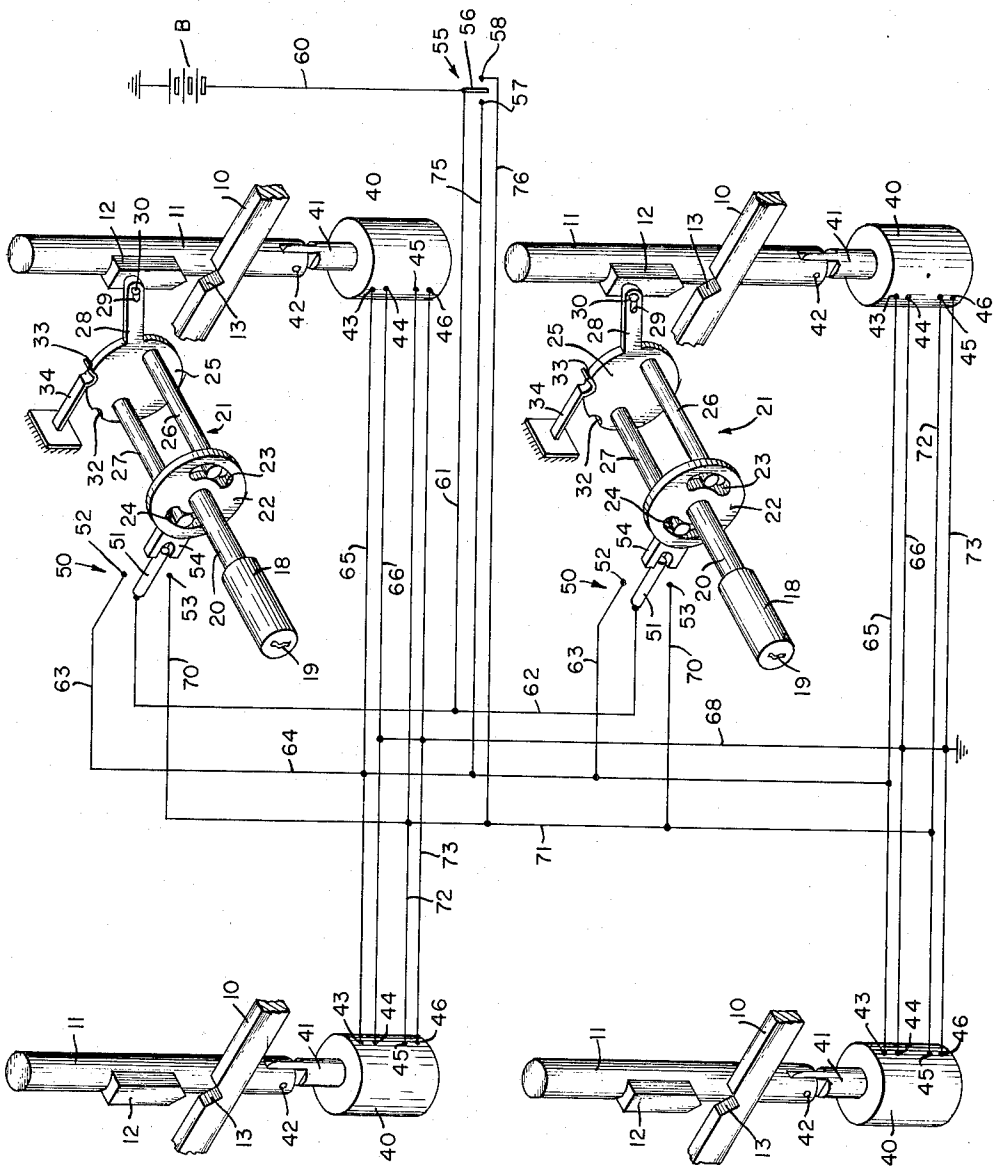
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DOOR LOCK SYSTEM

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DOOR LOCK SYSTEM

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This invention relates to vehicles and more particularly to mechanism for locking and unlocking the doors simultaneously.

In many localities it is desirable to lock the vehicle, especially an automobile, whenever it is left unattended, and with passengers getting in and out time is consumed in locking and unlocking the various doors after each stop. Furthermore, when driving through certain areas, especially at night, it is desirable to keep the doors locked in order to avoid the possibility of being molested when the vehicle slows down or stops.

Heretofore automobiles have usually been provided with a key-operated lock for either or both of the front doors and the rear doors have been locked from the inside or from the outside by depressing the button lock with the door open and then depressing the door handle release as the door is closed. In more recent years the button type of lock has been commonly employed for engagement with the latch bar of the door locking mechanism.

Various types of electrically operated locking mechanisms have been attempted but these have involved complexity of structure and substantial additional expense and have not been adaptable to the existing commonly used locking mechanism of the door.

Accordingly, it is an object of the present invention to provide electrical actuating mechanism which may be easily connected to existing slightly modified conventional structure for locking and unlocking doors, and which consist of relatively simple and inexpensive parts.

A further object of the invention is the provision of elctrically operated door locking and unlocking mechanisms by means of which all the doors may be simultaneously locked or unlocked by means of a switch within the vehicle or by a switch associated with a door key lock.

These and other objects of the invention will become apparent from the following description in conjunction with the accompanying drawing which illustrates schematically a set of four door locks modified to include apparatus in accordance with one form of the present invention.

Briefly stated, the present invention includes the provision of a double or two-way acting electric solenoid or other actuating means attached to each door button lock, and connected to switches operable by either or both key locks and preferably to another switch in the car's interior, such switches being connected to the battery of the vehicle, the actuators being grounded to the vehicle frame in accordance with conventional single-wire practice. Operation of a key lock toward unlocking or locking position, or of the interior switch to one of two positions, simultaneously energizes the actuators which either raise or lower the button locks in order to unlock or lock all the door latch locks simultaneously.

With continued reference to the drawing, the door lock mechanism for each of the four doors includes a latch bar **10** mounted in each door which engages a latch (not shown) in the door frame. Retraction of the latch bar permits the door to be opened and such bar is commonly operated by a handle or button on the exterior or interior of each door (not shown). In order to prevent retraction of the latch bar and thereby lock the door, a button or rod-type lock **11** is commonly provided having a projection **12** engageable with a notch **13** in the latch bar. The upper extremity of the button lock extends above the window frame and is manually depressed or raised to lock or unlock the door.

Key locks are customarily mounted in the front doors in order that the button lock may be operated by a key. Such key locks commonly consist of a rotatably mounted key cylinder **18** having an opening **19** for the reception of a key and an extension from its inner end **20** attached to a rotatably mounted cage **21**. The cage has a disc-likefront member **22** to which the member **20** is attached, and arcuate slots **23** and **24** disposed around its periphery. A disc-like back member **25** is spaced from and parallel to the front member and has rods **26** and **27** attached thereto and engaging the arcuate slots **23** and **24** of the front member. The back member has an arm **28** extending therefrom with a slot **29** in its end which receives a pin **30** in the member **12** in order to hold the cage in locked or unlocked position until manually moved by operation of the key or the button lock. In order to bias the back member and button lock in locked or unlocked position the back member has a pair of spaced notches **32** and **33** on its periphery which are engaged by a spring finger detent **34** suitably mounted in the door.

In the mechanism described rotation of the key cylinder clockwise causes the portions of the front member defining one end of the slots **23** and **24** to engage the rods **25, 26** in order to rotate the back member and move the button lock downwardly until the projection **12** engages the notch **13** in the latch bar. With the cage in such position the detent **34** engages the notch **32** of the back member. When the key cylinder is turned counter-clockwise to a sufficient extent the front member portions defining the other ends of the arcuate slots engage the rod and rotate the back member counter-clockwise, thereby raising the button lock projection from engagement with the latch bar and engaging detent **34** with the notch **33** in the back member. The button locks may be lifted or depressed manually if desired. After a key cylinder is rotated sufficiently to lock or unlock a door, it is returned to a midway position with the key slot vertical and the key removed, the biasing mechanism holding the button lock in the selected position.

The present invention contemplates the modification of and addition to the mechanism described in order that all of the locks may be operated electrically by a switch associated with the key lock or by a switch mounted elsewhere, such as in the vehicle's interior.

The apparatus illustrated for carrying out the invention includes a solenoid mechanism **40** having a core **41** pivotally connected by a pin **42** to the lower end of each button lock rod. Modification of the effective length of the button lock rod to connect it to the core may be accomplished, if necessary, by well-known methods, or a rod of suitable length may be substituted. The solenoid mechanism is of the double-acting or two-way type, or a pair of solenoids, and has contacts **43** and **44** connected to one of its windings and contacts **45** and **46** connected to the other.

Although a double-acting solenoid mechanism is a preferred type of actuator, it is obvious that other electromechanical devices may be employed.

Associated with each of the key locks is a single-pole double-throw switch **50** having an arm or switch member **51** which may be alternately connected with a contact **52** or **53**. The switch member **51** is engaged by an operating member **54** connected to the side of the front member **22** of the cage **21**. The switch may be of the toggle or other desired type, that on the drawing being illustrated schematically.

Mounted in the interior of the vehicle, as for example on the dashboard, is a switch **55** of the single-pole double-throw type having an arm or switch member **56** and contacts **57, 58** which may be alternately engaged.

The switches and actuators are connected as follows.

The battery B of the vehicle has a hot lead **60** connected to the switch member **56** of the switch **55**, and to the switch member **51** of switches **52** by leads **61, 62**. Leads **63** from the contacts **52** of switches **50** are connected to line **64** to which leads **65** are connected from the contacts **43** of the solenoids **40**. The other contacts **44** of the pair are connected by leads **66** to a common ground line **68**.

The other contacts **53** of the switches **50** are connected by leads **70** to line **71** to which contacts **45** of the solenoid are connected by leads **72**. The other contacts **46** of the pair are connected by leads **73** to the common ground **68**. Contact **57** of switch **55** is connected by lead **75** to line **64** and contact **58** by lead **76** to line **71**.

In the operation of the device rotation of either key lock in the clockwise direction closes the switch **50** to the contact **52**, thereby energizing the winding of the solenoid connected to contacts **43, 44**. Such winding draws the core **41** into the winding and thereby locks the latch bar. Since all of the solenoids are connected together in parallel, they are energized and operated at the same time. After the button lock has been moved to locked position the slot of the key cylinder **18** is customarily returned to vertical position, which causes the switch to open and de-energizes the solenoid, the button lock remaining biased in locked position.

To unlock the latch bar the key cylinder is rotated counter-clockwise which causes the switch member **51** to engage the contact **53** which is attached to the contact **45** of the other winding of the solenoid, thereby energizing such winding to move the core **41** and the attached button lock upwardly. Upon rotating the key back to vertical position the switch member disengages from the contact **53**, thereby de-energizing the solenoid, the button lock remaining biased in unlocked position, as indicated in the drawing.

Switch member **55**, which may be mounted on the dashboard or other preferred location, may be operated to momentarily engage either contact **57** or **58** to connect the battery directly to either pair of contacts of the solenoid in order to lock or unlock all the doors simultaneously.

Accordingly, it will be understood that the present invention includes electrically operable double-acting lock actuators connected through switches operable from the key locks or remotely by relatively simple operating means.

It will be obvious to those skilled in the art that various changes may be made in the invention without departing from the spirit and scope thereof and therefore the invention is not limited by that which is illustrated in the drawing and described in the specification, but only as indicated in the accompanying claim.

What is claimed is:

A door lock system for a vehicle having a plurality of doors, each door having a latch bar and a button lock for engagement therewith in one position in which said latch bar is restricted from movement and movable to a position out of movement-restricting position with such latch bar, means for biasing said button lock in each of said positions, at least one door having a key lock, said key lock having a cylinder operable by a key, comprising a cage attached to and extending from said cylinder, said cage having a first plate with arcuate slot means, a second plate spaced from the first plate and parallel thereto, rod means extending from the second plate, said rod means extending into said slot means of the first plate, means interengaging said second plate and said button lock whereby rotation of said cage in one direction actuates and in the other direction releases said button lock, two-way opposed winding solenoid means attached to each of said button locks for actuating or releasing the same, double contact switch means mounted adjacent to said key lock cage and having contacts connected to the opposed windings of said solenoid means and to a source of electrical energy, and switch actuating means extending from the first plate of said cage and engaging the switch means and adapted to move it to one contact position or the other when said key lock is operated in a direction to lock or unlock said button lock, said slot means permitting movement of said cage means to operate said switch means before movement of said button lock occurs.

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