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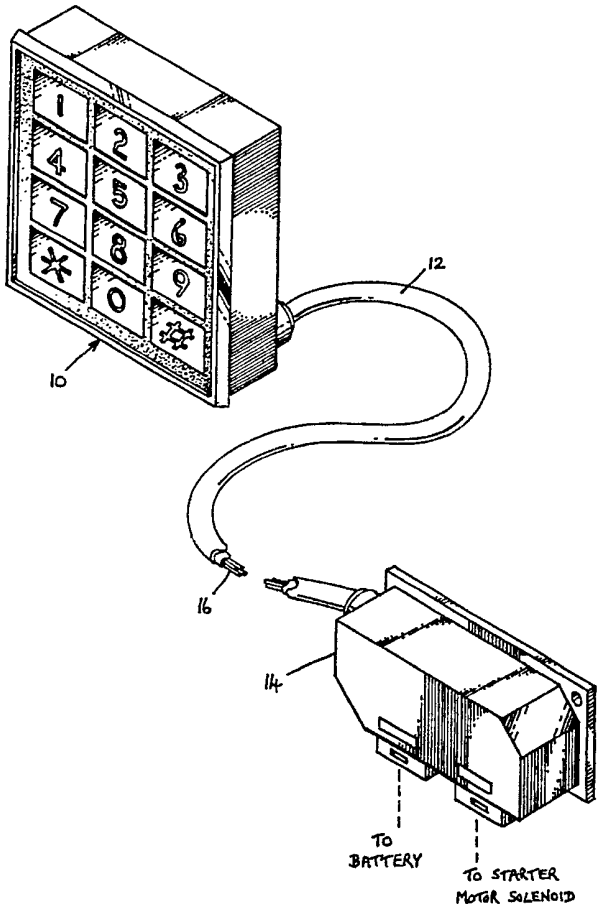
(56) Documents Cited
GB 1596485 A **GB 1595797 A** **WO 93/15935 A1**
WO 88/05391 A1 **US 5193641 A** **US 4380225 A**

(58) Field of Search
UK CL (Edition N) **G4H HTG**
INT CL^6 **B60R , G08C**

(54) Fibre optic switching system

(57) A fibre optic switching system, especially for the control of the ignition of motor vehicles, comprises a key pad (10) located in the vehicle cabin, a light source controlled by operation of the key pad, a fibre optic cable (12) to carry light signals to a control box (14) , for example in the engine compartment, and switches in the control box which respond to the light signals to control the vehicle ignition. A key could replace the keypad.



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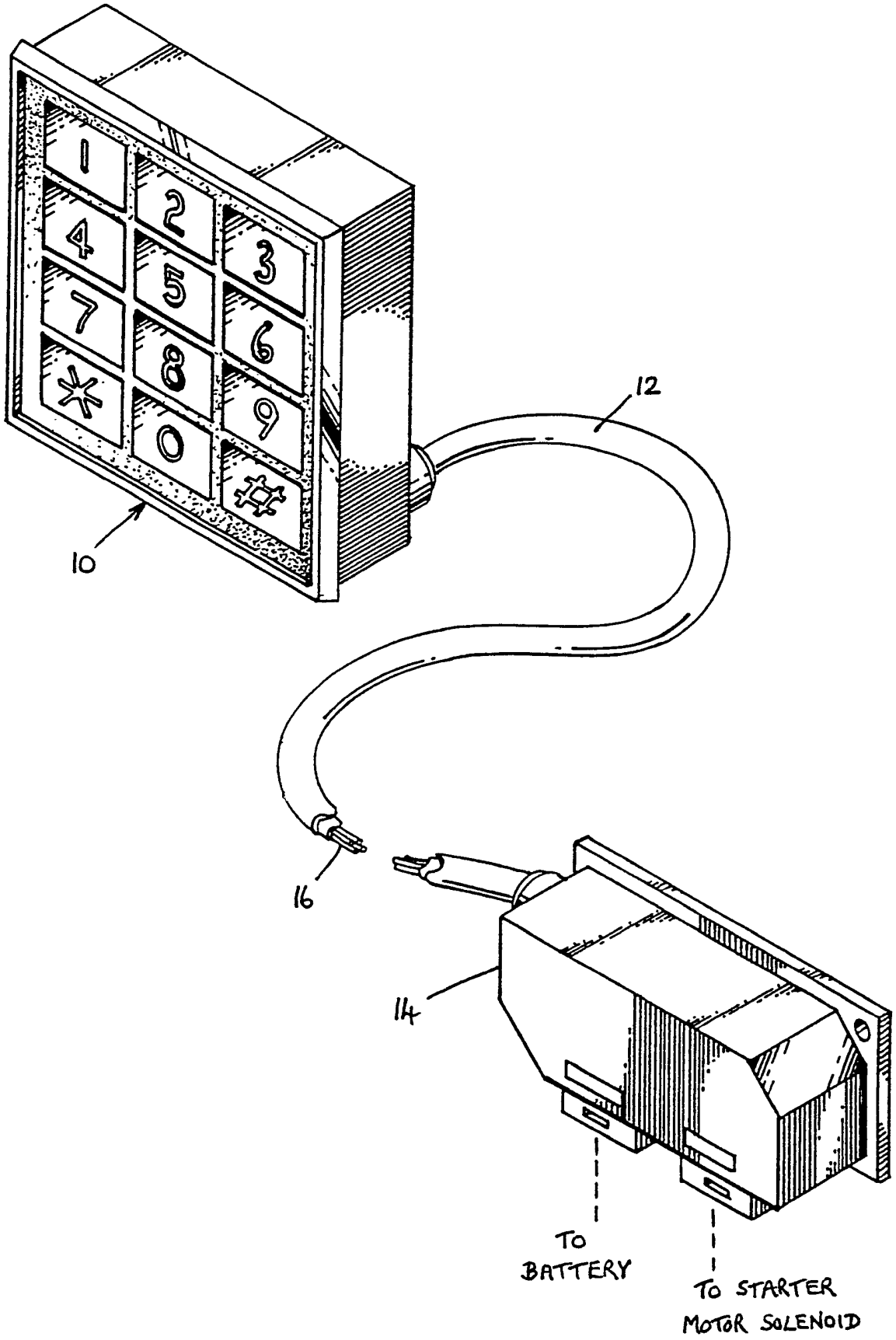
The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1990.


1
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10
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16
14
TO BATTERY
TO STARTER MOTOR SOLENOID

FIBRE OPTIC SWITCHING SYSTEM

This invention relates to fibre optic switching systems, and is particularly concerned with fibre optic switching systems which are utilisable to control the ignition of motor vehicles.

Motor vehicle theft is a continuing and increasing problem. Many different types of alarm system have been devised but many of these are ineffective against the skilled thief. Once a thief is inside the vehicle "hot wiring" is a common method used to start the vehicle and enable the thief to drive the vehicle away.

It is a primary object of the present invention to provide a switching system which will prevent a thief from "hot wiring" a vehicle.

It is a further object of the invention to provide a switching system which will make it extremely difficult if not impossible for a thief to activate the ignition system of a vehicle.

Broadly in accordance with the present invention there is provided a switching system comprising keying means arranged to be operated by a user to generate a valid entry signal, light generating means controlled by the keying means, a fibre optic conductor extending from the light source to a remotely positioned control unit, and switch means in the control unit arranged to be actuated by light signals from the light source.

Preferably, the keying means is associated with a microprocessor which controls the light generating means. The keying means is preferably a key pad.

In the case of a motor vehicle the actuator means would normally be located within the vehicle

cabin and the control unit would be housed at a concealed location within the engine compartment.

In order that the invention may be more fully understood, one presently preferred embodiment of fibre optic ignition switch system appropriate for use on a motor vehicle will now be briefly described by way of example and with reference to the accompanying drawing which is a schematic illustration of the switch system.

As shown in the drawing the system includes a key pad, indicated generally at 10, which is normally situated within the motor vehicle cabin, for example on the dashboard. The key pad 10 incorporates a microprocessor (not shown) and also a light source (not shown). A fibre optic cable 12 extends from the key pad housing, through the engine bulkhead, to a control unit housing 14 which is located within the engine compartment of the vehicle. The fibre optic cable 12 includes a plurality of individual glass or plastics filaments as indicated at 16. Within the control unit housing 14 is provided a photoelectric cell (not shown) as well as solid state switches (not shown). These solid state switches are connected both to the battery of the vehicle and to the starter motor solenoid.

In use, the motorist would key in a code on the numeric key pad 10. The correct code is pre-programmed into a PROM chip in the microprocessor and if the correct code is entered then the microprocessor will recognise the number series. Upon recognition of the correct code the microprocessor activates the light source and transmits a light signal to the photoelectric cell within the control unit housing 14. Activation of the photoelectric cell causes the solid state switches to be activated and this in turn closes the battery to solenoid switch and engages the starter

motor.

If an incorrect code is entered on the key pad 10 then the microprocessor will reject this and no signal will be sent to the control unit.

The codes of other authorised users could be programmed into the programmable read only memory of the microprocessor or the same code could be used by all authorised users. A series of four single digit numbers in a discrete sequence is considered to be adequate, from a statistical point of view, to make it virtually impossible for a thief to key in the correct number code.

Although the preferred embodiment described above uses a key pad for entry of a numeric code, the switching system could alternatively be operated with a conventional key which again, upon turning of the key, would activate a light source and trigger the transmission of a light signal along the fibre optic cable to the control unit. However, a numeric key pad is preferred from the point of view of better security.

It will be appreciated that the switching system of the present system relocates the ignition and starter solenoid wires from the motor vehicle steering column to a less accessible location in the engine compartment and replaces them with solid state switches that are controlled by signals transmitted along the fibre optic cable from the passenger cabin. This greatly reduces the likelihood of theft of the vehicle by the "hot wiring" method, since there are no "hot" wires available in the cabin.

A further advantage of the present invention is that the use of the fibre optic cable will also eliminate some of the bulky wiring now associated with the steering column in most motor vehicles.

The fibre optic ignition switch can either be

built into new vehicles or can be sold as a kit to be fitted to an existing vehicle.

Although the fibre optic switching system has been described above in connection with a motor vehicle, the switching system does have other uses, indeed for virtually any situation where conventional electromechanical or mechanical methods are used for closing circuits, locking and unlocking doors, etc. This can apply to buildings, aircraft, boats, and many other situations.

CLAIMS:

1. A switching system comprising keying means arranged to be operated by a user to generate a valid entry signal, a light source controlled by the keying means, a fibre optic conductor extending from the light source to a remotely positioned control unit, and switch means in the control unit arranged to be actuated by light signals from the light source.

2. A switching system as claimed in claim 1, in which the keying means has a microprocessor associated therewith which controls the light source.

3. A switching system as claimed in claim 1 or 2, in which the keying means comprises a numeric key pad.

4. A switching system as claimed in any preceding claim, in which the control unit includes a photoelectric cell and solid state switches responsive to signals from the cell.

5. A switching system as claimed in any preceding claim, for use in a vehicle, in which the keying means is arranged to be mounted within the vehicle cabin, and the control unit is arranged to be positioned within the engine compartment, with the switch means having connections to a vehicle battery and to a starter motor solenoid.

6. A switching system substantially as hereinbefore described with reference to the accompanying drawings.

Patents Act 1977 Examiner's report to the Comptroller under Section 17 (The Search report)	Application number GB 9403142.4
Relevant Technical Fields (i) UK Cl (Ed.N) G4H (HTG) (ii) Int Cl (Ed.6) B60R, G08C	Search Examiner M J DAVIS Date of completion of Search 12 APRIL 1995
Databases (see below) (i) UK Patent Office collections of GB, EP, WO and US patent specifications. (ii)	Documents considered relevant following a search in respect of Claims :- 1-6

Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

&: Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages		Relevant to claim(s)
X	GB 1596485	(HONEYWELL BULL) eg pages 3-4	1-4 at least
X	GB 1595797	(PUSHMAN) whole document	1-4 at least
X	WO 93/15935 A1	(NORTHLYNN) whole document	1-6
X	WO 88/05391 A1	(CHANDLER) whole document, noting page 5 line 21	1-6
X	US 5193641	(DURRELL) whole document	1-6
X	US 4380225	(WESEMEYER ET AL) whole document	1-6

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