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(71) Applicant: **Mastì S.r.l.**
31015 Conegliano (TV) (IT)

(72) Inventor: **AGOSTINETTO, Daniele**
31010 Farra di Soligo (TV) (IT)

(74) Representative: **Mincone, Antimo**
Viale Europa 101
50126 Firenze (IT)

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(54) **METHOD FOR DUPLICATING A REMOTE CONTROL AND REMOTE CONTROL OBTAINED WITH THE SAME METHOD**

(57) The invention relates to a method for duplicating a remote control and to a remote control obtained with this method; according to the method, a clone remote control (1) provided with a first series of buttons (10, 11, 12, 13) and at least one signalling device (14) is configured so as to memorize in the first series of buttons (10, 11, 12, 13) a number of signals to be emitted correspond-

ing to the signals emitted by an original remote control (2) by means of a second series of buttons (20, 21, 22, 23); the method is characterized in that the clone remote control (1) is provided with a resident program capable of memorizing the signals on the buttons based on instructions received by pressing a single button (10) of the first series of buttons (10, 11, 12, 13).

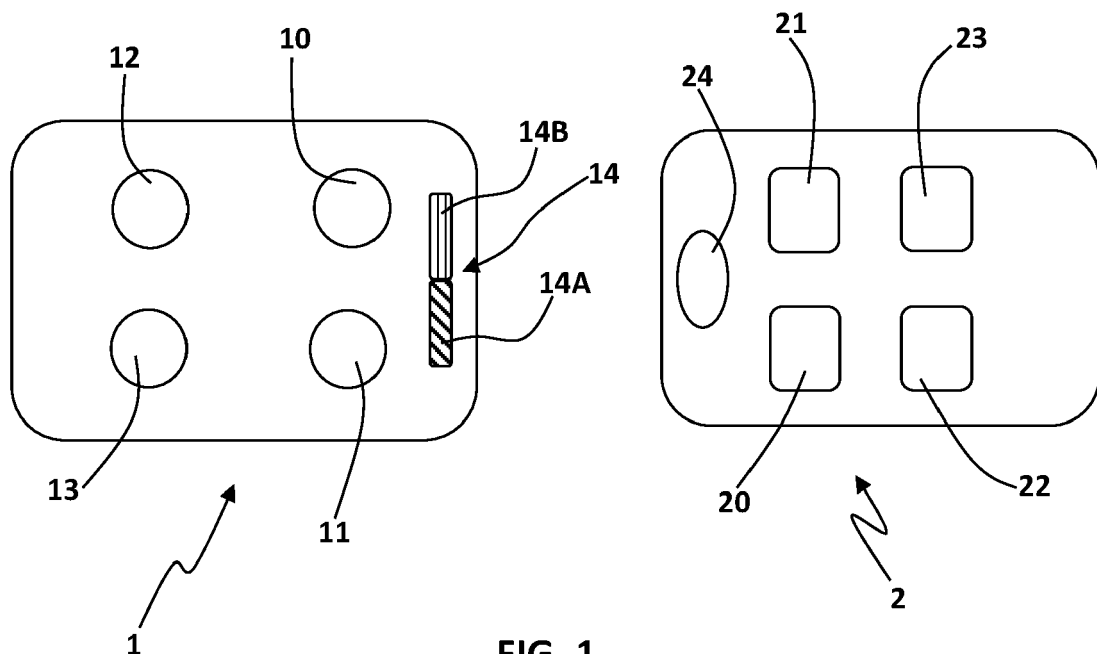


FIG. 1

Description

[0001] The present invention belongs in the technical field of remote controls.

[0002] The invention relates to a method for duplicating a remote control that operates in radio frequency and a remote control obtained with the concerned method.

[0003] One of the first examples of remote control is described in US613809A in the name of N. Tesla of 1898, relating to a device for remotely controlling a vessel. Since then the technology has continuously and significantly developed and substantially all the equipment can be controlled remotely.

[0004] One of the problems related to remote control concerns the methods of duplicating remote controls.

[0005] The operations necessary for duplicating remote controls have been simplified thanks to procedures that have made this operation quick and easily achievable even by medium-skilled operators.

[0006] Remote control duplication methods are described in US2008/068205A1, EP3089134A1, US2017/245097A1, WO2021/260745A1. Reading these documents therefore provides a reference to the state of the art of the present invention.

[0007] The methods for duplicating a remote control generally involve "copying" the codes that characterize the signals emitted by the remote control to be duplicated onto a new remote control, called "clone".

[0008] Throughout this description, the term "clone remote control" will be used to identify the new remote control on which to copy the codes, while the term "original remote control" will identify the remote control to be duplicated.

[0009] The methods currently in use differ from each other in the sequence of phases to be performed during the duplication procedure; for example, the methods described in EP3089134A1 and WO2021/260745A1 involve pressing at least two buttons on the clone remote control.

[0010] Among the purposes of the present invention is to allow the duplication of the remote control by pressing a single button on the clone remote control, thus simplifying the procedure by adopting the idea of creating a method having the features indicated in claim 1. Other innovative features are subject of the dependent claims.

[0011] Among the advantages offered by the present invention it is possible to list the following: the duplication procedure is extremely simplified and is easy to understand even by non-specialised operators, also because it does not require any specific expertise in the subject; it is possible to duplicate the remote control using a single button on the clone remote control and, correspondingly, a single button on the original remote control; the components (hardware) that equip the clone remote control are substantially comparable to those of the usual configuration and therefore the times and costs of manufacturing the components determine an optimal cost/benefit ratio; once duplicated, the clone remote control can be

reprogrammed; once duplicated, the clone remote control retains its characteristics over time; in an embodiment of the invention, the clone remote control can independently verify the correctness of the copy without the intervention of an external analyzing device.

[0012] These and further advantages and features of the present invention will be more and better understood by every person skilled in the art thanks to the following description and the attached drawings, provided by way of example but not to be considered in a limiting sense, in which:

- Fig. 1 is a schematic representation of a possible configuration of two remote controls during duplication;
- Fig.2 shows a possible example of creating a "clone" remote control in accordance with the present invention.

[0013] With reference to the attached drawings, a remote control (1) that can be used as a "clone" in accordance with the invention is of the type comprising a central unit (UC) equipped with a processor (P) and a memory (M); the central unit (UC) is powered by a battery (B) and is connected to a transceiver (RT) connected to an antenna (A).

[0014] The central unit (UC) houses a software program capable of managing the activities and functions of the remote control (1) based on a series of instructions that can be stored in the memory (M). The antenna (A) can be made in different ways and has the purpose of allowing the bidirectional exchange of data between the remote control (1) and the relevant remote control to be copied (2) or the remote device to be controlled.

[0015] The remote control (1) is provided with a first plurality of buttons (10, 11, 12, 13) and a signalling device (14), for example of a luminous type. The signalling device (14) can consist of one or more LEDs capable of emitting light signals of at least two types, for example green and red. In the example of Fig. 1 the reference (14A) indicates a green LED and the reference (14B) indicates a red LED.

[0016] The signalling device (14) can be of the luminous and/or acoustic type; in practice, the central unit (UC), through the signalling device (14) is able to emit a signal relating to a corresponding status or function of the remote control, using differences in the emission methods. In the case of a light indicator, the different states or functions of the remote control can be indicated by means of different colours and/or continuity or discontinuity of the emitted signal, by one or more LEDs. In the case of a sound signal, the differentiations may be related, for example, to the tone of the signal and/or to its continuity or discontinuity.

[0017] The original remote control to be copied (2) is equipped, in a manner essentially corresponding to the clone remote control (1), with a second plurality of buttons (20, 21, 22, 23) and a signalling device (24), e.g. of the

light type.

[0018] Some procedures for duplicating a remote control according to the present invention will be described below.

[0019] Advantageously, the duplication method can implement four different procedures, which in the present description will be identified with: procedure A "ordinary copy", procedure B "identical copy", procedure C "fixed code copy" and procedure D "copy on all buttons".

[0020] All the different procedures can be carried out using a single button, such as, for example, the one marked with (10) in Fig.1.

[0021] Procedure A or "ordinary copy" involves the assignment of a code equal to the original for fixed codes, and a code with the same algorithm and a different drawn serial for rolling codes.

[0022] Procedure A involves, initially, pressing the button where is intended to store once, as if it is wanted to transmit; this determines the activation of the signalling device. As soon as the signalling device is deactivated, simply the original remote control (2) is brought closer to the clone remote control (1) and pressing the button to be copied on the original remote control (2). Upon learning, the signalling device will send a first signal.

[0023] By way of example, using the references in Fig.1, procedure A can start by pressing the button (10) only once; at this point the LED (14A) will emit a green light; when the green light turns off the clone remote control (1) will be ready to receive a code to be memorized through the signal received from the original remote control (2) on which the button (20) was pressed to which the button (10) is to correspond of the clone remote control (1). Pressing the button (20) will therefore determine the memorization of the desired code in correspondence with the button (10), with the emission by the clone remote control (1) of the said first signal which can consist, for example, of the switching on of the LED (14B) with steady red light.

[0024] To activate the procedure, the button (10) of the clone remote control (1) is pressed for a time substantially comparable to that of normal use to control a remote device, i.e. for a minimum time of a few hundredths of a second; by way of example, a minimum value of 40 ms can be pre-established in order to also guarantee the so-called "anti-bounce of the button", i.e. any improper activations due to vibrations and transients in the mechanics of the button.

[0025] A time limit or an upper limit (v_{max}) can be provided for the period of time the button is pressed; this time limit can be set equal to the time after which the remote control switches off for fixed codes and rolling codes that do not allow SAM, or the start of sending the SAM procedure for rolling codes that do allow it. The SAM procedure is described later in this document. In both cases, if the button (10) is pressed for a period exceeding this maximum value (v_{max}), the duplication procedure does not take place.

[0026] As mentioned previously, pressing the button

(10) causes the indicator (14) to turn on, i.e. the LED to turn on. At the end of the radio transmission, which occurs approximately 1 second after the start of pressing the button if it was released in less than 1 s, or upon release of the button itself if it was pressed for more than 1 second, the LED turns on turns off. When the LED turns off, a waiting time (t_a) begins to count. Turning off the LED basically signals the end of the radio transmission: if the button is pressed for a period of less than 1 second, the transmission is extended up to 1 second because otherwise the remote device may not activate, while if it is pressed for a longer period, the transmission is interrupted because the user could use the so-called "dead man" mode, according to which a function/activity is activated on the remote device only for the entire time the button is pressed and then turns off immediately at the end of the pressure. A time value of 1 or 2 seconds can be conveniently defined as the waiting time (t_a), i.e. the period of time within which a subsequent press of the button causes the activation of one of the procedures previously identified as B, C and D. The next press can occur even when the LED is still lit, if the button was released in less than 1 second. Each subsequent press causes the period to be recounted.

[0027] Using the periods indicated above as an example, once the button (10) has been pressed for the first time, the absence of a second press before the waiting time (t_a) has elapsed determines the start of procedure A while the second press of the button causes the start of procedure B.

[0028] Similarly, after the second press of the button (10) the period (t_a) of 1 second is counted again to establish the start of procedure B in the absence of a third press or the start of procedure C if the third press occurs within the pre-established time (t_a).

[0029] Subsequently, after the third press of the button (10), the period of 1 second is counted again to establish the start of procedure C in the absence of a fourth press or the start of procedure D if the fourth press occurs within the pre-established time.

[0030] As mentioned previously, the "waiting period" (t_a) which determines the time for which the program waits for a subsequent pressure or the absence of pressure, can advantageously correspond to the period of activation of the LED (14).

[0031] A minimum time can also be foreseen between two successive presses of the button to avoid or at least drastically reduce errors due to any improper activations due to vibrations and transients in the mechanics of the button; a period (v_{min}) of 40 ms can be used.

[0032] After the procedure choice phase, i.e., again with reference to the example, after one, two, three or four presses of the button (10) and after the waiting time (t_a) has passed, the program waits to receive a signal radio for a second pre-established period, for example 6 seconds, to copy according to the received signal; in the absence of a received signal, the remote control (1) returns to the "sleep" state. The second pre-established

period can be adjusted according to the characteristics of the remote control and the duplication times; for example, it can be set to a variable value between 5 and 20 seconds.

[0033] In this description reference has been made to the button (10) but the procedure can also be started using the other buttons.

[0034] As expressed above, a method implemented in accordance with the present invention also provides a procedure for identical copying, a procedure identified as B in the present description. The identical copy determines the configuration of a clone remote control (1) which is the same as the original for fixed codes, with the same algorithm and the same serial for rolling codes. This type of copy can be used to replace the original or for particular uses such as, for example, the remote control known as "V2".

[0035] The identical copy procedure B involves pressing the button on the clone remote control (1) where is intended to store a code twice in succession; as soon as the signalling device is deactivated (the LED goes off), simply bringing the remote control to be copied closer (2) and pressing the button whose emitted signal is to be copied. Once learning has taken place, the signalling device will emit a second signal.

[0036] By way of example, using the references in Fig.1, procedure B can start by pressing the button (10) twice in succession; at this point the LED (14A) will emit a green light; when the green light turns off the clone remote control (1) will be ready to receive a code to be memorized through the signal received from the original remote control (2) on which the button (20) was pressed to which the button (10) is to correspond of the clone remote control (1). Pressing the button (20) will therefore determine the memorization of the desired code in correspondence with the button (10), with the emission by the clone remote control (1) of the said second signal which can consist, for example, of the switching on of the LED (14) with fixed red light (14B) and fixed green light (14A) together.

[0037] The present method also includes the fixed code copy procedure, also called procedure C in this description; procedure C assigns a code equal to the original for fixed codes, and assigns the same algorithm and the same serial and rolling code as the original and does not change subsequently for rolling codes; this type of procedure can be used for particular uses.

[0038] The fixed code copying procedure C involves pressing the button on the clone remote control (1) where it is intended to store a code three times in a row; as soon as the signalling device is deactivated (the LED goes off), simply bringing the remote control to be copied closer (2) and pressing the button whose emitted signal is to be copied. Once learning has occurred, the signalling device will emit a third signal.

[0039] By way of example, using the references in Fig.1, procedure C begins by pressing the button (10) three times in succession; at this point the LED (14A) will

emit a green light; when the green light turns off the clone remote control (1) will be ready to receive a code to be memorized through the signal received from the original remote control (2) on which the button (20) was pressed to which the button (10) is to correspond of the clone remote control (1). Pressing the button (20) will therefore determine the memorization of the desired code in correspondence with the button (10), with the emission by the clone remote control (1) of the said third signal which can consist, for example, of the switching on of the fixed green LED (14A).

[0040] This method also includes the copy on all buttons procedure, also called procedure D in this description; procedure D for some types of remote control (such as, for example, those known by the names or brands Nice Flor S, Nice One, SomfyKeygo, Sommer, Cardin S449) is able to copy all the buttons of the clone remote control (1) emulating the corresponding buttons on the original remote control (2); for other types of remote control this procedure copies only the pressed button.

[0041] Procedure D for copying all keys involves pressing the button in which is intended to store a code four times in a row on the clone remote control (1); as soon as the signalling device is deactivated (the LED goes off), simply bringing the remote control to be copied closer (2) and pressing the button whose emitted signal is to be copied.

[0042] As expressed previously, the reference to button (10) was made as an example and starting the procedure is also possible using the other buttons. Even for the copying procedure of all the codes it is sufficient to press the same button four times in succession to activate the relevant procedure.

[0043] Generally, the clone remote control (1) recognizes for rolling codes which button is pressed on the original remote control (2). Only particular cases are excluded and, in any case, not included among those that allow copying on all buttons. In other words, the clone remote control (1) is able to identify the algorithm and the button of the original rolling remote control used for copying to all the buttons. For the four-button copy to be successful, is sufficient the pressing of any button on the original remote control (2), even if the number of the button pressed on the original remote control (2) does not coincide with the number of the button previously pressed on the clone remote control (1). It is precisely the software resident on the clone remote control (1) that manages to identify the algorithm of the remote control (2) via the signal received from the latter.

[0044] Once learning has occurred, the signalling device will emit a fourth signal.

[0045] Again using the references in Fig.1, procedure D begins by pressing the button (10) four times in succession; at this point, the LED (14A) will emit a green light; when the green light turns off, the clone remote control (1) will be ready to receive, in the case of remote controls of the aforementioned type to be copied, a signal that allows all the buttons of the original remote control

to be stored on the clone remote control; in practice, through the signal received from the original remote control (2) on which a pre-established button (20) has been pressed, it is possible to consequently instruct the software of the clone remote control (1) to program the memorization of all the buttons. Pressing the button (20) will therefore determine the memorization on all the buttons (10, 11, 12, 13) of the clone remote control (1), with the subsequent emission by the same remote control (1) of said fourth signal which can be consisting, for example, of the LED flashing green (14A).

[0046] If a copy error is detected, the signalling device will output a fifth signal or error signal. This signal can consist of the turning on of flashing red LEDs (14B).

[0047] There are various conditions that can cause an error. A possible but not exclusive cause can be found in a radio signal with pulses that are too short (e.g. < 50 μ s), not normally used for a radio control, or, for rolling codes, a failure of the decoding routine which suggests data received incorrectly, or an unstable radio signal resulting in it being corrupted during one of the acquisition procedures, etc. Advantageously, in addition to allowing the programming of the clone remote control (1) with the consequent possibility of memorizing on its buttons (10, 11, 12, 13) a plurality of commands corresponding to those given with the relevant buttons (20, 21, 22, 23) of the original remote control (2), the method of the present invention also allows the operator who is carrying out the duplication to be informed about the phases that must be carried out subsequently.

[0048] In practice, based on the signal emitted by the clone remote control (1), instead of using the second signal emitted to indicate which type of duplication was used among procedures A, B, C or D, the user receives an instruction on the next steps to follow to complete the duplication procedure.

[0049] For example, if following the emission of said second signal, with the fixed red light (14B) turning on, the user must manually memorize the remote control on the control unit; this is when the control unit to which the remote control is connected (14B) does not allow self-storage for rolling-code codes cloned with a code different from the original.

[0050] In the case of emission of the second signal, corresponding to the fixed red light (14B) and fixed green light (14A) together, the user will be able to carry out the self-memorization procedure on the control unit (the so-called "SAM", or "Smart Auto Memorizing") for rolling-code codes cloned with a serial number different from the original since the control unit generally allows self-storage for them.

[0051] The emission of the third signal, corresponding to the fixed green light of fixed code copying procedure C, indicates that the remote control is already functioning on the control unit; this option is valid for all fixed codes and all rolling-code codes cloned with a serial number different from the original whose control unit automatically activates with the copied remote control (for exam-

ple those known by the names Faac XT, Genius XT, Jcm Go, BFT). This signal is also activated in all cases in which an identical copy has been requested, since the copied remote control already works on the receiver.

[0052] The fourth signal, corresponding to the flashing green light (14A), is activated when copying has been requested on all buttons. The user will have to memorize the remote control on the control unit with the SAM procedure.

[0053] If the fifth signal is emitted (red light 14B flashing) the user is informed of the presence of a copy error.

[0054] As indicated among the advantages of the present invention, the clone remote control (1) can independently verify the correctness of the copy without the intervention of an external analyzing device.

[0055] A possible error in remote control duplication procedures could be caused by possible disturbances during remote control copying when the button is released after a transmission; these disturbances, which could overwrite the code stored by the user, may be due, for example, to a mobile phone or another remote control which, being in the area where the duplication is carried out, causally transmits due to an inadvertent pressing of a button .

[0056] To remedy this possible inconvenience, the copying phases would take place as in the example described below.

[0057] As foreseen by the procedure object of the present invention, initially the user presses the button as if he were to make a transmission and upon release the remote control enters into copy and accepts any remote control to be copied which transmits at close range, for a maximum time of approximately 6 seconds. Once the radio signal has been received and decoded, the LED (14) will emit an appropriate signal.

[0058] At this point the copying procedure, which up to this point coincides with what was described previously, differs in that it requires a request to press the button where it is to be stored the copy on the remote control: this would ensure that the action is voluntary.

[0059] In other words, the remote control duplication procedure is always carried out by pressing a single button and, based on the number of subsequent presses performed, it is possible to differentiate the duplication procedures and, following the choice of the procedure and its execution, involves an additional verification phase which consists in pressing the button on which to copy the code.

[0060] A further drawback which is resolved by the present invention relates to poorly executed copies, which give rise to non-functioning code. This inconvenience may be due, for example, to an imperfect radio signal for which some remote controls are particularly sensitive. The verification of cloned remote controls has so far been carried out using special devices which have a radio reception area in which to expose the signal of the copied remote control and that of the original remote control in succession, to carry out a verification of the

correctness of the copy, communicating the results via a display or via a connected computer. According to a possible embodiment of the present invention, it is possible to carry out the check directly on the remote control. This solution involves using two different signals to express the concept of "correct" (for example green LED or steady LED) and "incorrect" (for example red LED or flashing LED).

[0061] The start of the duplication procedure is the same: the user presses the button (10) as if he were to make a transmission and upon release the clone remote control (1) enters into copy mode and accepts any command to be copied that is transmitted at remotely close range for a maximum of approximately 6 seconds. Once the radio signal from this remote control (2) has been received and decoded, the LED (14) displays the message "correct" if the remote control has been able to decode it and the radio signal appears correct, while "wrong" if the opposite is the case. In case of "incorrect" the operation stops, in case of "correct" the code is saved. According to this verification procedure, instead of going into stand by in the event of a "correct" and saved code, the remote control remains listening for a verification waiting period (av) of approximately another 6 seconds. If the user presses the original remote control again at close range, after having received and decoded the radio signal, the 'correct' signal is displayed if the radio code received appears to be correct and is the same as the one already stored, while the 'wrong' signal is displayed if the radio code received is incorrect or is different from the one already stored. At the end of this phase, called verification, instead of entering sleep mode, the user enters the same phase again, so as to allow the user to repeat the verification, if he ever has doubts that he has not performed it correctly, for example having seen a response of "wrong" when he thought he had done it correctly. The verification phases are repeated indefinitely until after one of them 6 seconds pass without reception from a remote control at close range.

[0062] The execution details may however vary in an equivalent manner in the shape, dimensions, arrangement of the elements, nature of the materials used, without however departing from the scope of the idea of the solution adopted or of the inventive concept and therefore remaining within the limits of the protection given by the claims of the patent.

Claims

1. Method for duplicating a remote control, according to which a clone remote control (1), provided with a first series of buttons (10, 11, 12, 13) and at least one signalling device (14), is configured to store in said first series of buttons (10, 11, 12, 13) a number of signals to be emitted corresponding to the signals emitted by an original remote control (2) by means of a second series of buttons (20, 21, 22, 23), method

characterized in that said clone remote control (1) is provided with a resident programme capable of memorising the signals on the buttons according to instructions received by pressing a single button (10) of said first set of buttons (10, 11, 12, 13) and **in that** the resident program is capable of storing the signals according to different procedures (A, B, C, D) and at the end of the at least partial execution of one of said different procedures (A, B, C, D) emits a corresponding signal usable for the completion of the duplication procedure with the possible operations to be carried out to store the clone remote control on the remote device.

2. Method according to claim 1, **characterized in that** the resident program is able to memorize the signals according to different procedures (A, B, C, D) based on the number of times for which said single button (10) is pressed.

3. Method according to claim 1 and/or 2, **characterized in that** said single button (10) of the clone remote control (1) is pressed for a period of time between a first value or minimum value (vmin) and a second value or maximum value (vmax) of the order of seconds that determines the interruption of the duplication procedure.

4. Method according to claim 1 and/or 2, **characterized in that** the choice of the duplication procedure is determined by the subsequent pressing of said button (10) within a pre-established time or waiting time (ta), with the condition that the choice corresponding to the pressure exerted on the button (10) for a given number of times is equivalent to the pressure for that number of times followed by a wait equal to said pre-established time (ta).

5. Method according to claim 1 and/or 2, **characterized in that** it comprises a verification procedure suitable for avoiding errors in the duplication procedure due to possible disturbances capable of overwriting the code that has been stored, said verification procedure comprising, following the execution of a duplication procedure (A, B, C, D), by further pressing the same button used to start copying.

6. Method according to claim 1 and/or 2, **characterized in that** it comprises, following the duplication procedure in which a code has been stored for the first time, a verification procedure in order to detect poorly executed copies which give rise to a non-working code and **in that** this verification procedure involves:

- keep the clone remote control (1) in a waiting state after memorization for a verification waiting period (av);
- press the button (20) on the original remote

control (2) again, sending a corresponding signal;

- compare the corresponding received and decoded signal with the said code stored for the first time to issue a correct duplication signal if the received radio code is correct and equal to the one already stored, or an incorrect duplication signal if the received radio code is not it is correct or different from the one already stored;
- repeat the verification procedure until a correct duplication signal is obtained.

7. Remote control (1), provided with a first series of buttons (10, 11, 12, 13) and at least one signalling device (14), remote control that can be used to memorize in said first series of buttons (10, 11, 12, 13) a number of signals to be emitted corresponding to the signals emitted by an original remote control (2) using a second series of buttons (20, 21, 22, 23), remote control **characterized in that** it is provided with a resident program capable of implementing a method according to one or more of the previous claims.

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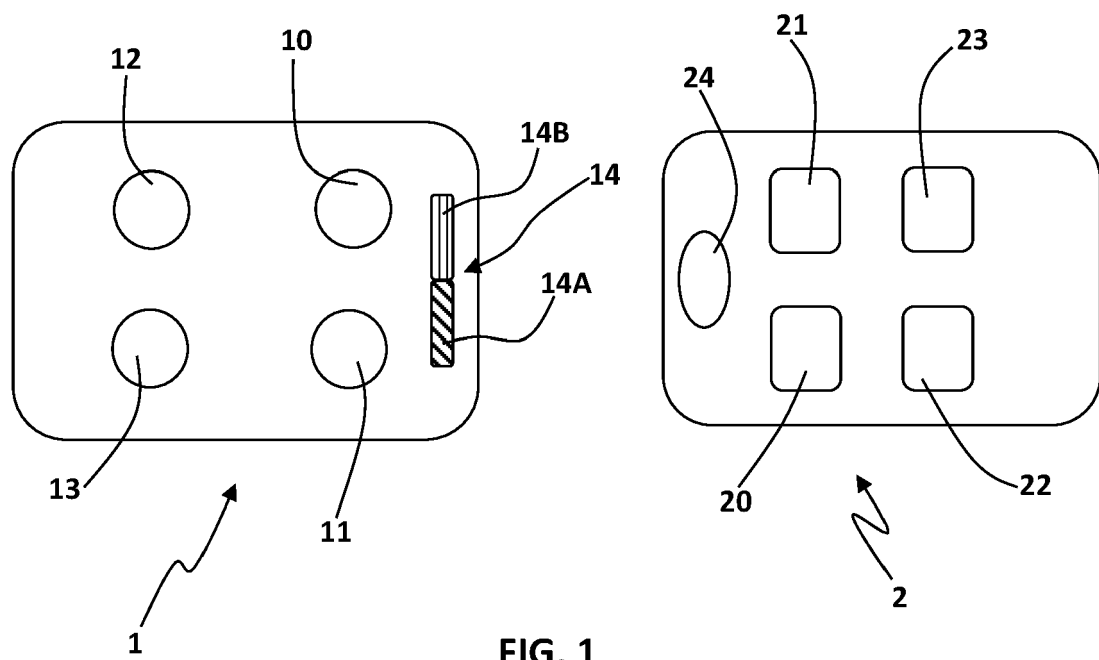
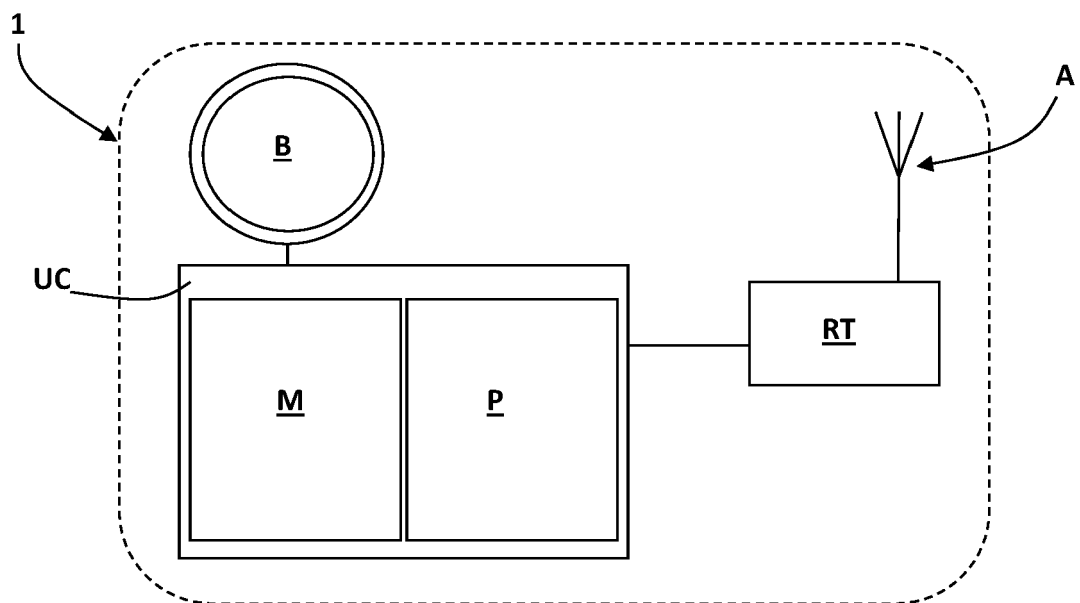


FIG. 2





EUROPEAN SEARCH REPORT

Application Number

EP 23 21 6631

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EPO FORM 1503 03.82 (P04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2018/233029 A1 (WITKOWSKI TODD R [US])	1, 7	INV.
	16 August 2018 (2018-08-16)		G08C17/00
A	* paragraph [0069] - paragraph [0085] *	2-6	

			TECHNICAL FIELDS SEARCHED (IPC)
			G08C
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		19 April 2024	Pham, Phong
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ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 23 21 6631

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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19-04-2024

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REFERENCES CITED IN THE DESCRIPTION

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