



- (51) **International Patent Classification:**
G06K 13/08 (2006.01) *G06K 19/077* (2006.01)
- (21) **International Application Number:**
PCT/EP2013/060923
- (22) **International Filing Date:**
28 May 2013 (28.05.2013)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
PCT/CN2012/076268 30 May 2012 (30.05.2012) CN
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(81) **Designated States** (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) **Designated States** (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

(54) **Title:** SMART CARD GRAPHICAL AND ELECTRICAL PERSONALIZATION MODULE AND METHOD OF GRAPHICAL AND ELECTRICAL PERSONALIZATION FOR SMART CARDS

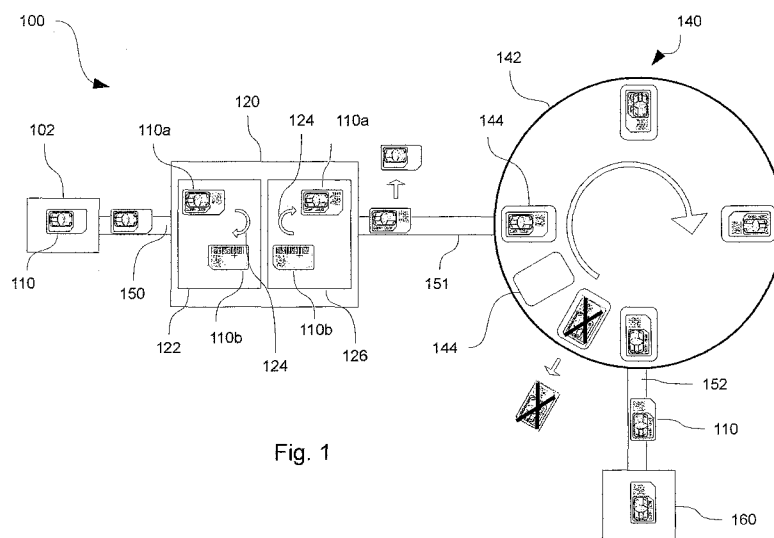


Fig. 1

(57) **Abstract:** The present invention consists in a smart card graphical and electrical personalization module 100 comprising a dispensing unit 102, a graphical personalization unit 120, an electrical personalization unit 140 and conveyors 150, 151, 152 to transport smart cards 110 from one unit to the other, said units are placed in a predetermined order to proceed to the graphical and electrical personalization of smart cards 110, the graphical personalization unit 120 being placed between the dispensing unit 102 and the electrical personalization unit 140.

**Smart card graphical and electrical personalization module and
method of graphical and electrical personalization for smart cards**

DESCRIPTION

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The present invention concerns a smart card graphical and electrical personalization module used in a fabrication process of a smart card. More precisely, the present invention concerns the module itself and the method of graphical and electrical personalization for
10 smart cards.

During a process of fabrication of a smart card, one of the last operation is the graphical and electrical personalization of said smart card. The graphical personalization consists in marking the personal
15 information corresponding to the smart card on one or two sides of the smart card for example by a laser printing, and the electrical personalization consists in recording said personal information on the electronic chip of the smart card and/or on the magnetic tracks of the smart card.

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The actual process of personalization consists on firstly proceeding to the electrical personalization of the smart card, verifying if the recorded information are properly recorded and after that, proceed to the graphical personalization. However, for certain clients it
25 is important to provide the smart cards in an ordered and determined sequence.

Generally, in order to keep the smart cards in an ordered and determined sequence, a manual intervention is required if one of them
30 is rejected due to a non-compliant graphical personalization. The operator must place a new graphically personalized smart card in place

of the rejected smart card. The problem is the same with the electrical personalization of the smart card.

Another solution to keep the smart cards in an ordered and
5 determined sequence is to use heavy buffer and sorting station at the end of the graphical and electrical personalization module in order to reorder the sequence of the smart cards. However, these solutions are complex and affect the production rate increasing the costs.

10 An object of the invention, among others, is thus to provide an improved smart card graphical and electrical personalization module and a method of graphical and electrical personalization, in order to produce an ordered and determined sequence of personalized smart cards with a high production rate and reduce costs.

15 The present invention thus consists in a smart card graphical and electrical personalization module comprising a dispensing unit, a graphical personalization unit, an electrical personalization unit and conveyors to transport smart cards from one unit to the other, said
20 units are placed in a predetermined order to proceed to the graphical and electrical personalization of smart cards, the graphical personalization unit being placed between the dispensing unit and the electrical personalization unit.

25 According to an aspect of the invention, the graphical personalization unit comprises a single print device and a flip over system of the smart card in order to print both sides of the smart card by the single print device.

30 According to another aspect of the invention, the single print device is a laser printing device.

According to another aspect of the invention, the graphical personalization unit comprises an optical character verification device to verify the graphical personalization of the smart card.

5 According to another aspect of the invention, the electrical personalization unit comprises a rotating plate provided with a plurality of connection devices).

10 The invention also consists in a method of graphical and electrical personalization for smart card comprising the following steps:

- a first step of providing a smart card from a dispensing unit,
- a second step of graphical personalization of the smart card by a graphical personalization unit,
- 15 - a third step of electrical personalization of the smart card by an electrical personalization unit.

According to an aspect of the method, the second step of graphical personalization comprises the following steps:

- 20 - a step of printing of the graphical personalization on a first face of the smart card by a printing device,
- a step of flipping over the smart card,
- a step of printing of the graphical personalization on a second face of the smart card by the printing device,
- 25 - a step of verification of the graphical personalization.

According to an aspect of the method, the step of verification of the graphical personalization comprises the following steps:

- 30 - a step of verification of the graphical personalization on the second face by an optical character verification device,
- a step of flipping over the smart card,
- a step of verification of the graphical personalization on the first face by the optical character verification device.

According to an aspect of the method, if a non-compliant smart card is detected during the step of verification of the graphical personalization, the non-compliant smart card is rejected in a step, and
5 a new smart card is re-graphically personalized with the same graphical personalization as the rejected smart card during said step of verification of the graphical personalization.

According to an aspect of the method, in a step of buffering, all
10 smart cards graphically personalized between the rejected smart card and the re-graphically personalized smart card, are stored in buffer connection devices placed on the last quarter of turn of a rotating plate, keeping available the empty connection device originally intended in receiving the rejected smart card.

15 According to an aspect of the method, the third step of electrical personalization comprises the following intermediate steps:

- a step of insertion of a graphically personalized smart card in a connection device of a rotating plate,
- 20 - a step of recording of information on the smart card and verification of said information by the connection device,
- either a step of ejection of said smart card from the connection device to a storage station at the end of the three quarter of turn of the rotating plate, if the information on the smart card are
25 correctly recorded,
- or a step of ejection of said smart card from the connection device to a rejection storage during the last quarter of turn of the rotating plate, if the information on the smart card are incorrectly recorded.

According to an aspect of the method, if the information on a smart card are incorrectly recorded, the third step of electrical personalization comprises the following intermediate steps:

- a step of graphical personalization of a new smart card with the same graphical personalization as the rejected smart card during step of ejection, and blocking of any ejection of other smart cards from any connection devices to the storage station,
- a step of buffering in buffer connection device of the smart cards placed before the new smart card,
- a step of insertion of the new smart card in a connection device,
- a step of re-recording of information on the new smart card with the same information of the rejected smart card during the rotation of the rotating plate,
- a step of ejection of the re-recorded new smart card, if it's compliant, from the connection device to the storage station at the end of the three quarter of turn of the rotating plate,
- a step of return of the rotating plate to the position it's had before the step of insertion of the new smart card, and releasing of the ejection of other smart cards.

The invention is explained in greater detail below with reference to the accompanying figures of which:

- the figure 1 represents a schematic view of a smart card graphical and electrical personalization module according to the invention,
- the figure 2 represents a flowchart of the method of graphical and electrical personalization of smart cards according to the invention.

Same elements in different figures have the same references.

The figure 1 depicts a schematic view of a smart card graphical and electrical personalization module 100 according to the invention. The graphical and electrical personalization module 100 comprises a dispensing unit 102 linked to a graphical personalization unit 120 and
5 an electrical personalization unit 140.

The dispensing unit 102, for example a magazine filled with smart cards 110, delivers a smart card 110 which is transported by a conveyor 150 to the graphical personalization unit 120, where the smart card 110
10 is graphically personalized by a printing device 122. Then, the graphical personalization of the smart card 110 is verified for example by an optical character verification (OVC) device. Non-compliant smart cards 110 are rejected and compliant smart cards 110 are transported to the electrical personalization unit 140 by conveyor 151.

The graphical personalization unit 120 may comprise a single printing device 122, for example a laser printing device, and in order to proceed to the graphical personalization of both sides 110a and 110b of the smart card 110, the graphical personalization unit 120 could also
20 contain a flip over system 124. The OVC device 126 could also have a flip over system 124 to verify the graphical personalization on both sides 110a and 110b of the smart card 110.

The electrical personalization unit 140 comprises a rotating plate
25 142 provided with a plurality of connection device 144. A smart card 110 coming from the graphical personalization unit 120 via the conveyor 151 is inserted into a connection device 144 and said smart card 110 is electrically personalized and verified. If the smart card 110 is compliant, at the end of the three quarter of turn of the rotating plate
30 142, said smart card 110 is ejected from the connection device 144 to a conveyor 152 and stored in a storage station 160. If the smart card 110 is non-compliant, said smart card 110 is rejected and ejected in a

rejection storage (not represented) during the last quarter of turn of the rotating plate 142.

For example, the rotating plate 142 may comprise forty eight
5 connection devices 144. So thirty seven of these connection devices 144
situated in the three quarter of turn of the rotating plate 142 are
connected to a smart card 110 for their electrical personalization and
verification. In the last quarter of turn of the rotating plate 142, eleven
connection devices 144 are empty, without any smart card 110
10 connected to them, except in case of rejection of a non-compliant smart
card 110 after the verification of the electrical personalization.

A smart card 110 could be randomly selected to be sampled and
ejected during the last quarter of turn of the rotating plate 142. So if as
15 above, the rotating plate 142 comprises forty eight connection devices,
the last quarter of turn may contain one connection device 144 for the
rejection of a non-compliant smart card 110, another connection device
144 for the sampling and nine empty connection devices 144.

20 These empty connection devices 144 located in the last quarter of
turn of the rotating plate 142 are used as buffering connection device
144 in order to keep the graphically and electrically personalized smart
cards 110 in an ordered and determined sequence in the storage station
160.

25 The smart cards 110 could be for example credit card form (1FF)
smart card or other form of smart cards like SIM cards (2FF), micro-SIM
cards (3FF) or other form of smart cards demanded by a client.

30 The invention also concerns the method of graphical and electrical
personalization for smart card 110 shown in figure 2.

Said method comprises the following steps according to the smart card graphical and electrical personalization module 100 described above:

- a first step 1 of providing a smart card 110 from the dispensing unit 102,
- a second step 2 of graphical personalization of the smart card 110 by the graphical personalization unit 120, and
- a third step 3 of electrical personalization of the smart card 110 by an electrical personalization unit 140.

The second step 2 of graphical personalization of the smart card 110 also comprises several steps. These steps are:

- a step 21 of printing of the graphical personalization on a first face 110a of the smart card 110 by the printing device 122,
- a step 22 of flipping over the smart card (110),
- a step 23 of printing of the graphical personalization on a second face 110b of the smart card 110 by the printing device 122,
- a step 24 of verification of the graphical personalization.

More precisely, the last step 24 of verification of the graphical personalization comprises the following steps:

- a step 26 of verification of the graphical personalization on the second face 110b by an optical character verification device 126,
- a step 27 of flipping over the smart card 110, and
- a step 28 of verification of the graphical personalization on the first face 110a by the optical character verification device 126.

If a non-compliant smart card 110 is detected during the step 24 of verification of the graphical personalization, the non-compliant smart card 110 is rejected in a step 25 and a new smart card 110 is re-graphically personalized with the same graphical personalization as the rejected smart card 110 during the step 24 of verification of the

graphical personalization. This graphical personalization of a new smart card 110 with the same graphical personalization as the rejected smart card 110 permits to keep the smart cards 110 in an ordered and determined sequence without any intervention of an operator.

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However, if some smart cards 110 are graphically personalized between the rejected smart card 110 and the re-graphically personalized smart card 110, said smart cards 110 are stored in the buffer connection devices 144 placed on the last quarter of turn of the rotating plate 142 during a step 29 of buffering. In this step 29 of buffering, the empty connection device 144 originally intended in receiving the rejected smart card 110 is kept available, in order to receive later the re-graphically personalized smart card 110. Once the re-graphically personalized smart card 110 has passed the step 24 of verification of the graphical personalization, the rotating plate 142 turn on it-self in order to place said re-graphically personalized smart card 110 in the empty connection device 144 originally intended in receiving the rejected smart card 110 in order to keep the graphically personalized smart cards 110 in an ordered and determined sequence.

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The third step 3 of electrical personalization comprises the following intermediate steps:

- a step 31 of insertion of a graphically personalized smart card 110 in a connection device 144 of a rotating plate 142,
- 25 - a step 32 of recording of information on the smart card 110 and verification of said information by the connection device,
- either a step 34 of ejection of said smart card 110 from the connection device 144 to a storage station 160 at the end of the three quarter of turn of the rotating plate 142, if the information on the smart card 110 are correctly recorded,
- 30 - or a step 35 of ejection of said smart card 110 from the connection device to a rejection storage during the last quarter of

turn of the rotating plate 142, if the information on the smart card 110 are incorrectly recorded.

However, in order to keep the graphically and electrically personalized smart cards 110 in an ordered and determined sequence in case the information are incorrectly recorded on the smart card 110 during the step 32 of recording, the third step 3 of electrical personalization comprises the following intermediate steps:

- a step 36 of graphical personalization of a new smart card 110 with the same graphical personalization of the rejected smart card 110 during step 35 of ejection, and blocking of any ejection of other smart cards 110 from any connection devices 144 to the storage station 160,
- a step 37 of buffering in buffer connection device 144 of the smart cards 110 placed before the new smart card 110,
- a step 38 of insertion of the new smart card 110 in a connection device 144,
- a step 39 of re-recording information in the new smart card 110 with the same information as the rejected smart card 110 during the rotation of the rotating plate 142,
- a step 40 of ejection of the re-recorded new smart card 110, if it's compliant, from the connection device 144 to the storage station 160 at the end of the three quarter of turn of the rotating plate 142,
- a step 41 of return of the rotating plate 142 to the position it's had before the step 38 of insertion of the new smart card 110, and releasing of the ejection of other smart cards 110.

So, according to the structure of the smart card graphical and electrical personalization module 100, placing the graphical personalization unit 120 before the electrical personalization unit 140, and the method associated to this particular structure, it is clear that

interventions of an operator are no longer necessary in case of error during the personalization of a smart card 110 in order to keep the graphically and electrically personalized smart cards 110 in an ordered and determined sequence.

CLAIMS

1. Smart card graphical and electrical personalization module (100)
5 comprising a dispensing unit (102), a graphical personalization unit (120), an electrical personalization unit (140) and conveyors (150, 151, 152) to transport smart cards (110) from one unit to the other, said units are placed in a predetermined order to proceed to the graphical and electrical personalization of smart cards (110), characterized in that
10 the graphical personalization unit (120) is placed between the dispensing unit (102) and the electrical personalization unit (140).
2. Smart card graphical and electrical personalization module (100) of claim 1, characterized in that the graphical personalization unit (120)
15 comprises a single print device (122) and a flip over system (124) of the smart card (110) in order to print both sides of the smart card (110) by the single print device (122).
3. Smart card graphical and electrical personalization module (100)
20 of claim 2, characterized in that the single print device (122) is a laser printing device.
4. Smart card graphical and electrical personalization module (100) of claim 1, characterized in that the graphical personalization unit (120)
25 comprises an optical character verification device (124) to verify the graphical personalization of the smart card (110).
5. Smart card graphical and electrical personalization module of claim 1, characterized in that the electrical personalization unit (140)
30 comprises a rotating plate (142) provided with a plurality of connection devices (144).

6. Method of graphical and electrical personalization for smart card comprising the following steps:

- a first step (1) of providing a smart card (110) from a dispensing unit (102),
- a second step (2) of graphical personalization of the smart card (110) by a graphical personalization unit (120),
- a third step (3) of electrical personalization of the smart card (110) by an electrical personalization unit (140).

7. Method of graphical and electrical personalization for smart card (110) of claim 6, characterized in that the second step (2) of graphical personalization comprises the following steps:

- a step (21) of printing of the graphical personalization on a first face (110a) of the smart card (110) by a printing device (122),
- a step (22) of flipping over the smart card (110),
- a step (23) of printing of the graphical personalization on a second face (110b) of the smart card (110) by the printing device (122),
- a step (24) of verification of the graphical personalization.

8. Method of graphical and electrical personalization for smart card (110) of claim 7, characterized in that the step (24) of verification of the graphical personalization comprises the following steps:

- a step (26) of verification of the graphical personalization on the second face (110b) by an optical character verification device (126),
- a step (27) of flipping over the smart card (110),
- a step (28) of verification of the graphical personalization on the first face (110a) by the optical character verification device (126).

9. Method of graphical and electrical personalization for smart card (110) of claim 7, characterized in that if a non-compliant smart card (110) is detected during the step (24) of verification of the graphical personalization, the non-compliant smart card (110) is rejected in a step
5 (25), and a new smart card (110) is re-graphically personalized with the same graphical personalization as the rejected smart card (110) during said step (24) of verification of the graphical personalization.

10. Method of graphical and electrical personalization for smart card
10 (110) of claim 9, characterized in that in a step (29) of buffering, all smart cards (110) graphically personalized between the rejected smart card (110) and the re-graphically personalized smart card (110), are stored in buffer connection devices (144) placed on the last quarter of turn of a rotating plate (142), keeping available the empty connection
15 device (144) originally intended in receiving the rejected smart card (110).

11. Method of graphical and electrical personalization for smart card (110) of claim 6, characterized in that the third step (3) of electrical
20 personalization comprises the following intermediate steps:

- a step (31) of insertion of a graphically personalized smart card (110) in a connection device (144) of a rotating plate (142),
- a step (32) of recording of information on the smart card (110) and verification of said information by the connection device
25 (144),
- either a step (34) of ejection of said smart card (110) from the connection device (144) to a storage station (160) at the end of the three quarter of turn of the rotating plate (142), if the information on the smart card (110) are correctly recorded,
- 30 - or a step (35) of ejection of said smart card (110) from the connection device to a rejection storage during the last quarter of

turn of the rotating plate (142), if the information on the smart card (110) are incorrectly recorded.

12. Method of graphical and electrical personalization for smart card (110) of claim 9, characterized in that if the information on a smart card (110) are incorrectly recorded, the third step (3) of electrical personalization comprises the following intermediate steps:

- a step (36) of graphical personalization of a new smart card (110) with the same graphical personalization as the rejected smart card (110) during step (35) of ejection, and blocking of any ejection of other smart cards (110) from any connection devices (144) to the storage station (160),
- a step (37) of buffering in buffer connection device (144) of the smart cards (110) placed before the new smart card (110),
- a step (38) of insertion of the new smart card (110) in a connection device (144),
- a step (39) of re-recording of information on the new smart card (110) with the same information of the rejected smart card (110) during the rotation of the rotating plate (142),
- a step (40) of ejection of the re-recorded new smart card (110), if it's compliant, from the connection device (144) to the storage station (160) at the end of the three quarter of turn of the rotating plate (142),
- a step (41) of return of the rotating plate (142) to the position it's had before the step (38) of insertion of the new smart card (110), and releasing of the ejection of other smart cards (110).

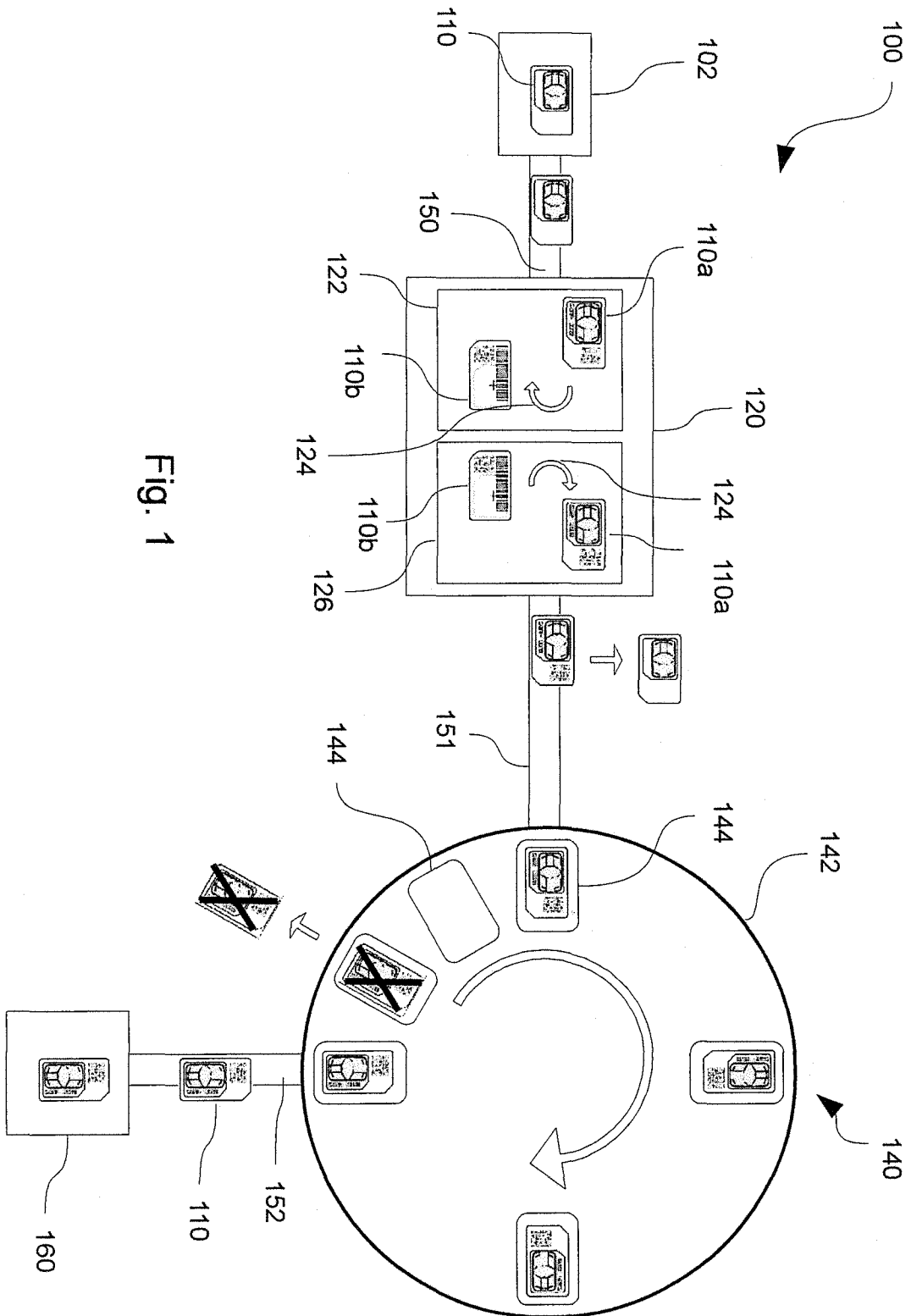
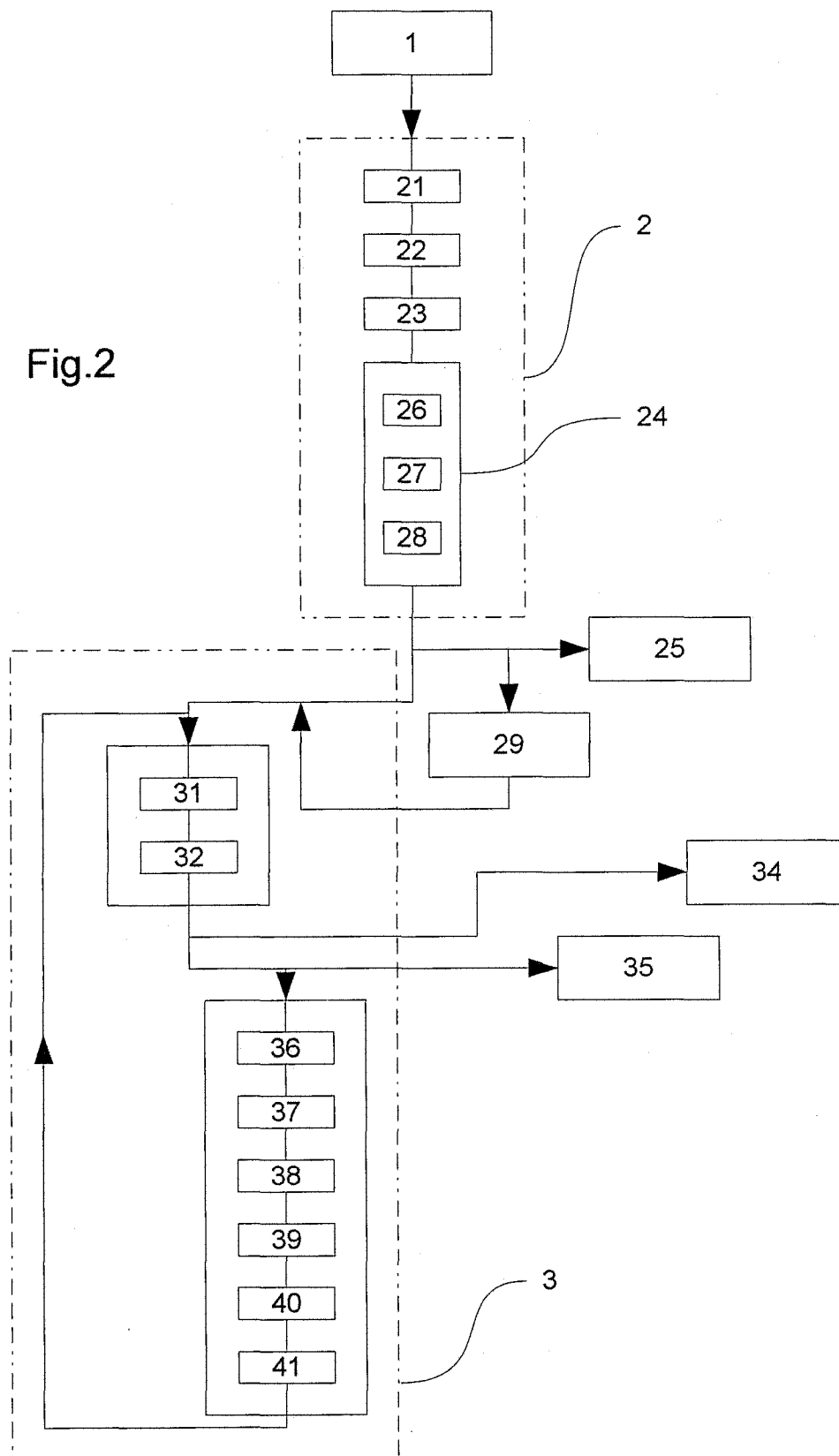


Fig.2



INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2013/060923

A. CLASSIFICATION OF SUBJECT MATTER

INV. G06K13/08 G06K19/077
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)

G06K

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Y	page 7, line 5 - page 14, line 31; claim 1; figures 1A-1C,2, 3A-3S	4,5,7
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Y	WO 2009/147118 A1 (MUEHLBAUER AG [DE]; DIMPFL MARTIN [DE]; VALTA THOMAS [DE]; STEIF RICHA) 10 December 2009 (2009-12-10) page 6, line 10 - page 8, line 26; figures 1,2	5
Y	US 5 943 238 A (NIOCHE GERARD [FR] ET AL) 24 August 1999 (1999-08-24) column 3, lines 9-66; figure 2	5



Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

22 August 2013

Date of mailing of the international search report

02/09/2013

Name and mailing address of the ISA/

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2013/060923

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