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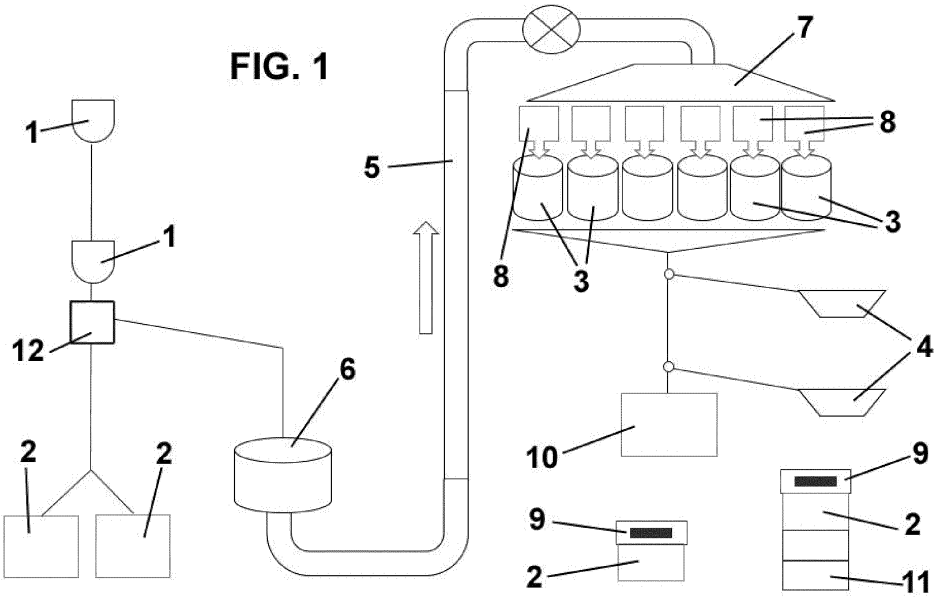
(54) AUTOMATED PAYMENT SYSTEM AND METHOD

(57) The present invention relates to an automated payment system and method. The system comprises: means for inserting coins (1, 9); means for collecting coins (2); a plurality of recycling repositories (3); and output means (4) through which correct change is provided; and it is characterized in that it also comprises automated conveyance means (5) for conveyance from a box (6) communicated with said means for inserting coins (1) and said plurality of recycling repositories (3).

The method comprises: inserting one or more coins for payment; collecting at least a portion of said coins; and giving change. It is characterized in that it also comprises the step of automatically recycling a portion of said inserted coins if the amount of coins available to give change is less than a re-loading threshold.

It allows increasing system efficiency, the value in the collection means being very similar to the takings.

FIG. 1



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Description

[0001] The present invention relates to an automated payment system and method, for example for use in a tollbooth, such that there is always a suitable amount of coins and/or notes to give change to users paying in cash.

Background of the Invention

[0002] A payment possibility which users can choose in tollbooths is cash payment, such that one or more coins are placed in a basket or one or more notes are inserted in a corresponding reader to pay the toll fee.

[0003] The user often needs to be given change since the total cash amount does not have to be exact. This means that if payment is made by means of an automated system without human intervention, the automated system must have a suitable number of coins to give said change.

[0004] In practice, this need to have change is satisfied periodically, such that a portion of the coins and/or notes inserted in the system by users is used to give said change, and another portion of the notes and coins inserted in the system by users when paying the toll is removed as tollbooth takings.

[0005] Using a portion of the coins and/or notes to subsequently give change is commonly referred to as recycling. Therefore, use of the term "recycling" in the present description and claims means reusing the coins inserted in a payment system for subsequent use to give correct change when the user does not pay the exact amount.

[0006] Recycling systems today are primarily manual systems, such that every so often, for example, each day, a service employee must manually load the corresponding change hoppers so that the next day the automated charging system can provide correct change.

[0007] These manual recycling systems have a series of drawbacks. The main drawback is the need for service employees to periodically perform this task, with the cost and time it involves. Another drawback is that there is a large amount of assets not being used in the charging system. In practice, it has been demonstrated that these unused assets can be greater than 50%, with the subsequent loss of efficiency.

[0008] The need for an automated payment system and method in which recycling is the most efficient and economical possible and involves minimal use of service staff is therefore evident.

[0009] Therefore, the objective of the present invention is to provide an automated payment system and method in which recycling is automatic depending on the money taken in and on the amount of coins and/or notes available to give change to users paying in cash.

Description of the Invention

[0010] The aforementioned drawbacks are solved with the payment system and method of the invention, offering other advantages described below.

[0011] According to a first aspect, the present invention relates to an automated payment system, comprising:

- means for inserting coins and/or notes;
- means for collecting the inserted coins and/or notes;
- a plurality of recycling repositories, one for each type of coin and/or note;
  and
- output means through which one or several coins and/or notes from at least one of said recycling repositories are supplied to a user, giving correct change depending on the price to be paid and on the value of the inserted coins and/or notes;

and it is characterized in that it also comprises automated conveyance means for conveyance from a recycling box communicated with said coin insertion means and said plurality of recycling repositories.

[0012] According to a preferred embodiment, said automated conveyance means comprise a passage extending from said recycling box to said recycling repositories, the coins being conveyed by means of an air stream.

[0013] Advantageously, the automated payment system according to the present invention also comprises a coin sorter at the inlet of said plurality of recycling repositories.

[0014] Furthermore, a plurality of removable loaders is preferably placed between said coin sorter and said recycling repositories.

[0015] According to a preferred embodiment, said means for inserting coins and/or notes are one or more validating baskets and/or one or more note readers, said means for collecting the inserted coins and/or notes are one or more removable boxes, and said output means are one or more receptacles.

[0016] The automated payment system according to the present invention also preferably comprises a selector located between said insertion means and said collection means to deflect the coins to said recycling box.

[0017] According to a second aspect, the present invention also relates to an automated payment method comprising the following steps:

- inserting one or more coins and/or notes for the payment of a predetermined total amount through insertion means;
- collecting at least a portion of said coins and/or notes in collection means;
  and
- giving as change one or more coins and/or notes arranged in recycling repositories if the inserted total amount is greater than said predetermined total amount;

and it is characterized in that it also comprises the step of automatically recycling at least a portion of said insert-

ed coins and/or notes if the amount of coins and/or notes available to give change is less than a re-loading threshold of said recycling repositories.

[0018] Advantageously, the automated payment method according to the present invention also comprises the step of storing coins in a recycling box before conveying them to the recycling repositories, the step of loading coins in removable loaders before placing them in recycling repositories, and/or the step of sorting said coins by means of a sorter before placing them in recycling repositories.

[0019] The transference of coins from the recycling box to the removable loaders is preferably performed when a maximum level is achieved in said recycling box, or when the amount of coins in said recycling repositories is below a replacement threshold.

[0020] At least the following advantages are achieved with the automated payment system and method of the present invention:

- system efficiency is increased, meaning that the value in the collection means is very similar to the takings;
- the amount of money immobilized in the system decreases;
- the number of interventions by service staff, such as removing boxes, loading money, etc., is reduced.

Brief Description of the Drawings

[0021] To better understand the previous description, a set a drawings is attached in which a practical embodiment is schematically depicted by way of non-limiting example.

Figure 1 is a diagram of the automated payment system of the present invention showing the components forming the system; and

Figure 2 is a simplified diagram of some of the components of the automated payment system with coins of the present invention, used to better understand the method of the present invention.

Description of a Preferred Embodiment

[0022] Figure 1 shows the components of the automated payment system of the present invention, comprising coin and/or note input means, such as one or more validating baskets 1 and/or note readers 9. It must be indicated that although the baskets 1 and readers 9 in Figure 1 are depicted in different positions, in practice they will be placed close to one another, such that the user can insert coins and/or notes in the payment system.

[0023] A selector 12 is arranged after said input means, said selector 12 determining whether the coins will be directed to collection means, such as one or more boxes 2, or to the recycling means explained below.

[0024] Said boxes 2 are removable, such that service staff may remove them to collect the coins and/or notes therein. Each of said boxes 2 shall have a defined replacement threshold and maximum threshold. The replacement threshold 2B will indicate that the box 2 must be replaced with an empty box, and the maximum threshold 2A will indicate that it has reached the maximum amount of coins and/or notes therein.

[0025] The automated payment system according to the present invention comprises a recycling box 6 where coins are accumulated for recycling in communication with said selector 12, as explained below in further detail.

[0026] In turn, note readers 9 have their own recycler 11, as is shown in said Figure 1.

[0027] When desired, as will be explained below in relation to the automated payment method of the present invention, coins in the recycling box 6 can be conveyed to recycling repositories 3 by means of a passage 5. Said conveyance is preferably performed by means of an air stream, which is a particularly advantageous system given its simplicity and low cost.

[0028] The amount of recycling repositories 3 is the suitable amount depending on the different types of coins used. For example, if the payment system of the present invention handles Euros, there will be a recycling repository 3 for each of the following coins: 5 cents, 10 cents, 20 cents, 50 cents, 1 Euro and 2 Euros.

[0029] A sorter 7 which is responsible for sorting and separating coins from the recycling box 6, is arranged between said recycling box 6 and said recycling repositories 3. In other words, all the coins are mixed in the recycling box 6 regardless of their value, and the coins are separated by value in the sorter.

[0030] Furthermore, a plurality of loaders 8 are arranged between the sorter 7 and the recycling repositories 3, there being one loader 8 for each recycling repository 3; the function of these loaders 8 is to store coins before placing them in recycling repositories 3. These loaders 8 are also removable, such that service staff may remove them when needed and replace them with empty loaders 8.

[0031] The automated payment system of the present invention also comprises output means formed by one or more change receptacles 4, which is where users of the payment system of the present invention will collect their change.

[0032] Finally, the automated payment system according to the present invention can also comprise an additional inventory box 10 that is also removable for the possible collection of coins from the recycling repositories 3 that are not removed from the change receptacles 4.

[0033] In a second aspect, the present invention also relates to an automated payment method. To aid the description, reference will be made below to payment in a highway tollbooth, but it is evident that the payment system and method of the present invention are suitable for making any type of cash payments that require change.

[0034] When a user approaches a tollbooth on a highway, he/she is informed beforehand of the total amount

to be paid and of the available payment options, for example, by means of credit/debit card, by electronic payment means or cash payment, either through a person who manually charges the user or through an automated payment system such as the one of the present invention.

[0035] To pay in cash the user places the coins in a validating basket 1 or inserts one or more notes into one of the readers 9. Once the coins and/or notes are inserted, their value is counted in a conventional manner and it is necessary to decide whether or not said coins and/or notes are recycled. If they are not recycled, the coins and/or notes are sent to boxes 2 for subsequent removal.

[0036] The amount of coins present in said recycling repositories 3 must be taken into account to decide on recycling. Specifically, four thresholds have been defined in each recycling repository 3: a maximum threshold 3A, a re-loading threshold 3B, a replacement threshold 3C and a minimum threshold 3D, as can be seen in Figure 2.

[0037] When the level of coins in the recycling repositories 3 is below the reloading threshold 3B, recycling will be performed, and when said level is below the replacement threshold 3C, the coins will be conveyed from the recycling box to the loaders 8 by means of the air-operated passage 5.

[0038] Detection of the level of coins in said recycling repositories 3 will evidently be done by conventional detection means and the entire system will be controlled by electronic control means (not depicted), such as a computer.

[0039] Furthermore, it must also be taken into account that a maximum level has been defined in the recycling box 6, such that if the level of coins inside the recycling box 6 is greater than said maximum level, the coins will be conveyed by air to said recycling repositories 3 by means of said passage 5.

[0040] Therefore, if the electronic control means determine that recycling will be performed, the coins inserted by the user will go to the recycling box 6 by means of the selector 12 and from there to the recycling repositories 3, as described above, going through the sorter 7 to be separated by coin type, and through the loaders 8.

[0041] So when the user pays by inserting a total amount greater than the predetermined total amount to be paid, the control means determine the amount of coins that must be allowed to fall from the recycling repositories 3 to the change receptacle 4, where the user may collect his/her change.

[0042] Coin recycling is therefore automatic, without requiring service staff to manually re-load the recycling repositories 3 every so often, for example, every day if it is a heavily used payment system.

[0043] Despite having referred to a specific embodiment of the invention, it is evident for a person skilled in the art that the described system and method are susceptible to a number of variations and modifications, and that all the mentioned details can be replaced with other technically equivalent details without departing from the scope of protection defined by the attached claims.

Claims

1. Automated payment system, comprising:

   - means for inserting coins and/or notes (1, 9);
   - means for collecting the inserted coins and/or notes (2);
   - a plurality of recycling repositories (3), one for each type of coin; and
   - output means (4) through which one or several coins from at least one of said recycling repositories (3) are supplied to a user, giving correct change depending on the total amount to be paid and on the total amount of the inserted coins and/or notes;

   characterized in that it also comprises automated conveyance means (5) for conveyance from a recycling box (6) communicated with said means for inserting coins and/or notes (1) and said plurality of recycling repositories (3).

2. Automated payment system according to claim 1, wherein said automated conveyance means comprise a passage (5) extending from said recycling box (6) to said recycling repositories (3), the coins being conveyed by means of an air stream.

3. Automated payment system according to claim 1, also comprising a coin sorter (7) at the inlet of said plurality of recycling repositories (3).

4. Automated payment system according to claim 3, wherein a plurality of removable loaders (8) is placed between said coin sorter (7) and said recycling repositories (3).

5. Automated payment system according to claim 1, wherein said means for inserting coins and/or notes is one or more validating baskets (1) and/or one or more note readers/issuers (9).

6. Automated payment system according to claim 1, wherein said means for collecting the inserted coins and/or notes is one or more removable boxes (2).

7. Automated payment system according to claim 1, wherein said output means is one or more receptacles (4) and note readers/issuers (9).

8. Automated payment system according to claim 1, also comprising a selector (12) located between said insertion means (1) and said collection means (2) to deflect the coins to said recycling box (6).

9. Automated payment method comprising the following steps:

   - inserting one or more coins and/or notes for

the payment of a predetermined total amount through insertion means (1, 9);
- collecting at least a portion of said coins and/or notes in collection means (2); and
- giving as change one or more coins and/or notes arranged in recycling repositories (3, 11) if the inserted total amount is greater than said predetermined total amount;
characterized in that it also comprises the step of automatically recycling at least a portion of said inserted coins and/or notes if the amount of coins and/or notes available to give change is less than a re-loading threshold of said recycling repositories (3, 11).

10. Automated payment method according to claim 9, also comprising the step of storing coins in a recycling box (6) before conveying them to the recycling repositories (3).

11. Automated payment method according to claim 9 or 10, also comprising the step of loading coins in removable loaders (8) before placing them in recycling repositories (3).

12. Automated payment method according to claim 9, also comprising the step of sorting said coins by means of a sorter (7) before placing them in recycling repositories (3).

13. Automated payment method according to claims 10 and 11, wherein the transference of coins from the recycling box (6) to removable loaders (8) is performed when a maximum level is achieved in said recycling box (6).

14. Automated payment method according to claims 9, 10 and 11, wherein the transference of coins from the recycling box (6) to removable loaders (8) is performed when the amount of coins in said recycling repositories (3) is below a replacement threshold.

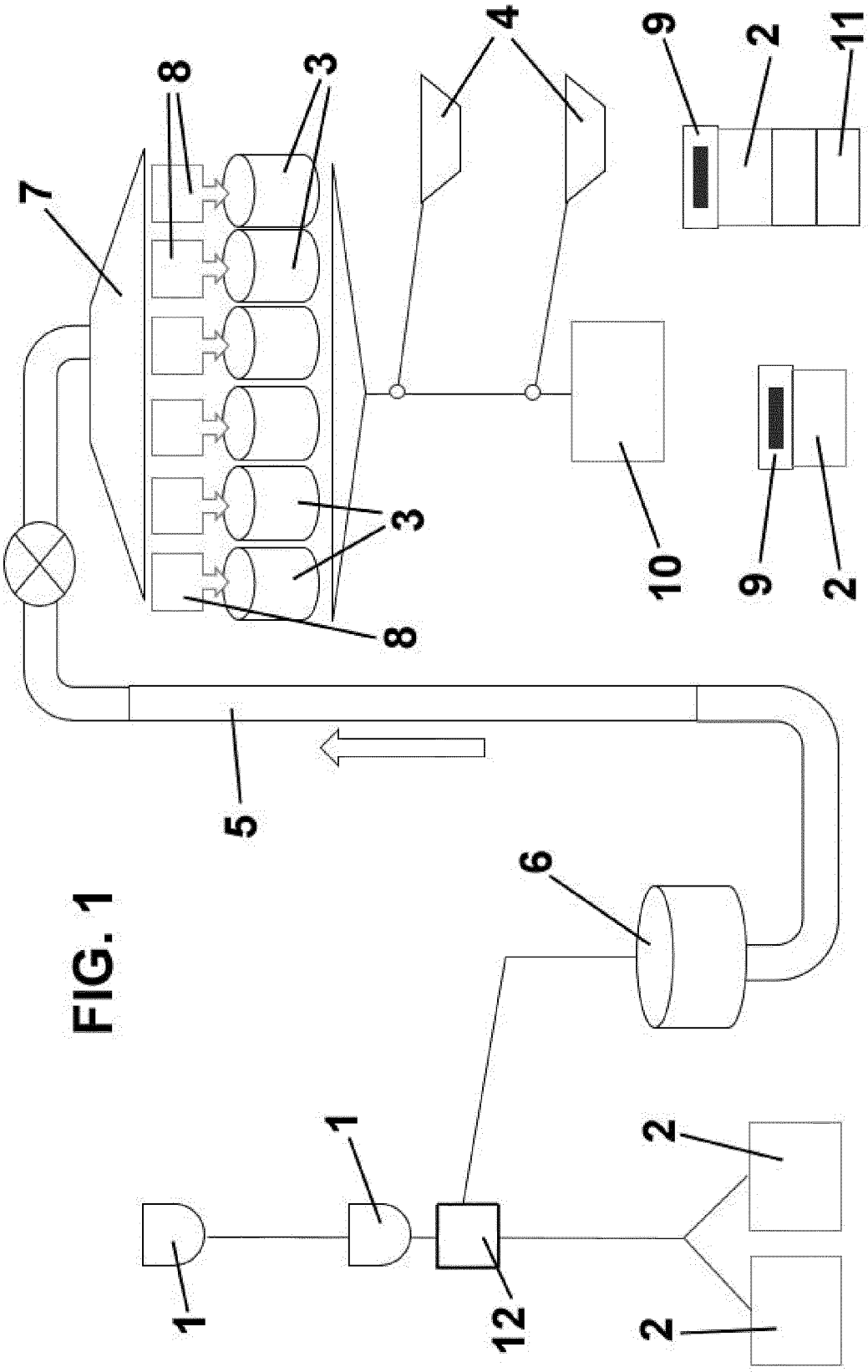

FIG. 1

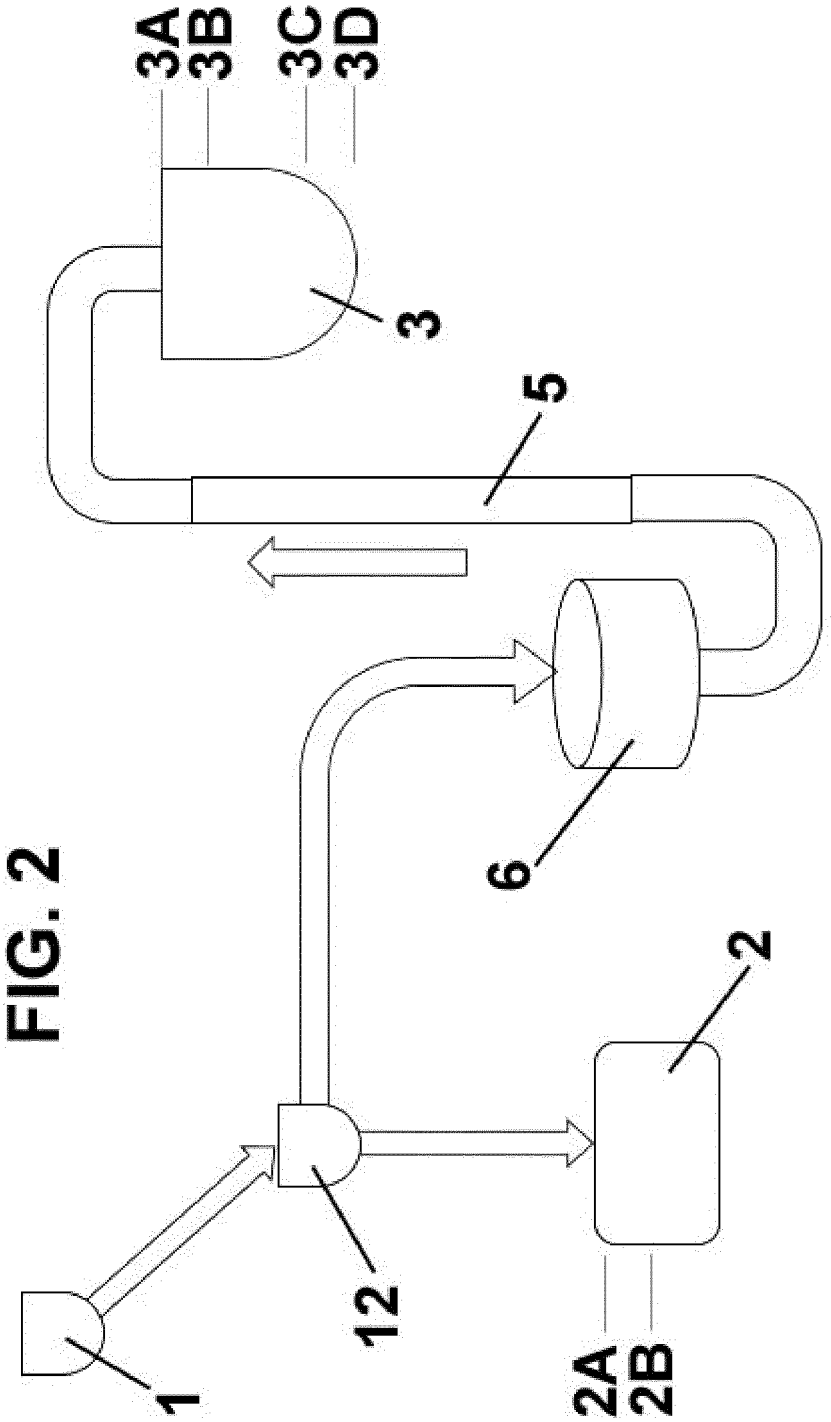

FIG. 2

INTERNATIONAL SEARCH REPORT

International application No
PCT/ES2013/070613

A. CLASSIFICATION OF SUBJECT MATTER
INV. G07F5/24 G07D1/06 G07D3/00 G07D9/00 G07D11/00
G07F9/04 G07F9/06
ADD.
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED
Minimum documentation searched (classification system followed by classification symbols)
G07D G07F

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2009/260948 A1 (MATSUMOTO YASUHIRO [JP]) 22 October 2009 (2009-10-22) abstract; figures paragraphs [0038] - [0046], [0049] - [0060], [0064], [0071], [0105] - [0112]	1-14
A	EP 1 113 406 A1 (NIPPON CONLUX CO LTD [JP]) 4 July 2001 (2001-07-04) abstract; figures paragraphs [0032] - [0037], [0043] - [0054]	1-14
A	US 3 239 046 A (MCGOLDRICK DANIEL J) 8 March 1966 (1966-03-08) figure 2 column 4, lines 12-22 column 4, lines 36-42	1-14

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
16 April 2014	25/04/2014

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INTERNATIONAL SEARCH REPORT

International application No
PCT/ES2013/070613

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2007/240966 A1 (TABACHNIK BRUCE M [US]) 18 October 2007 (2007-10-18) abstract; figures paragraphs [0027] - [0034] -----	1-14

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
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