car by the use of a double throw double pole switch, and the control system is operative from the exterior of the car by the use of the customary key in connection with a locking and releasing, or reversing switch.

The invention consists in certain novel combinations and arrangements of parts as will hereinafter be more fully set forth and claimed. In the accompanying drawings I have illustrated one complete example of the physical embodiment of my invention wherein the parts are combined and arranged according to the best mode I have thus far devised for the practical application of the principles of my invention.

Figure 1 is a view in elevation of an automobile, the four doors of which are equipped with electro-magnetic control system of my invention. Figure 2 is a view in elevation showing the bolt in latched position and disconnected. Figure 3 is a view similar to Figure 2 showing the ineffectual operation of the latching device when the latch bolt is disconnected. Figure 4 showing the parts of Figures 2 and 3, illustrates the manner of unlatching or retracting the slide bolt, after it is released. Figure 5 is a diagrammatic view showing the circuits and accessories of the controlling system for the door locks. Figure 6 is a diagrammatic view of the system showing particularly the automatic door-switches of the circuits.

In order that the general arrangement and utility of parts may readily be understood

I have indicated in Figure 1 an automobile as A, with its usual battery B, which supplied current for the handle disconnecting circuit C and the handle connecting circuit D of my system. The front doors F, and F' and the rear doors R, R', are each provided with the usual handle or lever H by means of which the door latching mechanism may be operated in usual manner.

The battery B is grounded, as at G in the wiring diagram of Figure 5, and each of the electro-magnetic control mechanisms is also grounded in the locking circuit C as indicated in Figure 5.

It will be understood that the doors may be opened and closed, or latched and unlatched, in customary manner by use of these levers, either from the outside or from the inside of the car, when the electro-magnetic control mechanisms are not in use.

The usual key may be applied at K in Figure 1 to the lock or latch of the front door F to lock or unlock the door in usual manner, and the key is used in connection with the disconnecting switch K' of Figure 5 for closing either the lock circuit C or the connecting circuit D of the electro-magnetic mechanisms of the four doors.

In Figure 1 the locking device for the door F is indicated as a whole by the letter M and the locking device for the door R is indicated as a whole by the letter N. The complete, detailed illustration of these devices M and N is shown in Figure 2, and each door is equipped with a hidden or enclosed and fixed base plate 1, arranged in vertical position as shown. The horizontally disposed, slidable, latch bolt 3 is mounted near the top of the plate, and co-operates with the usual keeper in the door frame for latching as well as for locking the door.

The bolt is supported to slide in its housing 5, which is fastened to one face of the plate 1, as by screws 7, and a spring 9, located in a slot of the bolt, is interposed between the bolt and a part of the housing, to urge the bolt to locked or latched position, i. e. projected, as in Figures 2 and 3.

The sliding movement of the bolt is limited by means of an integral lug 11, turned in from a wall of the housing, and this lug projects into a slot 13 of the bolt in order that the movement of the bolt may be limited by the length of the slot.

As indicated by dotted lines at 14, a bolt-link 15 is pivoted at its upper end to the slide bolt, and this end of the link projects through a slot in the bottom wall of the housing 5 and fits loosely within a notch of the bolt to which it is

pivoted, in order that the upper end of the link may reciprocate the bolt as the link is oscillated.

The link, at its lower end is anchored, by means of a spring 16 having one end secured to the plate 1 and its other end fastened to the head 17 of the link, which head is provided with an L-shaped slot 17'. The spring 16, it will be noted, tends to pull the lower end of the link to the right in Figure 3 to the position of Figure 2, or to the position of Figure 4.

By means of a screw or bolt 18 and the L-shaped slot of the link, the latter is loosely pivoted at its lower end on a lever 19, which is pivoted at 2 on the base plate 1, with the free end of its long arm guided by the strap 4 that is spaced from and fastened at its ends to the base plate, and this strap limits the swinging movement of the lever 19 on its pivot 2.

The short arm of the lever 19 is fashioned with an angular head 20 having an edge notch 20a which engages the free end of and co-acts with the armature lever 41 of the electro-magnetic mechanism as will be described.

The spindle of the door latch, as shown in sectional lines at 21, is turned in usual manner by means of the handle H for latching and unlatching the door, and the movement of the handle and spindle is transmitted to the bolt-link 15 and latch-bolt 3 through the instrumentality of a cam disk 25. The cam disk is fixed to turn with the spindle, and it co-acts with a vertically arranged cam shoe or abutment 26, fashioned integral with or rigidly mounted on the actuating slide plate 27.

This horizontally disposed, actuating slide plate is bifurcated or forked at one end 29, and this forked end straddles or loosely embraces and is supported on the spindle 21, while the other end of the plate is fashioned with a central, longitudinal slot 31 through which a headed bolt or screw 33 extends. The bolt or screw is threaded into the base plate 1 and the actuating plate is supported to slide horizontally on the spindle and the bolt 33, for imparting the projecting and retracting movement to the latch bolt 3.

As will be seen in the drawings, when the spindle and the cam are turned by manipulation of the handle H, the cam rides in frictional contact against the adjoining face of the cam shoe or abutment 26, to move the actuating plate to the left for the purpose of retracting the bolt from latched position, against the tension of the bolt-spring 9, and when the spring is free to do so its tension exerted on the bolt projects the bolt to latched position. This projection of the bolt by the spring also tends to swing the bolt link 15 to the right in Figure 2, thereby returning the actuating plate 27 also to projected position.

The sliding movement of the actuating plate is translated into an oscillating movement of the bolt link 15 through the instrumentality of a pin 35, mounted rigidly on the actuating plate between the spindle 21 and the bolt 33, and a longitudinal slot 36 of the bolt-link, through which slot the bolt 33 projects.

It will thus be evident that the bolt-link has a floating support between the pivotal suspending pin 14 of the slide bolt 3 and the pin or pivot bolt 18 of the lever 19, and the intermediate pin-and-slot connection 35-36 with the actuating slide plate provides for an oscillating movement of the link on the pin 35 as a center.

As indicated in Figure 2 where the door is locked and in Figure 3 which also shows the door in locked condition, the handle H which is dis-

connected may be swung from vertical to upright position, i. e. with the unlatching movement of the door, but such movement is ineffectual because the slide plate 27 as it moves from right to left swings the bolt link on the pivot 14 as a center, and the slot 17' at the lower end of the link permits the lower end of the link to swing from the position of Figure 2 to that of Figure 3, against the tension of spring 16. During this ineffectual attempt to retract the bolt 3, the latter is held in projected position by its spring 9, as indicated in Figures 2 and 3.

In Figure 4, however, the pin 18 forms a fixed pivot point for the lower end of the link 15, in order that when the handle H is turned up to horizontal position, the actuating plate swings the upper end of the link to the left or retracted position, and the bolt is thereby retracted in usual manner.

For locking the projected latch bolt in position to lock the latched door or doors, the lock switch K' in Figure 5 is turned to the left by means of the key applied to the lock K in Figure 1 for the purpose of closing the disconnecting circuit C, and for connecting the control system in order that the bolt may be retracted, the lock switch K' is turned to the right in Figure 5 to open the disconnecting circuit and close the connecting circuit D.

The disconnecting circuit C as shown includes a pair of electromagnets 37 and 38 for each door locking mechanism, and the connecting circuit D includes an opposed pair of electro-magnets 39 and 40 for each of the four door locking mechanisms. These electro-magnets are supported in suitable manner, as by straps or brackets on the plate 1, adjacent the latch mechanism for each door, and a single armature-lever common to opposed pairs of electro-magnets, is indicated at 41 and pivoted at 41a between the pairs of magnets. The free end of the armature lever is guided in its pivotal movement, and limited in its range of movement by means of a strap 42, attached to, but spaced from the base plate 1.

The free end of the armature lever 41 engages at all times in the notch 20a of the head 20 of the lever 19, and the armature, under control of the pairs of magnets in a set, and through its flexible engagement or connection with the lever 19, swings the lever on its pivot 2 for disconnecting the latch mechanism, and for connecting the latch mechanism.

For alternately directing the flow of current from the battery B to the locking circuit C and the releasing circuit D, I employ a transfer switch in each door latch mechanism, which switch is grounded, by direct contact with the base plate 1, to form ground connections for the two circuits, and this switch is at all times closed with either the disconnecting circuit or the connecting circuit.

A transfer wire 50 having an insulated contact point or block terminal 51, and a second wire 52 having a similar terminal block 53, connect the disconnecting circuit and the connecting circuit, respectively with the transfer switch, and these blocks form parts of the switch, as indicated in the diagram Figure 5.

The movable member of the transfer switch includes a bell-crank lever 42a, which is pivoted at 44 to the base plate 1, and one arm of the bell-crank is fashioned with an arcuate conductor head 43. The other arm of the bell crank is connected to the lever 19 by a switch operating link 47 loosely fastened by means of

a slot 48 in the lever 19 in which a bent end of the link is pivotally retained, and pivotally connected at 49 to the arm of the bellcrank lever.

5 The two insulated contact blocks 51 and 53 are located in the path of movement of the arcuate conductor head or switch member 43, so that the latter may frictionally engage alternate blocks for closing the disconnecting circuit and the connecting circuit.

10 When the switch K' is turned to the left in Figure 5, closing the disconnecting circuit, the four pairs of electro-magnets 37 and 38 are energized to pull the armature lever 41 to the position shown in Figures 2, 3, and 5, and the transfer switch is closed in the disconnecting circuit C.

15 This movement of the armature 41 rocks the locking lever 19 on its pivot 2 to the position of Figure 2, with the pin 18 at the left end of the slot 17'. Now, if the handle H is swung to horizontal position in an ineffectual attempt to open the door of the automobile, the link 15 will swing, futilely and freely on its pivot 14, to the left, because of the presence of the slot 17' in the head 20 17 and of the pin 18 in the slot.

25 In order to release the locked latch bolt, the link must again be operatively connected or coupled between the slide bolt and the lever 19. For this purpose the switch K' is turned to the right in Figure 5 to open the disconnecting circuit and close the connecting circuit. Now the current passes through the transfer wire 52 to the release circuit and to the sets of electro-magnets, including the lower ones designated as 35 39 and 40, and as these magnets are energized, the armature lever 41 is dropped, rocking lever 19 to swing its free end upwardly on the pivot 2. This upward swing of lever 19 causes the conductor-head 43 to swing to the right in Figure 2, 40 to dotted position, and in contact with the block 51, thereby transferring the connection from the disconnecting circuit to the connecting circuit, and leaving the transfer switch in position to be again operated when the locking switch is again 45 closed to close the circuit.

As the free end of the lever swings upwardly on its pivot 2 to dotted position of Figure 2, the pin 18 is lifted from the horizontal or long leg of the slot 17' into the short leg of the slot, to position of 50 Figure 4. Now, if the handle H is turned to horizontal position, the pin 18 becomes the fixed pivotal support for the lower end of the link 15, and the actuating plate 27 swings the link so that its upper end will retract the slide bolt 3 to unlatch the door or doors. When the handle is again 55 turned down, the spring 9 projects the latch bolt and the spring tension also moves the actuating plate to the right into projected position.

When the doors are to be locked or unlocked from the interior of the car, I employ a double throw, double pole reversing switch indicated in Figure 5 as P, and this switch is preferably located in convenient position on the instrument board of the automobile. Assuming that the latched 60 slide bolts are unlocked and the connecting circuit D is closed at K', which switch K' is outside the automobile, the occupant throws the reversing

switch P to open the connecting circuit and close the disconnecting circuit C, and the before described locking action takes place. To connect the locked latch bolts, the switch P is of course 80 turned to open the disconnecting circuit C and close the connecting circuit D.

The transfer switch 43—51—53 is grounded at all times by the bell crank lever 42a that is grounded by contact with the base plate 1, the contact blocks 51, 53 being insulated from the plate, and therefore an effective ground connection is made and ready for the impulse that is to energize the electro-magnets of either the disconnecting circuit or the connecting circuit. Inas- 85 much as the movable contact member 43 is swung to always break the circuit that is employed in the last operation of locking or of unlocking the door, there can be no drain upon the electrical source of energy from the battery B when the electrical control system is not in use.

Provision is made for the necessary opening and closing of the several doors by providing automatically opening and closing switches 54, 55, 56 and 57 in the disconnecting circuit and a similar set of switches 54', 55', 56' and 57' in the connecting circuit. These switches are automati- 90 cally opened and closed as the doors are opened and closed, and of course all the doors and all of these switches are closed when the slide bolts are locked in their latched positions, according to the diagram in Figure 5.

The latching mechanism it will be understood may be manually operated either from handles H outside the door or from similar handles inside the door. However, when the driver throws the 110 reversing switch P while in the car, to lock the slide bolts in latched position, he must first rethrow switch P before he may open the door from the inside. When the driver steps out of the car he merely turns the switch key K' to the left in Figure 5 to lock all the doors, and thus it will be seen that it is impossible for the occupant to lock himself, through negligence, outside the car.

Having thus fully described my invention, what I claim as new and desire to secure by Letters 120 Patent is:—

1. The combination with a horizontally slidable, spring-projected latch-bolt, of a link pivotally suspended from said bolt at one end and a spring-anchor for the lower end of the link, means for 125 actuating the link to retract the bolt, a horizontally disposed locking lever and operating means therefor, and co-acting means on the link and lever whereby the link may have a pivotal movement on the lever, or swing relatively to said 130 lever.

2. The combination with a horizontally slidable, spring projected latch bolt, of a link pivotally suspended from the bolt and having an L-shaped slot and a spring anchor at its lower free end, 135 manually operated means for retracting the slide bolt, a horizontally disposed, pivoted locking lever and operating means therefor, and a fixed pivot pin on said lever adapted to function in said L-shaped slot, for the purpose described. 140

JOHN G. LOVELL.