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AUTOMATIC LOCK FOR AUTOMOBILE DOORS

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Fig. 1

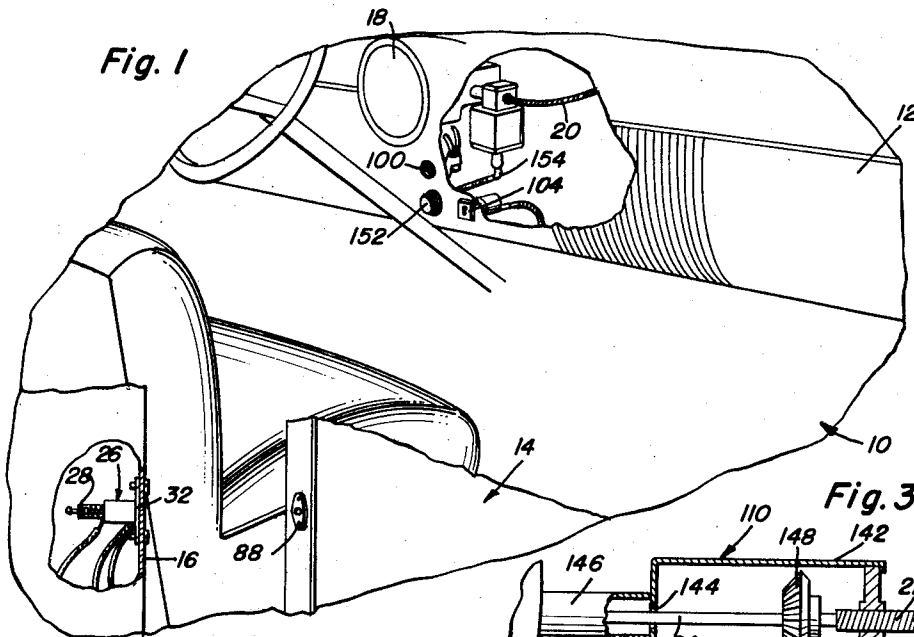


Fig. 3

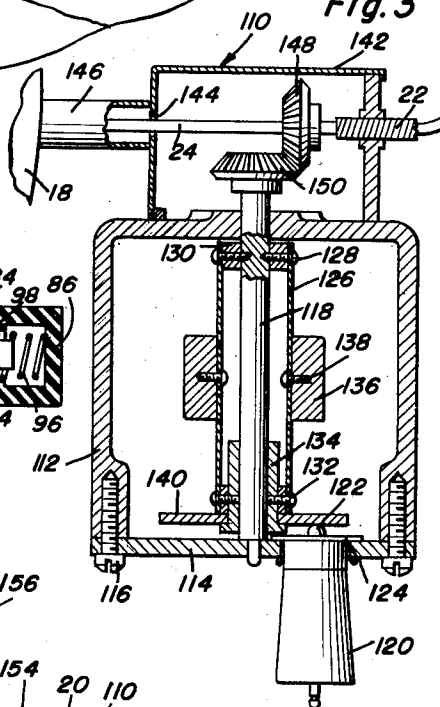


Fig. 2

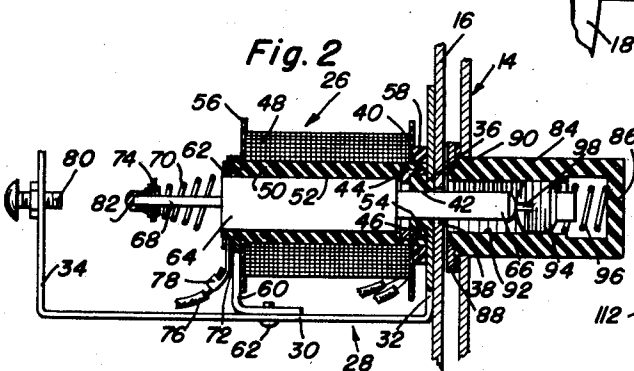
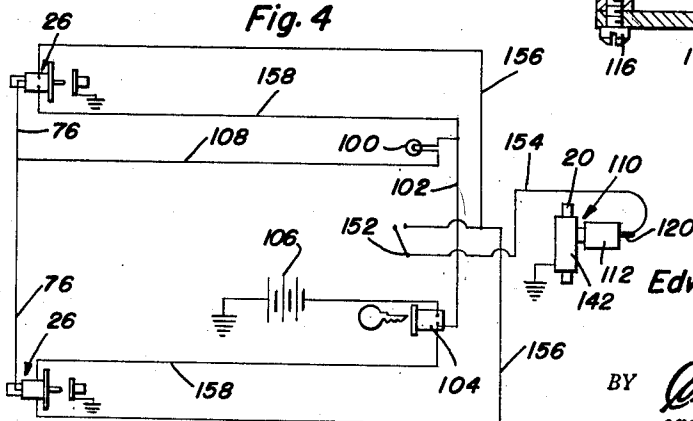


Fig. 4



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AUTOMATIC LOCK FOR AUTOMOBILE
DOORS

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5 Claims. (Cl. 180—82)

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This invention comprises novel and useful improvements in locking systems and more particularly pertains to a vehicle locking system whereby the doors will be locked whenever the vehicle is in motion.

An important object of this invention is to provide a vehicle locking system whereby the doors will be locked when the vehicle is in motion, and unlocked when the vehicle is stopped, to thereby prevent the accidental opening of the doors when the vehicle is traveling.

Another important object of this invention is to provide a vehicle locking system, in accordance with the foregoing object, together with a signal mechanism for indicating when the locks are in proper locking position, which signals are actuated in response to the position of the movable locking member.

An important feature of this invention resides in the provision of a locking system including an electromagnetically operated lock having a movable locking member with a means for energizing the lock, a switch for controlling energization of the lock, together with a mechanism responsive to motion of the vehicle for closing the switch and energize the locking mechanism.

Another feature of this invention resides in the provision of a locking system, in accordance with the foregoing feature, together with a mechanism for operatively connecting the vehicle motion responsive means to the speedometer drive cable, whereby the motion responsive means is actuated in response to driving rotation of the cable.

A further feature of this invention resides in the provision of a locking system which includes a solenoid having a locking member movably mounted thereon and electrically insulated therefrom, an electrically insulated keeper for receiving the locking member; signal means operatively electrically connected to the member to be actuated in response to electrical grounding thereof, an electrically grounded finger disposed in the path of movement of the member as the latter moves into locking position, and a stop means in the keeper for retaining the member out of contact with the finger, whereby the member will be electrically grounded whenever it is actuated into its locking position, and does not move into the electrically insulated keeper therefor.

These, together with various ancillary objects and features are attained by this device, a preferred embodiment of which has been illustrated in the accompanying drawings, wherein:

Figure 1 is a fragmentary perspective elevation view of a vehicle having the locking system mounted thereon;

Figure 2 is a longitudinal sectional view of one of the electromagnetically actuated locks;

Figure 3 is a longitudinal sectional view of

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the speed responsive assembly for controlling actuation of the locks; and

Figure 4 is a schematic wiring diagram of the locking system.

Reference is now made more specifically to the accompanying drawings wherein a portion of a vehicle 10 is illustrated, which vehicle includes a dashboard 12 and a door 14 swivelly mounted on the vehicle for movement into and out of registry with the door frame 16. As is conventional, a speedometer 18 is mounted on the dashboard 12 and is operatively connected to the ground engaging wheels of the vehicle, by a Bowden wire 20, and which wire includes a housing 22 and a drive cable 24, as is best shown in Figure 3.

The electromagnetic lock, designated generally by the numeral 26, includes a U-shaped bracket 28 having a web 30, and legs 32 and 34. The leg 32 of the bracket is adapted to be secured to the vehicle frame 16, and is provided with an outwardly flared opening 36 in alignment with the aperture 38 in the frame. A plug 40 is molded or pressed into the opening 36, which plug has, for reasons which will later become apparent as the following description proceeds, an axial guide bore 42 therein. An annular contact finger 44 having an inwardly directed flange 46 is disposed about the periphery of the plug 40, and is secured, or otherwise disposed in electrical contact with the leg 32 of the bracket 28, which finger is formed of an electrically conductive material.

The solenoid 48 is formed about a core 50, of electrically insulating material, which core has a plunger receiving bore 52 therein, and a counterbore 54 adjacent one end for receiving the annular finger 44, as is clearly apparent from a consideration of Figure 2. A pair of discs 56 are disposed about opposite ends of the core, and retain the windings of the solenoid in position thereon, a suitable washer 58, of electrically insulating material, being interposed between the leg 32 of the bracket 28 and the adjacent disc.

An L-shaped support arm 60 has one leg thereof secured, as by fastener 62, to the web 30 of the bracket 28, the other leg having an aperture 64 therein for receiving the diametrically reduced outer end of the core 50. As will be noted, the arm 60 serves to retain the adjacent disc 56 in position on the core 50, and also serves to support the core relative to the leg 32.

A plunger 64 having a locking finger 66 on one end thereof and an axially disposed rod 68 on the other end thereof, is reciprocally disposed within the bore 52 in the core 50, with the finger 66 slidably extending through the guide bore 42 in the plug 40, and through the aligned opening 38 in the frame 16. As will be noted from a consideration of Figure 2, the inwardly directed flange 46 on the annular finger 44 is disposed in

the path of movement of the plunger 64, as the latter moves into its locking position.

In order to yieldingly urge the plunger 64 out of locking position, there is provided a coil spring 70, one end of which engages the electrically insulating washer 72 which is disposed about the core 50, and abuts the arm 60, the other end of which spring engages a stop plate 74 on the rod 68. It is contemplated that the spring 70, the stop plate 74, and the rod 68 be of an electrically conductive material so that when the plunger 64 moves into contact with the flange 46 on the finger 44, the conductor 76 which is connected by the fastener 78 to the spring 70, will also be electrically grounded. An adjustable stop member 80 is carried by the leg 34 of the bracket 28, and is adapted to engage the cap 82, of electrically insulating material, on the end of the rod 68, to limit movement of the plunger 64, into its unlocking position.

A tubular keeper 84, having an end wall 86 is secured to one edge of the door 14, as by the mounting plate 88 which is molded or pressed into position on the open end thereof. The keeper is disposed in an opening 90 in the door 14, in axial alignment with the locking finger 66 on the plunger 64, which keeper has an internally threaded bore 92 for threadedly receiving an adjustable stop member 94 which is spring biased outwardly of the keeper, by a spring member 96 which is interposed between the end wall 86 and the stop member 94. The stop member has a slot 98, or other type of keyway, to permit adjusting of the same. It is contemplated that the stop 94 be so positioned as to engage the end of the locking finger 66, and maintain the plunger 64 out of engagement with the contact finger 44.

A signal 100 (see Figure 4) which may be a warning light, or buzzer, is electrically connected by a conductor 102 to the ignition switch 104, which switch is otherwise connected to the source of power 106. The signal 100 is also connected, by a conductor 108 to the conductors 76 which are electrically connected to the plungers 64, in the manner previously mentioned, whereby the signal will be actuated whenever the plunger 64 comes into electrical contact with the frame of the vehicle. Thus, when the door 14 is open, the stop 94 will be ineffectual to limit movement of the plunger into its locking position, whereby the plunger will contact the finger 44 and actuate the signal 100. Similarly, when the door is only partially ajar, the finger 66 will contact the portion of the door 14 adjacent the keeper, and complete the electrical circuit to ground, thereby energizing the lamp 100.

As it is contemplated that the electromagnetic locks 26 be energized, only when the vehicle is in motion, there is provided an assembly 110, for controlling actuation of the locks, in response to movement of the vehicle 10. For this purpose, there is provided a housing 112 having a removable bottom 114 fastened thereto, as by fasteners 116, and which housing has a shaft 118 journaled in the top and bottom walls thereof, as is best shown in Figure 3. A normally closed switch 120, having an actuating finger 122, is secured to the bottom wall 114 as by the supporting flange 124. A plurality of elongated resilient strips 126, each having one end thereof secured as by fasteners and blocks 128 and 130, respectively, to one end of the shaft 118, the other end of each of the strips being secured, as by fasteners

132, to a sleeve 134 which is slidably disposed on the shaft 118. Weights 136 are secured by fasteners 138 to intermediate portions of the strips 126, which weights are adapted to be centrifugally actuated outwardly in response to rotation of the shaft 118, to thereby reciprocate the sleeve 134 on the shaft. A collar 140 is carried by the sleeve 134, for movement therewith, which collar engages the switch actuating finger 122 whenever the shaft 118 is not rotating, to maintain an open circuit, and which collar is movable with the sleeve 134 out of contact with the finger 122, whenever the shaft 118 is caused to rotate, by means to be hereinafter described.

It will be appreciated that any suitable means may be provided for rotating the shaft 118 in response to movement of the vehicle 10, without departing from the scope of this invention. A convenient drive is best illustrated in Figure 3 and includes a casing 142 which is mounted upon the top wall of the housing 112, in any desired manner, the sheath 22 of the Bowden wire 20 being secured to one wall thereof, with the drive cable 24 extending through an aperture 144 in the opposing wall thereof. A sleeve 146 is secured to one wall of the casing 142, in alignment with the opening 144 therein, which casing is otherwise secured to the speedometer housing, and serves to support the assembly 110. Alternatively, any suitable bracket may be provided for mounting the assembly 110 on the vehicle dashboard or the like.

The drive cable 24 has a bevel gear 148 mounted thereon, which gear is in meshing engagement with a second bevel gear 150 carried by the outer end of the shaft 118. It will thus be appreciated that whenever the speedometer drive cable 24 is rotated, in response to movement of the vehicle ground engaging wheels, the shaft 118 will also be rotated so as to move collar 140 operatively connected thereto out of engagement with the finger 122 of the switch 120, to thereby permit the switch to move into its circuit closing position.

As is best shown in Figure 4, the switch 120 is connected in series with a manual switch 152, by a conductor 154, which manual switch is connected, as conductors 156, to the electromagnetically operated locks 26, which locks are otherwise connected to the ignition switch 104, as by conductor 158.

In operation, the ignition switch 104 is first closed so as to render the energy of the battery 106 available to the signal 100, and to the electromagnetically operated locks 26. Additionally, the manual switch 152 is moved into its closed position, it being understood that the manual switch 152 is provided only for de-actuating the solenoids if it should, for any reason, be found desirable to do so. When the vehicle is stopped, the collar 140 will depress the finger 122 on the switch 120, and maintain an open circuit, whereby the spring 70 may yieldingly retain the plunger 64 into its unlocking position. However, whenever the vehicle is in motion, the speedometer drive cable 24 will rotate the shaft 118, which will cause the centrifugally actuated weights 136 to move the collar 140 out of contact with the finger 122, and thereby complete electrical circuit to the electromagnetically operated locks 26.

If the door 14 is in its closed position, when the locks are actuated, the locking finger 66 on the plunger 64 will move into the keeper 84, and

abut the stop 94 disposed therein. This stop will retain the plunger out of contact with the finger 44 and, since the plunger will then be electrically insulated from ground, the signals 100 will not be energized. If, however, the door is open, the plunger 34 will move until it contacts the finger 44, thereby completing the electrical circuit to ground, and energizing the signal 100. Further, if the door is only slightly ajar, the locking finger 66 will contact the edge of the frame adjacent the keeper, to thereby establish an electrical circuit to ground, and actuate the signal 100.

Although the centrifugal switch is shown as being connected at the speedometer end of the cable, it can also be connected to the other end between the cable and drive shaft.

As it is believed that the construction and operation of the device will be readily understood from a consideration of the foregoing specification and accompanying drawing, further description is believed unnecessary. However, since numerous modifications will readily occur to those skilled in the art after a consideration of the foregoing description, it is not intended to limit the invention to that shown and described but all suitable modifications may be resorted to, falling within the scope of the appended claims.

Having described the invention, what is claimed as new is:

1. A vehicle door locking system comprising a solenoid adapted to be mounted on the frame of a vehicle, said solenoid having a movable locking member mounted thereon and electrically insulated therefrom, said member having a locking position and an unlocking position, means for energizing said solenoid to move said movable member into its locking position, switch means controlling energization of said solenoid, an electrically insulated keeper adapted to be mounted on the door of the vehicle, said keeper being movable in a direction transverse to the direction of movement of said locking member and being adapted to be axially aligned with said locking member when the door is in fully closed position and receiving said member when in its locking position, signal means, means electrically connecting said signal means to a source of power and to said locking member, and means disposed in the path of movement of said member as the latter moves toward its locking position for electrically grounding said member to activate the signal means when said member is not aligned with said keeper, and stop means in said keeper for limiting movement of said member and retaining the latter out of contact with said member grounding means when said member is in locking position in said keeper.

2. The combination of claim 1 including spring means yieldingly urging said member into its unlocking position.

3. A vehicle door locking system comprising a solenoid having a movable locking member mounted thereon and electrically insulated therefrom, said member having a locking position and an unlocking position, means for energizing said solenoid to move said movable member into its locking position, switch means controlling energization of said solenoid, an electrically insulated keeper for receiving said member when in its locking position, said keeper being movable in a direction transverse to the direction of movement of said member into and out of alignment with said member, signal means, means elec-

trically connecting said signal means to a source of power and to said locking member, and means disposed in the path of movement of said member as the latter moves into its locking position for electrically grounding said member to activate said signal means when said keeper is out of alignment with said member, and stop means in said keeper for limiting movement of said member and retaining the latter out of contact with said member grounding means when said keeper is in alignment with said member.

4. In a vehicle door locking mechanism, a substantially U-shaped mounting bracket having first and second leg portions and a web joining said leg portions, said first leg portion having an opening therein, a plug fitted in the opening and having a guide bore, an annular contact finger about the plug and having an inwardly directed flange disposed over one end of the plug, said finger contacting said first leg portion, a core having one end receiving the plug and finger therein, a support arm secured to the web and supporting the other end of the core, a solenoid formed about the core, a plunger slidably received in the core, a locking finger secured to one end of the plunger and slidably received in the guide bore of the plug, said flange extending radially inwardly of the inner periphery of said core to be engaged by said plunger when the solenoid is energized, a rod fixed to the other end of said plunger, means engaging the rod and urging the plunger and rod toward the said second leg portion, and a stop carried by said second leg portion limiting sliding movement of the plunger and rod toward said second leg portion.

5. In a vehicle door locking mechanism, a substantially U-shaped mounting bracket having first and second leg portions and a web joining said leg portions, said first leg portion having an opening therein, a plug fitted in the opening and having a guide bore, an annular contact finger about the plug and having an inwardly directed flange disposed over one end of the plug, said finger contacting said first leg portion, a core having one end receiving the plug and finger therein, a support arm secured to the web and supporting the other end of the core, a solenoid formed about the core, a plunger slidably received in the core, a locking finger secured to one end of the plunger and slidably received in the guide bore of the plug, said flange extending radially inwardly of the inner periphery of said core to be engaged by said plunger when the solenoid is energized, a rod fixed to the other end of said plunger, a conductive plate on the rod, a conductive ring about the core engaging said second leg portion, a conductive coil spring about the rod and biased between the plate and the ring and urging the plunger and the rod toward the second leg portion, a stop carried by the second leg portion limiting sliding movement of the plunger and rod toward the second end portion, and a ground conductor connected to the ring.

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