June 30, 1970 A. C. PURPURA 3,518,383

KEYLESS IGNITION SWITCH FOR AUTOMOBILES

Filed Oct. 17, 1967 2 Sheets-Sheet 1

FIG. 1

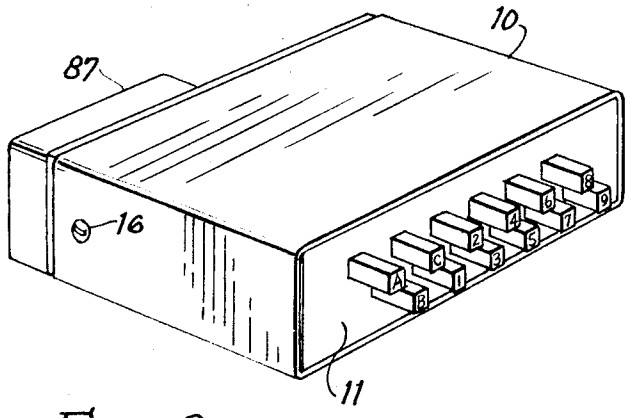


FIG. 2

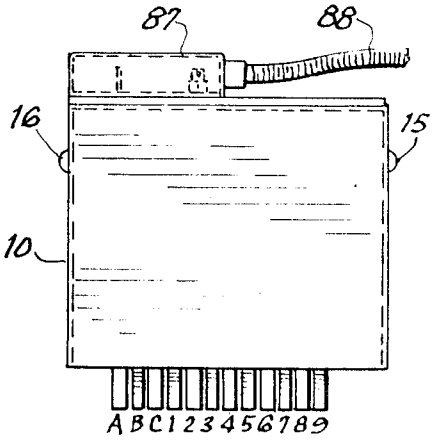


FIG. 3

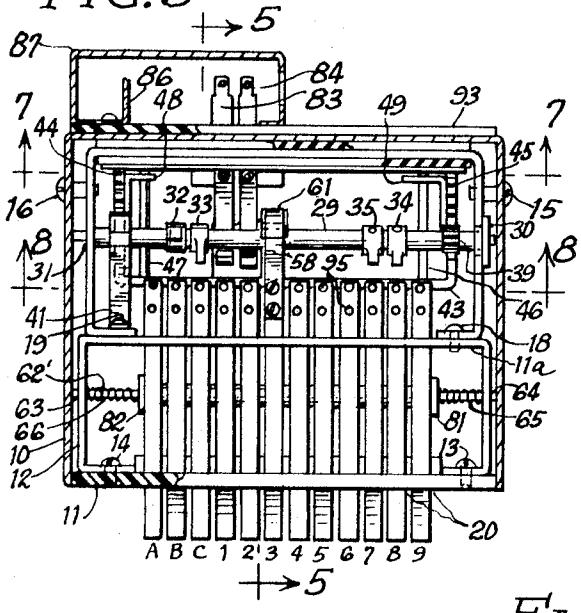


FIG. 4

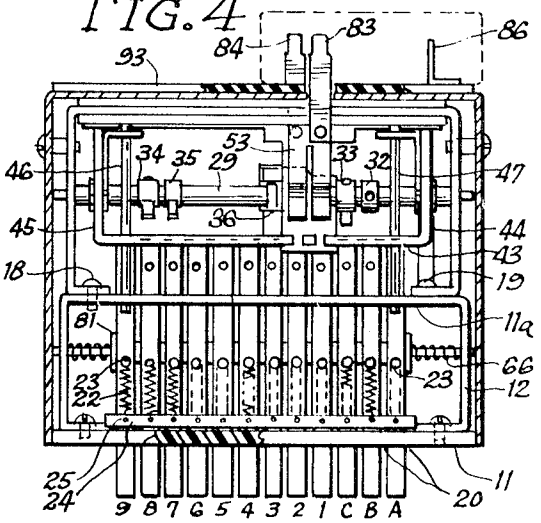
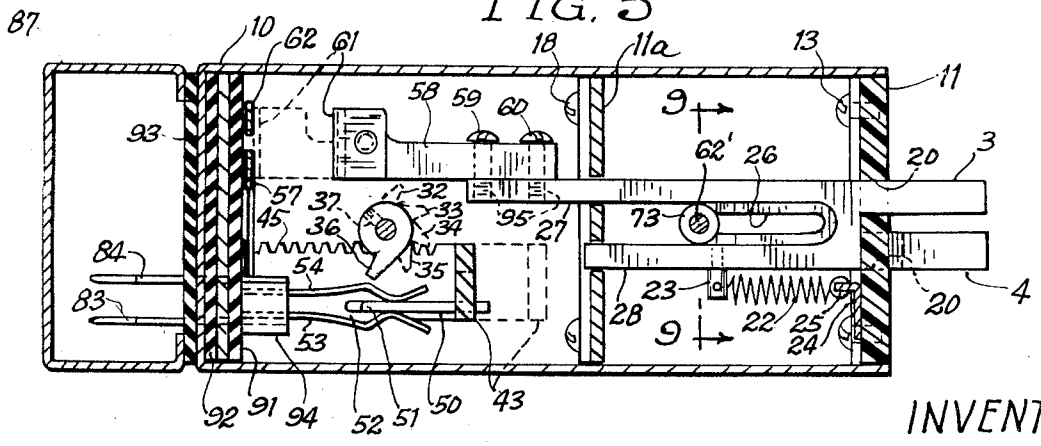


FIG. 5



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FIG. 6

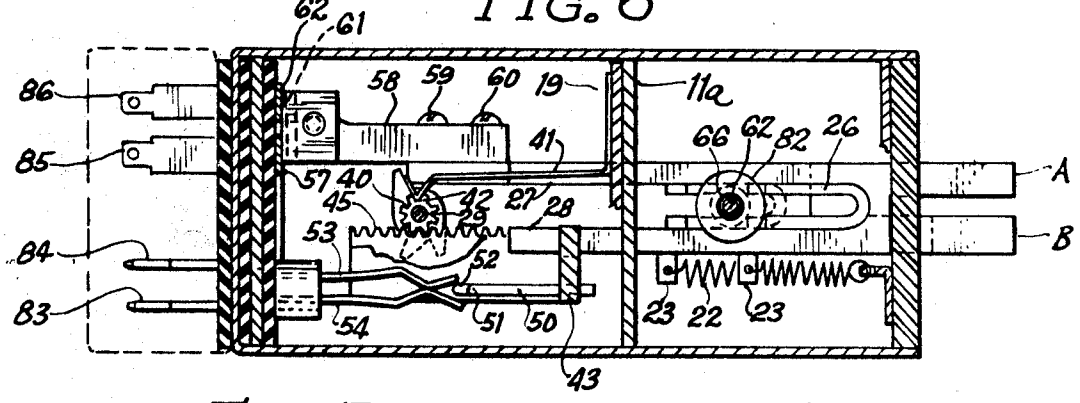


FIG. 7

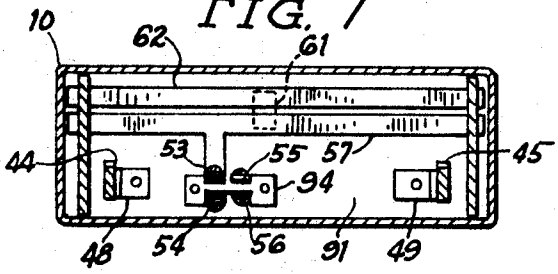


FIG. 8

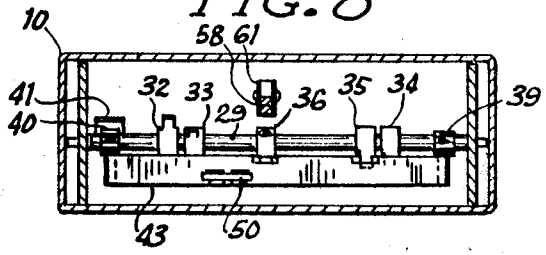


FIG. 9

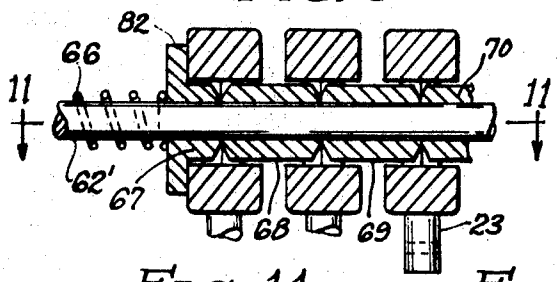


FIG. 10

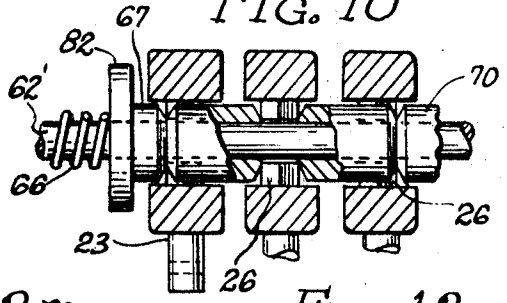


FIG. 11

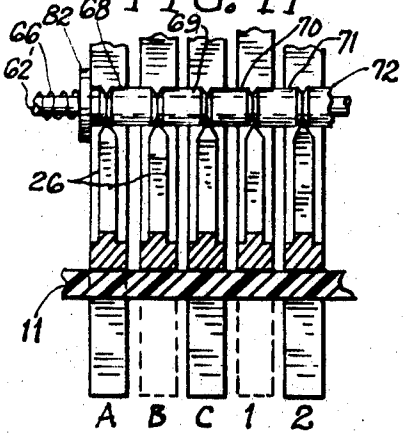


FIG. 12

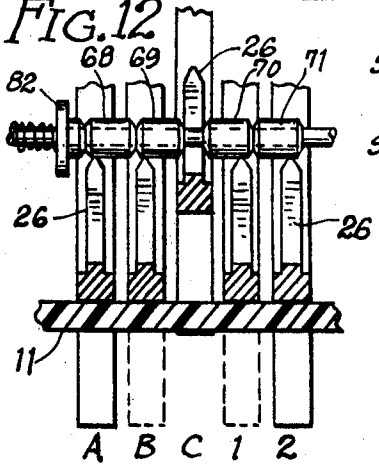
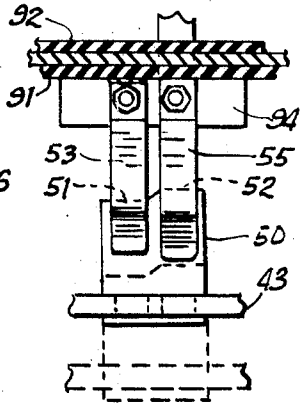


FIG. 13



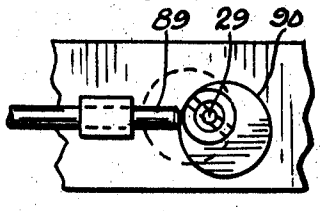


FIG. 14

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3,518,383

KEYLESS IGNITION SWITCH FOR AUTOMOBILES

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Int. Cl. H01h 27/10
U.S. Cl. 200—43 14 Claims

ABSTRACT OF THE DISCLOSURE

A keyless switch operated by depressing a series of push buttons in a predetermined sequence to energize a pair of circuits. The first push buttons of of the code close a first switch for energizing a first circuit and the last push button of the code closes a second switch for energizing a second circuit. Operation of any button out of the proper sequence prevents closing of both the first and second switches. A prevent mechanism precludes operation of more than one push button at a time.

The invention relates to a new and novel keyless ignition switch, for automobiles that will be theft proof, simple to operate and inexpensive to manufacture.

It is a known fact that duplicate keys and special master keys can be easily and inexpensively obtained which makes the theft of automobiles a simple matter.

It is therefore an object of the invention to produce an ignition switch for automobiles that can be operated by only those who are given the code necessary to operate the ignition switch.

Still another object of the invention is the design of an ignition switch for starting the automobile by manual depression of a series of push buttons that are alphabetically and numerically identified and that are depressed individually in a predetermined sequence to conform to a predetermined code of a combination of letters and figures.

Still another object of the invention is a design of a mechanical locking mechanism for a combination push button operated switch that will permit the manual depression of only one push button at a time.

It is still another object of the invention to construct a keyless locking and unlocking means for energizing 3 separated circuits. The first circuit energized by the push buttons is the accessory circuit that energizes the radio and fuel gauge etc. The second circuit energized when the last push button in the code is depressed is the ignition circuit. The third circuit energized is the starting motor circuit that is energized only after the ignition circuit has been energized when the last push button of the code is depressed and to de-energize the starting motor circuit when the last push button is released.

In another modified form of my invention the switches are eliminated and replaced with a mechanical latch locking means so that my invention can be used to lock the door of a motor vehicle.

Further objects and advantages of the present invention will become apparent as the following description proceeds, and the features of novelty which characterize the invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

For a better understanding of the present invention reference may be had to the accompanying drawings in which:

FIG. 1 is an exterior perspective view of my invention.

FIG. 2 is a top view of my invention showing the wiring outlet to a cable.

FIG. 3 is a plan view of the mechanism of my invention.

FIG. 4 is a bottom plan view of FIG. 3.

FIG. 5 is a section taken along line 5—5 of FIG. 3.

FIG. 6 is similar to FIG. 5 with the exception that the ignition and accessory switches are shown in a closed position.

FIG. 7 is a section taken along line 7—7 of FIG. 3.

FIG. 8 is a section taken along line 8—8.

FIG. 9 is an enlarged detail view on line 9—9 of FIG. 5 of the push button locking mechanism showing the push buttons in their normal positions.

FIG. 10 is similar to FIG. 9 but showing the positions of the push button locking members when one push button is depressed.

FIG. 11 is the top sectional view of FIG. 9 taken on line 11—11 of FIG. 9.

FIG. 12 is the same sectional view as FIG. 11 except it shows the position of the locking members when one push button is depressed.

FIG. 13 is an enlarged detail view of the ignition and accessory switches in their open position and shows the switch actuator in dotted lines when it is in a switch closed position.

FIG. 14 shows a modified construction of my invention showing how it can be used for a mechanical latch locking mechanism for locking doors.

Referring now to the drawings:

FIG. 1 illustrates the exterior view of my invention showing the housing **10** and the push buttons that are identified by their code letters and numbers as follows, A, B, C, **1**, **2**, **3**, **4**, **5**, **6**, **7**, **8**, and **9**. For purpose of clarity the push buttons will be identified in the drawings by their code numbers and letters.

The push buttons slide in top plate **11** that fastens to support **12** by screws **13** and **14**. The assembly is held in the housing **10** by 2 shouldered screws **15** and **16**.

Before continuing with the description it should be pointed out that the combination or code for unlocking and energizing the ignition switch shown in the drawings is B, C, **8**, **7** and **3**. Therefore to unlock and energize the switches these push buttons must be depressed in that order only.

Continuing with the description and specification, support **12** is fastened to another support **17** by screws **18** and **19**. The push buttons A to **9** inclusive slide through slots numbered **20** in top plate **11** and through double slots **21** in bracket **11***a*. The 12 springs, one for each push button all numbered **22** are connected on one end to each hook all numbered **23** that are fastened to each push button. When the push buttons, A to **9** inclusive are manually depressed the springs **22** being under tension will return the push buttons to their original position when the push buttons are manually released.

The push buttons A to **9** inclusive have centrally located U-shaped portions all numbered **26**. On each side of the U-shaped members **26** are long extended legs **27** and short legs **28**. Extending across and mounted in the bearings **30** and **31** and located to run through the central portions **26** of push buttons A to **9** inclusive is ratchet shaft **29**.

Mounted on ratchet shaft **29** are single tooth ratchet wheels **32**, **33**, **34**, **35**, and **36** and locked on the shaft **29** by set screws all numbered **37**. The ratchet wheel **32** is located below push button B. The ratchet wheel **33** is located below push button C. The ratchet wheel **34** is located below push button **8**. The ratchet wheel **35** is located below push button **7**. The ratchet wheel **36** is located below push button **3**.

Mounted on opposite ends of shaft **29** are gears **39** and **40**. Mounted on bracket **17** and secured thereon with screw **19** is latch **41** that is made of flat spring material, latch **41** has a V-shaped tooth **42** that rests between the teeth of gear **40**, which resiliently holds the gear **40**

and shaft 29 in equally spaced movements of one tooth at a time when each code push buttons B, C, 8, 7 and 3 are individually depressed.

A U-shaped gear rack bracket 43 with gear racks 44 and 45 slides up and down on supporting pins 46 and 47 through bearing brackets 48 and 49 fastened to gear racks 44 and 45. The gear racks 44 and 45 are in mesh with the gears 39 and 40 on shaft 29.

When the push button B is depressed the leg 27 of push button B will engage the single tooth ratchet wheel 32 and rotate it ⅛ of a revolution which is equivalent to the movement of one tooth of gears 39 and 40. This places single tooth ratchet wheel 33 in position to be engaged by leg 27 of push button C when it is depressed, as well as advance the gear rack 43 by 1 tooth.

After push button C is depressed single tooth ratchet 34 will be in position to be engaged by leg 27 of push button 8 when it is depressed and that will also advance gear rack bracket 43 by still another tooth.

After push button 8 is depressed single tooth ratchet wheel 35 will be in position to be engaged by leg 27 of push button 7 when it is depressed and thereby advance gear rack bracket 43 by still another tooth. However on this cycle which is the fourth combination of the code, the bracket 43 will have carried the short end 51 of insulator 50 mounted on bracket 43 far enough to permit the spring bladed contacts 53 and 54 to touch and make contact for energizing the accessory circuit of the automobile.

When the push button 3 which is the last push button in the code is depressed the leg 27 of push button 3 will engage ratchet wheel 36 and will turn the ratchet shaft 29 the final ⅛ revolution and advance the gear rack bracket 43 and the insulator 50 and its long end 52 far enough to permit the switch blades 55 and 56 to engage each other and make contact to energize the ignition circuit and also energize one side of the starting motor switch contact blade 57.

Mounted on the leg 27 of push button 3 by screws 59 and 60 is an extension 58 made of insulated material. On the extreme end of extension 58 is mounted a contact 61 made of good electrical current carrying material and when push button 3 is depressed all the way down the contact 61 will bridge the contact blades 57 and contact blade 62 which permit the starter motor circuit to be energized. Push button 3 is held down until the automobile engine starts and then push button 3 is released to de-energize the starter motor.

To turn off and lock the ignition switch, it is necessary only to depress any one push button that is not one of the push buttons in the code. It could be any one of the following push buttons A, 1, 2, 4, 5, 6 or 9.

This switch opening operation is accomplished as follows: When any one of these non-code push buttons are depressed the short leg 28 of the push button depressed engages the top of gear rack bracket 43 and pushes it down all the way to the end of its travel. The gear racks 44 and 45 rotate the gears 39 and 40 which returns the ratchet shaft 29 to its original starting position and the ratchet bracket 43 moves the insulator 50 between the switch blades 53 and 54 and between switch blades 55 and 56 thus breaking contact and de-energizing the accessory and ignition circuits.

To prevent more than one push button being depressed at one time, I provide locking means for this purpose. The locking mechanism is shown in FIG. 9, FIG. 10, FIG. 11, and FIG. 12. The shaft 62′ mounted in holes 63 and 64 in bracket 12 and best shown in FIG. 3 is located centrally between U-shaped center portions 26 of push buttons A to 9 inclusive. On one end of shaft 62′ is mounted a compression spring 65 and on the opposite end another compression spring 66. In between the springs 65 and 66 are 13 locking members 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78 and 79. Locking members 68 to 78 inclusive are of identical construction and are made of tubular material. Locking member 67 has a shoulder 82 and locking member 79 has a shoulder 81. Shoulders 81 and 82 act as stops and keep locking members 67 to 79 inclusive centrally located and the beveled ends of locking members 67 to 79 inclusive in alignment with the beveled ends of central portions 26 of the push buttons A to 9 inclusive. The locking members 67 to 71 inclusive are shown in detail in FIG. 11. The locations of locking members 73 to 79 inclusive are not identified in the drawings due to lack of space in the drawings. The operation of the push button locking is as follows:

When the push buttons are in their normal positions the tapered ends of portions 26 on all push buttons are all in alignment with the bevels on the ends of lock members 67 to 79 inclusive, as partially shown in FIG. 11. When push button C as shown in FIG. 12 is depressed the tapered end 26 of push button C slides between lock members 69 and 70 and spreads lock member 69 and 70 apart.

This slides the lock members 67, 68 and 69 to the left of push button C and the lock members 70 to 79 inclusive to the right of push button C. This sliding action moves the straight portions o f the locking members 67 to 79 inclusive in positions where they act as stops to prevent the movement of push buttons A, B, 1, 2, 3, 4, 5, 6, 7, 8 and 9, as shown in FIG. 10 and FIG. 12.

The switch contact blades 57 and 61 and male wire connectors 83, 84, 85 and 86 are mounted on non-metallic insulating material 91, 92 and 93. The switch blades 53, 54, 55, and 56 are mounted on a plastic support 94.

The hot lead from the automobile battery is wired to male connector 83 where it carries current to switch blades 53 and 55. When blade 53 touches blade 54 current will flow from blade 54 through male connector 84. Male connector 84 is then connected by lead wire to the accessory circuits. When switch blade 55 touches switch blade 56 current will flow from switch blade 56 to starter switch contact blade 57, male connector 85 is wired to the ignition coil of the automobile. Male connector 86 is connected to switch contact blade 62. The male end of connector 86 is wired to the starter motor solenoid switch. When the final push buttom 3 of the code is depressed the contact 61 actuated by push button 3 will bridge contact blades 57 and 62 thereby energizing the starter motor solenoid switch, not shown in drawings.

The lead wires from the male connectors 83, 84, 85 and 86 are incased in box 87 and the are carried through te steel cable 88 and then to their respective outlets as outlined above.

If it is desired to change the code, this can easily be done. For example if it is desired to change the code to 8–A–6–3–4. The screws 59 and 60 are removed from switch extension 58, then switch extension 58 is mounted on push button 4 using the same screws 59 and 60. All push buttons have 2 threaded holes all numbered 94 in the drawings and are all properly positioned so that switch extension 58 can be mounted on any push button. However the switch extension must always be mounted on the last push button of the code. The starting switch contact blades 57 and 62 are made long enough so that switch extension 58 can be mounted on any push button. Then the set screws 37 on ratchet wheels 32, 33, 34, 35, and 36 are loosened and each ratchet wheel is then moved on the shaft in alignment with the push buttons of the new code. The ratchet wheel under the first push button in the code is turned so that the single tooth ratchet will rotate the shaft 29 by one tooth of gear 40 as indexed by the latch tooth 42, when the first push button in the new code is depressed. The set screw 37 is then tightened. After the first ratchet wheel has been properly set, the first push button in the code is depressed and the ratchet wheel under the second push button is turned so that it too will turn the shaft by one tooth of gear 40. When the second push button of the code is depressed this same procedure is followed for the third, fourth and

fifth ratchet wheels and push buttons, thus the code is thereby changed.

In FIG. 14 I show a modified construction wherein my invention can be used to lock a latching mechanism for locking the door of an automobile. The electric switches are eliminated in this modification.

Referring directly to FIG. 14 a cam **90** is secured to one end of the ratchet shaft **29** of my invention a latch **89** is actuated by the cam **90**. The latch can be made in any desired shape to serve the purpose of locking a car door.

While I have illustrated and described several embodiments for my invention, various changes and modifications will occur to those skilled in the art, and it is intended in the appended claims to cover all such changes and modifications that fall within the true spirit and scope of the present invention.

What I claim as new and desired to be secured by Letters Patent of the United States is:

1. In a keyless combination lock having individual accessory, ignition and starter switches for automobiles comprising a series of at least five manually depressable push buttons alphabetically and or numerically identified, mechanical means to close the accessory switch when the fourth push button of a predetermined code has been depressed in its proper sequence in the predetermined code, and identical mechanical means for closing the ignition switch when the fifth push button of the predetermined code is depressed in its proper sequence in the predetermined code and a starter energizing switch closed when the fifth push button is fully depressed and to open the starter switch when the fifth push button is manually released.

2. In a combination push button actuated ignition switch for automobiles comprising a series of push buttons alphabetically and or numerically identified, a rotatable shaft mounted adjacent one end of the push buttons, a series of single tooth ratchet wheels mounted and spaced on the rotatable shaft to rotate the shaft step by step with the manual depression of each push button that conforms to a predetermined code and mechanical means actuated by the rotatable shaft to to permit the closing of an electrical switch to energize the igintion coil when the last push button has been depressed in its proper sequence.

3. In a combination push button operated ignition switch comprising a series of alphabetically and or numerically identified push buttons, a rotatable shaft, a series of single tooth ratchet wheels mounted and spaced on the rotatable shaft to rotate the shaft step by step by the manual depression of certain push buttons engaging individual single tooth ratchet wheels that conform to a predetermined code, a gear mounted on the rotatable shaft, a combined bracket and gear rack mounted for slidable movements and positioned to be in mesh with the gear on the rotatable shaft and means to permit the closing of an electrical circuit when the last pushbutton of the code is depressed in its proper sequence

4. In a combination push button actuated door locking means for automobiles comprising a series of manually depressed push buttons alphabetically and or numerically identified, a rotatable shaft mounted adjacent one end of the push buttons, a series of single tooth ratchet wheels mounted on the rotatable shaft and spaced on the shaft to rotate the shaft step by step by certain push buttons engaging the single tooth ratchet wheels when the push buttons depresed conform to a predetermined code, a cam mounted on the rotatable shaft, a door latch positioned to be engaged by the cam to lock the latch when the rotatable shaft is in a locking position and to turn the cam and unlock the latch when certain push buttons are depressed to conform to a predetermined code.

5. In a combination push button operated ignition switch comprising a series of alphabetically and or numerically identified push buttons, a rotatable shaft, a series of single tooth ratchet wheels mounted and spaced on the rotatable shaft to rotate the shaft step by step by the manual depression of certain push buttons engaging individual single tooth ratchet wheels that conform to a predetermined code, gears mounted on opposite ends of the rotatable shaft, a U-shaped bracket mounted for slidable movements, gear racks on each end of the U-shaped bracket and positioned to be in mesh with the gears on the rotatable shaft, an insulator mounted on the U-shaped bracket, a set of spring tensioned switch blades mounted in position to be opened by the insulator when the combination of push buttons are in deenergized non-operative position.

6. The combination of a push button operated switch as per claim **5** wherein a spring tensioned detent is mounted to engage a tooth of a gear on the rotatable shaft to hold the shaft resiliently in its step by step operation.

7. In a combination push button operated accessory, ignition and starter motor switches having a series of push buttons alphabetically and numerically identified, mechanical means actuated in a step by step operation by individual manual depression of a series of push buttons to conform to a predetermined code and means to close the accessory switch after the fourth push button of the code is depressed in its predetermined sequence and identical mechanical means to close the contact of the ignition switch when the fifth push button of the predetermined code is manually depressed in its predetermined sequence and a momentarily actuated starter switch energized when the fifth push button of the code is fully depressed and to de-energize the starter circuit when the fifth push button is manually released.

8. In a combination push button operated ignition switch having 12 alphabetical and numerical identified push buttons, a rottable shaft rotatable in one direction in a step by step operation when a series of push buttons have been individually and manually depressed to conform to a predetermined code, mechanical means operated by the rotatable shaft to permit the closing of the ignition switch when the last push button of the code has been depressed in its proper predetermined sequence, gears on the ratchet shaft, a U-shaped bracket mounted for slidable movements, gear racks on each side of the U-shaped bracket being in mesh with the gears on the rotatable shaft, one side of the U-shaped bracket being positioned to be mechanically engaged by non-code push buttons and thereby turn the rotatable shaft in the opposite direction through the gear racks and gears on the rotatable shaft in a single step to its original starting position and thereby open the ignition switch.

9. The combination of a push button operated ignition switch as per claim **8** whereby a mechanical slidable means are provided to lock the idle push buttons when any one push button is manually depressed.

10. A permutation switch comprising a plurality of push buttons, means for closing a first switch in response to the depression of selected number of said buttons in a selected sequence, means for closing a second switch in response to the depression of additional of said buttons in a selected sequence, and means for preventing operation of both said closure means upon depression of any of said push buttons out of proper sequence.

11. A switch as defined in claim **10** further including means for preventing simultaneous depression of a plurality of said buttons.

12. A switch as defined in claim **11** wherein said first switch comprises a pair of normally engaged contacts, and in insulator between said contacts to prevent engagement thereof, and wherein the means for closing the first switch comprises means connected to the insulator for withdrawing said insulator from between said contacts

in response to the depression of the buttons to permit the contacts to engage.

13. A switch as defined in claim 11 wherein each switch comprises a pair of normally engaged contacts and insulator means between the contacts and wherein the means for closing the switches comprises means connected to the insulator means for withdrawing said insulator means from between the contacts in response to the operation of the buttons.

14. A switch as defined in claim 13 further including means for withdrawing the insulating means of one switch prior to withdrawing the insulating means from the other switch.

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