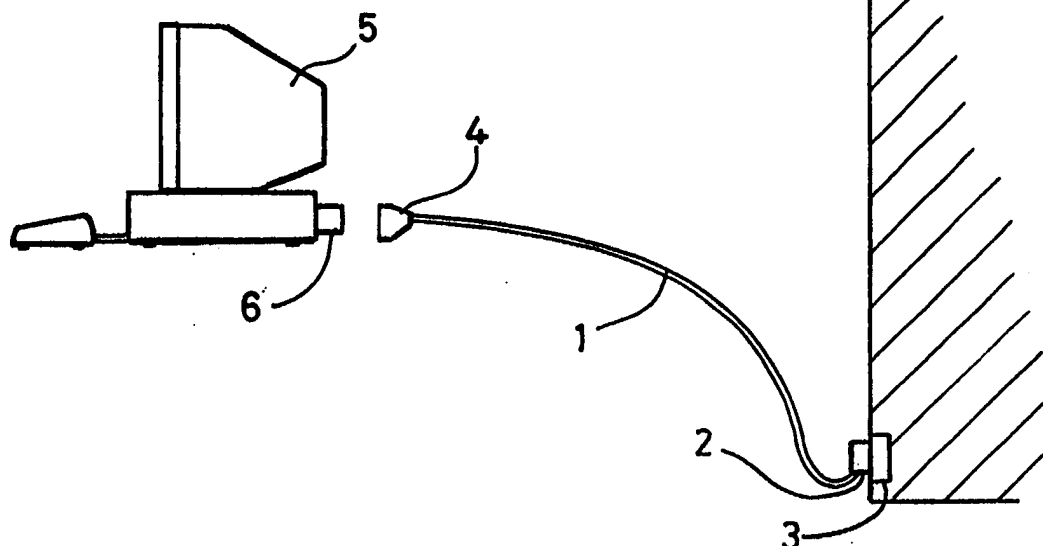




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(54) Title: SECURITY APPARATUS



(57) Abstract

The invention discloses a novel tamper proof security apparatus including a number of modular and interoperable components that when correctly coupled enable power to be supplied to an item, and when one of said components is incorrectly coupled, power supply is prevented and the item is thus selectively disabled. Said security apparatus can effectively protect electrically powered equipment from unauthorised use and/or theft and by use of a trinary addressing system provides unlimited numbers of unique security codes in addition to an unbreakable code.

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SECURITY APPARATUS

Field of the Invention

The invention relates to the field of security apparatus for electrically-powered equipment or appliances; components thereof; a kit of parts including
5 said components and methods of use thereof, in particular but not exclusively for use in improving the security of all types of electrical equipment and commercial vehicle trailers, caravans, trailers or the like.

Background to the Invention

Caravans, trailers, commercial vehicle trailers, articulated tractor units and
10 other towable vehicles are a prime target for thieves owing to their intrinsic value and the ease with which they can be towed away, if left unattended by the owner.

A range of mechanical and/or electrical and/or coded locking devices exist which attempt to improve trailer security which typically rely on locking the
15 trailer to the towing vehicle or locking the trailer in a stationary position (such as the well-known wheel clamp device) so that it cannot be towed away.

However, any such mechanical and/or electrical device is vulnerable to physical attack and, by breaking or "picking", can be rendered ineffective by a determined thief with relatively little special knowledge (this problem being
20 identical to the ineffectiveness of many similar mechanical and/or electrical locking devices used in cars and commercial vehicles). It is known from coded security devices to provide a binary addressing system code, however, disadvantageously such codes are not only limited in the number of individual

and unique codes available to a user but more detrimentally such codes can be broken/read by a computer and thus do not provide a truly tamper-proof system. A security system employing an addressing system of more integers than two would automatically provide significant advantage over the prior art devices and overcome the aforementioned problems.

In the instance of employing a mechanical type lock, once the mechanical lock has been overcome, the trailer can be easily and quickly attached to another vehicle and towed away. Once away from the scene of the crime, there are few; if any outward indications to other motorists or law enforcement personnel that the trailer has been stolen.

There is thus a need for security apparatus which can effectively protect vehicles of this kind from theft.

Ease of theft is also a problem in relation to high value electrical equipment such as, without limitation, video recorders, computers and hi-fi equipment. Once a thief has entered a domestic dwelling or other premises, such equipment is generally only protectable by physical means (locks, chains, etc) or audio alarm. The equipment is often security marked for identification purposes which can aid recovery of stolen property, but obviously does not prevent the crime from occurring in the first place.

Ease of theft is also a problem in the work place where high value electrical equipment may need to be protected and/or where a form of security clearance may be needed in order to ensure that only authorised individuals are granted access to, and/or use of, certain equipment. For example, in a hospital environment, it may be desirable to secure certain equipment from

theft and/or desirable to ensure that equipment, especially equipment which cannot be continuously guarded, is only rendered available to authorised personnel. Furthermore, it is essential to ensure that the appropriate equipment is employed for specific situations, for example, during anaesthesia
5 it is vital to ensure the correct gas mixture is given to a patient, hence by using a security device for each gas cylinder/line or the like any inadvertant errors can be avoided. Typically, hospital equipment security is enacted by restricting access to the relevant equipment by a virtue of locking the equipment away in a secure location such as a closet, cupboard or the like, or
10 even a section of the building to which only authorised individuals have access. It will be appreciated by those skilled in the art of providing security that a hospital is only one example of an environment requiring accurate use and securement of equipment, and exemplification of a hospital environment is not intended to limit the scope of the application.

15 There is therefore also the need to provide a tamper-proof security apparatus which can protect not only high value, electrical/powered equipment from theft but also electrical/powered equipment from use ie where there may be a need to restrict access or use.

It is thus an object of the present invention to provide security apparatus
20 which seeks to overcome the above-described problems.

It is a further object of the invention to provide a preprogrammed security apparatus with selectively controllable initiation.

It is a further object of the invention to provide a security apparatus including unique item identification means.

It is a further object of the present invention to provide a method of using such security apparatus to protect vulnerable equipment.

Summary of the Invention

According to the present invention, in its broadest aspect, there is provided
5 a tamper-proof security apparatus for protecting electrically powered
equipment or trailers from theft, the apparatus being adapted to disable the
electrically powered equipment/trailers if one attempts to operate it without
the correct elements of the security apparatus, thus enabling the owner to
protect the equipment/trailer simply by removing one or more of said
10 elements.

Reference herein to an ability to protect the equipment includes reference to
the ability to protect the equipment from theft and/or unauthorised use.

Additionally, reference herein to electrically powered equipment is intended
to include caravans, trailers, commercial vehicle trailers, articulated tractor
15 units, towable vehicles, computers, audio-visual units, household electrically
operated devices, commercial electrically operated devices, hospital
equipment, scientific equipment, garden equipment and the like or any other
electrically powered device that it is desirable to protect and is not intended
to limit the scope of the application.

20 According to a first aspect of the invention there is therefore provided a
security apparatus for protecting electrically/powering equipment comprising;
a first security means adapted to be placed in or associated with an

electrically/powering item to be protected; and a second security means adapted to be removably attached to, or associated with, said first security means wherein at least one of said security means is provided with at least one identification code, ideally unique to the security apparatus, and at least one transmitter means for transmitting said identification code to said other security means, and said other security means comprises a detection means for receiving and de-coding said identification code; and an output control means for controlling the electrical power supply to the said equipment.

It will be apparent from the above that removal of at least one security means affects the output control means and thus the flow of electricity to the said equipment. Thus, in a preferred embodiment of the invention removal of one of said security means prevents flow of electrical power to said equipment and thus prevents operation of the equipment. Thus, removal of one of the said security means results in a disabling of the system. It therefore follows that only individuals with access so the security means will be in a position to operate the equipment. Moreover, it also follows that one is able to protect electrically/powering equipment by storing one of the said security means in a safe location so that each time the electrically/powering equipment is switched on the equipment will only work when the removable security means is in place.

In a yet further preferred embodiment of the invention said first security means is embedded within the equipment to be protected or, less preferably, securely attached thereto.

In a further preferred embodiment of the invention said first security means is provided in a socket attached to said equipment and said second security

means may be provided in a plug that is adapted to mate with said socket.

In a yet further preferred embodiment of the invention said first security means and/or said second security means comprises at least one encoded chip ideally said chip has suitable circuitry imprinted thereon so as to provide a
5 unique identification code whereby interrogation of said chip by said detection means enables said control means to activate said equipment in the instance of a correctly matched code or alternatively not to activate said equipment in the instance of an incorrectly read code.

In a yet further preferred embodiment of the invention said security apparatus
10 and/or electrically powered equipment has associated therewith, or attached thereto, an auditory and/or visual alarm, whereby incorrect matching of said code activates said alarm.

Ideally, in the instance where one of the said security means is embedded within equipment, a second security means is provided in a smart key adapted
15 to mate therewith, ideally said smart key is suitably sized and shaped so as to be portable and easily manipulated by a user.

It will be apparent that in the instance where the first security means is provided as a socket and the second security means is provided in a plug then removal of the plug and, optionally, associated cabling, will effectively
20 disable the equipment and only when the correct plug and, where appropriate, cabling, is attached to the equipment will the equipment again function.

It will be apparent that said security means are capable of associating uniquely theretogether. Thus alternative security means cannot be used in a different

security apparatus, ideally each system is unique.

In a yet further preferred embodiment of the invention the security system that is embedded in or attached to the relevant equipment to be protected is adapted so that, in one preferred embodiment, the output control means, in combination with a detection means, will only allow electricity to flow if the other security means is in place and is sending its identification code. This embodiment of the invention is particularly suited to a battery operated piece of electrical equipment, for example, without limitation, a laptop computer or a vehicle trailer. In this instance the system will be continually monitoring status in order to ensure that the two security means are working together.

In an alternative embodiment of the invention the security means comprising the output control means and detection means may be adapted such that when the electrically/powering equipment is switched on the detection means checks for the existence of and identification of the alternative security means and then allows electricity to flow, regardless of whether the two security means remain together, whilst the electrically/powering equipment is in use. Once the equipment is switched off the procedure will need to be repeated. This preferred embodiment is most suited to electrically/powering equipment which operate from a mains supply.

In yet a further preferred embodiment of the invention the security apparatus may include electrical cabling and the two security means may be associated with a socket and plug associated with the electrical cabling. In this embodiment of the invention the security apparatus for protecting electrically/powering equipment ideally comprises;

a cable capable of electrical conduction and having a security plug at at least one end thereof;

5 a number of security sockets corresponding to the number of security plugs, at least one security socket being attached to the item it is desired to protect and each security socket being adapted to mate with one of said security plugs; and

10 electronic identification means capable of associating said security plugs with said security socket(s) and thus associating said cable with the equipment it is desired to protect,

whereby the cable is electrically-conductive only when the cable is correctly associated with the equipment it is desired to protect, thus at least partially disabling said equipment at all other times.

15 Ideally, said electronic identification means are capable of associating said security plug(s) with said security socket(s) and uniquely associating said cable with the equipment it is desired to protect.

In a preferred form, at least one said security socket or chip is permanently attached to or integrated into the item it is desired to protect.

20 Preferably, said electronic identification means comprises

at least one identification code, unique to that particular security apparatus;

transmitter means for transmitting said identification code;

detection means for receiving and decoding said identification code;

and output control means for controlling the electrical conductivity of
5 the cable.

In a preferred form, said identification code and transmitter means are located within at least one of said security plugs and the detection means and output control means are located within at least one of said security sockets. Alternatively, the reverse is true.

10 In yet a further embodiment of the invention said identification code and transmitter means are located in a smart key that is adapted to releasably mate with said security socket; in this embodiment of the invention, cabling including a conventional plug is used to mate with said socket. Alternatively, said identification code and transmitter means are located in a smart key that
15 is adapted to releasably mate with said security plug; in this embodiment of the invention, an item to be protected includes a socket of a conventional nature. Alternatively further still, in each of the two aforementioned preferred embodiments of the invention said smart key may comprise the detection means and output control means and the corresponding identification
20 code and transmitter means may be located in the associated security plug, as afore described, or security socket, as afore described.

Advantageously, one of said security sockets is permanently attached to the equipment it is desired to protect during manufacture thereof. Alternatively, one of said security sockets is capable of being permanently attached to the

equipment it is desired to protect by its owner, and after manufacture of said equipment.

In a preferred form, one of said security sockets is employed being permanently attached to a towable vehicle (for example a caravan or commercial trailer) respectively, said cable being releasably attached
5 therebetween, in use.

Ideally, said identification code may include any number of codes, the combination of which is ideally unique to each security apparatus and even more ideally employs a trinary addressing system whereby the system has
10 increased code capacity, it will be appreciated by those skilled in the art of providing a security device that quaternary or quinary or any other multiple addressing may be used and is not intended to limit the scope of the application. Moreover, means may be provided to continuously, or periodically, or preselectively, arrange for the transmission of said codes.

15 In a preferred form, said detection means may be provided with means to elicit the transmission of said code in the event of system error.

Reference herein to identification code is taken to mean, without limitation, any known form of electronic coding whether encrypted or otherwise.

In yet a further preferred embodiment of the invention said cable is
20 removable. This embodiment is particularly preferred where either the electronic identification means or the output control means are not located on a smart key but provided in either the security plug or the security socket.

In a yet further preferred embodiment of the invention said security apparatus

is associated with or attached to or integral with a rechargeable trailer light/brake unit monitor display means ideally said display means comprises at least one coded and at least one decoded circuit housed within a suitable robust, waterproof housing whereby insertion of a detection means, ideally a smart key or the like, into an appropriate site activates said display means so as to visually display selected units for the purpose of checking the operational status of master and/or back-up systems of said trailer brake/lights and or any other system which it is desired to check and/or maintain. It will be appreciated that the security apparatus in this particular embodiment of the invention is operationally linked to a trailer brake/light system which upon correct interrogation of a coded security means enables the user/driver/maintenance personnel of said trailer, especially a commercial trailer, to check the function of the trailer brake/lights prior to moving away and consequently dispenses with laborious and time consuming tasks, typically performed by more than one person, of walking around said trailer and turning each brake/light on separately, in order to carry out safety and/or maintenance checks.

According to a yet further aspect of the invention, there is provided a kit of parts for providing a security apparatus in accordance with the invention, said kit comprising at least one security plug and security socket as herein described, and optionally, at least one cable capable of electrical conduction.

According to a yet further aspect of the invention, there is provided at least one component for use in a security system as herein described, said component comprising a first security means and/or second security means and/or smart key

as herein described.

According to a yet further aspect of the invention there is provided a kit of parts for providing a security apparatus in accordance with the invention, said kit comprising at least one smart key as herein described and at least one
5 associated security plug or security socket as herein described, and optionally, at least one cable capable of electrical conduction.

It will be appreciated that the invention includes within its scope security apparatus substantially as described herein with reference to and as illustrated
10 by any appropriate combination of the accompanying drawings.

Brief Description of the Drawings

A preferred embodiment will now be more particularly described, by way of example only, with reference to the accompanying drawings, wherein:

Figure 1 illustrates a side view of security apparatus embodying the present
15 invention in use with computer equipment;

Figure 2 illustrates a side view of security apparatus embodying the present invention, in use with a car and caravan;

Figure 2a illustrates a side view of security apparatus embodying the present invention in use with a commercial vehicle and tractor trailer unit;

20 Figure 2b represents a plan view of a smart key;

Figure 3 is a schematic representation of the security plug circuitry;

Figure 3a is an end view of the plug showing its pin layout;

Figure 4 is a schematic representation of the security socket circuitry;

Figure 4a is an end view of the security socket showing the socket layout;

5 Figure 5 illustrates a side view of security apparatus according to a further embodiment of the present invention, in use with a commercial vehicle and trailer;

Figure 6 is a schematic representation of the security socket circuitry for the security apparatus of Figure 5;

10 Figure 7 is a schematic representation of the "smart key" circuitry of the key depicted in Figure 2b to be used in conjunction with the security apparatus in Figure 5; and

Figure 8 is a schematic representation of an electrically powered device, in this instance a TV, having a Smart Key installed into the back thereof.

15 Figure 9a is a front view of a schematic representation of a commercial trailer brake/light display unit associated with a smart key;

Figure 9b is a side view of a schematic representation of Figure 9a;

Figure 9c is a front view of a schematic representation of an alternative of the invention of display unit and smart key.

Description of the Preferred Embodiments

Referring to Figure 1, the security apparatus of the present invention comprises an electrically-conductive cable 1 having at one end thereof a conventional mains plug 2 for use with a conventional mains socket 3.

- 5 Cable 1 is normally conductive, and although in this embodiment is adapted to carry mains power only, may alternatively (or in addition) carry data signals, or power supplies at voltages other than that of the mains.

The other end of cable 1 is provided with a security plug 4 which will be described in more detail below.

10

The equipment it is desired to protect 5 (in this case a personal computer) is provided with a security socket 6 which is adapted to receive security plug 4. Socket 6 is preferably permanently attached to the body of equipment 5 during manufacture for example a chip may be built into the power circuit thereof as
15 the installation needs to be resistant to physical attack whereby security socket 6 could be easily removed. Alternatively, security socket 6 and its fixings (not shown) could be provided as a kit of parts for D-1-Y installation by the owner of equipment 5.

Alternative general arrangements of security apparatus embodying the present
20 invention are illustrated in Figures 2 and 2a where the equipment it is desired to protect are towable vehicles, in these cases respectively a caravan 7 and a commercial vehicle tractor trailer unit 7. Instead of a mains plug at one end of cable 1, a further security plug 4 is provided which is intended to mate with a further security socket 6 which is permanently attached to caravan or

trailer 7.

Referring now to Figure 2b, there is shown a smart key 21, comprising an upper portion 21A suitably sized and shaped so as to be easily held/manipulated by an individual. At a lower portion of 21A there is provided member 21B, which member is to be inserted into an appropriate site of a security means, tip C is the portion which is intended to be in contact with said security means and which conducts electric interrogation of a chip housed within smart key 21 (not shown) and upon a correct code being read said smart key 21 allows activation of electrically powered equipment.

The general principle embodied in each of the above-described cases is that each security plug 4 is uniquely associated with the security socket 6 in which it is intended to be placed. This is described with reference to the remaining figures below.

Security plug 4 is provided with circuitry as shown in Figure 3 which is preferably completely enclosed within the body of security plug 4 so as to be tamper-proof.

Power supply board 8 is provided with a diode matrix 9 which protects the remaining circuitry from input spikes.

FET switch 10 enables power to be supplied to code set board 11 in relatively short pulses.

Code set board 11 contains an encoded chip 12 on which a unique identification code is predetermined during manufacture and which is capable

of uniquely identifying that particular security plug 4 from any others.

The unique identification code is amplified at amplifier 13 and transmitted by transmitter 14 (which is enabled when power is supplied to it by FET switch 10).

5

Security plug 4 is, therefore, periodically transmitting its own unique identification code.

Each security plug 4 (at one end of cable 1) is designed to be fitted into a security socket 6. The security socket 6 is described below with reference to
10 Figures 4 and 4A.

The circuitry shown in Figure 4 is designed to be completely enclosed within security socket 6 or, alternatively, within the vicinity thereof inside the equipment it is desired to protect (5). Again, there is provided a protective diode input matrix 15 and voltage regulator 16. Detector 17 detects the
15 identification code from an adjacent security plug 4. Decoder 18 is also pre-programmed during manufacture with a unique identification code. This code is identical to that of the security plug 4 with which the socket 6 is intended to be used.

The identification code transmitted by the security plug 4 is detected by
20 detector 17 in socket 6 and compared with the identification code on decoder IC 18.

If the detected identification code is identical to that on decoder IC 18 then the correct security plug 4 has been employed and electrical power is allowed to pass through output control means 19, to the plug 4 which is plugged into

("mated with") socket 6 and then to cable 1.

If the identification codes do not match then output control means 19 (which comprises 6 15 amp p-channel MOSFETs) interrupts power lines a-f thus
5 disabling the equipment 5 to which socket 6 is attached.

The disabling of equipment 5 (or, in the case of the Figure 2 and 2a examples, caravan or tractor trailer unit 7) can occur in a number of ways. Taking firstly the Figure 1 example, equipment 5 depends upon the security apparatus of the present invention for its mains power which is supplied via
10 cable 1. In order to protect the equipment 5, the owner unplugs security plug 4 from security sockets 6 and unplugs mains plug 2 from mains socket 3. Cable 1 can then simply be removed and carried or locked away elsewhere, for example when leaving the equipment 5 unattended.

The thus-disabled equipment 5 can only be operated again if a cable 1 is
15 employed which has the identification code transmitted from its security plug 4 corresponding to that expected by security socket 6 on the equipment. The equipment 5 is thus rendered useless in the absence of the correct cable 1.

Turning now to the example shown in Figures 2 and 2a, a caravan 7, tractor trailer unit 7 or other towable vehicle can be protected by the owner removing
20 cable 1 by unplugging each security plug 4 from its security socket 6 and taking the cable 1 away with him/her when leaving the caravan or tractor trailer unattended. Alternatively security socket 6A is built into or integral with the caravan itself (as in the embodiment depicted in Figure 9B), in this particular embodiment of the invention further security is provided by
25 concealment of security socket 6A within the device which it is desired to

protect. It is intended that the caravan or tractor trailer's electrical needs (for example to power its rear brake lights) should be normally supplied via cable 1 and hence disabled on removal of cable 1. Attempted theft of the caravan or tractor trailer (assuming some other means of attaching the caravan or tractor trailer 7 to a towing vehicle is found) will result in the caravan or tractor trailer 7 being driven at least without lights and, preferably, without other electrically-operated appliances etc being functional. A warning notice, clearly visible at the rear of the caravan or tractor trailer 7, in full view of the following traffic could be employed, warning that if the caravan or tractor trailer 7 is being driven without lights then it may well be stolen.

Ideally, the caravan or tractor trailer unit could be adapted so that, in the absence of the correctly identified cable I the caravan or tractor trailer unit's brakes are locked on, thus preventing the caravan or tractor trailer unit from being towed away at all. Commercial tractor trailers may already be fitted with special braking systems such that, unless there is a power supply, the brakes are locked on thus preventing the tractor trailer being towed away at all.

The above described circuitry arrangement is a preferred embodiment because it enables a device to be manufactured having a security socket in accordance with the invention fitted therein or attached thereto, which device can, optionally be used with conventional cabling until such time as a suitable cable/plug in accordance with the invention is purchased and used therewith.

It is nevertheless conceivable that the circuit elements could be reversed ie, transmitter 14 etc located within the socket 6 with detector 17, decoder IC 18 and output control means 19 located within plug 4.

Notably, once a cable and plug in accordance with the invention has been used with a device including socket 6, the latter is programmed and will thereafter only work with the cable and plug of the invention.

5 An alternative embodiment of the invention is shown in Figure 5. This embodiment is particularly, but not exclusively, suitable for use in the protection of commercial vehicle trailers. Vehicle 20 is provided with a conventional cable 1A, at least one end of which is provided with a plug 4A which is suitably sized and shaped to mate with security socket 6A on trailer
10 unit 7. Plug 4A need not be of the security plug type 4 described above; its function is simply to make the physical connection between cable 1A and security socket 6A.

Security socket 6A differs from the previously-described sockets 6 in that it is further provided with a removable "smart key" 21. The smart key 21
15 performs the electronic security function ~ (i.e. transmission of identification codes) performed by security plug 4 in the previous embodiment.

In use, the "smart key" is releasably mated with security socket 6A and periodically transmits its own identification code which is received by the socket. When the trailer 7 is to be left unattended, smart key 21 is removed
20 from the socket ~ 6A, thus electronically disabling the trailer unit 7 (as the identification code is no longer received by the socket 6A). On return to the trailer, the driver inserts the security key 21 back into socket 6A, thus electronically re-enabling the trailer unit 7, which can then be driven/used in the normal way.

Since the security identification code is transmitted between smart key 21 and socket 6A, the plug(s) 4A and/or cable 1A can be of a conventional nature. This enables existing equipment to be more easily adapted to use the security apparatus of the present invention. This embodiment also eliminates the need
5 to remove the entire cable I or 1A in order to make the vehicle/trailer/equipment secure.

Suitable circuit arrangements for the security socket 6A and smart key 21 are shown in Figures 6 and 7 respectively.

This Smart Key arrangement is also suitable for use with electrically/powering
10 equipment of any kind please refer to the particular embodiment of the invention depicted in Figure 8. Ideally the smart key is adapted for releasably mating with a piece of equipment to be protected and the said piece of equipment has embedded therein, ideally in an irremovable fashion, an associated piece of security equipment which comprises, ideally, the means
15 for detecting the identification code transmitted by the smart key and a means to controlling the supply of power to the equipment. Alternatively the embedded piece of security equipment comprises the identification code means and transmitter means therefor.

It will be apparent that the simple transportation and use of the smart key will
20 effectively govern whether a piece of electrically/powering equipment will work and also, advantageously, control the number and nature of individuals who can use the equipment by controlling the number and nature of smart keys that are available.

25 Most suitably, the security equipment that is embedded in or associated with

the equipment to be protected is further adapted so as to control the nature of current flow to the equipment. For example, the equipment may be adapted so that current will only flow whilst the smart key is in place. Thus, when the smart key is removed current will cease to flow. This arrangement is preferred with battery operated equipment. Alternatively, the equipment may be arranged so that once the equipment is switched on, providing the smart key is in place current will flow and will continue to flow until such time as the equipment is switched off, regardless of whether or not the smart key remains in place. This arrangement is most suited for use with mains operated equipment.

Finally, with reference to Figure 9a there is shown an alternative embodiment of the invention wherein said smart key 21 has a coded circuit (not shown) and display unit 22 has a decoded circuit (not shown) which are integral. Connection of "suzys" 23 to the cab of the trailer assembly 7 and insertion of smart key 21 (correctly matched to the code) activates display unit 22 so as to permit visualisation of brake/light master/back-up systems and maintenance thereof if required. In the instance of the test kit 24 being portable (Figure 9C) the kit may be housed within the trailer 7 itself, suitably positioned below floor at an area 25 and connected by cable 26 to "suzys" 23, please refer to Figure 9B for illustration. In such an embodiment concealment below floor level A provides further safety from unauthorised use.

It will be apparent to the man skilled in the art that a number of modifications may be made to the workings of the security apparatus without departing from the spirit of the invention.

The invention therefore provides novel tamper-proof security apparatus

including a number of modular and inter-operable components that when correctly coupled enable power to be supplied to an item, and when one of said components is removed, power supply is prevented and the item is thus selectively disabled.

CLAIMS

- 1 A security apparatus for protecting electrically powered equipment comprising; a first security means adapted to be placed in or associated with an electrically powered item to be protected; and a second security means adapted to be removably attached to, or associated with, said first security means wherein at least one of said security means is provided with at least one identification code, and at least one transmitter means for transmitting said identification code to said other security means, and said other security means comprises a detection means for receiving and decoding said identification code; and an output control means for controlling the electrical power supply to the said equipment.
- 2 A security device according to Claim 1 wherein said apparatus is adapted so that removal of one of said security means prevents flow of electrical power to said equipment and thus prevents operation of or disables the equipment.
- 3 A security apparatus according to Claims 1 or 2 wherein said first security means is embedded within the equipment to be protected.
- 4 A security apparatus according to Claims 1 or 2 wherein said first security means is securely attached to the equipment to be protected.
- 5 A security apparatus according to any preceding Claim wherein said first security means is provided in a socket attached to said equipment and said second security means is provided in a plug which is adapted to mate with said socket.

- 6 A security device according to any preceding Claim wherein said first security means and/or said second security means comprises at least one encoded chip.
- 7 A security device according to Claim 6 wherein said chip has suitable circuitry imprinted thereon so as to provide a unique identification code whereby interrogation of said chip by said detection means enables said control means to activate said equipment in the instance of a correctly matched code or alternatively not activate said equipment in the instance of an incorrectly read code.
- 8 A security apparatus according to any preceding Claim wherein said security apparatus and/or said electrically powered equipment has associated therewith, or attached thereto, an auditory and/or visual arm, whereby incorrect matching of said code activates said alarm.
- 9 A security apparatus according to any preceding Claim wherein one of said security means is provided in a smart key adapted to mate with said other security means.
- 10 A smart key according to Claim 9 wherein said smart key is suitably sized and shaped so as to be portable and easily manipulated by a user.
- 11 A security apparatus according to any preceding Claim further comprising electrical cabling wherein the two said security means are integral with or associated with at least one socket and at least one plug associated with said electrical cabling.

12 A security apparatus according to Claim 11 comprising; a cable capable of electrical conduction and having a security plug at at least one end thereof; a number of security sockets corresponding to the number of security plugs, at least one security socket being attached to the item it is desired to protect and each security socket being adapted to mate with one of said security plugs; and electronic identification means capable of associating said security plugs with said security socket(s) and thus associating said cable with the equipment it is desirable to protect, whereby the cable is electrically-conductive only when the cable is correctly associated with the equipment it is desired to protect, thus at least partially disabling said equipment at all other times.

13 A security apparatus according to Claims 11 or 12 wherein said electronic identification means is provided with a unique identification means so as to uniquely associate said cable with the equipment it is desired to protect.

14 A security apparatus according to Claims 9-13 wherein said smart key comprises said identification code and said transmitter means so that said smart key is adapted to releasably mate with said other security means or said security socket.

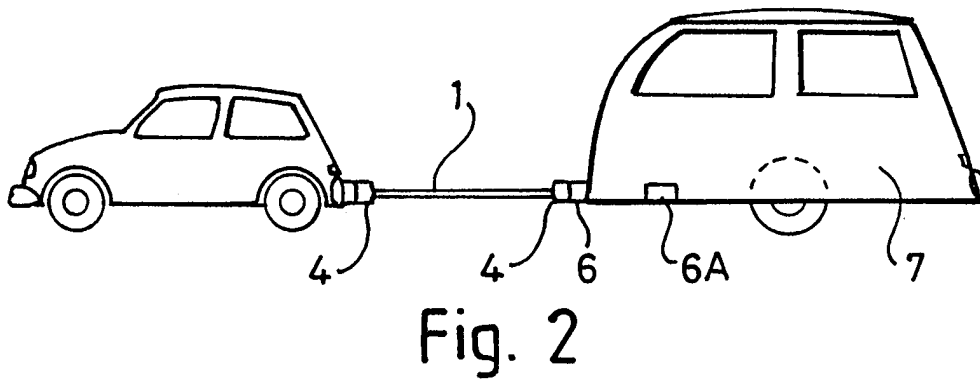
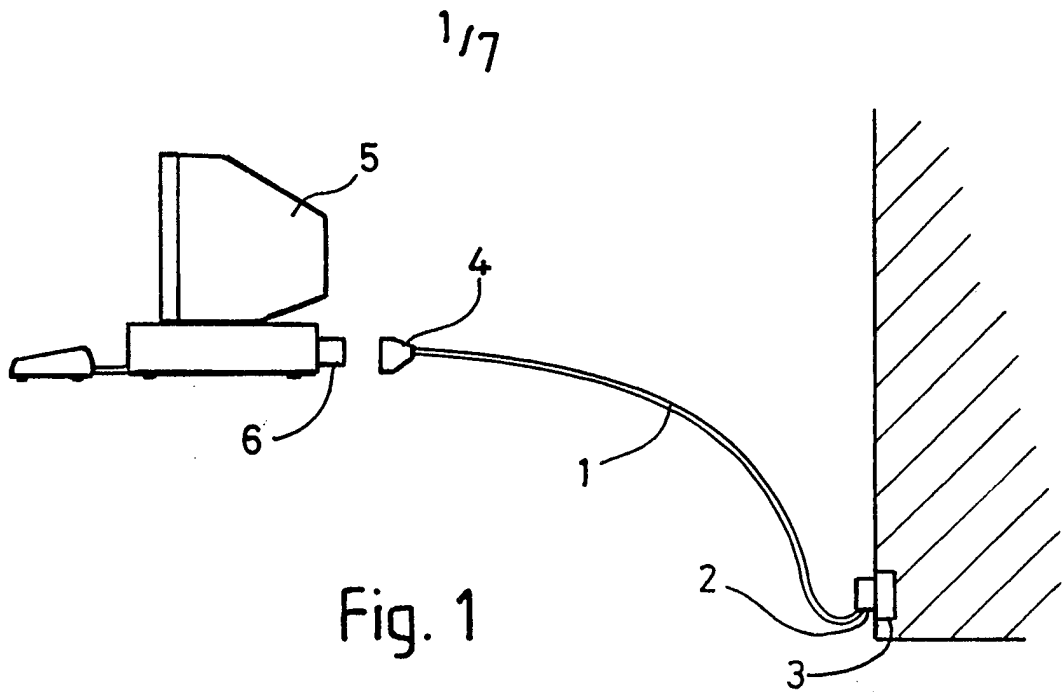
15 A security apparatus according to Claims 9-13 wherein said smart key comprises said identification code and said transmitter means so that said smart key is adapted to releasably mate with said other security means or said security plug(s).

- 16 A security apparatus according to Claims 9-13 wherein said smart key comprises said detection means and said output control means.
- 17 A security apparatus according to Claims 12-16 wherein at least one of said security sockets is permanently attached to a towable vehicle and further wherein said cable is releasably attached thereto.
- 18 A security apparatus according to any preceding Claim wherein said identification code includes any number of codes, the combination of which is unique to each security apparatus.
- 19 An identification code according to Claim 18 which employs a trinary addressing system.
- 20 A security apparatus according to any preceding Claim wherein said detection means is provided with means to elicit transmission of said code in the event of a system error.
- 21 A security apparatus according to Claims 12-20 wherein said cable is removable from said socket(s) and said plug(s).
- 22 A security apparatus according to any preceding Claim wherein said security apparatus is associated with or attached to or integral with a rechargeable trailer break/light monitor display means.
- 23 A security apparatus according to Claim 22 comprising at least one coded and at least one de-coded circuit housed within robust, water-proof housing.

24 A security apparatus according to Claims 22 or 23 wherein said smart key is further adapted so as to activate said display means for the purpose of checking the operational status of master and/or backup systems of said trailer break/light and/or any other system which it is desired to check and/or maintain.

25 A security apparatus, for protecting electrically powered equipment, comprising a kit of parts including at least one first security means adapted to be placed in or associated with an electrically powered item to be protected; and at least one second security means adapted to be removably attached to, or associated with, said first security means wherein at least one of said security means is provided with at least one identification code, and at least one transmitter means for transmitting said identification code to said other security means, and said other security means comprises a detection means for receiving and de-coding said identification code; and an output control means for controlling the electrical power supply to the said equipment.

26 At least one component for use in a security system according to Claims 1-25, said component comprising a first security means and/or a second security means and/or smart key according to any preceding claim.



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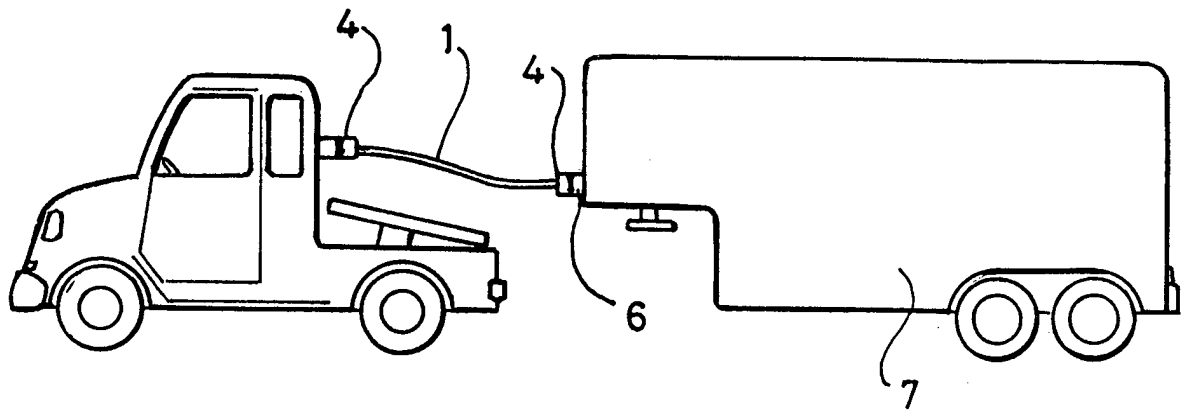


Fig. 2a

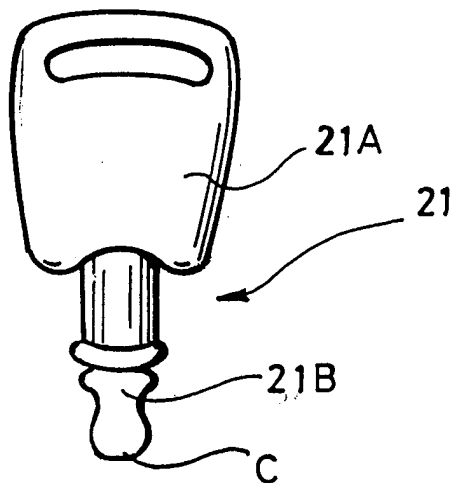
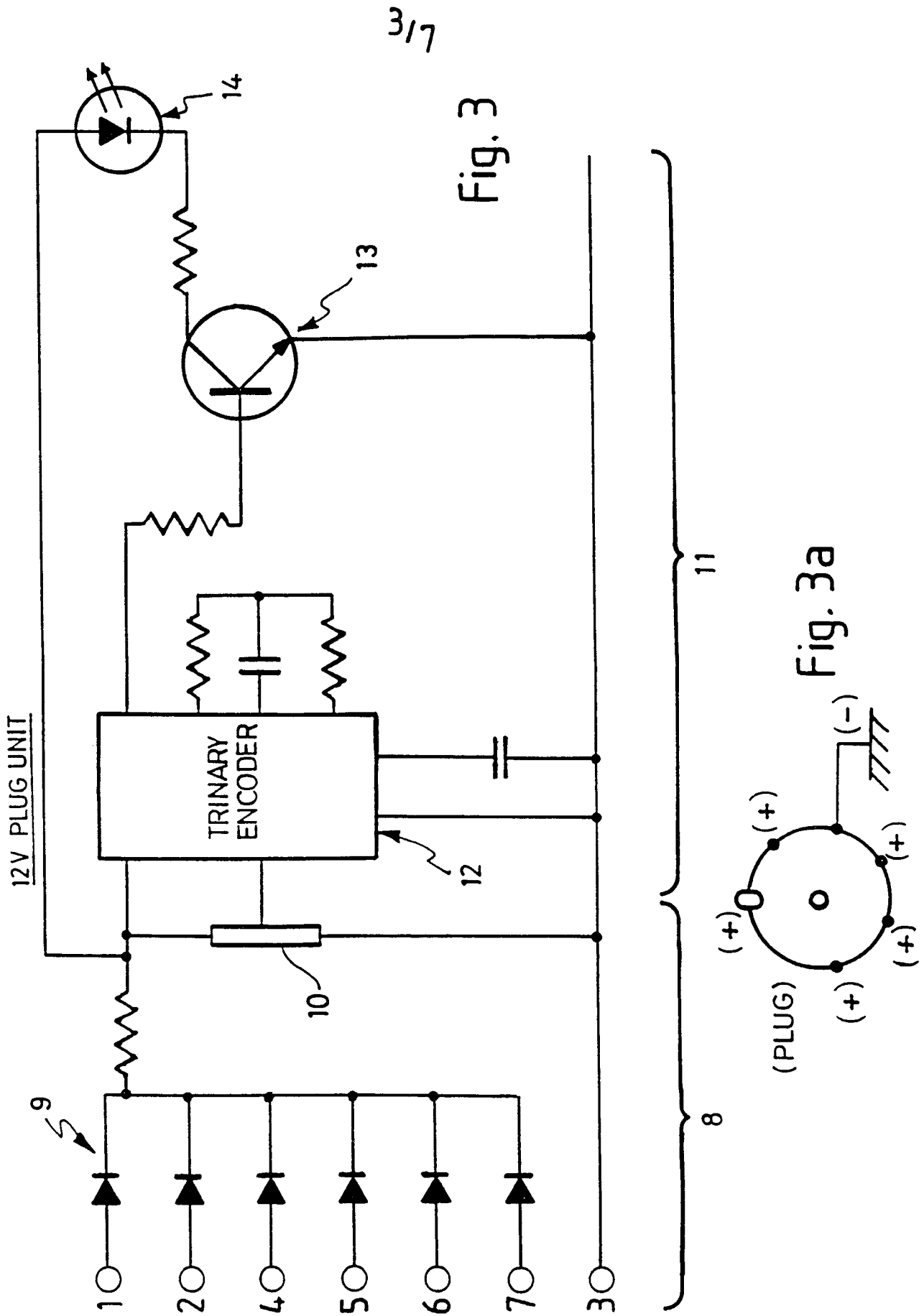


Fig. 2b



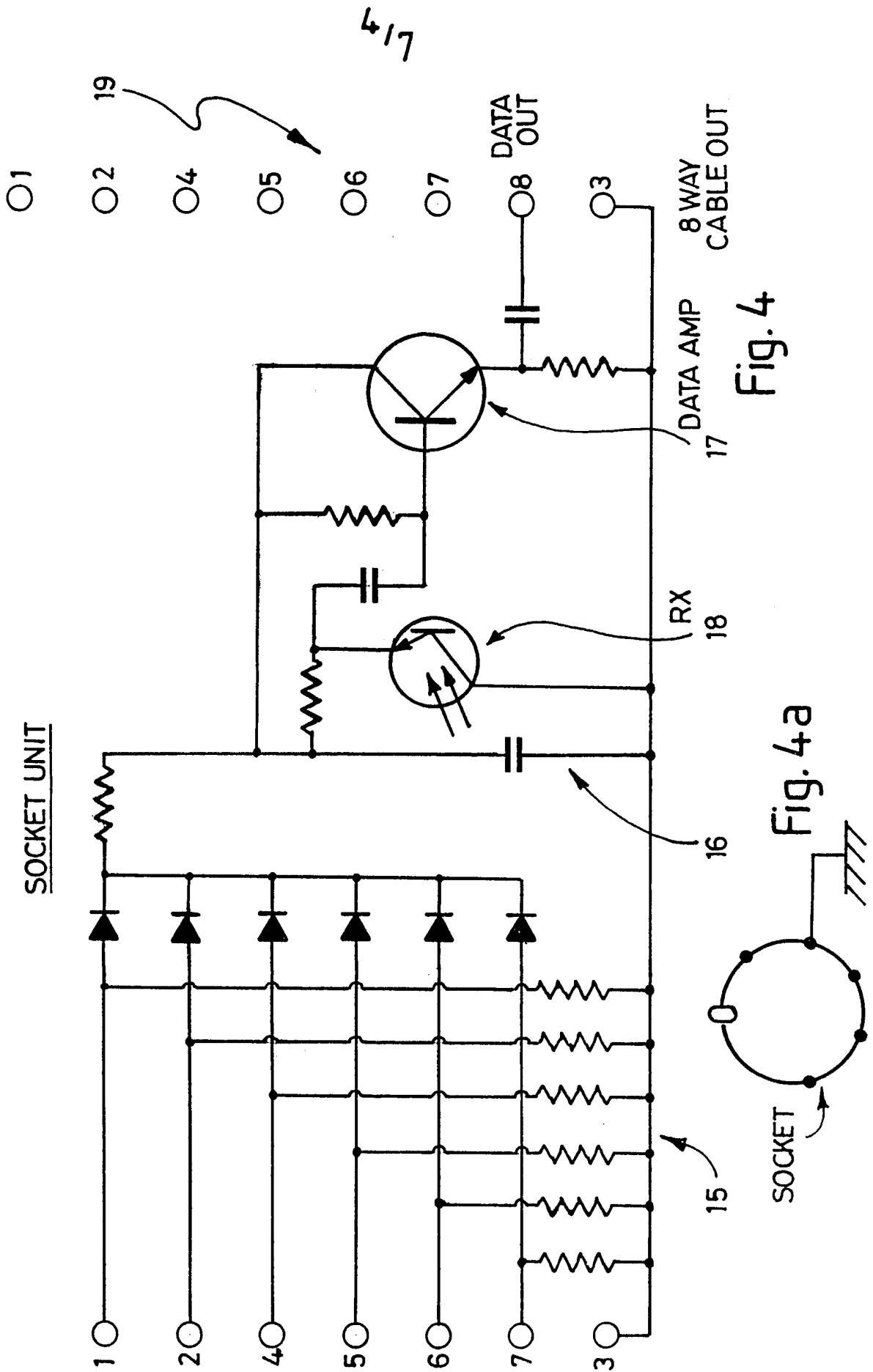


Fig. 4

Fig. 4a

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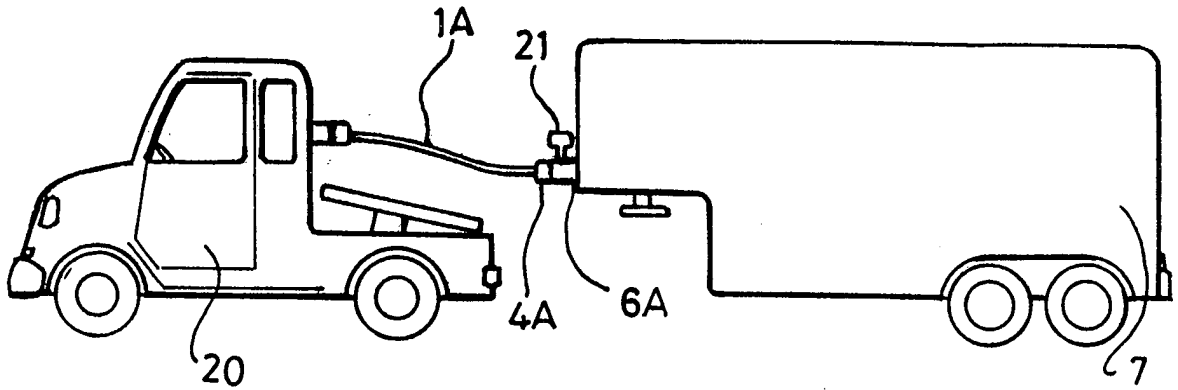


Fig. 5

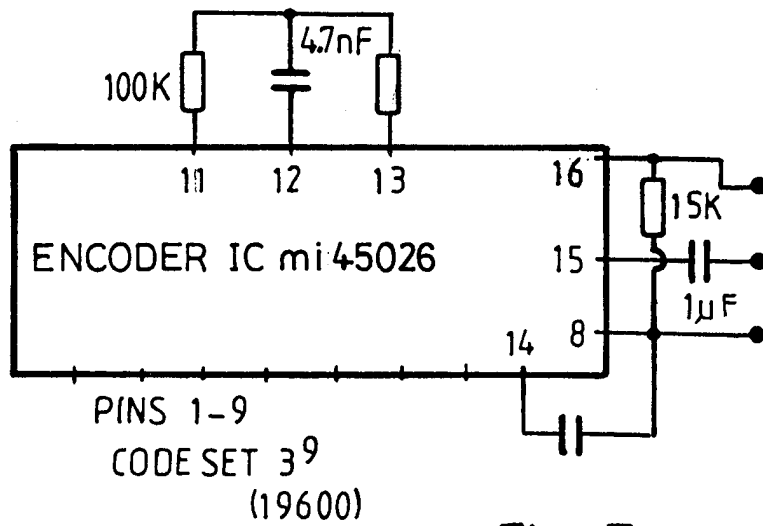


Fig. 7

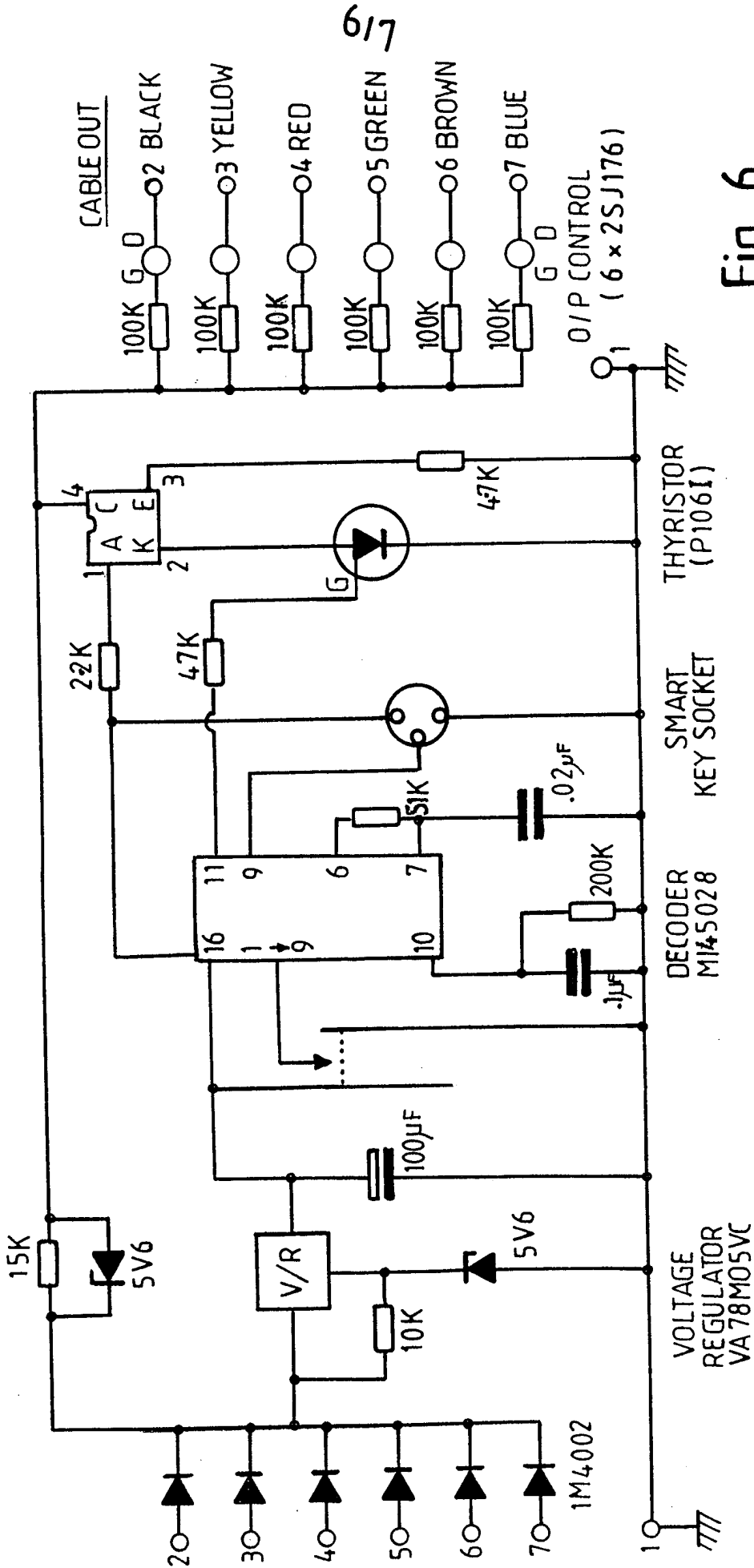
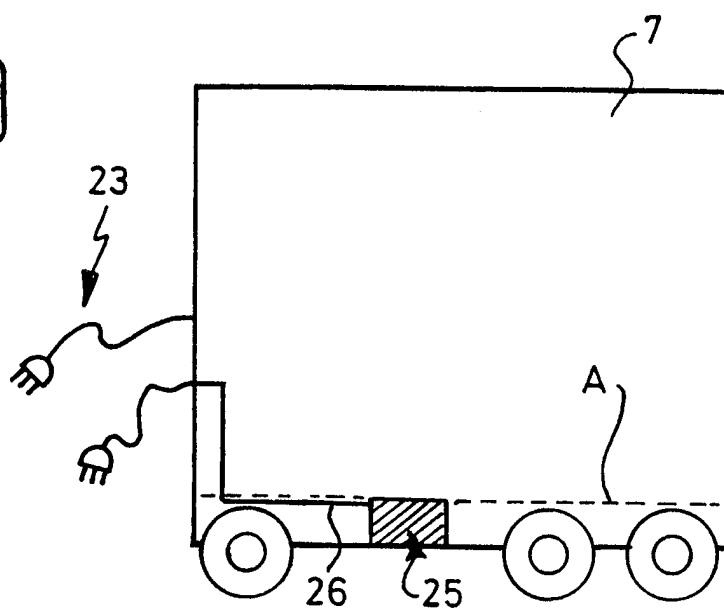
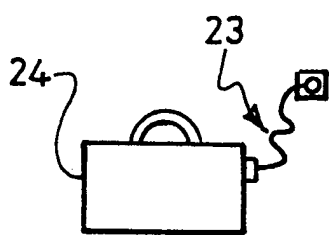
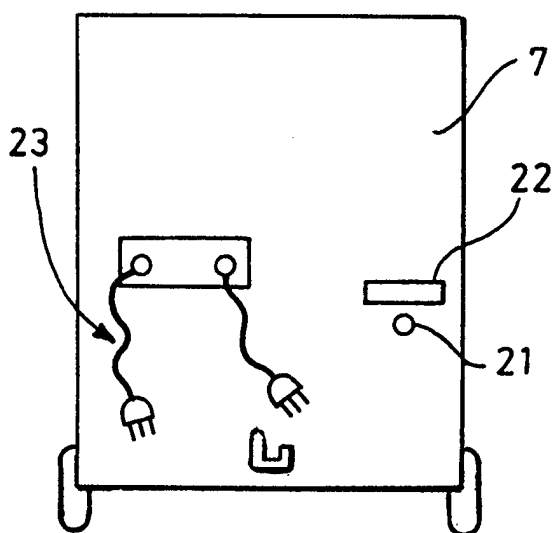
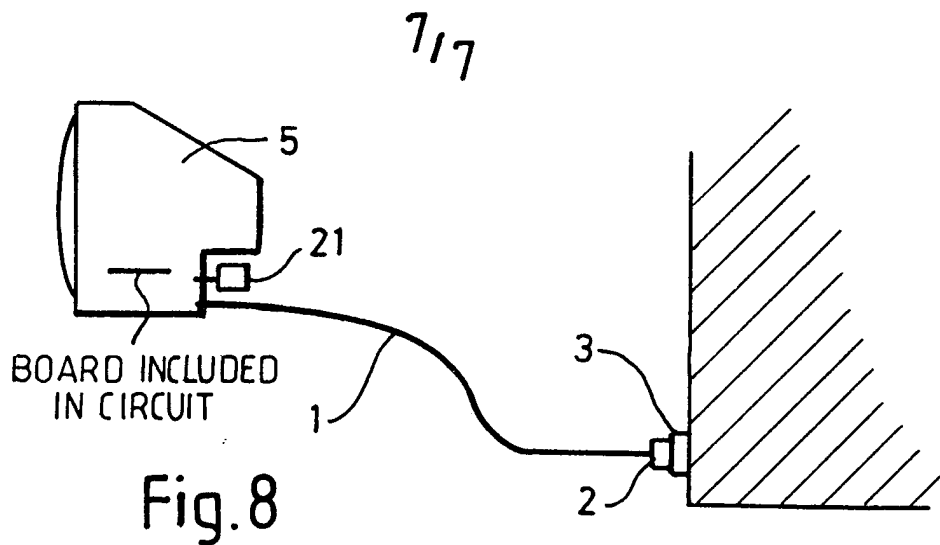


Fig. 6



INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 97/02762

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 G08B13/14

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 G08B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 530 431 A (P. F. WINGARD) 25 June 1996 see column 6, line 57 - column 7, line 54; figure 1	1-26
X	WO 87 01229 A (J. DUNN) 26 February 1987 see page 3, line 19 - line 38 see page 5, line 3 - line 14 see page 6, line 23 - page 7, line 1; figures 1,2	1-26
X	WO 93 14550 A (EASY SHOPPING AB) 22 July 1993 see abstract	1-26
A	FR 2 731 812 A (SAMSUNG ELECTRONICS) 20 September 1996 see abstract	9, 10

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

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Date of the actual completion of the international search

24 February 1998

Date of mailing of the international search report

05/03/1998

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 97/02762

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 052 193 A (IBM) 26 May 1982 see abstract -----	1-26

INTERNATIONAL SEARCH REPORT

Information on patent family members

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