235-382 SR
XR 3,846,640

United State
Mihlhauser

[11] 3,846,640
[45] Nov. 5, 1974

[54] ELECTRICAL COMBINATION KEY LOCK

[76] Inventor: **Nicholas W. Mihlhauser,** PO Box 3694, Eureka, Calif. 95501

[22] Filed: **Nov. 16, 1972**

[21] Appl. No.: **307,243**

[52] **U.S. Cl.** ..... **307/10 AT,** 317/134, 340/164 A
[51] **Int. Cl.** **B60r 25/04**
[58] **Field of Search** ..... 180/114; 317/134; 70/278; 340/147 R, 164 R, 164 A; 307/10 A T

[56] **References Cited**

UNITED STATES PATENTS

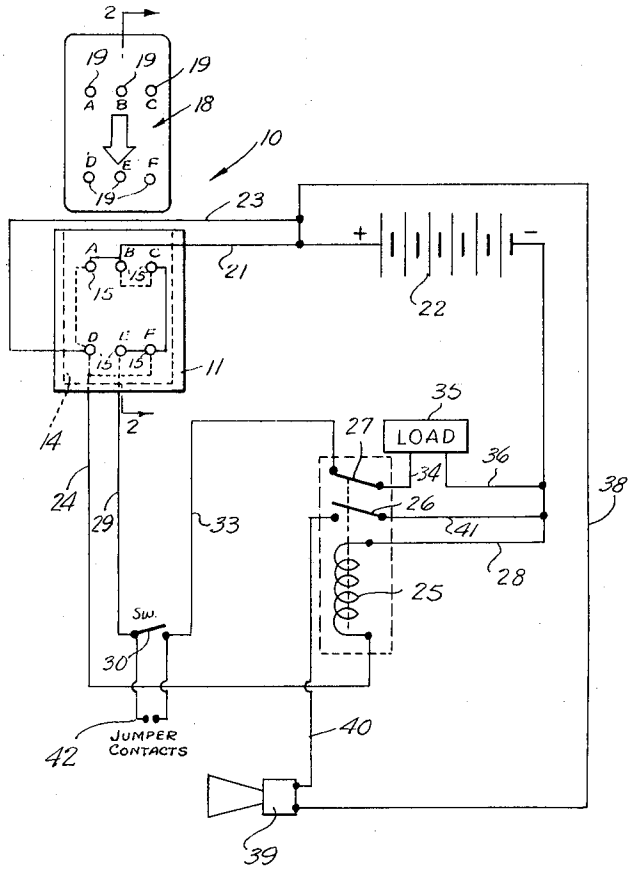
3,450,953	6/1969	Gardner	317/134
3,634,880	1/1972	Hawkins	180/114
3,644,745	2/1972	Bell	180/114

Primary Examiner—L. T. Hix
Attorney, Agent, or Firm—Blair & Brown

[57] **ABSTRACT**

An electrical combination key lock in which a card is provided with a plurality of electrical contacts to serve as a key when inserted into an electric contact slot with the electric contacts in the card completing correct circuits if correctly mated to the lock to operate the motor vehicle and electrically connected to a warning system if improperly mated to the lock. The card is provided with a plurality of balls which engage contacts on opposite sides of the lock with the combination being established by the use of varying numbers of balls and for various interconnections of the balls.

1 Claim, 5 Drawing Figures



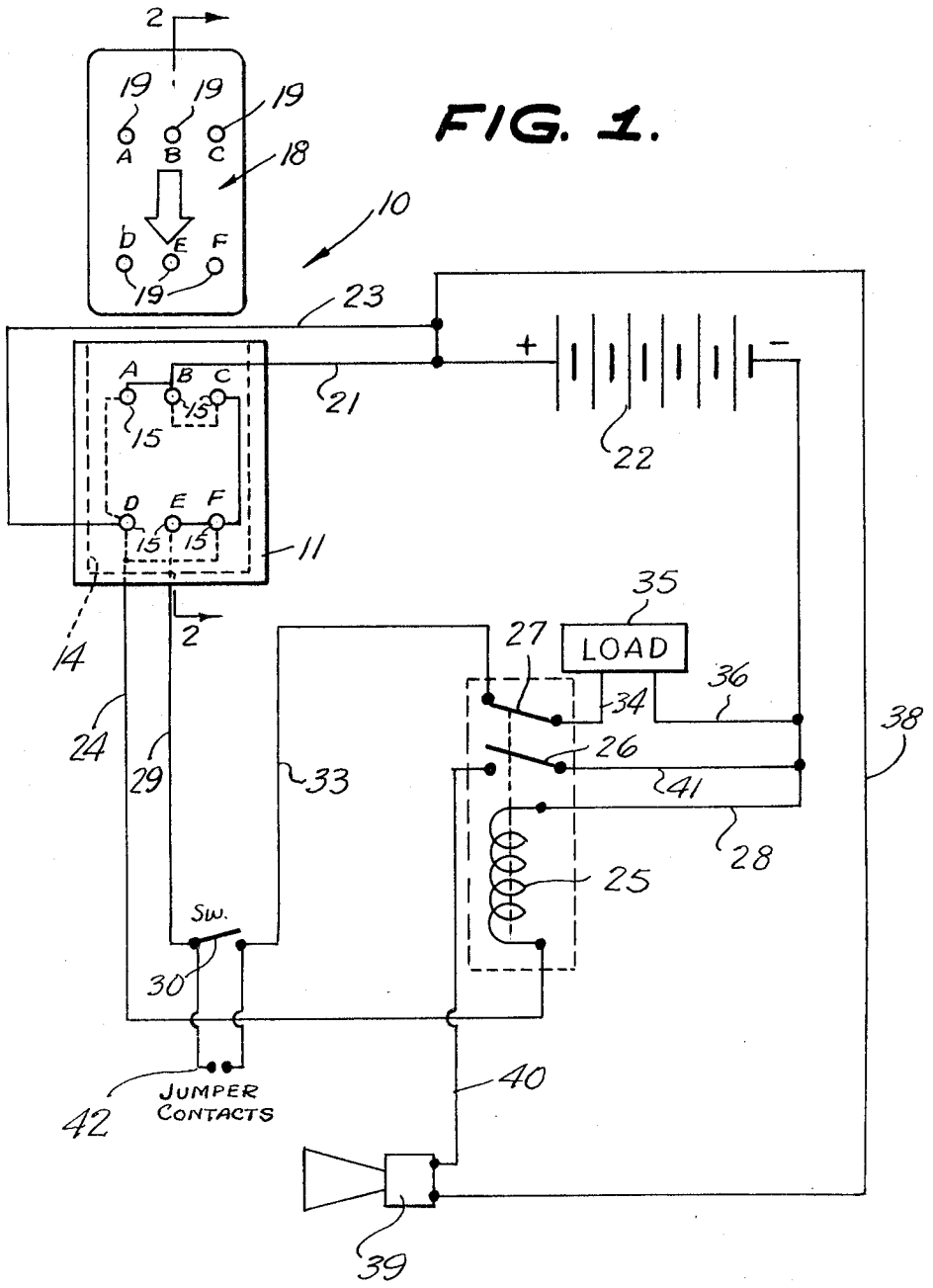

2
19
19
19
A
B
C
18
10
D
E
F
19
23
+
-
A
B
C
15
15
21
22
D
E
F
15
15
11
14
2
35
27
LOAD
36
34
38
24
29
33
26
41
28
25
Sw.
30
JUMPER CONTACTS
42
40
39

FIG. 1.

FIG. 2.

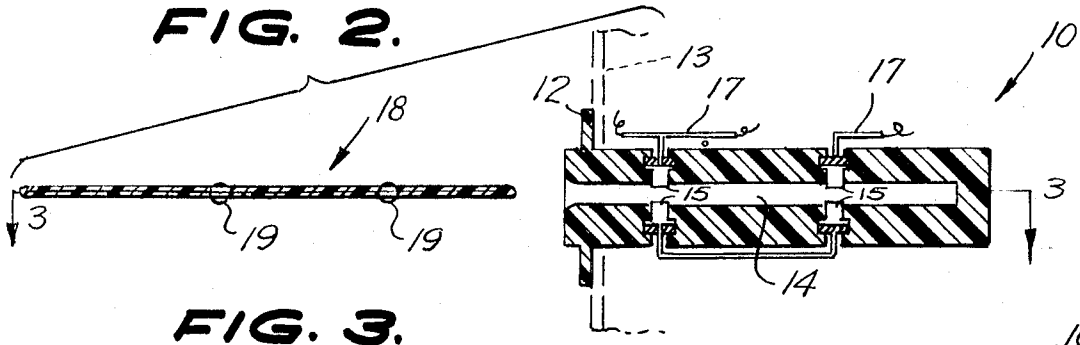


FIG. 3.

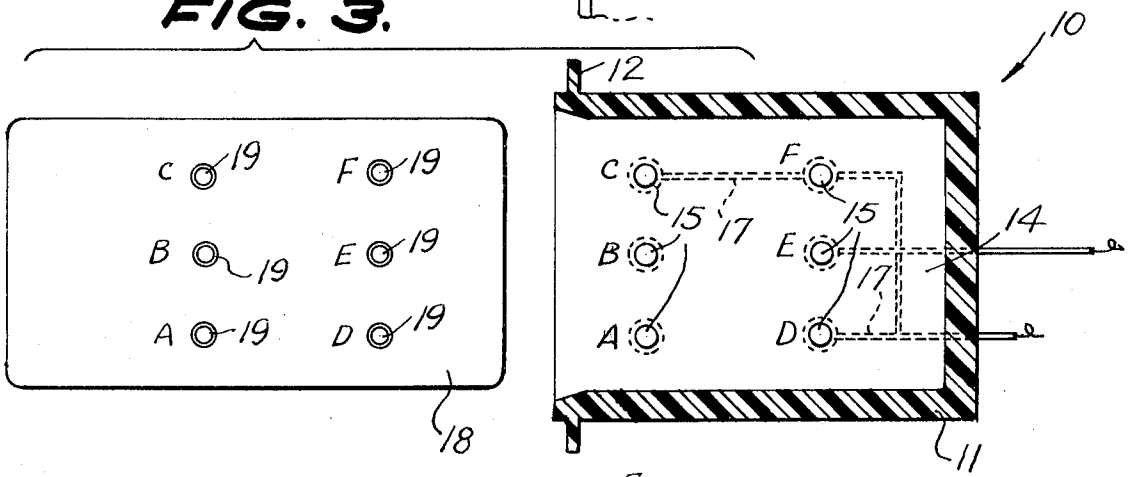
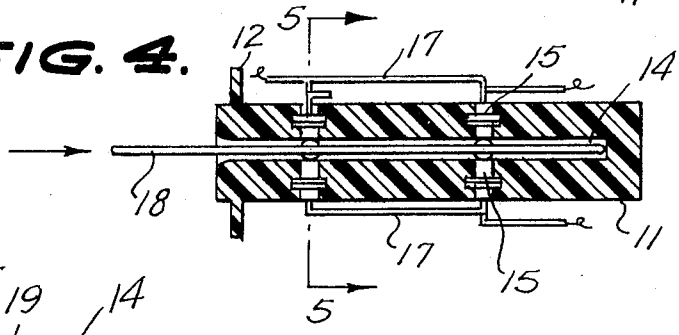


FIG. 4.



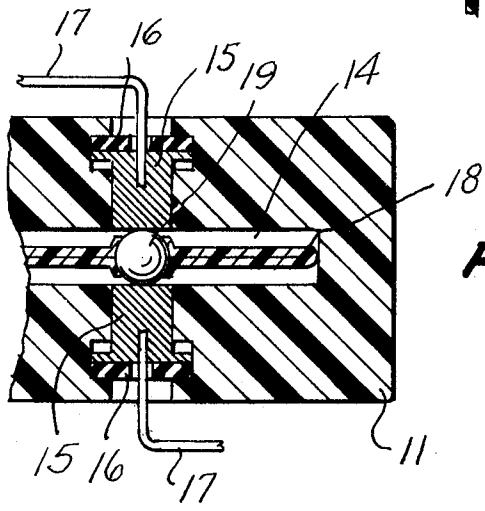


FIG. 5.

ELECTRICAL COMBINATION KEY LOCK

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

The present invention relates to a card combination key lock system for motor vehicles.

SUMMARY OF THE INVENTION

A card formed of insulating material provided with a plurality of ball contact members which extend out each face of the card for electrical contact with the electrical contacts of a lock. The electrical contacts of the lock are connected in such a manner and related to the contact of the card that when proper mating of the card with lock occurs the motor vehicle is permitted to operate, but when improper mating of a card and lock occurs a warning signal is sounded.

The primary object of the invention is to provide a lock system actuated by a contact carrying card such as to give a warning signal when the wrong card is inserted into the lock.

Other objects and advantages will become apparent in the following specification when considered in the light of the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a semi-diagrammatic view of the invention illustrating the circuitry in which it operates;

FIG. 2 is an exploded sectional view, taken along the line 2—2 of FIG. 1, looking in the direction of the arrows;

FIG. 3 is a horizontal sectional view, taken on the line 3—3 of FIG. 2, looking in the direction of the arrows;

FIG. 4 is a view similar to FIG. 2 with the card in the lock; and

FIG. 5 is a vastly enlarged fragmentary sectional view, taken on the line 5—5 of FIG. 4, looking in the direction of the arrows.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings in detail wherein like reference characters indicate like parts throughout the several figures, the reference numeral **10** indicates generally a combination card key and lock system constructed in accordance with the invention.

The system **10** includes a lock **11** formed of insulating material and having a generally rectangular shape. The lock **11** has a flange **12** formed on one end thereof for securing the lock **11** to a steering column **13** of a motor vehicle.

A relatively thin generally rectangular pocket **14** opens into the lock **11** and extends nearly all the way therethrough. A plurality of contact buttons **15** embedded in the insulating material forming the lock **11** so that their inner ends coincide with the surface of the pocket **14.** The plugs **15** are provided with insulators **16** on their outer face and electric circuit wires **17** extend therefrom in a manner to be described.

A combination key card **18** is formed of plastic or any non-conducting material and has a plurality of conducting or non-conducting balls **19** secured between the opposite sides of the card **18** in such a manner as to cooperate with the plugs **15** on opposite sides of the pocket **14** to complete a circuit there-between.

For convenience of description the contact balls **19** are lettered A, B, C, D, E and F and similarly the contact plugs **15** in the lock **11** are lettered A, B, C, D, E and F both in FIG. **1.** The card **18** may have anyone of the balls **19** either omitted or formed of non-conducting material so as not to complete a circuit between adjacent plugs **15** with the card **18** inserted into the lock **11.**

The wires **17** may interconnect any of the plugs **15** lettered A, B, C, D, E and F to provide the desired circuit. In the lock **11** as illustrated in FIG. **1** the contacts A and D, contacts C and F and contacts F and E on the upper side of the lock are interconnected and the contacts B and C, A and D and D and F are interconnected on the lower side of the lock. To establish the desired circuits the balls B, C, and E in the card **18** are formed of conducting material while the balls A, D, and F are formed of non-conducting materials or omitted. Inclusion of conducting balls A, D, and F will cause the alarm to be sounded even if balls B, C, and E are properly included.

A wire **21** connects the contact B on the upper side of the lock **11** to the plus side of a battery **22.** A wire **23** connects the plus side of the battery **22** to the contact D on the upper side of the lock **11.** A wire **24** connects the contact D on the lower side of the lock **11** to a relay **25.** The relay **25** actuates a switch **26** and a switch **27** for reasons to be assigned. A wire **28** extends from the relay **25** to the negative side of the battery **22.** A wire **29** extends from the contact E on the lower side of the lock **11** to a hand control switch **30.** A wire **33** connects the switch **30** to the switch **27** connected by a wire **34** to the load **35.** A wire **36** extends from the load **35** to the negative side of the battery **22** through the wire **28.**

A wire **38** extends from the positive side of the battery **22** to a horn **39** which is connected on its opposite side by a wire **40** to the switch **26** and from there by means of a wire **41** to the negative side of the battery **22** through the wire **28.** A pair of jumper contacts **42** are connected across the switch **30** so as to permit the connection of jumper cables from a hot battery with the switch **30** open when the battery **22** is discharged and when auxiliary electrical power is needed.

In the use and operation of the invention the card **18** is inserted into the pocket **14** with the contact balls **19** making contact between the plugs **15** on the opposite sides of the lock **11.** With the card **18** inserted a circuit is established from the wire **21** to the top contact **15B** through the ball **19B,** bottom contact **15B,** bottom contact **15C,** ball **19C,** top contact **15C,** top contact **15E,** ball **19E,** bottom contact **15E;** closing the hand switch **30** provides a circuit through the switch **27** to the load **35** to permit the vehicle to be operated. If any of the balls A, D, and F are formed of conducting material a circuit is established through the wire **24** to the relay **25** which closes the switch **26** to the horn **39** and opens the switch **27** to deprive the load **35** of electricity.

The card **18** may have any one of the balls A, B, C, D, E and F formed of conducting material, non-conducting material or omitted and the lock **11** is provided with suitable circuits to sound the alarm of the incorrect card is inserted therein and to provide electricity to the load when a card having only the correct combination of conducting balls is used therein.

Having thus described the preferred embodiment of the invention it should be understood that numerous structural modifications and adaptations may be resorted to without departing from the spirit of the invention.

What is claimed is:

1. In an electric combination card lock for a system, an electrically actuated alarm and an electrically energized engine, a lock formed of insulating material and having a generally rectangular shape, said lock embodying a relatively thin card receiving pocket extending substantially all the way therethrough, a plurality of spaced contact elements embedded in the lock on opposite sides of said pocket and said contact elements coinciding with the surfaces of the pocket, insulators on the outer surfaces of said contact elements, electric

circuits separately connecting at least one of said contact elements to an electrically actuated alarm circuit and at least one other of said contact elements to an electrically energized engine circuit, a relatively thin flat key card formed of insulating material insertable in the pocket of said lock, a plurality of selectively conductive and nonconductive balls rigidly mounted in said key card between opposite sides of the card with each ball extending from opposite faces of said card, said card with said conductive balls being adapted to electrically interconnect at least some of the contacts in the pocket of said lock to complete a circuit to said alarm, to said engine, or to both said alarm and said engine, and a hand control switch battery electrically connected in said circuits.

* * * * *