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(54) **DUPLICATION METHOD FOR A REMOTE CONTROL OPERATING IN RADIO FREQUENCY AND REMOTE CONTROL THUS OBTAINED**

DUPLIKATIONSVERFAHREN ZUM FERNBEDIENUNGSBETRIEB IN FUNKFREQUENZEN UND SO ERHALTENE FERNBEDIENUNG

PROCÉDÉ DE DUPLICATION POUR UNE TÉLÉCOMMANDE FONCTIONNANT EN FRÉQUENCE RADIO ET TÉLÉCOMMANDE AINSI OBTENUE

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Description

[0001] The present invention refers to a duplication method for a remote control operating in radio frequency and to a remote control obtained according to said method.

[0002] More particularly, but not exclusively, the invention concerns a duplication method for a remote control operating in radio frequency and capable of remotely control an electrical device by pressing at least one control key or button; said remote control including at least one memory, a transceiver and a microprocessor capable to execute a program.

Known art

[0003] As it is well known in this specific technical sector, a remote control is an electronic device that allows sending signals to another remotely placed device being controllable by means of those signals. The remote control is a portable object having small dimensions, being battery operated and structured in order to being able to be easily kept and activated also with a single hand.

[0004] The most common remote controls in the domestic field are intended for opening and closing doors and gates or for controlling lighting systems.

[0005] A remote control is capable to emit electromagnetic signals that are picked up by the remotely controlled device by means of a dedicated receiver. For short-range remote controls, infrared signals are used, while for longer distances, the radio waves are used and in that case, they are called radio remote controls.

[0006] There are also remote controls in the domestic field, which are defined as "universal" meaning that they have the peculiarity to be set in order to control a plurality of electrical devices such as a music center, a television and/or other apparatuses being present in the domestic field.

[0007] In this field, often it is needed to quickly duplicate a remote control without necessarily having to turn to skilled or professional staff.

[0008] However, for this purpose it is necessary to have available an instrument, called frequency counter, which allows measuring the working frequency of the original radio remote control, usually being few dozens or hundreds of MHz.

[0009] Once detected the working frequency of the original remote control to be duplicated, it is necessary to have available a programmable universal remote control having the same frequency and being capable to be programmed with the same radio code.

[0010] Although being relatively easy, the duplication operation is still left even nowadays to the skill of specialized operators.

[0011] However, sometimes, for security reasons, one would prefer to avoid having to request this service to a staff that is outside one's circle of close acquaintance.

[0012] Therefore, there is the need of being able to perform the duplication operation of a radio remote control independently, in an easy and quick way.

[0013] A possible known technical solution is described in the U.S. Patent Application no. US 2008/068205. However, in that document there is described only a duplication mode of a radio remote control, which however does not allow automatically accrediting the new cloned radio remote control with the controlled electronic device.

[0014] The technical problem underlying the present invention is to conceive a method having such functional and structural characteristics as to allow duplicating an original remote control operating in radio frequency without needing to know anything about the receiver of radio frequency signals and even without needing to know the transmission protocols of the original remote control, which could have been manufactured by an unknown company or even being no more active in the sector.

[0015] This and other purposes must be able to be achieved with definitely reduced costs and with particularly simple operative modes, for example by means of a remote control having such structural and functional characteristics as to allow the realization of the above-mentioned method.

Summary of the invention

[0016] The solution idea underlying the present invention is to provide for an apprenticeship step wherein the clone remote control is put listening a remote control to be duplicated; a recognition step of the working frequency and the code being transmitted by the original remote control to be duplicated, also in case of variable code, and a totally automatic storing control step, wherein the clone remote control initiates a recognition and accreditation procedure with the electrical device to be controlled, which, if it is permitted, stores also the new code of the clone remote control emulating the variable code of the original remote control to be duplicated.

[0017] Based on said solution idea, the technical problem is solved by a method of the previously described type and characterized by including the following steps:

- enabling the clone remote control to a duplication phase by pressing said control key and simultaneously pressing a programming key for a predetermined number of times;
- releasing the said control and programming keys;
- approaching the emitting ends of an original remote to be duplicated and the clone remote control in the duplicating phase;
- pressing for a predetermined period of time a key of the original remote control, allowing said microprocessor to receive via the transceiver the working frequency and the code transmitted from the original

remote control by means of a recognition and/or emulation procedure of the transmitted code;

- pressing for a predetermined period of time a key of the clone remote control to which assign the same function of said key of the original remote control;

- storing in said memory said working frequency, the recognized code and the assigned key;

- starting an automatic storing procedure that provides for the transmission of predetermined sequences of recognized or emulated codes toward the electrical device to be controlled, said storing procedure automatically forcing the storing of the recognized or emulated code on a receiver of the electrical device to be controlled by generating alternating old and new codes being transmitted towards the electrical device to be controlled in a predetermined storing sequence; and

- repeating said storing procedure for a plurality of storing sequences being stored in said memory of said clone remote control until said clone remote control is recognized by said electrical device to be controlled.

[0018] Advantageously, said predetermined number of times is equal to four.

[0019] The step of storing in memory the recognized or emulated codes is implemented in three phases:

- a first phase wherein n duration measurements are carried out of the high-low and low-high transitions performed by the received radio signal;

- a second step wherein said measurements are processed; and

- a third phase wherein a sampling of the code is carried out.

[0020] In the first measuring step, duration measurements are performed of n high-low and low-high transitions of the received radio signal obtaining the minimum and maximum duration values of these transitions. For the maximum duration of the transitions, the corresponding level of the radio signal is also stored.

[0021] In the second stage of processing, it is obtained the length of the period of the radio signal corresponding to the duration of the shorter transmission element, as well as the duration and the level of the pause corresponding to the duration and level of the longest transition.

[0022] In the third sampling phase the radio signal is sampled at different time instants, starting half a period after a transition and then continuing after each full period until the next transition from which it will be counted again half a period and so on.

[0023] It should be noted that the recognition procedure provides for the subsequent initiation of a storing step in case the recognized code is a fixed code or an emulation phase of a variable rolling-type code having a serial number different from the recognized code.

[0024] Moreover, the storing procedure provides for the initiation of a procedure that automatically forces the storage of the new emulated code on the receiver of the electrical device to be controlled, said procedure generating alternative new and old codes transmitted in a predetermined sequence.

[0025] The invention refers also a remote control comprising at least one control key or button, a memory, a transceiver and a microprocessor capable to execute a program in order to implement the previously described steps of the method.

[0026] Characteristics and advantages of the method and the remote control of the present invention will be apparent from the following description of an exemplary embodiment given by way of non-limitative example with reference to the attached drawings.

Brief description of the drawings

[0027]

- Figure 1 shows a schematic and perspective view of a remote control being realized according to the present invention;

- Figure 2 shows a schematic view of the essential electronic circuitry embedded in the remote control of figure 1;

- Figure 3 shows a view of a flowchart illustrating the steps of the method of the present invention;

- Figure 4 shows a further flowchart illustrating further realization steps of the method according to the invention;

- Figure 5 shows a view of a flowchart illustrating a particular code storing phase according to the method of the present invention.

Detailed description

[0028] With reference to those figures, and particularly to the example of figure 1, a remote control is schematically shown as a whole with 1, which will be defined in the following as "clone", being realized according to the present invention by duplicating an original remote control.

[0029] The clone remote control 1 includes a casing 2 being essentially parallelepiped-shaped with rounded corners and having a reduced thickness. The casing 2 contains and protects an electronic circuitry 3 including

a microprocessor 4, a memory 5, a transceiver 6 and a pair of antennas 7 and 8. More particularly, the memory 5 is integrated in the microprocessor 4.

[0030] The double antenna has the advantage of increasing the radio frequency range and thus the effective action distance with respect to the controlled device.

[0031] All the electronic circuitry 3 is supplied by a small direct current battery being inserted in the casing 2, but not represented in the drawings because conventional.

[0032] On the visible surface 9 of the casing 2 there are arranged few buttons among which: a control key or button 10, in order to control a main electrical device, a second programming key or button 11 and a third and fourth button 12, 13 in order to optionally control further electrical devices.

[0033] On each of the four keys or buttons, there is a corresponding embossed character in braille code, which eases its identification with the touch alone.

[0034] A signaling LED 14, being connected to the operation of the remote control 1 is also provided for.

[0035] The remote control 1 operates in radio frequency and, for this reason, in the following description it will be referred to using the term radio remote control.

[0036] The remote control 1 can also be defined as "universal", since it is capable to be used with a plurality of electrical devices to be controlled, particularly for a domotic use. Moreover, the remote control 1 is able to emulate the original remote controls being realized by a plurality of manufacturing companies, independently from their internal structure. Advantageously, according to the invention, the clone remote control is structured in order to automatically force the storing of his codes on the receiver of the main controlled electrical device, but without a direct intervention on that receiver.

[0037] More particularly, the emulation of the original remote control occurs after a learning procedure of the code of the original remote control, which in the following will be called copy procedure.

[0038] There are fixed code remote controls, namely transmitting the same code every pressing of the control key; for them the emulation occurs by making an exact copy of the radio code, characterized by the radio signal, the modulation and the working frequency. Instead, for the original variable code remote controls, namely those remote controls that change the transmitted code every pressing of the control key, the emulation of the original remote control occurs by making a similar copy of the radio code, being characterized by the same modulation and working frequency, but by a partially different radio code.

[0039] The method according to the invention initially provides for a procedure to be executed in order to put the clone remote control in "listening" mode and thus to be able to transmit to the clone remote control the same code and the same working frequency of the original remote control to be duplicated. The replication procedure as a whole is innovative with respect to the similar products currently on the market and is extremely more simple and comfortable for the user.

[0040] The main advantage of the method of the present invention is given in that it allows working with both free hands. Actually, in a different way from all the other solutions being proposed in the known art, after pressing the keys in the exact sequence provided for in the cloning step, the user can release all the keys without being forced to keep the "destination" key pressed, namely the key of the clone remote control which will duplicate the control function carried out by the original remote control to be duplicated.

[0041] In this way, it is possible to carry out all the duplication operation in a much more practical way and to decide for example on which key of the clone remote control to store the code being learnt during the duplication, by pressing the related key at the end of the procedure.

[0042] According to the method of the present invention, now it is possible to see which steps are to be carried out in order to activate the copy procedure.

[0043] Firstly, it was chosen to enable the copy procedure by asking the user to keep two keys pressed at the same time. More particularly, while keeping the top left control key 10 pressed, the second top right programming key 11 must be pressed for a preset number of times on the remote control 1.

[0044] The preset number of times has been chosen equal to four in order to avoid the accidentally start and enabling of the copy procedure. Other keys combinations are used in order to enable more specific copy procedures, which will be described later.

[0045] After releasing both the buttons 10 and 11, and activating the copy procedure, the LED 14 of the remote control 1 starts flashing slowly. At this point, the emitting end of an original remote control to be copied and the emitting end of the clone remote control of the present invention must be put near to each other and the desired key of the original remote control which is to be copied must be pressed.

[0046] In this first step, the clone remote control searches the frequency of the original remote control for about thirty seconds, while the LED 14 flashes slowly. After finding the working frequency, the code of the original remote control is stored by means of a code writing method being described in the following; at this point, the LED 14 starts flashing quickly in order to show that the code has been learnt.

[0047] Therefore, it is necessary to push the key of the clone remote control where it is desired to store said code. Not necessarily that key corresponds in number and order to the one of the original remote control.

[0048] All the procedure is illustrated in detail in the flowchart of figure 3.

[0049] In few cases, the remote control under consideration needs other information corresponding to a further pressing of the key of the original remote control or any other special key of the original remote control. In this case, the LED will flash with a double flashing in order

to signal the request for a further pressing.

[0050] For few original variable code remote controls, the clone remote control is able to recognize the type of variable code, and for these remote controls, the remote control 1 will generate a similar code to be stored directly or with an automatic procedure in the memory 5 being associated to the receiver 6. The variable codes generation occurs by means of proper algorithms being specific to each type of code. In all the other cases, it will be clone an identical copy of the original code.

[0051] Now, there will be described more in particular the modes by which the method of the present invention provides for writing the variable code acquired from the original remote control in the memory 5.

[0052] The mode substantially occurs in three steps.

[0053] In a first phase, n duration measurements are carried out of the high-low and low-high transitions performed by the received radio signal; in a second step, those measurements are processed and in a third phase a sampling of the code is carried out.

[0054] In the first measuring step, duration measurements are performed of n high-low and low-high transitions of the received radio signal; in this way the minimum and maximum duration values of these transitions are obtained. For the maximum duration of the transitions, the corresponding level of the radio signal is also stored.

[0055] In the second stage of processing, it is obtained the length of the period of the radio signal corresponding to the duration of the shorter transmission element. Moreover, the duration and the level of the pause corresponding to the duration and level of the longest transition is obtained.

[0056] In the third sampling phase the radio signal is sampled at different time instants, starting half a period after a transition and then continuing after each full period until the next transition from which it will be counted again half a period and so on.

[0057] Once obtained the samples sequence, it will be possible to recognize a known code called rolling-code, in order to realize a similar code, different in the serial number, or, on the contrary, it will be stored the code as it is.

[0058] All the procedure of recognizing and writing in memory the duplicate code is shown in detail in the flowchart of figure 4.

[0059] By pressing the key 10 of the remote control 1 where the duplicate radio code has been stored, it is obtained its ordinary transmission if the pressing time is less than eight seconds.

[0060] If instead the pressing time exceeds the eight seconds, the remote control 1 is programmed to turn off if the code is of a fixed or variable type that does not allow the automatic storing. The automatic storing procedure takes place if the code is of a variable type that allows the automatic storing.

[0061] Now, the automatic code storing procedure is described more in particular.

[0062] For the original variable code remote controls, the clone remote control 1 generates a code similar to the original, which is stored in the memory 5. This code must be stored also in the memory of the receiver of the controlled electrical device.

[0063] Actually, it is not possible to use the same code of the original remote control, because the two remote controls would interfere.

[0064] If the receiver of the controlled electrical device allows it, the storing procedure can automatically force the storing of the new code on the receiver, by generating for that purpose alternating old and new codes being transmitted in a sequence, called storing sequence, which is shown by way of example in the flowchart of figure 5.

[0065] The alternating old and new codes allow the receiver to understand that the sequence of received signals does not represent an ordinary activation command, but a sequence for programming and storing the new alternate variable code similar to the cloned code.

[0066] The storing sequence is activated by keeping the key 10 of the remote control under consideration pressed for eight seconds. The LED starts to flash quickly and the storing sequence is transmitted, after which the remote control turns off.

[0067] At this point, the variable code is stored also on the receiver of the controlled device.

[0068] Now, turning back to the recognizing procedure of the code called rolling-code, being previously outlined, it is appropriate to underline that it is a completely automatic procedure being carried out by the clone remote control 1.

[0069] More particularly, it is a function that allows the new universal clone radio remote control 1 to perform alone all the operative steps needed to be able to be recognized, and therefore used, by the electrical devices to be controlled.

[0070] As already mentioned, in contrast to the old and simpler fixed codes, the new generation remote controls use variable codes and almost all the remote control manufacturers use "Rolling-codes", which instead of replicating the same code each time the control key is pressed, emit a totally different one generated by an algorithm being preset on both the transmitter and the respective receiver.

[0071] In order to being able to duplicate a radio remote control operating with these modes, it would be necessary to perform a storing procedure on the receiver of the controlled electrical device that varies depending on the manufacturer.

[0072] Therefore, the clone remote control of the present invention includes a series of algorithms reproducing the storing sequences of the cloned variable codes for almost all the remote control manufacturers. Those sequences are automatically timed and executed each time a duplication is carried out of an original remote control using variable codes during transmission.

[0073] In other words, the sequence of steps shown in the flowchart of figure 5 is repeated for a series of se-

quences stored in the clone remote control 1 so that pressing the key being previously programmed according to the method of the invention, the step is autonomously activated which forces the storing of the new codes similar to those of the original remote control on the receiver of the controlled device.

[0074] Substantially, the clone remote control 1 continuously sends information being useful for its identification, and consequent use, based on the storing sequences contained in its memory and corresponding to almost all the remote control manufacturers.

[0075] In this way, errors by the final user are avoided and the accreditation step of the new clone remote control 1 with each electrical device to be controlled is much simplified.

[0076] It is clear that this fully automatic mode allows solving a problem that is considered as an obstacle when the identification function of the new clone remote control is managed by people that are totally lacking knowledge about the subject.

[0077] Thanks to this function, the final user must not know and be able to correctly carry out the insertion procedures in the respective receiver anymore. Until today, the difficulty was caused by each manufacturer applying its procedures, which are always different from brand to brand. With this innovation instead, they are perfectly and fully automatically and autonomously executed by the clone remote control, being unified in a single and simple prolonged pressing of the proper key.

Claims

1. Duplication method for a clone remote control (1) operating in radio frequency and capable to remotely control an electrical device by the pressure of at least one control key or button (10); said remote control comprising at least one memory (5), a transceiver (6) and a microprocessor (4) capable of executing a program for implementing the following steps:

   - enabling the clone remote control (1) to a duplication phase of said by pressing said control key (10) and simultaneously pressing a programming key (11) for a predetermined number of times;
   - releasing the said keys (10, 11);
   - approaching the emitting ends of an original remote to be duplicated and the clone remote control (1) in the duplicating phase;
   - pressing for a predetermined period of time a key of the original remote control, allowing said microprocessor (4) to receive via the transceiver (6) the working frequency and the code transmitted from the original remote control by means of a recognition and/or emulation procedure of the transmitted code;
   - pressing for a predetermined period of time a key of the clone remote control (1) to which assign the same function of said key of the original remote control;
   - storing in said memory (5) said working frequency, the recognized code and the assigned key;
   - starting an automatic storing procedure that provides for the transmission of predetermined sequences of recognized or emulated codes toward the electrical device to be controlled, said storing procedure automatically forcing the storing of the recognized or emulated code on a receiver of the electrical device to be controlled by generating alternating old and new codes being transmitted towards the electrical device to be controlled in a predetermined storing sequence; and
   - repeating said storing procedure for a plurality of storing sequences being stored in said memory (5) of said clone remote control (1) until said clone remote control (1) is recognized by said electrical device to be controlled.

2. Method according to claim 1 wherein said predetermined number of times is equal to four.

3. Method according to claim 1 in which an LED (14) of the clone remote control (1) clone flashes both during the storage phase of the transmitted code or during the assignment phase of the key having the same function, but with different flashing frequencies.

4. Method according to claim 1 wherein said step of storing in memory the recognized or emulated codes is implemented in three phases:

   - a first phase wherein n duration measurements are carried out of the high-low and low-high transitions performed by the received radio signal;
   - a second step wherein these measurements are processed; and
   - a third phase wherein a sampling of the code is carried out.

5. Method according to claim 4 wherein in said first measuring step duration n measurements are performed of the high-low and low-high transitions of the received radio signal obtaining the minimum and maximum duration values of these transitions.

6. Method according to claim 5 wherein for the maximum duration of the transitions the corresponding level of the radio signal is also stored.

7. Method according to claim 4 wherein in said second stage of processing it is obtained the length of the period of the radio signal corresponding to the dura-

tion of the shorter transmission element, as well as the duration and the level of the pause corresponding to the duration and level of the longest transition.

8. Method according to claim 4 wherein in said third sampling phase the radio signal is sampled at different time instants, starting half a period after a transition and then continuing after each full period until the next transition from which it will be counted again half a period and so on.

9. Method according to claim 1 wherein said recognition procedure provides for the subsequent initiation of a storing step in case the recognized code is a fixed code or an emulation phase of a variable rolling-type code having a serial number different from the recognized code.

10. Method according to claim 1, wherein said step of initiating said storing procedure is started by keeping said control key (10) pressed for a predetermined period of time.

11. Method according to claim 1, wherein said repeated storing sequences correspond to storing sequences of all the remote control manufacturers.

12. Remote control (1) comprising at least one control key or button (10), a memory (5), a transceiver (6), a pair of antennas (7, 8) associated to said transceiver (6) and a microprocessor (4) being configured to execute a computer program in order to implement the method steps of claim 1.

13. Remote control (1) according to claim 12, **characterized by** further including a programming key (11), a third key (12) and a fourth key (13) in order to optionally control further electrical devices.

14. Remote control (1) according to claim 12, **characterized in that** said memory (5) includes a plurality of storing sequences corresponding to storing sequences of all the remote control manufacturers.

Patentansprüche

1. Duplizierungsverfahren für eine Klonfernsteuerung (1), die in Hochfrequenz betrieben wird und in der Lage ist, ein elektrisches Gerät durch Druck auf mindestens eine Steuertaste oder einen Knopf (10) fernzusteuern; wobei die Klonfernsteuerung mindestens einen Speicher (5), einen Sendeempfänger (6) und einen Mikroprozessor (4) aufweist, der ein Programm zur Durchführung der folgenden Schritte ausführen kann:

- Ermöglichen einer Duplizierungsphase der Klonfernsteuerung (1) durch Drücken der Steuertaste (10) oder des Knopfes und durch gleichzeitiges Drücken einer Programmiertaste (11) für eine vorbestimmte Anzahl von Malen;
- Freigeben dieser Tasten (10, 11);
- Annähern der sendenden Enden einer originalen Fernsteuerung, die dupliziert werden soll, und der Klonfernsteuerung (1) in der Duplizierungsphase;
- Drücken für eine vorbestimmte Zeitspanne einer Taste der originalen Fernsteuerung, und Ermöglichen, dass der Mikroprozessor (4) über den Sendeempfänger (6) die Sendefrequenz und den von der originalen Fernsteuerung gesendeten Code mittels einer Erkennungs- und / oder Emulationsprozedur des gesendeten Codes erkennen kann;
- Drücken für eine vorgegebene Zeitspanne einer Taste der Klonfernsteuerung (1), um dieser Taste die gleiche Funktion der genannten Taste der originalen Fernsteuerung zuzuordnen;
- Speichern der Sendefrequenz, des erkannten Codes und der zugeordneten Taste in dem Speicher (5);
- Starten eines automatischen Speichervorgangs, der die Übertragung von vorbestimmten Sequenzen von erkannten oder emulierten Codes zu dem zu steuernden elektrischen Gerät ermöglicht,

dadurch gekennzeichnet, dass dieser Speichervorgang automatisch die Speicherung des erkannten oder emulierten Codes auf einem Empfänger des zu steuernden elektrischen Gerätes erzwingt, indem alternierende alte und neue Codes erzeugt werden, die in einer vorbestimmten Speichersequenz zu dem zu steuernden elektrischen Gerät übertragen werden; und

- Wiederholen des Speichervorgangs für eine Vielzahl von Speichersequenzen, die in dem Speicher (5) der Klonfernsteuerung (1) gespeichert sind, bis die Klonfernsteuerung (1) von dem zu steuernden elektrischen Gerät erkannt ist.

2. Verfahren nach Anspruch 1, wobei die vorbestimmte Anzahl von Malen gleich vier ist.

3. Verfahren nach Anspruch 1, bei dem eine LED (14) der Klonfernsteuerung (1) sowohl während der Speicherphase des gesendeten Codes als auch während der Zuordnungsphase der Taste mit der gleichen Funktion blinkt, aber mit unterschiedlichen Blinkfrequenzen.

4. Verfahren nach Anspruch 1, wobei der genannte Schritt des Speicherns der erkannten oder emulierten Codes in drei Phasen implementiert wird:

- eine erste Phase, in der n Messungen der Dauer der Hoch-Tief- und der Tief-Hoch-Übergänge durchgeführt werden, die das empfangene Funksignal durchführt;
- ein zweiter Schritt, in dem diese Messungen verarbeitet werden; und
- eine dritte Phase, in der eine Abtastung des Codes durchgeführt wird.

5. Verfahren nach Anspruch 4, wobei in dem genannten ersten Schritt der Messungen n Messungen der Dauer der Hoch-Tief- und der Tief-Hoch-Übergänge des empfangenen Funksignals durchgeführt werden, um Werte für eine Minimaldauer und eine Maximaldauer dieser Übergänge zu erhalten.

6. Verfahren nach Anspruch 5, wobei für die maximale Dauer der Übergänge auch der entsprechende Pegel des Funksignals gespeichert ist.

7. Verfahren nach Anspruch 4, wobei in dem genannten zweiten Schritt der Verarbeitung die Länge der Periode des Funksignals entsprechend der Dauer des kürzeren Übertragungselements sowie die Dauer und der Pegel der Pause entsprechend der Dauer und des Pegels des längsten Übergangs erhalten werden.

8. Verfahren nach Anspruch 4, wobei in der dritten Abtastphase das Funksignal zu unterschiedlichen Zeitpunkten abgetastet wird, wobei eine halbe Periode nach einem Übergang begonnen und dann nach jeder vollen Periode bis zum nächsten Übergang fortgefahren wird, von dem aus es wieder eine halbe Periode gezählt wird und so weiter.

9. Verfahren nach Anspruch 1, wobei die Erkennungsprozedur die nachfolgende Initialisierung eines Speicherschrittes, falls der erkannte Code ein fester Code ist, oder eine Emulationsphase eines variablen Codes vom Rolling-typ mit einer von dem erkannten Code verschiedenen Seriennummer vorsieht.

10. Verfahren nach Anspruch 1, wobei der Schritt der Initialisierung der Speicherprozedur gestartet wird, indem die Steuertaste (10) für eine vorgegebene Zeitspanne gedrückt gehalten wird.

11. Verfahren nach Anspruch 1, wobei die wiederholten Speichersequenzen den Speichersequenzen aller Fernsteuerungshersteller entsprechen.

12. Fernsteuerung (1) mit mindestens einer Steuertaste oder einem Knopf (10), einem Speicher (5), einem Sendeempfänger (6), einem dem Sendeempfänger (6) zugeordneten Paar Antennen (7, 8) und einem Mikroprozessor (4), der dazu ausgebildet ist, ein Computerprogramm auszuführen, um die Verfahrensschritte des Anspruchs 1 zu implementieren.

13. Fernsteuerung (1) nach Anspruch 12, **dadurch gekennzeichnet, dass** sie ferner eine Programmiertaste (11), eine dritte Taste (12) und eine vierte Taste (13) aufweist, um gegebenenfalls weitere elektrische Geräte zu steuern.

14. Fernsteuerung (1) nach Anspruch 12, **dadurch gekennzeichnet, dass** der Speicher (5) eine Vielzahl von Speichersequenzen aufweist, die den Speichersequenzen aller Fernsteuerungshersteller entsprechen.

Revendications

1. Procédé de duplication d'une télécommande clone (1) fonctionnant par radiofréquence et capable de commander à distance un dispositif électrique par l'enfoncement d'au moins une touche ou un bouton de commande (10) ; ladite télécommande clone comprenant au moins une mémoire (5), un émetteur-récepteur (6) et un microprocesseur (4) capable d'exécuter un programme de mise en œuvre des étapes suivantes :

- l'activation de la télécommande clone (1) dans une phase de duplication en appuyant sur ladite touche de commande (10) et en appuyant simultanément sur une touche de programmation (11) un nombre de fois prédéterminé ;
- le relâchement desdites touches (10, 11) ;
- le rapprochement des extrémités émettrices d'une télécommande d'origine devant être dupliquée et de la télécommande clone (1) lors de la phase de duplication ;
- l'enfoncement pendant une période de temps prédéterminée d'une touche de la télécommande d'origine, ce qui permet audit microprocesseur (4) de recevoir via l'émetteur-récepteur (6) la fréquence de travail et le code transmis depuis la télécommande d'origine à l'aide d'une procédure de reconnaissance et/ou d'émulation du code transmis ;
- l'enfoncement pendant une période de temps prédéterminée d'une touche de la télécommande clone (1) pour attribuer à celle-ci la même fonction que ladite touche de la télécommande d'origine ;
- le stockage dans ladite mémoire (5) de ladite fréquence de travail, du code reconnu et de la touche attribuée ;
- le démarrage d'une procédure de stockage automatique qui permet la transmission de séquences prédéterminées de codes reconnus ou émulés vers le dispositif électrique devant être commandé,

caractérisé en ce que ladite procédure de stockage entraîne automatiquement le stockage du code reconnu ou émulé sur un récepteur du dispositif électrique devant être commandé par la génération en alternance de codes anciens et nouveaux transmis vers le dispositif électrique devant être commandé dans une séquence de stockage prédéterminée ; et

- la répétition de ladite procédure de stockage pendant une pluralité de séquences de stockage stockées dans ladite mémoire (5) de ladite télécommande clone (1) jusqu'à ce que ladite télécommande clone (1) soit reconnue par ledit dispositif électrique devant être commandé.

2. Procédé selon la revendication 1 dans lequel ledit nombre prédéterminé de fois est égal à quatre.

3. Procédé selon la revendication 1 dans lequel une DEL (14) de la télécommande clone (1) clignote à la fois au cours de la phase de stockage du code transmis ou au cours de la phase d'attribution de la touche ayant la même fonction, mais avec des fréquences de clignotement différentes.

4. Procédé selon la revendication 1 dans lequel ladite étape de stockage dans la mémoire des codes reconnus ou émulés est mise en œuvre au cours de trois phases :

- une première phase dans laquelle n mesure de durée est réalisée à partir des transitions haut-bas et bas-haut effectuées par le signal radio reçu ;
- une deuxième étape dans laquelle ces mesures sont traitées ; et
- une troisième phase au cours de laquelle un échantillonnage du code est réalisé.

5. Procédé selon la revendication 4 dans lequel au cours de ladite première étape de mesure, n mesure de durée est effectuée à partir des transitions haut-bas et bas-haut du signal radio reçu pour obtenir les valeurs de durée minimales et maximales de ces transitions.

6. Procédé selon la revendication 5, dans lequel pendant la durée maximale des transitions, le niveau correspondant du signal radio est également stocké.

7. Procédé selon la revendication 4, dans lequel lors du ledit second stade de traitement, est obtenue la longueur de la période du signal radio correspondant à la durée de l'élément de transmission plus court, ainsi que la durée et le niveau de la pause correspondant à la durée et au niveau de la transition la plus longue.

8. Procédé selon la revendication 4, dans lequel lors de ladite troisième phase d'échantillonnage, le signal radio est échantillonné à différents instants, en partant d'une demi-période après une transition et en continuant ensuite après chaque période pleine jusqu'à la transition suivante à partir de laquelle sera à nouveau comptée une demi-période, et ainsi de suite.

9. Procédé selon la revendication 1, dans lequel ladite procédure de reconnaissance permet le lancement consécutif d'une étape de stockage dans le cas où le code reconnu est un code fixe ou une phase d'émulation d'un code de type évolutif variable ayant un numéro de série différent du code reconnu.

10. Procédé selon la revendication 1, dans lequel ladite étape de lancement de ladite procédure de stockage est démarrée en maintenant ladite touche de commande (10) enfoncée pendant une période de temps prédéterminée.

11. Procédé selon la revendication 1, dans lequel lesdites séquences de stockage répétées correspondent aux séquences de stockage de tous les fabricants de télécommandes.

12. Télécommande (1) comprenant au moins une touche ou un bouton de commande (10), une mémoire (5), un émetteur-récepteur (6), une paire d'antennes (7, 8) associées audit émetteur-récepteur (6) et un microprocesseur (4) configuré pour exécuter un programme informatique afin de mettre en œuvre les étapes du procédé selon la revendication 1.

13. Télécommande (1) selon la revendication 12, **caractérisée en ce qu'**elle inclut également une touche de programmation (11), une troisième touche (12) et une quatrième touche (13) afin de commander éventuellement d'autres dispositifs électriques.

14. Télécommande (1) selon la revendication 12, **caractérisée en ce que** ladite mémoire (5) inclut une pluralité de séquences de stockage correspondant aux séquences de stockage de tous les fabricants de télécommande.

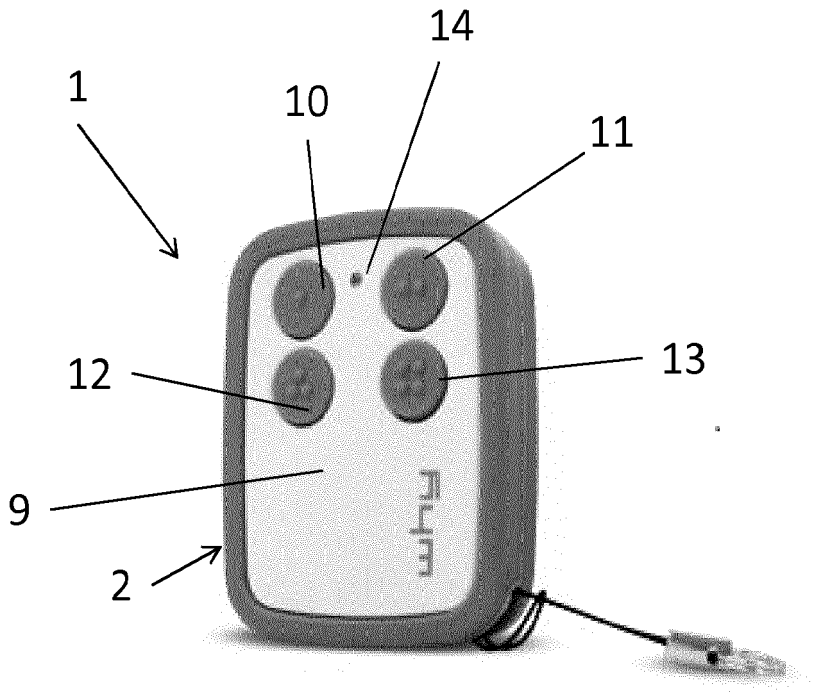

Fig. 1

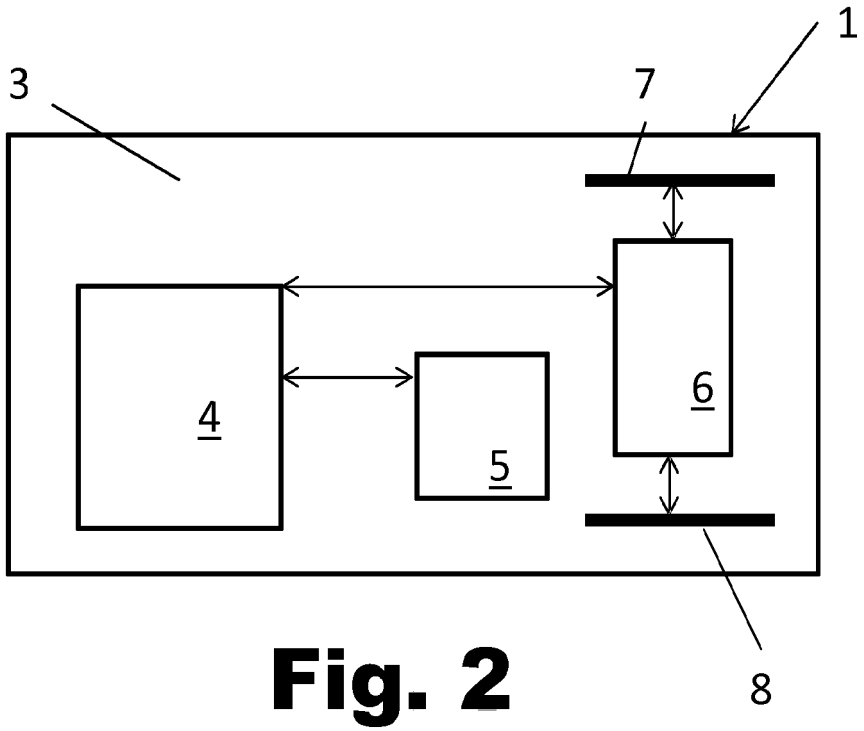

Fig. 2

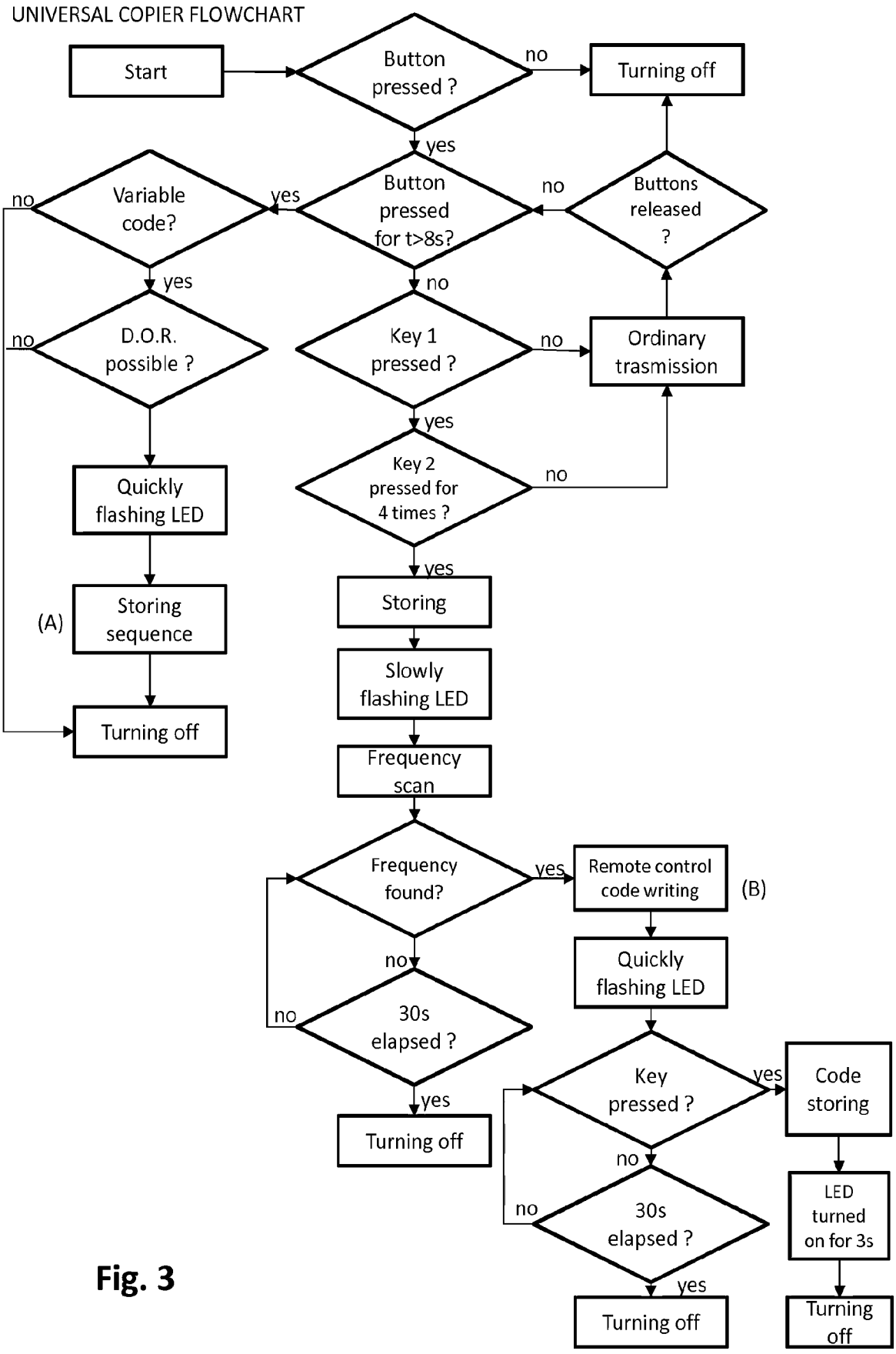
UNIVERSAL COPIER FLOWCHART
Start
Button pressed ?
no
Turning off
yes
Button pressed for t>8s?
no
Buttons released ?
yes
Variable code?
no
yes
D.O.R. possible ?
no
yes
Key 1 pressed ?
no
Ordinary trasmission
yes
Key 2 pressed for 4 times ?
no
yes
Quickly flashing LED
(A)
Storing sequence
Turning off
Storing
Slowly flashing LED
Frequency scan
Frequency found?
yes
Remote control code writing
(B)
no
Quickly flashing LED
no
30s elapsed ?
yes
Turning off
Key pressed ?
yes
Code storing
no
LED turned on for 3s
no
30s elapsed ?
yes
Turning off
Turning off

Fig. 3

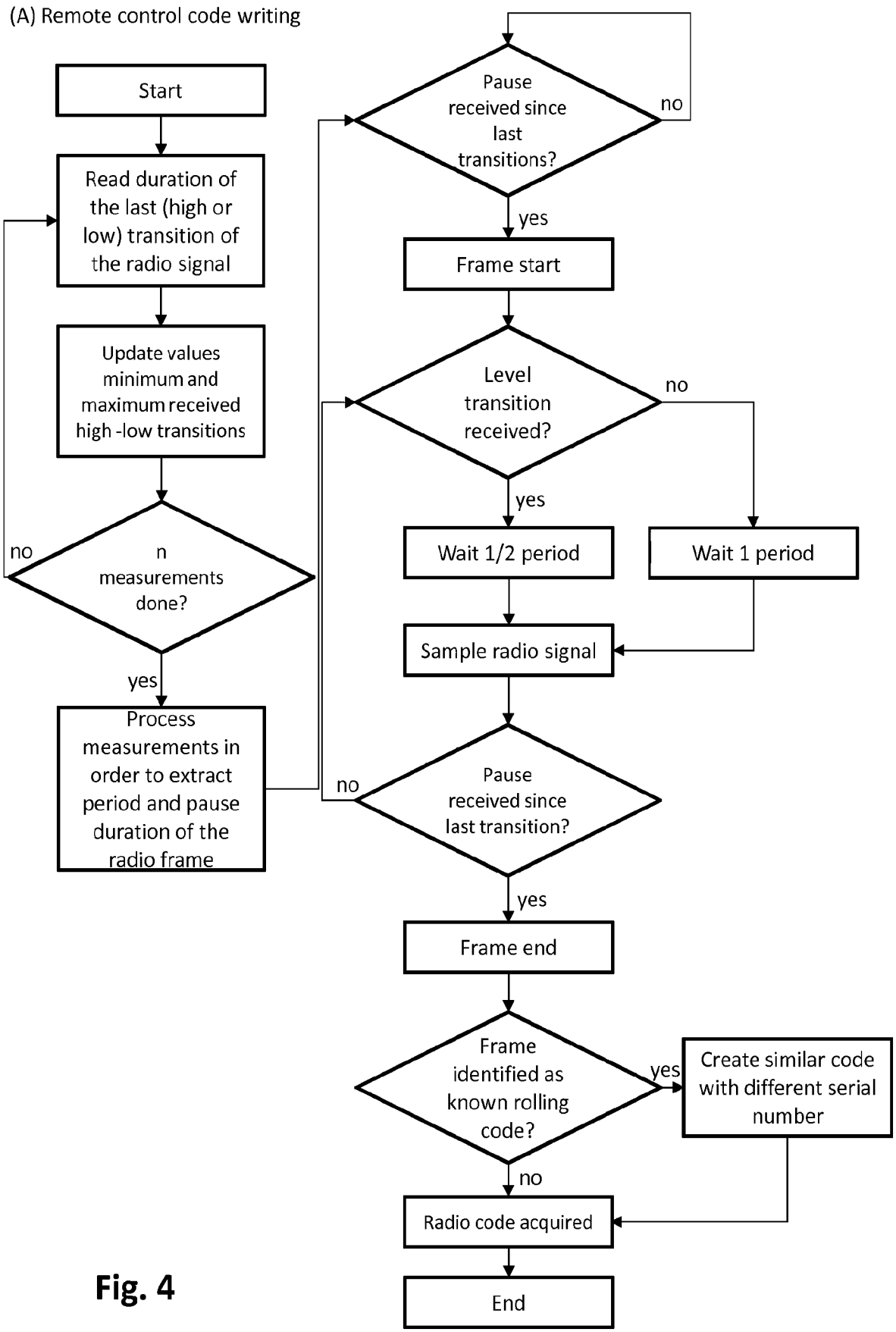
(A) Remote control code writing
Start
Read duration of the last (high or low) transition of the radio signal
Update values minimum and maximum received high -low transitions
n measurements done?
no
yes
Process measurements in order to extract period and pause duration of the radio frame
Pause received since last transitions?
no
yes
Frame start
Level transition received?
no
yes
Wait 1/2 period
Wait 1 period
Sample radio signal
Pause received since last transition?
no
yes
Frame end
Frame identified as known rolling code?
yes
Create similar code with different serial number
no
Radio code acquired
End

Fig. 4

(B) Storing sequence

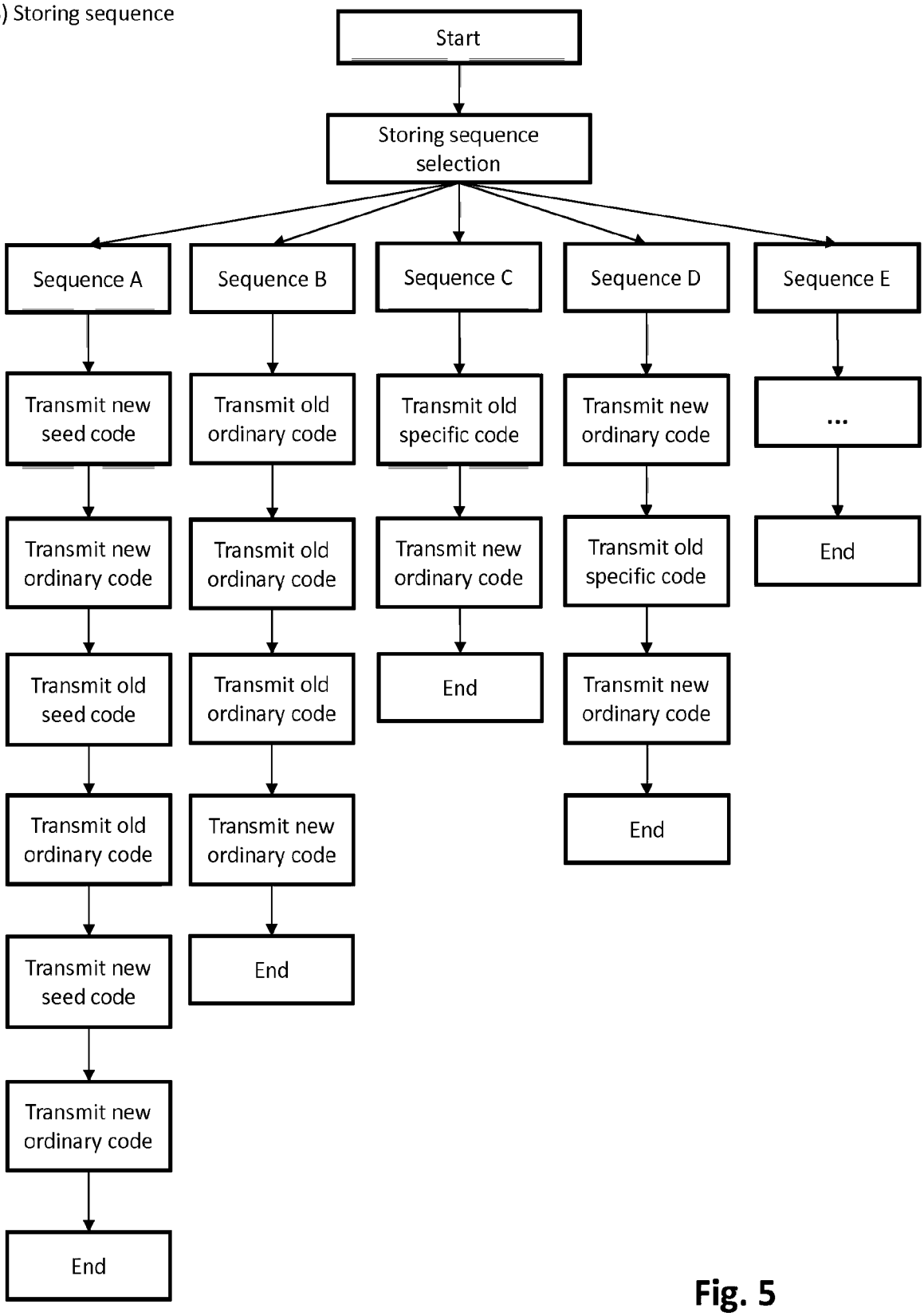

Fig. 5

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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