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(54) **A key for a remote control security device.**

(57) The mechanical door or ignition key has a shaft 32 and a key head 30 with a battery 42, switch 38, coding circuit 36 and RF oscillator 40. RF coupling between the shaft 52 and the oscillator 40 causes the shaft 52 to act as an RF aerial.

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The present invention relates to a remote control security device which operates by sending electromagnetic radiation signals, usually coded and at radio frequencies, to a receiver on a lock system. Such devices are used frequently on vehicles.

Known transmitters for vehicle security systems are usually housed in a unit which is attached to the vehicle door or ignition key, and typically comprise a printed circuit board (PCB) with an RF signal generating circuit, a coding circuit, a switch and an aerial on it, and a battery.

The size of the unit is largely affected by the aerial which can take up an area of several square centimeters on the PCB, but is necessary for the production of a suitable electomagnetic signal.

It is an aim of the present invention to produce a compact transmitter which can produce an electromagnetic signal of sufficient power to operate a remote control security device.

Accordingly the present invention provides a key comprising a key head and a shank shaped for operation of a mechanical lock, an electrical circuit mounted on the key head for producing or detecting an oscillating signal, the shank being coupled to the electrical circuiting to act as an aerial for transmitting or receiving the signal in the form of electromagnetic radiation.

It has been found that for normal RF signals a normal key shank is of the right dimensions to enable a good degree of matching between the oscillating circuit and the shank.

Preferably other components such as a coding circuit and, if the transmitter needs its own power supply, a switch for connecting the coding circuit to a power supply such as a battery are also mounted on the key head to form a single compact unit.

As an alternative to a battery and switch, a piezo-electric power supply can be used, and can also be mounted on the key head. This has the advantage that the power supply does not run out, as does a battery.

In some cases the transmitter is only required to operate in response to an electromagnetic signal received, for example, from the security device to be operated. The electrical circuit, in that case, includes a sensing means coupled to the shank so that the shank can act as a receiving aerial for passing signals received as electromagnetic radiation to the sensing means. In this case the power for the oscillating circuit with produces the signal to be transmitted can be obtained from the received electromagnetic signal.

Preferred embodiments of the present invention will now be described by way of example only with reference to the accompanying drawings in which:-

Fig 1 is a diagram of a known radio frequency transmitter.

Fig 2 is a diagram of a key according to the present invention, and

Fig 3 is a diagram of a key according to a second embodiment of the present invention.

Referring to Figure 1, a known radio frequency transmitter comprises a printed circuit board (PCB) 10 having a battery 12 connected to it, a coding circuit 14 and a switch 16 mounted on it, and an RF oscillating circuit 18 coupled to a track 20 on the PCB which forms an aerial.

To operate the known transmitter, the switch 16 is depressed which completes the circuit. The coding circuit 14 produces a pulse coded D.C. signal which is fed to the RF oscillating circuit 18, where it is converted to a pulse coded AC signal at radio frequency. The aerial track 20 which is coupled to the oscillating circuit 18 radiates a coded radio frequency electromagnetic signal corresponding to the electric signal produced by the oscillating circuit 18.

The PCB and battery are enclosed in a unit which can be attached to a key ring together with a conventional vehicle door or ignition key.

Referring to Figure 2, the key of the present invention comprises a head 30 and a shank 32 which is shaped to operate a mechanical door or ignition lock. Mounted in the key head 30 is a PCB 34 having a coding circuit 36, a switch 38, and a radio frequency oscillating circuit 40 on it. A battery 42 is held between two clip connectors 44 which connect it to the PCB 34.

The oscillating circuit 40 is coupled to the shank 32 by a coupling connection 44. The key functions in the same way as the known transmitter, except that the shank 32 acts as a transmitting aerial for sending coded signals to a vehicle security device.

The coupling connection 44 is shown as an electical connection. However, the oscillating circuit 40 and the shank 32 can be coupled simply by being arranged in suitable positions relative to one another.

The radio frequencies used are the same as those in known devices, and are often between 200 and 500 MHz. At these frequencies it is possible to achieve sufficient matching with the shank 32.

Referring to Figure 3, the second embodiment of the invention is for use in a system where the security device on a vehicle continuously emits a coded radio frequency signal which is picked up by a hand held receiver, which then returns a coded signal to operate the security device. The key comprises a key head 50 and a shank 52.

The key head 50 has a rectifier circuit 54, a code sensing circuit 56, a coding circuit 58 and an RF oscillating circuit 60. The shank 52 is coupled

to the rectifier circuit 54 which converts the received pulse coded RF signal to a pulse coded DC signal. The code sensing circuit 56 receives the DC signal and, if the correct code is detected, sends a signal to the coding circuit 58. The signal is then re-coded, converted to a coded RF signal by the oscillating circuit 60 and transmitted by the shank 52 which is coupled to the oscillating 60 and acts as a transmitting aerial. No power supply is needed since all the power required comes from the received RF signal.

Claims

1. A key comprising a key head (30) and a shank (32) shaped for operation of a mechanical lock, electrical circuitry (36,40) mounted on the key head for producing or detecting a signal, characterized in that the shank (32) is coupled to the electrical circuitry (36,40) to act as an aerial for transmitting or receiving the signal in the form of electomagnetic radiation.

2. A key according to claim 1 wherein the shank (32) is coupled to the electrical circuitry to act as a transmitting aerial for electomagnetic radiation.

3. A key according to claim 2 wherein the circuitry (36,40) includes a coding circuit (36) for coding the electromagnetic signal.

4. A key according to any foregoing claim wherein the circuitry includes an oscillating circuit (40).

5. A key according to claim 4 further comprising a switch (38) mounted on the key head for connecting the oscillating circuit to a power supply (42).

6. A key according to claim 4 wherein the oscillating circuit (60) is powered by a piezoelectric device mounted on the key head (30).

7. A key according to any foregoing claim wherein the circuitry includes sensing means (56) coupled to the shank (52) so that the shank can act as a receiving aerial for passing electromagnetic radiation signals to the sensing means.

8. A key according to any foregoing claim wherein the circuitry includes a code sensing circuit (56), the shank (52) being coupled to the sensing circuit to act as a receiving aerial for passing electromagnetic radiation signals to the sensing circuit.

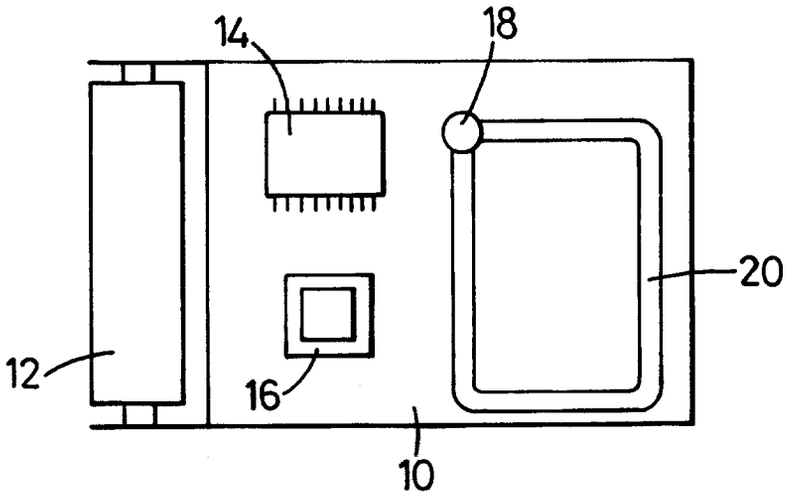

Fig. 1

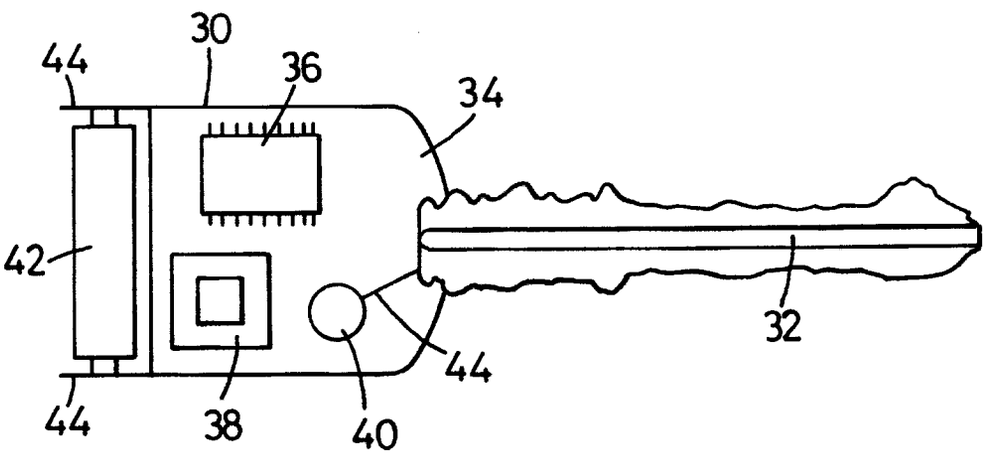

Fig. 2

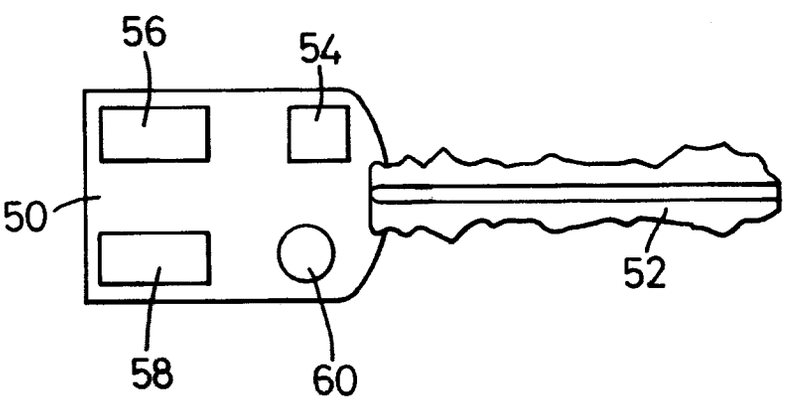

Fig. 3