May 26, 1970 H. LAFRANCE 3,514,556

IGNITION LOCK AND SWITCH COMBINATION

Filed June 7, 1968 2 Sheets-Sheet 1

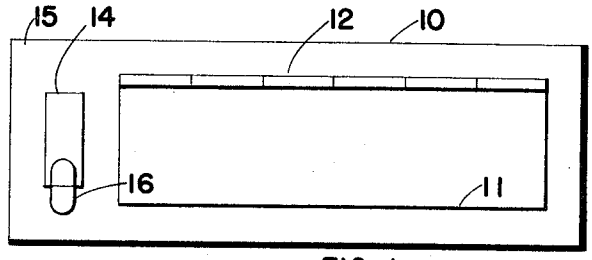


FIG. 1

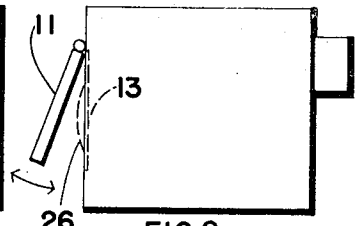


FIG. 2

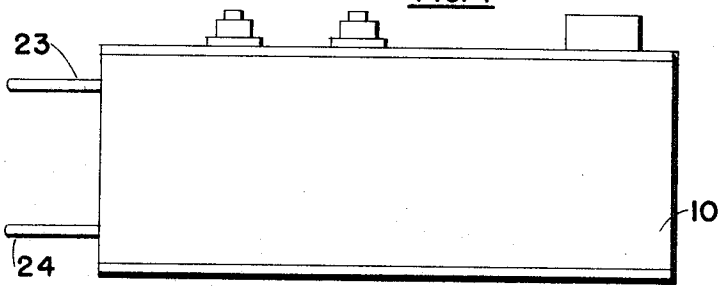


FIG. 3

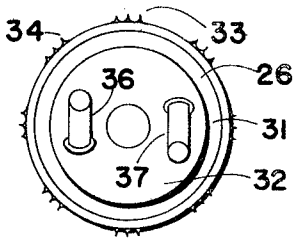


FIG. 6

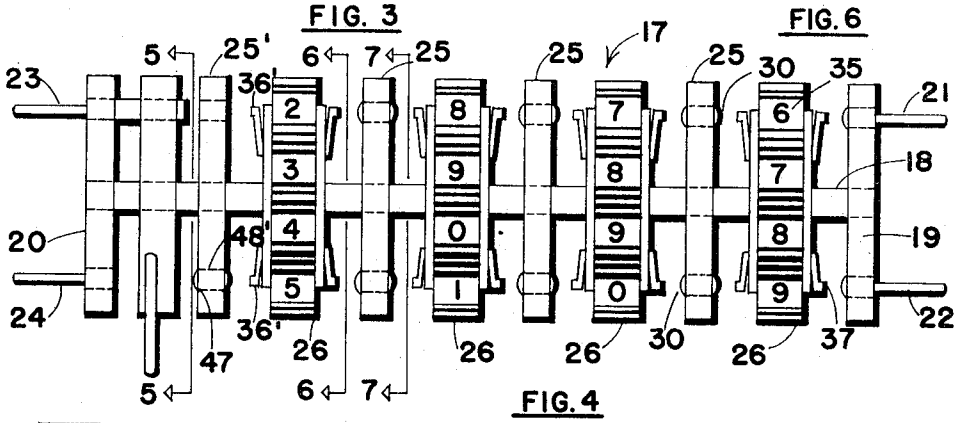


FIG. 4

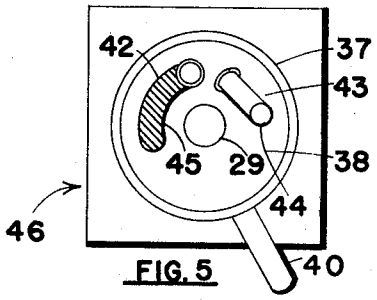


FIG. 5

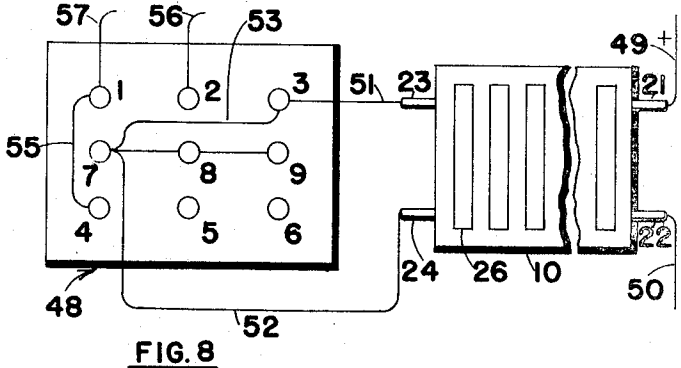


FIG. 8

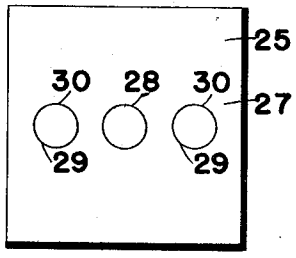


FIG. 7

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IGNITION LOCK AND SWITCH COMBINATION

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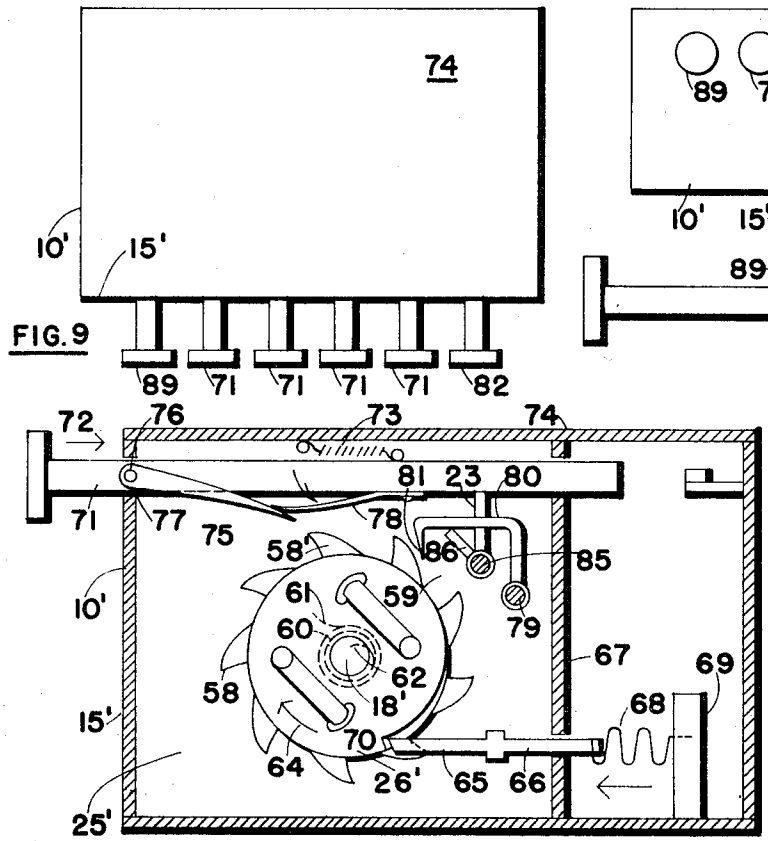


FIG. 9

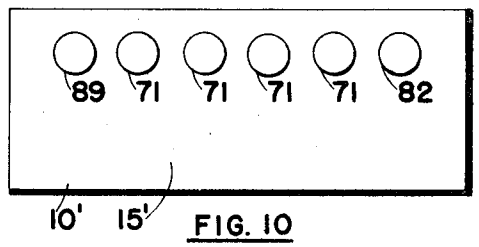


FIG. 10

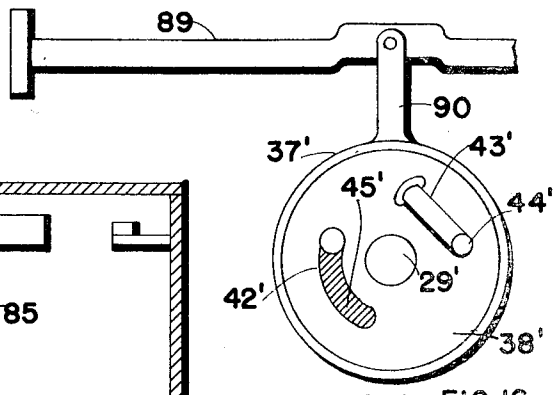


FIG. 11

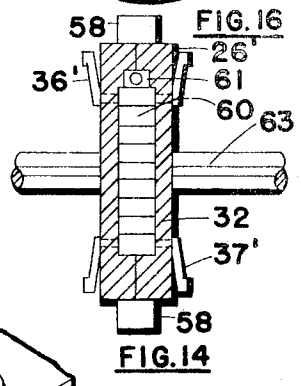


FIG. 16

FIG. 14

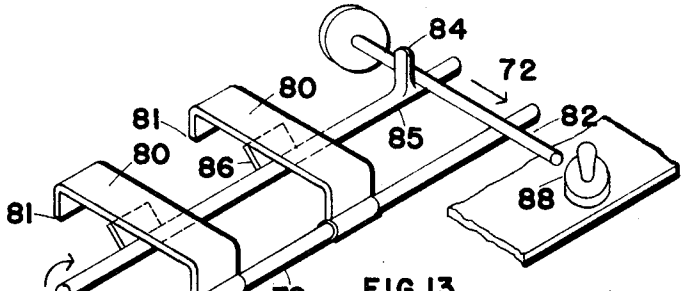


FIG. 13

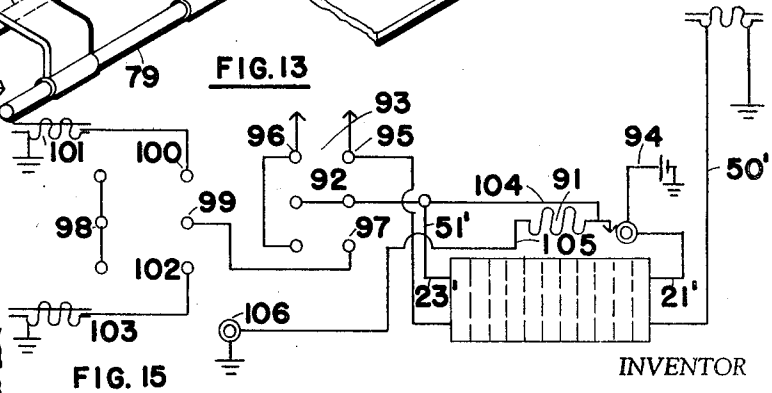


FIG. 15

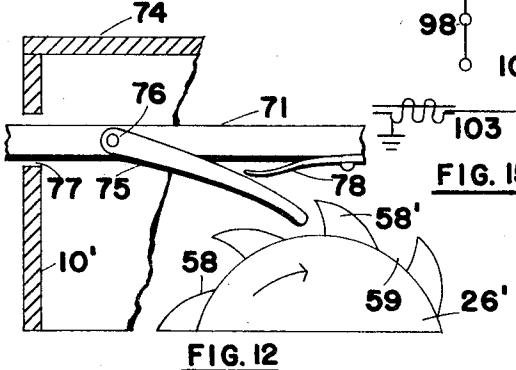


FIG. 12

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3,514,556

IGNITION LOCK AND SWITCH COMBINATION

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Filed June 7, 1968, Ser. No. 735,243
Int. Cl. H01h 27/10
U.S. Cl. 200—43 1 Claim

ABSTRACT OF THE DISCLOSURE

The current from the battery to the starter solenoid and to the ignition is routed through the enclosure having a plurality of rotatable elements therein and continuity is only established if these elements are rotated to a preset code. The rotation may be by friction or by ratchet type plungers.

This invention relates to new and useful improvements in ignition lock and switch combinations for automobiles, boats, aircraft, or other apparatus operating by a key switch system.

Conventional automobiles are provided with a key for the ignition which is usually wired in conjunction with the starting solenoid so that one turn of the key not only switches on the ignition but engages the starter solenoid.

These keys are readily interchangeable and in fact, master keys exist which fit an entire range of automobiles by one manufacturer.

In order to prevent theft and unauthorized tampering of cars and the like, I have designed a combination ignition lock and switch which takes the part of the conventional ignition lock.

It consists of a plurality of cylinders which have to be rotated to a predetermined code before the ignition solenoid circuit is complete thus enabling the switch incorporated therewith to be engaged for starting purposes.

This eliminates the necessity for keys and only the owner or other authorized operators know the code pertaining to one particular automobile.

With the foregoing considerations in view, and such other objects, purposes or advantages as may become apparent from consideration of this disclosure and specification, the present invention consists of the inventive concept exhibited in the method, process, construction, arrangement of parts, or new use of any of the foregoing herein particularly exemplified in the one or more specific embodiments of such concept, reference being had to the accompanying figures in which:

FIG. 1 is a front elevation of the casing of my device.

FIG. 2 is an end view thereof.

FIG. 3 is a plan view thereof.

FIG. 4 is an expanded front elevation of the interior components of the casing.

FIG. 5 is an end view of the component indicated by the line 5—5 of FIG. 4.

FIG. 6 is an end view of the component indicated by the line 6—6 of FIG. 4.

FIG. 7 is an end view of the component indicated by the line 7—7 of FIG. 4.

FIG. 8 is a wiring diagram showing the connection of the device to the ignition and battery circuits.

FIG. 9 is a top plan view of my preferred embodiment.

FIG. 10 is a front view thereof.

FIG. 11 is an end sectional view of FIG. 9.

FIG. 12 is an enlarged fragmentary partially sectioned view showing the ratchet connection between the plunger and the drum.

FIG. 13 is a fragmentary isometric view showing the clearing mechanism.

FIG. 14 is an enlarged fragmentary sectional view of one of the drums.

FIG. 15 is a wiring diagram of the improved embodiment.

FIG. 16 is a fragmentary end elevation of the switch plunger per se.

In the drawings like characters of reference indicate corresponding parts in the different figures.

Proceeding therefore to describe the invention in detail, I have provided a substantially box-like enclosure **10** having a spring loaded hinge lid **11** on the front thereof hinged as at **12** so that when this hinged lid is lifted up, the components within the box are exposed through the cutout **13**, said cutout being substantially the same dimensions as the lid **11**.

There is a further small rectangular cutout **14** within the front panel **15** of the casing just to one side of the lid **11** and a lever or knob **16** extends through this cutout and is utilized to engage the starting solenoid which will hereinafter be described.

Within the casing are the components collectively designated **17** and illustrated in exploded form in FIG. 4.

There is a central fixed spindle **18** having an end plate **19** secured thereon at one end and a further end plate **20** secured thereon and at the other end. These plates which are of insulating material such as plastic or the like, are provided with electrical terminals **21**, **22** and **23**, **24**.

Fixed upon the shaft in spaced intervals therealong is a plurality of separators **25** also made of an insulated material such as plastic. Rotatable upon shaft **18** between the end plate **19** and the separators **25** is a plurality of disc components **26** there being four in the present embodiment. However, it will be appreciated that any number can be provided.

The separators **25** are shown in end view in FIG. 7. They consist of a rectangular plate **27** apertured centrally as at **28** to engage over shaft **18** and to be fixed thereon. Upon each side of the aperture is an electrical connector **29** extending clear through and presenting faces **30** upon each side of the separator **25**.

The components **26** consist of a disc **31** having shouldered discs **32** formed upon each side thereof and a partially knurled perimeter surface **33**. Between adjacent sets of knurls **34** is imprinted, engraved or otherwise placed on the surface, a plurality of numbers or indicia **35**.

Contacts **36** extend through the components **26** and terminate in resilient inclined legs **37** upon each side of the component so that when the assembly shown in FIG. 4 is closed up together, the resilient legs are compressed against the surface of the separators **25** and are in wipe contact therewith.

Describing the operation of this portion of the device, the battery and starting solenoid are conected to terminals **21** and **22**. By rotating the four components **26** so that a predetermined number code is presented within the front aperture **13**, electrical contact is formed extending between the terminals **21** and **22**, through the connectors **36** and the connectors **30** to the connectors **36'** situated on the extreme left of FIG. 4. By positioning the knurled ring **33**, the code can be changed so that a vast variety of number combinations can be formed known only to the owner of the vehicle.

Dealing next with the switch mechanism illustrated in FIG. 5, this consists of a ring **37** surrounding an insulated cylinder **38** journalled for rotation upon shaft **18** through centrally located aperture **39**. An operating lever or handle **40** extends from one side of the ring.

A cylindrical contact **41** is secured to end plate **20** and extends inwardly therefrom. This contact connects with terminal **23**. The contact extends through an arcuately formed slot **42** in the cylinder **38** and also through the last separator **25'** so that it can be connected to the end leg **36'** of the component **26** when the assembly is

closed together and the end component **26** has been rotated to the requisite number.

An electrical connector **43** similar to the connectors **36** extends through the cylinder **38** and has legs **44** upon each side thereof. A small spring **45** is situated within the arcuate recess **42** and normally maintains the component **37** in the position shown in FIG. 5.

However, when the lever **40** is moved in the direction of arrow **46**, compressing spring **45**, leg **44** moves around to connect with the face **47** of connector **48** extending through the end separator **25'**, thus completing the circuit between terminals **21** and **23**, and terminals **22** and **24**.

FIG. 8 shows the wiring diagram which includes a three position switch **48**. A wire **49** extends from the battery to terminal **21** and a wire **50** extends from terminal **22** to the starter solenoid. A wire **51** extends from terminal **23** to pole **3** of the switch **48** and a wire **52** extends from terminal **24** to pole **7** of the switch. Jumper **53** extends between pole **7** and pole **3**, a jumper **54** connects poles **7**, **8** and **9**, and a jumper **55** connects poles **1** and **4**.

When the cylinders are aligned for current contact, current is permitted to flow through wire **49**, through the switch to terminal **23** and thence to switch **48** at pole **3**. When the switch is in one position, operation of the starting lever **16** connects pole **7** to terminal **22** thus connecting the battery to the solenoid. At the same time current flows through pole **3** of the switch to pole **2** and thence via wire **56**, to the ignition so that the car may start. As soon as switch **16** is released, current continues to flow from **49**, through **51** to pole **3** and thence to pole **2** and the ignition. At the same time current flows through **51** to pole **1** of the switch due to the position of the switch thus feeding the accessories through wire **57**. The other position of the switch cuts out current from wire **56** to pole **2** but maintains it at pole **1** through wire **57** so that the accessories can be operated when the engine is not running providing the dials have not been moved. When the switch **48** is in the neutral or off position, current is prevented from flowing to poles **1** and **2** thus cutting off both the ignition and the accessories.

FIGS. 9 to 16 show the preferred embodiment of my device. However, inasmuch as many of the parts are similar in construction to the embodiment hereinbefore described, similar reference characters have been given these parts with the exception that they have been primed.

The components **17'** are similar in construction and operation to the components **17** and are mounted upon a similar shaft **18'** within the enclosure **10'**.

However, instead of having serrated surfaces **26**, the components **17'** are provided with serrations in the form of ratchet teeth **58** around the perimeter thereof, each disc having nine such serrations equally spaced around the perimeter but leaving a gap **59** between two adjacent teeth or serrations.

A coiled spring **60** is situated within each disc or cylinder, one end of the spring being secured to the disc as at **61** and the other end **62** of the spring engaging a slot **63** upon shaft **18'**. This means that as the disc is rotated in the direction of arrow **64**, the spring is wound up so that when the disc is released, the spring returns the disc to the original position. It is desirable to have means incorporated within the device to establish this original position and for this I provide a fork **65** upon end of shaft **66** which in turn extends through partition **67** of the enclosure thus mounting the shaft. A shock absorbing spring **68** reacts between the end of shaft **66** and a stop **69**.

Shoulders **70** are formed upon each side of the disc or cylinder **26'** and these shoulders are engaged by the ends of the fork **65** when the device is in the position shown in FIG. 11. This position is considered to be the cancelled or reset position of the discs under which circumstances electrical contact is not made between the adjacent discs and separators as hereinbefore described.

In this embodiment, means are provided to rotate the discs to the predetermined position in order that the electrical contact may be established.

This takes the form of a plurality of plungers **71** extending through the front wall **15'** of the enclosure and through the aforementioned partition **67**, substantially above the discs **26'**. These plungers can be pushed inwardly in the direction of arrow **72** and are returned by return spring **73** secured between the plungers and the upper surface **74** of the enclosure as clearly shown.

A ratchet lever **75** is pivotally connected by pin **76** to the plunger adjacent the aperture **77** in the front wall **15'** through which the plunger is extruded. The size of this aperture is such that when the plunger is in the return position shown in FIG. 11, the ratchet lever **75** engages the lower boundary of the aperture **77** which raises the plunger to the position shown in FIG. 11 against the pressure of a leaf spring **78** extending from the plunger and engaging the upper side of the ratchet lever **75**. However, as the plunger is moved inwardly in the direction of arrow **72**, the ratchet lever **75** clears the lower boundary of aperture **77** thus enabling the leaf spring **78** to move the plunger downwardly so that it engages the first ratchet tooth or serration specifically designated **58'**. This rotates the disc in the direction of arrow **64** and against pressure of spring **60** situated within the disc **26'**.

A further shaft **79** extends through the casing and supports a further ratchet finger **80** for each disc assembly **26'**. This finger curves over and down to terminate in a tooth engaging end **81** and is positioned so that when the plunger **71** is in the fully depressed position, the end **81** of the ratchet finger **80** engages over the adjacent tooth or serration **58** and holds same against the pressure of spring **60**. The plunger is then returned by the spring pressure **73** to pick up the next succeeding tooth or serration **58** thus rotating the disc incrementally each time the plunger is depressed. It will therefore be seen that a code can be set on the disc so that the plunger has to be depressed a predetermined number of times in order to rotate the disc to make the necessary electrical connection between adjacent discs and separators as hereinbefore described.

In each case the ratchet finger **80** holds the disc from returning against the spring pressure **60**.

When it is desired to cancel or reset the discs, a further plunger is provided specifically designated **82** and mounted in the same way as the other plungers and to one side thereof. A link **83** is pivotally connected to this plunger by pin **84** and in turn is connected to a shaft **85** also extending and being supported within the enclosure **10'**. As the plunger **82** is moved in the direction of arrow **72**, the shaft **85** is rotated so that fingers **86** secured to shaft **85** engage upon the underside of the ratchet fingers **80** and lift same upwardly in the direction of arrow **87** thus clearing the ends **81** from the serrations or teeth **58** thereby enabling spring **60** to snap the disc assemblies **26'** back to the neutral or cancelled position shown in FIG. 11. The provision of the shock absorber springs **68** is appreciated at this point.

The operation of plunger **82** also operates a main switch **88** just after the discs have been returned to the neutral or reset position.

FIG. 16 shows the switch mechanism equivalent to that shown in FIG. 5. However, instead of rotating this mechanism by means of the lever **40**, I utilize a further plunger **89** similar in construction to those previously described which is connected to the specific disc **38'** by means of a link **90** depending from the plunger as clearly shown. The construction and operation of this disc is similar to that shown in FIG. 5.

The wiring schematic shown in FIG. 15 includes a solenoid **91** connected to pin **92** of a double throw, double pull switch **93** situated in a convenient position. The main battery conduit **94** goes to switch **88** and then to the intake terminal **21'**, through the electrical connections within the disc assembly **26'**, to the outlet terminal **23'**. It is then connected by cable or conduit **51'**, to the

terminal **92**. The starter solenoid is inserted with conduit **50'**, through the assembly to terminal **95** and thence to the ignition circuit of the car or truck.

Terminal **96** is connected to the accessories and terminal **97** is connected to a further toggle switch **98** via terminal **99**. Terminal **100** from toggle switch **98** extends to a hood locking solenoid **101** and terminal **102** extends to a trunk locking solenoid **103**.

One side of the aforementioned solenoid **91** is connected via conduit **104** to terminal **92** of toggle switch **93** and the other side extends via conduit **105** to a door operated switch **106** which, when the door is closed, breaks the circuit to the solenoid. However, as soon as the door opens, the switch connects to ground thus completing the solenoid circuit and operating the solenoid which in turn switches off switch **88** and breaks the circuit from the battery. This is a safety feature inasmuch as this of course stops the engine.

The operation is such that when toggle switch **93** is operated to connect terminals **92** with terminals **95** and **96**, both the accessory and ignition circuits are inserted, through the disc assemblies, with the battery.

When the toggle switch **93** is operated to connect terminal **92** with terminal **97**, the accessories only are in circuit.

Insofar as the toggle switch **98** is concerned, when this toggle switch is centered, both the hood and truck solenoids **101** and **103** respectively are locked. However, if terminal **99** is connected with terminal **100** then the hood is unlocked and terminal **99** is connected with terminal **102** then the trunk solenoid unlocks.

However, neither of these solenoids operate unless switch **88** is closed and the plungers **71** are actuated to set the correct code.

To start the engine, the reset or cancel plunger **82** is actuated thus returning all of the cylinders to the cancelled position and at the same time actuating switch **88** which has been switched off when the door was opened.

The plungers **71** are then actuated to form the correct numerical code so that electrical contact is made between the intake end of the cylinders and the outlet end thereof. Plunger **89** is then actuated to connect the starter solenoid so that the engine starts, it being understood that the correct code on plungers **71** completes the circuit via toggle switch **93** to the ignition as well as permitting the starter solenoid circuit to be actuated.

To stop the engine, it is merely necessary to open the door which enables solenoid **91** to actuate switch **88** thus breaking the circuit to the ignition.

Various modifications can be made within the scope of the inventive concept disclosed. Accordingly, it is intended that what is described herein should be regarded as illustrative of such concept and not for the purpose of limiting protection to any particular embodiment thereof, but that only such limitations should be placed upon the scope of protection to which the inventor hereof is entitled, as justice dictates.

What is claimed to be the present invention is:

1. In a plunger-operated electrical combination switch, a housing, a shaft in said housing, a set of peripherally toothed contact discs independently rotatable on said shaft and adapted to close an electrical circuit when each of the discs has been rotated to a predetermined angular position from a common initial position of all the discs, stop means for all the discs in their common initial position, resilient means biasing each disc to its initial position against said stop means, said stop means being resiliently yieldable to absorb impacts of the discs under the action of said resilient biasing means, a set of reciprocable plungers in said housing, a set of pawls provided on the respective plungers and engageable with the respective peripherally toothed discs for incrementally rotating the same to their predetermined angular positions against the action of said resilient biasing means, a second shaft parallel to the first mentioned shaft and rotatable in said housing, a set of ratchet fingers secured to said second shaft and engageable with the respective peripherally toothed discs to prevent rotation thereof to their initial position by said resilient biasing means, a finger-actuated cancelling button reciprocable in said housing, and means operatively connecting said button to said second shaft for rotating the same sufficiently to disengage said ratchet fingers from said discs, whereby to permit all the discs to return to their initial position by said resilient biasing means.

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