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(54) **ELECTRICAL SYSTEM FOR CONTROLLING AT LEAST ONE GATE OR DOOR OR SIMILAR ELEMENT OF THE TYPE MOVED ELECTRICALLY**

ELEKTRISCHES SYSTEM ZUR STEUERUNG MINDESTENS EINES TORS ODER EINER TÜR ODER EINES ÄHNLICHEN ELEMENTS DES ELEKTRISCH BEWEGTEN TYPS

SYSTEME ELECTRIQUE DE COMMANDE D'AU MOINS UNE GRILLE, UNE PORTE OU UN ELEMENT SIMILAIRE D'UN TYPE MU ELECTRIQUEMENT

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present invention

[0019] With (non-limiting) reference to Fig 2, the electrical control system according to the present invention has the function of controlling at least one gate or door or similar element (below reference will often be made to a gate for the sake of simplicity of the description) of the type moved by means of at least one corresponding electric motor; said system comprising:

a) an electric network NTWRK consisting of two electric wires adapted to allow distribution of power supply and digital information;
b) a central control unit UC having two terminals T1,T2 adapted to be connected respectively but indifferently to the two wires of the network NTWRK in order to transmit direct-current power supply and to transmit and receive digital information;
c) a certain number of peripheral units UP, each having two terminals T1,T2 adapted to be connected respectively but indifferently to the two wires of the network NTWRK in order to receive direct-current power supply and to receive and/or transmit digital information

[0020] Fig 2 conceptually shows N peripheral units UP indicated by UP-1, UP-2, UP-3, UP-N

[0021] The network NTWRK according to the present invention, with its two wires, may comprise branches, as can be clearly seen in the diagram of Fig 1; also in the complicated diagram of Fig 1, the electric wires are conceptually only two in number; basically, these wires will probably be formed by means of a series of twin-wire cable sections which are suitably connected together

[0022] As can be seen from the diagram according to Fig 1, the wiring is very simple, the number of wires is minimal (two both for the power supply and for the information) and the length of the wires is minimal if installation is performed properly (branches limited to the minimum necessary)

[0023] The units are all connected together (in parallel) on the network NTWRK and without the need to take into account the polarity; it is therefore not possible to make mistakes during connection since there are no constraints

[0024] The power supply may be obtained in the form of direct current directly from the network NTWRK; this power supply is designed mainly for the peripheral units which make up the system and which may therefore be extremely simplified from the point of view of the power supply These peripheral units may then in turn provide a power supply to the devices to which they are connected and which may therefore be simplified greatly from the point of view of the power supply

[0025] The circuit which generates the power supply for the network NTWRK (and therefore for the peripheral units and if necessary for the devices connected to the latter) is generally located inside the housing which contains the central unit UC

[0026] Depending on the type of device to which a peripheral unit is connected, the latter may have the need only to receive digital information (such as conceptually, for example, a luminous signalling device), only to transmit digital information (such as conceptually, for example, a safety device) and both to receive and transmit digital information (as will be clarified below)

[0027] Such an electrical control system must be connected to at least three essential devices: an electric motor for moving the gate, a device for entering requests of movement of the gate (for example a key-operated selector, a command keypad, a remote control receiver, etc), a safety device (for example a photocell system, a sensitive edges system, a mat presence detector, a radar presence detector, etc)

[0028] Depending on the functions performed by the central unit UC, three designs of the present invention are possible

[0029] According to a first embodiment, the system comprises at least three peripheral units, each of which have terminals adapted to be connected respectively but indifferently to the two wires of the network in order to receive direct-current power supply and to receive and/or transmit digital information; wherein one of the peripheral units is adapted to be electrically connected to an electric motor for controlling operation thereof; wherein one of the peripheral units is adapted to be electrically connected to a device for entering requests of movement of the gate or door or similar element; wherein one of the peripheral units is adapted to be electrically connected to a safety device for gates or doors or similar elements

[0030] In other words, according to this first embodiment, the three essential devices are connected electrically to three different peripheral units

[0031] According to a second embodiment, the system comprises at least two peripheral units, each having two terminals adapted to be connected respectively but indifferently to the two wires of the network in order to receive direct-current power supply and to receive and/or transmit digital information; wherein the central unit is adapted to be electrically connected to an electric motor for controlling operation thereof and/or to a device for entering requests of movement of the gate or door or similar element and/or to a safety device for gates or doors or similar elements; wherein a peripheral unit is adapted to be electrically connected to an electric motor for controlling operation thereof and/or to a device for entering requests of movement of the gate or door or similar element and/or to a safety device for gates or doors or similar elements; wherein another peripheral unit is adapted to be electrically connected to an electric motor for controlling operation thereof and/or to a device for entering requests of movement of the gate or door or similar element and/or to a safety device for gates or doors or similar elements

voltage at its inputs If the central unit UC modulates ON/OFF the voltage on the network NTWRK, this signal is substantially already ready to be sampled and discriminated by the peripheral unit UP; for example, if the sample has a voltage value greater than +8 volts it will correspond to a digital value "1"="high" and if the sample has a voltage value less than +4 volts it will correspond to a digital value "0"="low"

[0047] The peripheral unit UP may comprise further a load circuit CC having outputs coupled respectively to the outputs of the polarity adapter circuit AP and adapted to load it according to digital information A simple way of doing this is to adopt an ON/OFF approach in this case also: for example, when the peripheral unit UC wishes to transmit a digital value "1"="high", the circuit CC applies to the network (by means of the circuit AP) a load which causes an additional current flow on the network NTWRK and, when the peripheral unit UC wishes to transmit a digital value "0"="low", the circuit CC does not apply any load to the network and therefore does not cause any additional current flow on the network NTWRK These differences in current are detected by the circuit RC of the central unit UC

[0048] All the peripheral units UP are connected in parallel to the network NTWRK and it is therefore necessary, during design of the voltage generator GT of the central unit UC, to take into account the current consumed by all the connected circuits AL, RT, CC

[0049] According to a preferred embodiment of the present invention, the transmission of digital information both in voltage form from the central unit UC to the peripheral units UP and in current form from the peripheral units UP to the central unit UC uses the PWM (Pulse Width Modulation) 1/3-2/3 approach; each bit has a predetermined duration considered unitary: if the pulse lasts less than one third of this predetermined duration, the bit has a logic value, for example, "0", whereas if the pulse lasts more than two thirds of this predetermined duration, the bit has a logic value, for example "1"

[0050] For the sake of completeness of the description, some detailed electrical diagrams of specific embodiments of parts of the system according to the present invention have been appended to the present description

[0051] Fig 5 shows the electrical diagram of a central unit according to the present invention divided into three parts Fig 5-A, Fig 5-B and Fig 5-C; Fig 5-A shows the interface part of the central unit with the network NTWRK; Fig 5-B shows the radio section of the remote control receiver of the central unit; Fig 5-C shows the remaining part of the central unit

[0052] Fig 6 shows the electrical diagram of a peripheral unit adapted to be connected to a receiver of a photocell system and to the network NTWRK

[0053] Fig 7 shows the electrical diagram of a peripheral unit adapted to be connected to the transmitter of a photocell system and to the network NTWRK

[0054] Below, aspects of the present invention which are more closely linked with operation of the system will be described

[0055] In order to be adapted to exchange digital information correctly and efficiently, it is advantageous for each of the peripheral units to comprise memory means adapted to store an own unit identification code which may be used as an address These memory means may consist of a conventional semiconductor memory (of the EPROM, EEPROM, FLASH or RAM type) or, more simply, of dip switches or also, even more simply, of jumpers; the choice depends both on cost criteria and on installation criteria: in fact the unit identification code may be determined either during production or during installation and may be fixed or variable

[0056] In the specific examples according to Fig 6 and Fig 7, for example, the code is determined by one or more jumpers and by four contacts arranged in the corners of a square: if there are two jumpers, these may be connected both horizontally, both vertically, or one horizontal and one vertical in four different ways: if there is only one jumper it may be connected horizontally at the top, horizontally at the bottom, vertically on the right and vertically on the left

[0057] For the safety devices consisting of a transmitting section and a receiving section (which are generally located well apart from each other), for example photocell systems, two associated peripheral units may be provided, being adapted to be connected respectively to the transmitting section and to the receiving section and being identified by the same unit identification code; in this way if the central unit needs to transmit digital information to the photocell system (for example a status reading request), a single transmission to the same address may be effected

[0058] A particularly effective and efficient solution for establishing communication between a central unit and peripheral units consists in exchanging packets of digital information using the "master-slave" technique, wherein the central unit operates as the "master" and the peripheral units operate as "slaves"; in other words a peripheral unit waits to be interrogated by the central unit before transmitting a packet of digital information

[0059] Depending on the type of device connected to the peripheral unit, when a peripheral unit receives a packet from the central unit, it might not be strictly necessary for the peripheral unit to transmit a response packet to the central unit; this typically occurs when the central unit transmits to the peripheral unit a command for activating a motor or a signalling device For the central unit, however, it is advantageous that a response should be transmitted in any case; in fact, for example, this response packet could contain the information that the command has been carried out successfully; failure to receive this confirmation could activate repetition of the transmission

[0060] In the case of the "master-slave" technique, in order to ensure ordered communication between the central unit and peripheral units, the central unit may

errors due to disturbances, is that of providing that the same digital information is transmitted twice from the same source to the same destination; typically said information could be sent in succession; in this case the destination may consider the transmission valid only if the digital information received coincides In the case of packet transmission, the source could transmit, for example, twice in succession the same packet to the same destination It is obvious that this solution results in doubling of the amount of data traffic in the network

[0073] It is also possible for said duplication of the transmission to be performed on the basis of predetermined criteria; for example, a choice which is a good compromise in terms of reliability and traffic is that of repeating the transmission only in relation to specific destinations; for example, the undesired illumination of a luminous signalling device (i e without an actual command from the system) is an event which may be acceptable, while the undesired closing of a gate (i e without an actual command from the system) is an event which is not acceptable owing to the riskof injury or damage; it is therefore possible, for example, to divide the peripheral units into "high risk" units and "low risk" units and duplicate only the information which is transmitted to the "high risk" units

[0074] In the case where the "master-slave" technique is used, it may be advantageously provided that the only the central unit of the system, namely the "master" automatically transmits twice its digital information, in particular its packets, destined for the peripheral units, namely the "slaves"; as regards the peripheral units, if the central unit, on the basis of predetermined criteria, considers that it is necessary to duplicate transmission it will duplicate interrogation; this could be the case of safety devices, the transmitted data of which is extremely important for the central unit and for the system

[0075] A measure which is quite widely used in order to determine errors in transmission of digital information is the parity bit; well known in the telecommunications sector, moreover, is the existence of fairly complicated codes which allow the detection and/or correction of one or more transmission errors

[0076] Even if the "master-slave" technique is used, it is not possible to eliminate entirely the risk that two peripheral units may transmit data to the central unit at the same time and therefore generate errors due to overlapping of two transmission operations; this could occur, for example, in the case where, owing to disturbances, two different peripheral units might regard the same packet of digital information as being destined for them

[0077] In a system such as that described above, a fourth measure which may be adopted to improve the reliability of data exchange, in particular in order to detect errors due to overlapping, is that of complicating the structure of the digital information packet: in this case, the packet comprises a data part and a check part; it is highly unlikely that, when receiving digital information resulting from the overlapping of two packets, the data part and the check part will correspond to each other

[0078] If the "master-slave" technique is used, any overlapping generally occurs during response to interrogation by the "master"; it may therefore be advantageously decided that the structure of the packet transmitted by the "master" should contain only the data (address+command) plus a parity bit and that the structure of the packet transmitted by a "slave" should contain both a data part and a check part without the parity bit The check part could be provided in many different ways; a simple and effective solution will be described below

[0079] The data part and the check part of the packet are chosen with the same length (for example 4 or 8 bits); the source which wishes to send digital information on the network takes a data digital sequence; takes a random digital sequence with the same length as the data (continuously generated in a known manner within the source); generates a digital check sequence by means of an EXCLUSIVE-OR operation between the data sequence and the random sequence; inserts into the packet the data sequence and the check sequence and transmits the packet over the network; the destination receives the packet and performs the reverse operation (which is again an EXCLUSIVE-OR operation), extracting the digital data sequence transmitted in the absence of overlapping; if overlapping has occurred with a packet transmitted by another unit, the digital sequence extracted by the destination will not correspond to the digital data sequence transmitted, but the destination will be unable to detect this; if the source re-transmits the digital data sequence, the random digital sequence which is used will be different and therefore the second packet transmitted is different; the destination receives a second packet different from the first packet which has not been overlapped or been subject to different overlapping; if there has been no overlapping during both the transmission operations, the destination extracts the same digital sequence; if, during at least one of the transmission operations, there has been overlapping, the destination obtains two different digital sequences and therefore detects the error

[0080] Another important aspect of an electrical system for controlling a closing element which is moved electrically is safety: it is necessary to prevent the movement of the closing element from inadvertently causing damage to objects and, in particular, injury to persons

[0081] A quite common way of obtaining this result is to identify an area inside which the movement of the closing element occurs and to stop this movement if an object or a person enters into this area

[0082] The safety devices most used for monitoring areas in these applications are photocell systems

[0083] As is well known, a photocell system is composed of a transmitter and a receiver; if the system is correctly installed, when the system is active, the trans-

wherein one of the peripheral units is adapted to be electrically connected to a device for entering requests of movement of the gate or door or similar element;

wherein one of the peripheral units is adapted to be electrically connected to a safety device for gates or doors or similar elements.

2. Electrical system for controlling at least one gate or door or similar element of the type moved by means of at least one corresponding electric motor, comprising:

a) an electric network consisting of two electric wires adapted to allow distribution of power supply and digital information;
b) a central control unit having two terminals adapted to be connected respectively but indifferently to the two wires of the network in order to transmit direct-current power supply and to transmit and receive digital information;
c) two or more peripheral units, each having two terminals adapted to be connected respectively but indifferently to the two wires of the network in order to receive direct-current power supply and to receive and/or transmit digital information;

wherein the central unit is adapted to be electrically connected to an electric motor for controlling operation thereof and/or to a device for entering requests of movement of the gate or door or similar element and/or to a safety device for gates or doors or similar elements;

wherein a peripheral unit is adapted to be electrically connected to an electric motor for controlling operation thereof and/or to a device for entering requests of movement of the gate or door or similar element and/or to a safety device for gates or doors or similar elements;

wherein another peripheral unit is adapted to be electrically connected to an electric motor for controlling operation thereof and/or to a device for entering requests of movement of the gate or door or similar element and/or to a safety device for gates or doors or similar elements

3. Electrical system for controlling at least one gate or door or similar element of the type moved by means of at least one corresponding electric motor, comprising:

a) an electric network consisting of two electric wires adapted to allow distribution of power supply and digital information;
b) a central control unit having two terminals adapted to be connected respectively but indifferently to the two wires of the network in order to transmit direct-current power supply and to transmit and receive digital information;
c) one or more peripheral units, each having two terminals adapted to be connected respectively but indifferently to the two wires of the network in order to receive direct-current power supply and to receive and/or transmit digital information;

wherein the central unit is adapted to be electrically connected to an electric motor for controlling operation thereof and/or to a device for entering requests of movement of the gate or door or similar element and/or to a safety device for gates or doors or similar elements;

wherein a peripheral unit is adapted to be electrically connected to an electric motor for controlling operation thereof and/or to a device for entering requests of movement of the gate or door or similar element and/or to a safety device for gates or doors or similar elements

4. Electrical system according to Claim 1 or Claim 2 or Claim 3, wherein the central unit comprises a voltage generator circuit having an output coupled to one of its two terminals and adapted to generate a direct supply voltage, and a modulating circuit coupled between said output and said terminal and adapted to modulate the direct supply voltage through digital information

5. System according to Claim 4, wherein the central unit comprises a current detection circuit having an input coupled to another one of its two terminals and adapted to extract digital information from the current at its input

6. System according to any of the preceding claims, wherein each of the peripheral units comprises a polarity adapter circuit having two inputs and two outputs, the two inputs being coupled respectively to its two terminals

7. System according to Claim 6, wherein each of the peripheral units comprises a power supply circuit having inputs coupled respectively to the outputs of the polarity adapter circuit

8. System according to Claim 6 or Claim 7, wherein each of the peripheral units comprises a voltage detection circuit having inputs coupled respectively to the outputs of the polarity adapter circuit and adapted to extract digital information from the voltage at its inputs

9. System according to Claim 6 or Claim 7 or Claim 8, wherein each of the peripheral units comprises a load circuit having outputs coupled respectively to

Netzwerkes verbunden zu werden, um eine Gleichstrom-Stromversorgung zu übertragen und um digitale Informationen zu übertragen und zu empfangen;

c) drei oder mehrere periphere Einheiten, von denen jede zwei Anschlüsse aufweist, die angepaßt sind, um jeweils aber indifferent mit den zwei Drähten des Netzwerkes verbunden zu werden, um eine Gleichstrom-Stromversorgung zu erhalten und um digitale Informationen zu empfangen und/oder zu übertragen;

wobei eine der peripheren Einheiten angepaßt ist, um elektrisch mit einem Elektromotor zum Steuern des Betriebs davon verbunden zu werden;

wobei eine der peripheren Einheiten angepaßt ist, elektrisch mit einer Vorrichtung zum Eingeben von Bewegungsbefehlen des Tors oder der Tür oder des ähnlichen Bauteiles verbunden zu werden;

wobei eine der peripheren Einheiten angepaßt ist, mit einer Sicherheitsvorrichtung für Tore oder Türen oder ähnliche Bauteile elektrisch verbunden zu werden

2. Elektrisches System zum Steuern von mindestens einem Tor oder einer Tür oder einem ähnlichen Bauteil des Typs, der mittels mindestens eines entsprechenden Elektromotors bewegt wird, aufweisend:

a) ein elektrisches Netzwerk, das aus zwei elektrischen Drähten gebildet wird, die angepaßt sind, um die Verteilung von Stromversorgung und digitaler Informationen zu erlauben;

b) eine zentrale Steuereinheit, die zwei Anschlüsse aufweist, die angepaßt sind, um jeweils aber indifferent mit den zwei Drähten des Netzwerkes verbunden zu werden, um eine Gleichstrom-Stromversorgung zu übertragen und um digitale Informationen zu übertragen und zu empfangen;

c) zwei oder mehrere periphere Einheiten, von denen jede zwei Anschlüsse aufweist, die angepaßt sind, um jeweils aber indifferent mit den zwei Drähten des Netzwerkes verbunden zu werden, um eine Gleichstrom-Stromversorgung zu erhalten und um digitale Informationen zu empfangen und/oder zu übertragen;

wobei die zentrale Einheit angepaßt ist, um elektrisch mit einem Elektromotor zum Steuern des Betriebs davon und/oder mit einer Vorrichtung zum Eingeben von Bewegungsbefehlen des Tors oder der Tür oder des ähnlichen Bauteils und/oder mit einer Sicherheitsvorrichtung für Tore oder Türen oder ähnliche Bauteile verbunden zu werden;

wobei eine periphere Einheit angepaßt ist, um elektrisch mit einem Elektromotor zum Steuern des Betriebs davon und/oder mit einer Vorrichtung zum Eingeben von Bewegungsbefehlen des Tors oder der Tür oder des ähnlichen Bauteils und/oder mit einer Sicherheitsvorrichtung für Tore oder Türen oder ähnliche Bauteile verbunden zu werden;

wobei eine weitere periphere Einheit angepaßt ist, um elektrisch mit einem Elektromotor zum Steuern des Betriebs davon und/oder mit einer Vorrichtung zum Eingeben von Bewegungsbefehlen des Tors oder der Tür oder des ähnlichen Bauteils und/oder mit einer Sicherheitsvorrichtung für Tore oder Türen oder ähnliche Bauteile verbunden zu werden

3. Elektrisches System zum Steuern von mindestens einem Tor oder einer Tür oder einem ähnlichen Bauteil des Typs, der mittels mindestens eines entsprechenden Elektromotors bewegt wird, aufweisend:

a) ein elektrisches Netzwerk, das aus zwei elektrischen Drähten gebildet wird, die angepaßt sind, um die Verteilung von Stromversorgung und digitaler Informationen zu erlauben;

b) eine zentrale Steuereinheit, die zwei Anschlüsse aufweist, die angepaßt sind, um jeweils aber indifferent mit den zwei Drähten des Netzwerkes verbunden zu werden, um eine Gleichstrom-Stromversorgung zu übertragen und um digitale Informationen zu übertragen und zu empfangen;

c) eine oder mehrere periphere Einheiten, von denen jede zwei Anschlüsse aufweist, die angepaßt sind, um jeweils aber indifferent mit den zwei Drähten des Netzwerkes verbunden zu werden, um eine Gleichstrom-Stromversorgung zu erhalten und um digitale Informationen zu empfangen und/oder zu übertragen;

wobei die zentrale Einheit angepaßt ist, um elektrisch mit einem Elektromotor zum Steuern des Betriebs davon und/oder mit einer Vorrichtung zum Eingeben von Bewegungsbefehlen des Tors oder der Tür oder des ähnlichen Bauteils und/oder mit einer Sicherheitsvorrichtung für Tore oder Türen oder ähnliche Bauteile verbunden zu werden;

wobei eine periphere Einheit angepaßt ist, um elektrisch mit einem Elektromotor zum Steuern des Betriebs davon und/oder mit einer Vorrichtung zum Eingeben von Bewegungsbefehlen des Tors oder der Tür oder des ähnlichen Bauteils und/oder mit einer Sicherheitsvorrichtung für Tore oder Türen oder ähnliche Bauteile verbunden zu werden

4. Elektrisches System gemäß Anspruch 1 oder Anspruch 2 oder Anspruch 3, wobei die zentrale Einheit eine Spannungsgeneratorschaltung aufweist,

mal die gleiche digitale Information an die gleiche periphere Einheit zu übertragen

21. System gemäß einem der vorangehenden Ansprüche, bei dem irgendeine oder jede periphere Einheit derart angepaßt ist, um jedes Mal dann, wenn sie für sie bestimmte digitale Informationen von der zentralen Einheit empfängt, digitale Informationen an die zentrale Einheit zu übertragen.

22. System gemäß einem der vorangehenden Ansprüche, welches eine erste periphere Einheit, die derart angepaßt ist, um elektrisch mit dem Sendeabschnitt einer Sicherheitsvorrichtung verbunden zu werden, eine zweite periphere Einheit, die derart angepaßt ist, um elektrisch mit dem Empfangsabschnitt der Sicherheitsvorrichtung verbunden zu werden, aufweist, wobei die erste und die zweite periphere Einheit derart angepaßt sind, um Zeitinformationen aus der Paketübertragung bei fester Übertragungsrate durch die zentrale Einheit zu extrahieren und wobei sie ferner derart angepaßt sind, um die entsprechenden Abschnitte für eine Zeitdauer einer vorbestimmten Länge und auf der Basis der Zeitinformationen zu aktivieren

23. System gemäß Anspruch 22, das eine dritte periphere Einheit, die derart angepaßt ist, um elektrisch mit dem Sendeabschnitt einer anderen Sicherheitsvorrichtung verbunden zu werden, eine vierte periphere Einheit, die derart angepaßt ist, um elektrisch mit dem Empfangsabschnitt der anderen Sicherheitsvorrichtung verbunden zu werden, aufweist, wobei die dritte und die vierte periphere Einheit derart angepaßt sind, um Zeitinformationen aus der Paketübertragung bei fester Übertragungsrate durch die zentrale Einheit zu extrahieren und die ferner derart angepaßt sind, um die entsprechenden Abschnitte für eine andere Zeitdauer einer vorbestimmten Länge und auf der Basis der Zeitinformationen zu aktivieren, wobei die Zeitdauer und die andere Zeitdauer sich gegenseitig zeitlich nicht überlappen

Revendications

1. Système électrique pour contrôler au moins un portail ou une porte, ou tout élément similaire du type déplacé au moyen d'au moins un moteur électrique correspondant, le système comprenant :

a) un réseau électrique consistant en deux fils électriques adaptés pour permettre la distribution de courant électrique et de données numériques ;

b) une unité de commande centrale ayant deux terminaux adaptés pour être connectés respectivement mais indifféremment aux deux fils du réseau afin de transmettre une alimentation électrique en courant continu, et pour transmettre et recevoir des données numériques ;

c) trois unités périphériques, ou plus, ayant chacune deux terminaux adaptés pour être connectés respectivement mais indifféremment aux deux fils du réseau afin de recevoir une alimentation électrique en courant continu, et pour recevoir et/ou transmettre des données numériques ;

dans lequel une des unités périphériques est adaptée pour être connectée électriquement à un moteur électrique pour contrôler le fonctionnement de celui-ci ;

dans lequel une des unités périphériques est adaptée pour être connectée électriquement à un dispositif pour entrer des demandes de mouvement du portail ou de la porte, ou d'un élément similaire ;

dans lequel une des unités périphériques est adaptée pour être connectée électriquement à un dispositif de sécurité pour des portails ou des portes, ou des éléments similaires

2. Système électrique pour contrôler au moins un portail ou une porte, ou tout élément similaire du type déplacé au moyen d'au moins un moteur électrique correspondant, le système comprenant :

a) un réseau électrique consistant en deux fils électriques adaptés pour permettre la distribution de courant électrique et de données numériques ;

b) une unité de commande centrale ayant deux terminaux adaptés pour être connectés respectivement mais indifféremment aux deux fils du réseau afin de transmettre une alimentation électrique en courant continu, et pour transmettre et recevoir des données numériques ;

c) deux unités périphériques, ou plus, ayant chacune deux terminaux adaptés pour être connectés respectivement mais indifféremment aux deux fils du réseau afin de recevoir une alimentation électrique en courant continu, et pour recevoir et/ou transmettre des données numériques ;

dans lequel l'unité de commande centrale est adaptée pour être connectée électriquement à un moteur électrique pour contrôler le fonctionnement de celui-ci, et/ou à un dispositif pour entrer des demandes de mouvement du portail ou de la porte, ou d'un élément similaire, et/ou à un dispositif de sé-

respectivement à la section de transmission et à la section de réception et étant identifiées par le même code d'identification d'unité

12. Système selon l'une quelconque des revendications précédentes, adapté pour établir une communication entre une unité centrale et des unités périphériques par un échange de paquets de données numériques selon la technique "maître-esclave", dans lequel l'unité centrale fonctionne en tant que le "maître" et les unités périphériques fonctionnent en tant que des "esclaves"

13. Système selon la revendication 12, dans lequel l'unité centrale est adaptée pour transmettre des paquets sur le réseau à un débit fixe et prédéterminé

14. Système selon la revendication 13, dans lequel la destination de la transmission d'un paquet par l'unité centrale est une unité périphérique choisie sur la base de critères prédéterminés

15. Système selon la revendication 13 ou 14, dans lequel au moins une des unités périphériques est adaptée pour extraire des informations de temps à partir de la transmission à débit fixe de paquets par l'unité centrale

16. Système selon l'une quelconque des revendications 12 à 15, dans lequel la structure des paquets transmis sur le réseau par les unités périphériques est fixe et comprend une partie de données et une partie de contrôle

17. Système selon la revendication 16, dans lequel la partie de données et la partie de contrôle ont la même longueur, et dans lequel la partie de contrôle est le résultat d'un fonctionnement OU exclusif entre la partie de données et une numérique séquence aléatoire ayant la même longueur

18. Système selon l'une quelconque des revendications 12 à 17, dans lequel l'unité centrale est adaptée pour exécuter, pendant la mise en route et le redémarrage du système, l'identification de toutes les unités périphériques actives connectées au réseau par le biais d'un échange de paquets

19. Système selon l'une quelconque des revendications 12 à 18, dans lequel l'unité centrale est adaptée pour exécuter, de façon répétée, durant le fonctionnement du système, l'identification de toutes les unités périphériques actives connectées au réseau grâce à un échange de paquets afin d'identifier des erreurs dans le système

20. Système selon l'une quelconque des revendications précédentes, dans lequel l'unité centrale est adaptée pour transmettre deux fois les mêmes données numériques vers la même unité périphérique sur la base de critères prédéterminés

21. Système selon l'une quelconque des revendications précédentes, dans lequel n'importe laquelle, ou chaque unité périphérique est adaptée pour transmettre des données numériques vers l'unité centrale chaque fois qu'elle reçoit des données numériques qui lui sont destinées, en provenance de l'unité centrale

22. Système selon l'une quelconque des revendications précédentes, comprenant une première unité périphérique adaptée pour être connectée électriquement à la section de transmission d'un dispositif de sécurité, une deuxième unité périphérique adaptée pour être connectée électriquement à la section de réception dudit dispositif de sécurité, lesdites première et deuxième unités périphériques étant adaptées pour extraire des informations de temps à partir de la transmission à débit fixe de paquets par l'unité centrale et étant par ailleurs adaptées pour activer les sections correspondantes pour une période de temps d'une durée prédéterminée et sur la base desdites informations de temps

23. Système selon la revendication 22, comprenant une troisième unité périphérique adaptée pour être connectée électriquement à la section de transmission d'un autre dispositif de sécurité, une quatrième unité périphérique adaptée pour être connectée électriquement à la section de réception dudit un autre dispositif de sécurité, lesdites troisième et quatrième unités périphériques étant adaptées pour extraire des informations de temps à partir de la transmission à débit fixe de paquets par l'unité centrale et étant par ailleurs adaptées pour activer les sections correspondantes pour une autre période de temps d'une durée prédéterminée et sur la base desdites informations de temps, dans lequel ladite période de temps et ladite une autre période de temps ne se chevauchent pas l'une l'autre provisoirement