

[54] **LOCKING MEANS**

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70/278, 264; 317/134; 200/43

[56] **References Cited**

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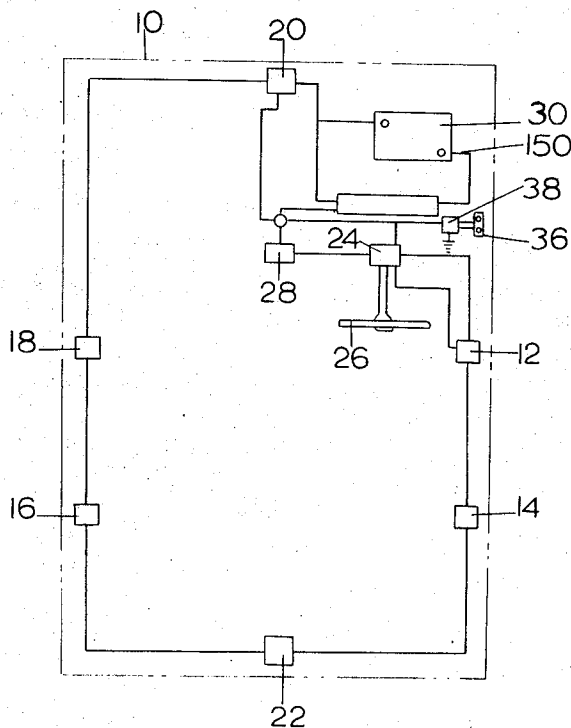
Assistant Examiner—John A. Pekar

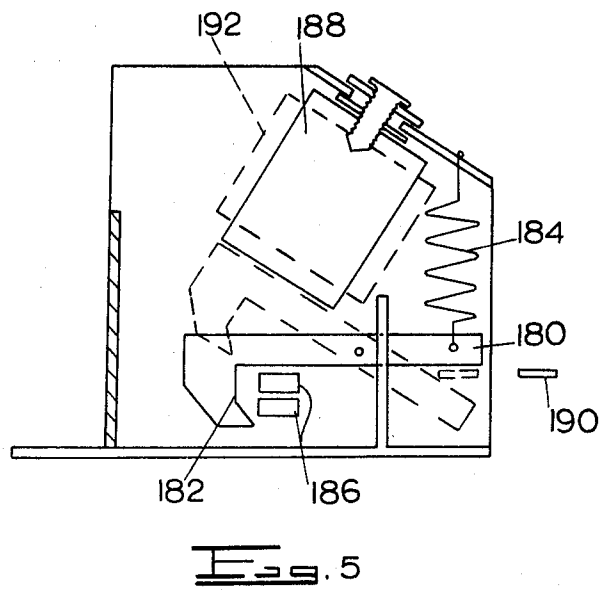
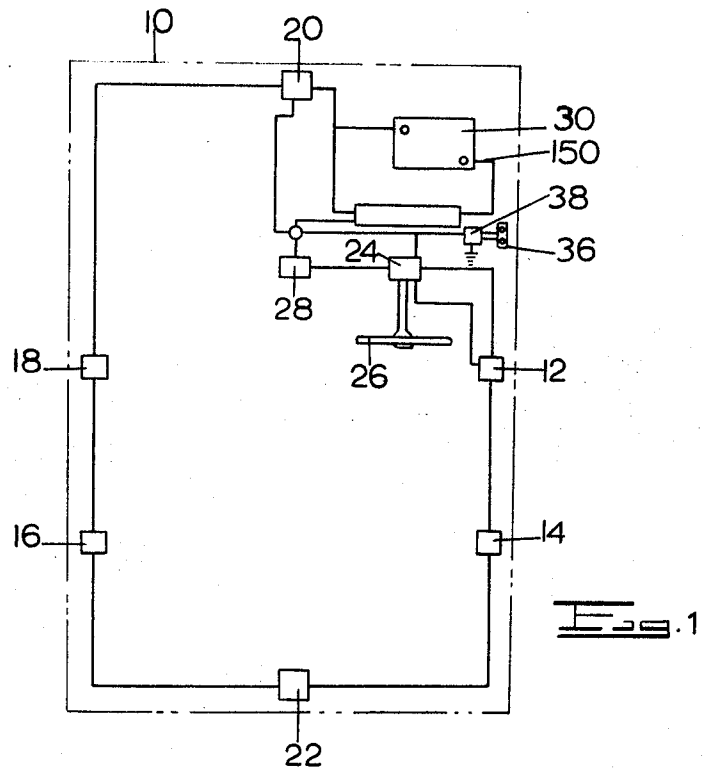
Attorney—Waters, Roditi, Schwartz & Nissen

[57] **ABSTRACT**

This invention relates to a system whereby all the locks of an automobile are electromagnetic locks and all are controlled from a single selector mechanism. The electrical parts of the mechanism are contained in a weatherproof container. An emergency transformer is provided connected to at least some of the locks so that when a power source is connected to the transformer those locks will be opened.

10 Claims, 5 Drawing Figures





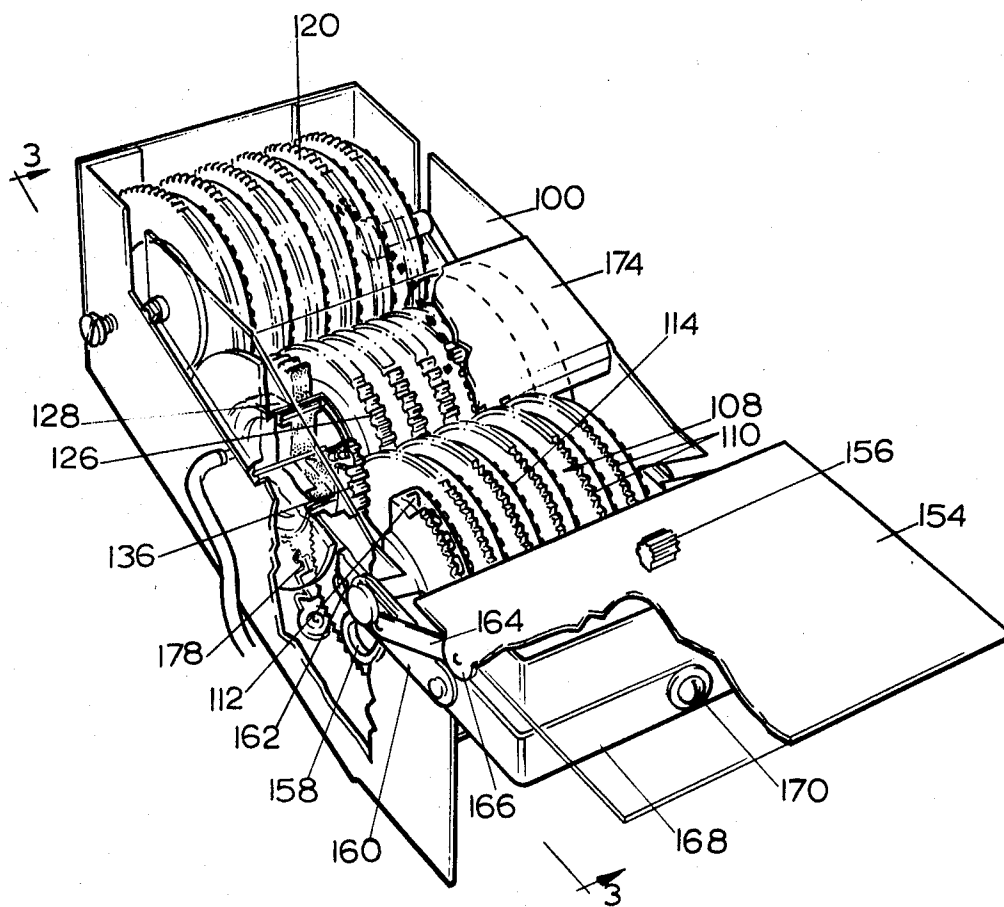
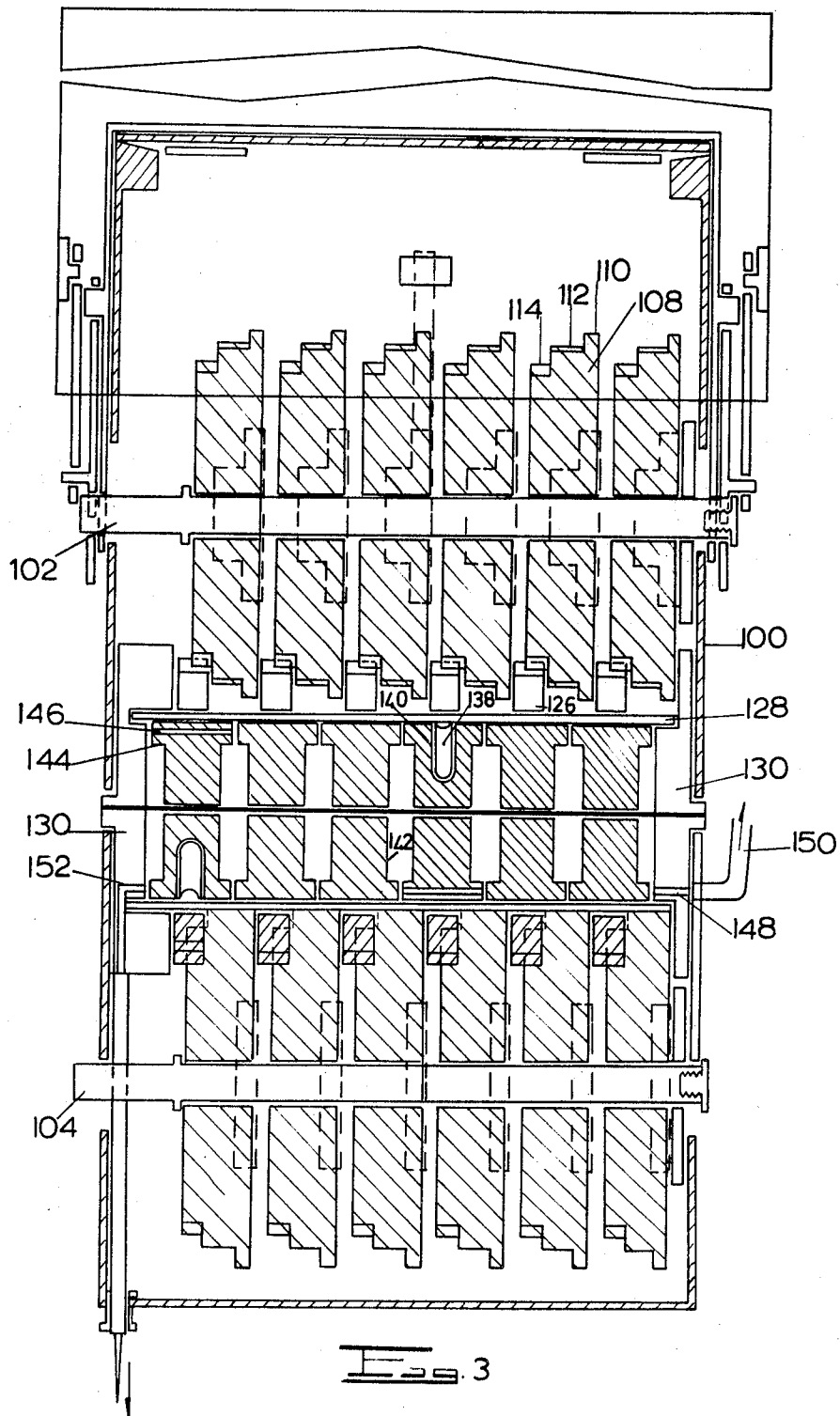


Fig. 2



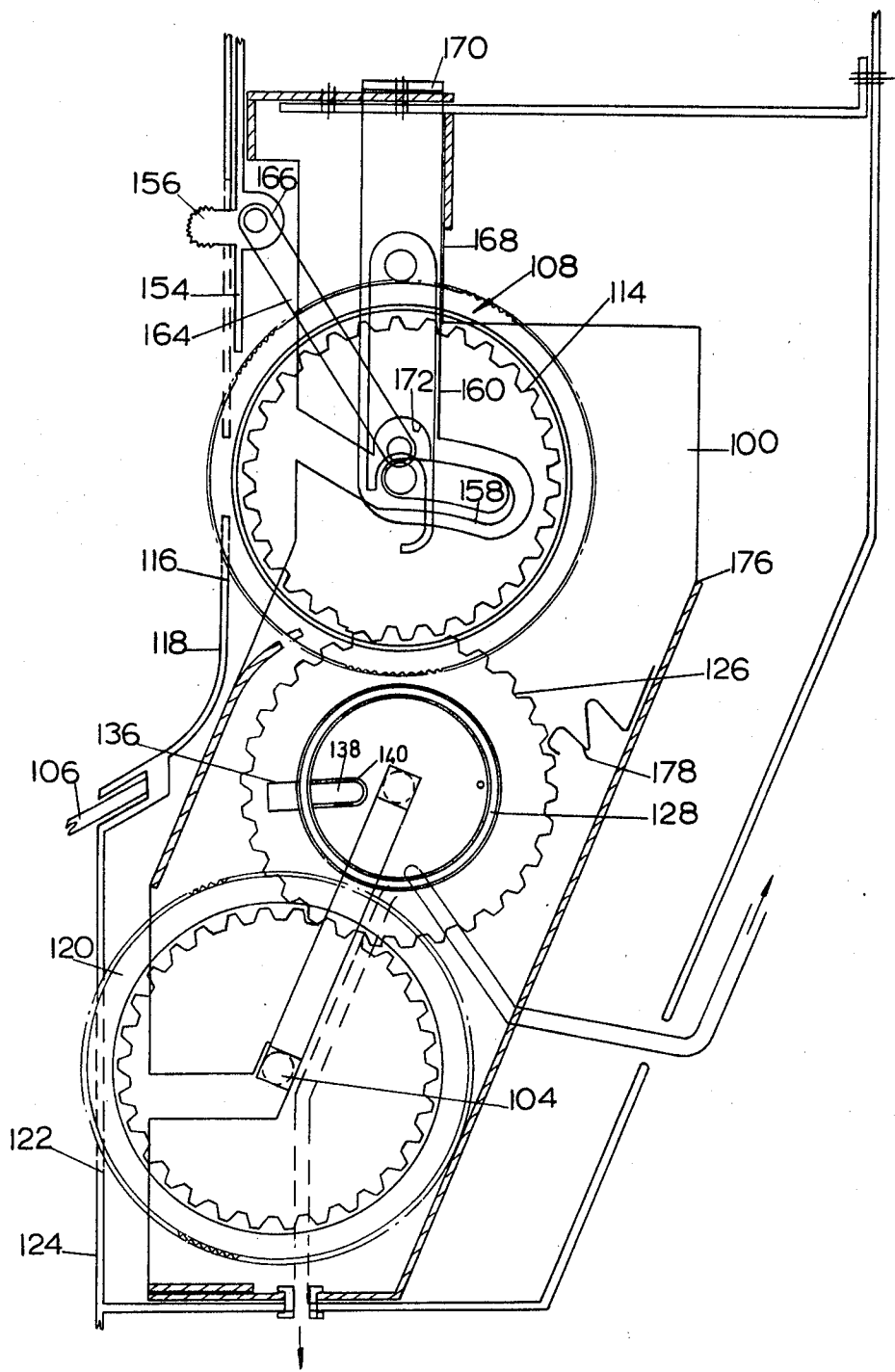


Fig. 4

1 LOCKING MEANS

This invention relates to electro-magnetic vehicle locking systems of the kind in which a number of locks are actuated by a single mechanism. Typical of such systems are those shewn in U.S. Pat. Nos. 1,901,548 to Beal, 2,028,852 to Vincent and 2,765,648 to Hatcher. In all of these systems a key mechanism is provided to actuate the system. Such an arrangement is not entirely satisfactory because of the inherent weaknesses of key mechanisms, i.e., that it can be picked, that substitute and master keys are obtainable by thieves and that when the vehicle owner has misplaced his key he is unable to enter his vehicle. A cipher combination mechanism provides a much more satisfactory actuating mechanism. This must, of course be accessible from outside the vehicle.

In German Offenlegungsschrift 1,905,333 in the name of Facchinelli, there is disclosed a cipher combination mechanism for use as a lock for vehicles, although not in a system as mentioned above. As mentioned above, the cipher combination mechanism must be accessible from outside the vehicle and consequently it must be weatherproof and as far as possible tamper proof. On both these scores, the cipher combination mechanism mentioned in the said Offenlegungsschrift is defective. Should the combination be flooded as can happen in a rain storm, all the contacts could be placed in electrical contact with the result that the locks can be opened when they should still be in their locked position. Further the said cipher combination mechanism can be easily damaged by someone wishing to tamper with it.

It is an object of the invention to provide a system of the kind set forth using a cipher combination mechanism which is weatherproof and which is largely tamper proof.

It is another object of the invention to provide a system of the kind set forth using magnetic means in the mechanism.

It is a further object of the invention to provide a system of the kind set forth using a cipher combination mechanism which is substantially silent in operation, i.e., which does not give a "click" when the combination wheels are in the correct relative positions.

It is yet a further object of the invention to provide a system of the kind set forth in which the number of locks being controlled can be varied as desired.

It is still a further object of the invention to provide a system of the kind set forth including means for deactuating some of the locks should the electrical system of the vehicle fail.

These and other objects of the invention will be apparent from the following description of an embodiment of the invention.

FIG. 1 is a diagrammatic layout drawing of a vehicle embodying the invention,

FIG. 2 is a perspective broken away drawing of the cipher combination mechanism,

FIG. 3 is a section on line 3 — 3 of FIG. 2,

FIG. 4 is a side view of the mechanism in position in a vehicle,

FIG. 5 is a diagrammatic view of a lock.

In FIG. 1 there is shewn diagrammatically an automobile 10 which has four door locks 12, 14, 16 and 18 as well as a front boot or bonnet lock 20, a rear boot

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lock 22, a lock 24 for the steering wheel 26 and a lock 28 for a removable radio.

The automobile 10 has a conventional battery 30 which is connected through a selector device comprising a cipher combination mechanism 32 and via wires 34 to the locks. It will be seen that all these locks will normally be operated together.

A secondary circuit is also provided. This comprises a socket 36 located, conveniently under the vehicle and connected to a step-down transformer 38.

The secondary coil of this transformer 38 is connected to the secondary coils of the front door lock 12, and the steering wheel lock 24, and the lock 20 of the boot containing the battery 30.

The cipher combination mechanism 32 is contained within a folded sheet metal housing 100. Bridging the housing 100 are a pair of shafts 102 and 104 which are so located that when the housing is in position adjacent the windscreen 106 (see FIG. 4) of the automobile 10, the shaft 102 will lie forwardly of the windscreen 106 and the shaft 104 will be rearward thereof.

On the shaft 102 there are six plastics selector wheels 108. Each selector wheel 108 has a knurled flange 110, a cylindrical portion 112 marked with ciphers e.g., digits, and a toothed portion 114. The location of the shaft 102 and the size of the wheels 108 is such that the flanges 110 project through an opening 116 in the skin 118 of the automobile body in front of the windscreen 106 and that the ciphers on the portions 112 are visible through this opening 116.

On the shaft 104 are six plastics wheels 120 which are identical with the selector wheels 108 save that there are no ciphers on the cylindrical portions of the wheels.

The location of the shaft 104 and the size of the wheels 120 is such that the flanges of the wheels project through an opening 122 in the upper surface 124 of the dashboard of the automobile.

The wheels 108 and 120 are aligned in pairs and the toothed portion of the wheels of each pair mesh with a common gear 126, there being of course six such gears 126. Each gear 126 is made of plastics and is rotatably mounted on a glass cylinder 128 that is closed off at each end by a glass plug 130. A steel rod 132 runs co-axially through the cylinder 128 and carries six plastics discs 134 which are located respectively within the gears 126.

Each gear 126 carries internally a pellet 136 of ferromagnetic material conveniently an alloy of soft iron and nickel.

Each disc 134 carries a small bar magnet 138 the ends of which are curved as shewn and which is contained in a sleeve 140 of suitable material to form a magnetic shield so that there is no attraction between adjacent discs 134. The central portion 142 is of reduced thickness to reduce weight. In the surrounding portion or rim 144 of the disc 134 is a rod 146 of electrically conductive material. When these rods 146 are aligned they form an electrically conductive path. A contact 148 projects through one of the plugs 130 and is connected by a cable 150 to the vehicle battery 30. A similar contact 152 projects through the other plug 130 and leads to the locks. These contacts 148 and 152 are aligned. When the rods 146 are aligned with the contacts 148 and 152, they place the contacts in electrical communication.

A closure plate 154 having a knob 156 to facilitate manipulation is provided for the opening 116. It will be

appreciated that when this closure plate 154 is moved to its closed position it will foul the flanges 110 of the wheel 108 if these remain in their normal operating position. To avoid this, the ends of the shaft 102 are contained in arcuate slots 158 in the sides of the housing 100. A pair of hinged levers 160 provided at each side of the housing 100 have hooked ends 162 in which the shaft ends are received. Connecting links 164 join lugs 166 on the closure plate 154 to the levers 160. As the closure plate 154 is moved towards its closed position the levers 160 pivot downwardly allowing the shaft 102 to be lowered down the slots 158 so that the flanges 110 of the wheels 108 move out of the path of the closure plate 154. The toothed portions 114 of the wheels 108 will remain in mesh with the gears 126 during such movement of the wheels 108.

The levers 160 are hinged on a stirrup member 168 which is secured by a screw 170 to the housing. By undoing the screw 170 and pulling the stirrup member 168, and with it the levers 160, backwards, the shaft 102 can be moved away from the gears 126, the slots 158 having horizontal recesses 172 to accommodate such movement. When the shaft 102 has so moved, the toothed portions 114 will be out of mesh with the gears 126 so that a new combination can be set. It will be appreciated that the rods 146 must be aligned with the contacts 148 and 152 when this takes place and that the stirrup must be relatively inaccessible so that changing of the combination cannot be effected frivolously.

In order to protect the gears 126, a bridging piece 174 is provided.

The base of the housing 100 has an opening 176 so that if any water should enter the housing due to the user of the automobile inadvertently forgetting to close the closure member, it, the water, can escape easily for drainage.

A leaf spring 178 is provided to engage each gear 126 so that it stops in predetermined positions only.

It will be seen that by correctly setting the combination of ciphers on the wheels 108, the contacts 148 and 152 will be put in electrical contact to open the locks as will be described. To facilitate use at night, the ciphers may be marked in luminous or fluorescent paint material. The inner wheels 120 are provided merely to enable the user to disarrange the wheels from within the automobile.

It will also be seen that there will be no tell-tale "click" when any wheel 120 reaches its correct position as the rods 146 will be slightly spaced from each other when aligned.

It will also be seen that as the electrical contacts 148 and 152 and the rods 146 are all contained within the glass cylinder 130 which serves as a weatherproof container, and as the gears and wheels are all made of plastics material, the combination mechanism 32 is wholly weatherproof.

A convenient lock is shown in FIG. 5. This lock comprises a pivotted lever 180 having one end 182 hooked and being biased by a spring 184 so that the hook 182 lies in the path of two levers 186 forming part of the door latch opening mechanism.

By preventing movement of these levers 186 the hook 182 prevents the door opening mechanism being operated.

An electromagnet 188 when energized draws the hooked end 182 of the lever 180 out of the path of the

levers 186 so that the door opening mechanism can be operated. A manually operable lever 190 is provided so that the user of the automobile can hold any lock unlocked when the automobile is in use.

A secondary coil 192 (shown in chain lines) surrounds the electromagnet 188 of the front door lock 12 and is connected to the transformer 38. When this secondary coil 192 is energized, as will be described, the lever will be moved as described in the preceding paragraph to enable the door opening mechanism to operate.

It will be understood that similar locks will be used for the locks other than the door locks.

The electromagnetic locks may be of any other convenient construction for example as described in the aforesaid Patents to Beal, Vincent, Hatcher or U.S. Pat. No. 2,028,852 to Jenkins.

Should the battery 30 fail when the locks are applied, it would be impossible to enter the automobile and to reach the battery. It is cater for this possibility that the secondary circuit mentioned above is provided. By energizing the secondary circuit the front door can be opened, the steering released and the boot containing the battery can be opened. Thus the automobile may be driven to garage or the like where the battery may be charged or replaced.

In order to prevent this facility being used by car thieves, the step-down transformer 38 is designed to accept a high voltage alternating current such as 250 volts or 110 volts. Such voltages are conventional domestic voltages so as to be accessible if necessary. But a thief is unlikely to have means to such a voltage in an inconspicuous manner.

In order that the use of the vehicle may have greater control over the various locks, a rotary switch is preferably connected to the output of the selector device. This switch may have a set of output contacts connected respectively to the lock 24; the locks 24 and 12; the locks 24, 12 and 18; the locks 24, 12, and 20 and 22; and all the locks. Thus by selecting the position of the switch, the user can maintain such locks as he requires in the locked position while one or more of the locks are open. Means will have to be provided so that when one wishes to enter the vehicle the rotary switch will always allow the door lock 12 to be energized.

The connections to the selector device are preferably very inaccessible and encased in steel tubes so that it is difficult to short out the selector after having removed it.

I claim:

1. A vehicle locking system comprising a number of locking devices each including electromagnetic means, a selector mechanism including a pair of fixed contacts and a number of carrier means rotatable about a common axis and carrying electrical contacts which when aligned with one another and with the fixed contacts provide an electrical connection between the two fixed contacts, means electrically connecting one of the fixed contacts to a source of electrical supply and means electrically connecting the other of the fixed contacts to the electromagnetic means of the locking devices, characterized by a weatherproof container which is co-axial with the axis of rotation of the carrier means and in which the carrier means are contained, moving means external of the weatherproof container arranged co-axially round the container and carrier means, and magnetic means in the carrier means and the moving

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means so that movement of the moving means is transferred to the carrier means.

2. A system as claimed in claim 1 in which the carrier means are discs.

3. A system as claimed in claim 2 in which the moving means comprise gears.

4. A system as claimed in claim 3 further comprising wheels having parts meshing with the gears and parts carrying ciphers.

5. A system as claimed in claim 4 in which the selector is contained within the body of a vehicle and in which the body has an opening through which the parts of the wheels carrying the ciphers are visible through the opening.

6. A system as claimed in claim 5 in which the wheels have flanges projecting through the opening whereby the wheels may be rotated.

7. A system as claimed in claim 5 further comprising a cover slidable over the opening.

8. A system as claimed in claim 1 in which the weatherproof container is a glass tube.

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9. A system as claimed in claim 1 in which the magnetic means comprises magnets and pellets of ferromagnetic material and in which magnetic shielding means shields the magnets from mutual attraction and repulsion.

10. A vehicle locking system comprising a number of locking devices each including electromagnetic means, a selector mechanism including a pair of fixed contacts and a number of carrier means rotatable about a common axis and carrying electrical contacts which when aligned with one another and with the fixed contacts provide an electrical connection between the two fixed contacts, means electrically connecting one of the fixed contacts to a source of electrical supply in the vehicle and means electrically connecting the other of the fixed contacts to the electromagnetic means of the locking devices, characterized by a secondary coil on the electromagnetic means of at least one locking device and means to connect the coil to a source of power external to the vehicle.

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