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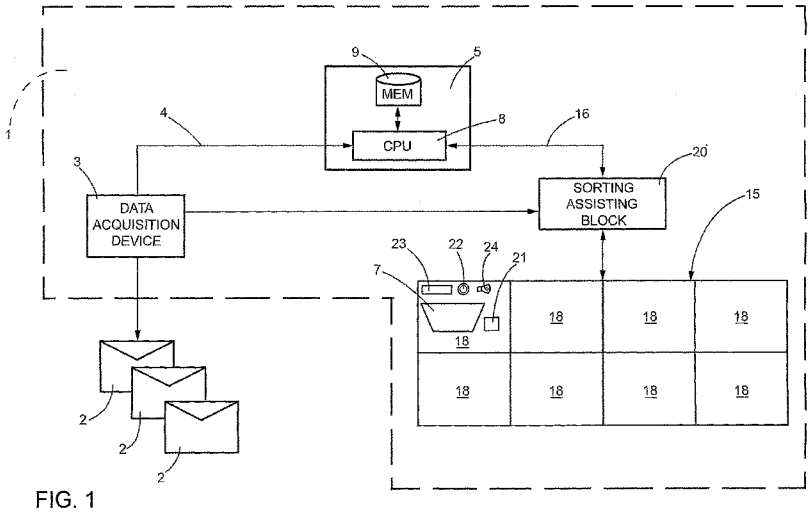


FIG. 1

(57) Abstract: System for sorting (1) postal articles (2), comprising a data-acquisition unit (3), for acquiring a first identifier parameter (Id) of a postal article (2); a sorting unit (15), comprising a plurality of housings (18) each designed to house a respective container (7) of postal articles (2); and a tracking unit (5), connected to the data-acquisition unit (3) and to the sorting unit (15). The sorting unit (15) comprises acquisition means (21), for acquiring a second identifier parameter (Ic) that uniquely identifies a container (7) housed in a respective housing (18); and moreover comprises insertion-authorization means (22, 24, 46), configured to authorize insertion of the postal article (2) into the container (7) on the basis of a result of a comparison between the first identifier parameter (Id) and the second identifier parameter (Ic).

SYSTEM AND METHOD FOR SORTING POSTAL ARTICLES

TECHNICAL FIELD

The present invention relates to a system for sorting postal articles and to the corresponding method, and more precisely to a sorting system assisted by RFID technology.

BACKGROUND ART

As is known, the current process of handling postal articles envisages different steps of sorting thereof, some of which are still currently carried out manually by one or more operators. The operators have in fact the task of identifying, for each postal article, its destination, and of sorting it manually in appropriate aggregates or dispatches, each of which is specific for each destination of the postal articles. At a physical level each dispatch can be, for example, represented by a box or a bag designed to contain the postal articles. Reading of the destination may be made physically by the operator or with the aid of a barcode reader for reading, when present, the barcode, which, on given postal articles, identifies, amongst other things, the destination of said postal article. However, said operations prove rather burdensome from the standpoint of the human resources employed for said purpose, and the sorting process is moreover subject to a considerable number of potential errors, in so far as it substantially does not include a step for controlling the operations carried out manually by the operators. For example, following upon identification of the destination of a particular postal article, the operator could erroneously insert it in a dispatch not corresponding to the destination, thus considerably delaying delivery of the postal article and increasing the postal traffic.

DISCLOSURE OF INVENTION

The aim of the present invention is to provide a system for sorting postal articles and the corresponding method that will

overcome the problems of the known art.

Provided according to the present invention are a system for sorting postal articles and the corresponding method as defined in Claim 1 and Claim 10, respectively.

BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of the present invention preferred embodiments thereof are now described, purely by way of non-limiting example, with reference to the attached drawings, wherein:

- Figure 1 shows a system for sorting postal articles according to the present invention;
- Figure 2 shows an RFID-tag reader that can be used for the operations for sorting postal articles within the sorting system of Figure 1;
- Figure 3 shows a perspective view of a sorting rack used in the sorting system of Figure 1;
- Figure 4 shows a flowchart that describes operations for sorting postal articles according to the present invention;
- Figure 5 shows a table designed to contain sorting information;
- Figure 6 shows a flowchart that describes the operations carried out during the sorting step of Figure 4 according to one embodiment of the present invention; and
- Figure 7 shows a flowchart that describes operations carried out during the sorting step of Figure 4 according to another embodiment of the present invention.

BEST MODE FOR CARRYING OUT THE INVENTION

Figure 1 is a schematic illustration of a system 1 for sorting a plurality of postal articles 2 into a plurality of containers 7, in which each container 7 is associated, for example, to a different destination of the postal articles 2. The sorting system 1 comprises a data-reading device 3, designed to acquire data identifying each postal article 2 to

be sorted. The data identifying the postal articles 2 can comprise a destination identifier Id, which corresponds, for example, to the country and/or town and/or postcode of the destination of the postal article 2, or to other data still. The data-reading device 3 is connected through a first connection 4, for example, a data connection of a wireless type, to a tracking unit 5, for transmitting the identifier data (for example, as has been said, the destination identifier Id) acquired. The tracking unit 5 is designed to receive, process, and possibly store the identifier data acquired by the data-reading device 3 for each postal article 2. In turn, the tracking unit 5 comprises a processor 8 for processing the identifier data received, and a memory 9 for storing the identifier data received and processed. Advantageously, the destination identifier Id of each postal article 2 can be a unique code for that given postal article 2. In this case, the correspondence or matching between the unique destination identifier Id and the destination can be stored in an appropriate database (not shown) in the memory 9. By accessing, when necessary, the database using the unique destination identifier Id it is possible to obtain the indication of the destination associated to said identifier Id.

The sorting system 1 moreover comprises a sorting unit 15, connected to the tracking unit 5 through a second connection 16, for example of a wireless type, which can be of the same type as the first connection 4. The sorting unit 15 is, for example, a rack, and comprises a plurality of housings 18, each designed to house a container 7. In addition, each housing 18 can advantageously comprise a detector device 21 designed to acquire data identifying the container 7 positioned in the respective housing 18. The data identifying the containers 7 can comprise a container identifier Ic, for example, a unique numeric or alphanumeric code for each container 7. In addition, each housing 18 comprises one or

more optical warning devices 22 (only one of which is shown in the figure), one or more acoustic warning devices 24 (only one of which is shown in the figure) and a display 23.

The sorting unit 15 is connected to the tracking unit 5 through a sorting-assisting block 20, having the function of interfacing between the sorting unit 15 and the tracking unit 5. Optionally, also the data-reading device 3 can be connected to the sorting unit 15 via the sorting-assisting block 20.

According to one embodiment of the present invention, the sorting system 1 uses RFID (Radio Frequency Identification) technology to perform the operations of sorting of the postal articles.

Figure 2 shows a data-reading device 3 that supports the RFID technology. According to said embodiment, the data-reading device 3 comprises: a supply battery 25; a processor 26 for handling the operations of the data-reading device 3; a memory 27; a wireless interface 28, for supporting the first connection 4 and managing the data communications with the tracking unit 5; an RFID-reading module 30 for acquiring the data identifying the postal articles 2; a keyboard 33; and optionally a display 31, for displaying a result of the acquisition. For said purpose, each postal article 2 must be provided with a radiofrequency (RF) tag 35. Advantageously, the data-reading device 3 can comprise, in addition to the RFID-reading module 30 or as an alternative thereto, also a microphone 34 and a voice-recognition program, managed by the processor 26 and stored in the memory 27.

By way of example, the data-reading device 3 can be a palmtop provided with an RFID-reading module 30 of an integrated type or connected via an appropriate wired or wireless connection, for example Bluetooth, and the RF tag 35 may be of various types, whether active or passive.

Likewise, also the sorting unit 15 can be based upon the RFID technology. In this case, also the containers 7 must be provided with an RF tag 39, for example of the same type as the one used for the postal articles 2. In this case, the detector device 21 for reading the RF tags 39 of the containers 7 can be an RF-tag reader of a known type, integrated in each housing 18.

Figure 3 shows in greater detail a perspective view of the sorting unit 15. As may be noted, the sorting unit 15 can comprise a plurality of sorting sections 40. Each sorting section 40 is in turn divided into a plurality of shelves, for example, as is shown in the figure, a first shelf 41 and a second shelf 42. The first shelf 41 comprises a plurality of resting areas 43 for the containers 7, whilst the second shelf 42, set on top of and substantially aligned to the first shelf 41, comprises a plurality of openings 44. Each opening 44 is vertically aligned to a respective resting area 43 for the containers 7. Each opening 44 and the corresponding resting area 43 form a housing 18.

In addition, the openings 44 are advantageously provided with an RF sensor 45 for reading the RF tags 35 of the postal articles 2 and, optionally, with retention means 46, for example, shelves or mobile flaps, designed to create, when open, a direct connection between the opening 44 and the respective container 7. In this way, when the retention means are open, they enable insertion of postal articles 2 into the respective container 7, and when they are closed, they interrupt connection between the opening 44 and the container 7. Opening and closing of the flaps 46 can be, for example, subordinated to the result of an operation of reading of the RF tag 35 of a postal article 2 by the RF sensor 45 during the sorting operations, as will be explained more fully in what follows.

Operation of the sorting system 1 is described with reference to the flowchart of Figure 4.

Initially (step 50), a plurality of RF tags 35, 39 is associated to a respective plurality of postal articles 2 to be sorted and to a respective plurality of containers 7 designed to contain the sorted postal articles 2. For example, the RF tags 35, 39 can be of a passive type and be generated by means of a computer provided with an appropriate printer for RF tags (not shown). The RF tag 35 generated for a postal article 2 contains information on the destination of the respective postal article, whilst the RF tag 39 generated for a container 7 contains information that uniquely identifies the respective container 7 from amongst the plurality of containers 7 present.

Then (step 51), an operator positions each container 7 on a respective resting area 43 of a respective housing 18 of the sorting unit 15. The detector device 21, in this case an RF-tag reader, acquires (step 52) the data identifying each container 7 by reading the RF tag 39 set on each container 7 and (step 53) sends the identifier data acquired to the tracking unit 5. More precisely, for each container 7 there are sent the container identifier Ic and a housing identifier Ia, which uniquely identifies each housing 18. The housing identifier Ia is, for example, a numeric or alphanumeric code, which is unique for each housing 18 and can be attributed to each housing 18 by the sorting-assisting block 20. The tracking unit 5 receives and stores in the memory 9, in an appropriate database, the pair of identifiers (Ia, Ic).

Then (step 54), the operator, via the data-reading device 3, interacts with the database in which the pairs of identifiers (Ia, Ic) are stored for setting a plurality of possible destinations, in such a way that each pair of identifiers (Ia, Ic) is associated to a destination. The destinations defined

by the operator can be, for example, countries or towns or postcodes or others still. In this way, a table 65 is created of the type shown in Figure 5 comprising n columns (in the example described, three columns, of which one for Ia, one for Ic, and one for the destination) and m rows (the number of the rows is given by the number of housings 18 of the sorting unit 15).

The tracking unit 5 then communicates to the sorting unit 15 (step 55) the destinations associated to each container 7. In this way, the sorting unit 15 can show on the display 23 of each housing 18 the pre-selected destination.

Then (step 56), identification of the destination of each postal article 2 is carried out.

In detail, according to one embodiment of the present invention, the operator carries out reading of the RF tag 35 of each postal article 2 via the RFID-reading module 30 of the data-reading device 3, acquiring the destination identifier Id.

According to another embodiment of the present invention, the operator reads aloud the destination address or part of the destination address of the postal article 2 (for example, he reads the country or town or postcode), enabling the voice-recognition program of the data-reading device 3 to acquire the destination identifier Id.

Then, in both of the embodiments, irrespective of the type of acquisition of the destination identifier Id (whether by reading of the RF tag 35 or else by voice recognition), the data-reading device 3 sends the destination identifier Id acquired to the tracking unit 5. Next (step 57), the tracking unit 5, using the table 65, associates the destination identifier Id to the destination set by the operator, which in

turn is associated to a respective container identifier Ic and hence to the housing identifier Ia.

In the case where the destination identifier Id is a unique identifier for each postal article 2, the association between the destination identifier Id and the destination can be implemented using a further table (not shown), similar to the table 65 of Figure 5, and then, after identification of the destination, it is possible to access the table 65 to retrieve the container identifier Ic and hence the housing identifier Ia.

The tracking unit 5 sends (step 58) the information on the housing identifier Ia to the sorting-assisting block 20, which issues a command for activation of the optical warning device 22 of the housing 18 corresponding to said housing identifier Ia.

Then (step 59) the operator, by visually identifying the optical warning device 22 activated, inserts the postal article 2 into the container 7.

The list of the postal articles 2 present in each container 7 (dispatch) is saved in electronic format, for example, in the memory 9 of the tracking unit 5. In this way, the path of each postal article 2 can be easily traced and monitored by simply tracing and monitoring the path of the container 7 in which it has been sorted.

At the end of the sorting operations the containers 7 are closed (step 60).

The operation described by step 59 can be performed with different degrees of freedom by the operator, according to the technical characteristics implemented by the sorting unit 15.

Figure 6 is a flowchart that shows substeps of the step 59 of Figure 4 in the case of a sorting unit 15 without flaps 46.

In this case (step 80), the operator, after visual identification of the activated optical warning device 22 corresponding to a housing 18, inserts the postal article 2 through the corresponding opening 44. The RF sensor 45 with which the opening 44 is provided acquires (step 81), the destination identifier Id associated to the postal article 2 that is about to be sorted into the respective container 7. The sorting unit 15 then queries (step 82), through the sorting-assisting block 20, the tracking unit 5 in order to validate the current sorting operation, thus reducing the possibility of sorting errors by the operator. In detail, the sorting-assisting block 20 sends to the tracking unit 5 the destination identifier Id of the postal article 2 detected by the RF sensor 45 and the housing identifier Ia of the housing 18 in which the postal article 2 is about to be inserted. Then, the tracking unit 5, using the table 65, verifies (step 83) matching between the destination identifier Id and the housing identifier Ia received by the sorting unit 15 with the destination identifier Id and the housing identifier Ia stored. If the outcome of the check is positive (the respective identifiers do correspond) (step 84), the tracking unit 5 sends an appropriate warning to the sorting-assisting block 20, which in turn issues a command for switching-on of the optical warning device 22 of the housing 18 checked, thus signalling proper insertion. Instead, if the outcome of the check is negative (the respective identifiers do not correspond) (step 85), the tracking unit 5 sends an appropriate warning to the sorting-assisting block 20, which, in turn, generates an alarm signal, for example of an acoustic type, optical type or some other type. The operator can in this way realize the existence of the error and sort the postal article 2 correctly, to return to step 80.

Figure 7 is a flowchart that shows substeps of the step 59 of Figure 4 in the case of a sorting unit 15 comprising flaps 46. The retention means are considered in the closed state during all the steps preceding step 59 of Figure 4.

In this case, after visual identification of the activated optical warning device 22 corresponding to a housing 18, the operator inserts (step 90) the postal article 2 through the corresponding opening 44. Since the flaps 46 are closed, the opening 44 does not communicate directly with the underlying container 7, and consequently the flaps 46 themselves constitute a resting surface for the postal article 2. The operator can thus rest the postal article 2 on the flaps 46 of the opening 44. The RF sensor 45 with which the opening 44 is provided acquires (step 91) the destination identifier Id associated to the postal article 2 set on the flaps 46.

In a way similar to what has been described previously with reference to Figure 6, the sorting unit 15, through the sorting-assisting block 20, queries (step 92) the tracking unit 5, sending the destination identifier Id of the postal article 2 and the housing identifier Ia of the housing 18 in which the postal article 2 is about to be inserted. The tracking unit 5 verifies (step 93) matching between the destination identifier Id and the housing identifier Ia received with the destination identifier Id and the housing identifier Ia contained in table 65. If the outcome of the check is positive (the respective identifiers do correspond) the tracking unit 5 sends (step 94) an appropriate warning to the sorting-assisting block 20, which in turn issues a command for opening of the flaps 46. The postal article hence drops into the container 7. Instead, if the outcome of the check is negative (the respective identifiers do not correspond) (step 95), the tracking unit 5 sends an appropriate warning to the sorting-assisting block 20, which hence maintains the flaps 46 closed. The postal article 2 is hence not accepted. It is

possible to generate moreover a warning of an optical or acoustic type. Once the operator has detected the sorting error, he can proceed to positioning of the postal article 2 in the correct housing 18, to return to step 90.

Possible events of malfunctioning of the sorting system 1, such as, for example, the failure to store or wrong storage of some identifiers Ia, Ic, Id by the tracking unit 5, can be managed individually by the operator when they arise. For example, in the case where the optical/acoustic indicators of the sorting unit 15 erroneously signal to the operator an incorrect sorting, the operator can force the sorting operations by inserting the postal article 2 in question into the container 7 that he deems correct and intervene on the creation of the dispatch by manually inserting the indication of the presence of the postal article 2 not recognized. Said manual insertion can be easily obtained using the keyboard 32 of the data-reading device 3.

From an examination of the characteristics of the system for sorting postal articles provided according to the present invention the advantages that it enables are evident.

In fact, the efficiency, speed, and accuracy of sorting are no longer parameters exclusively dependent upon the individual capacities of the operator. In fact, the operator is assisted in his task of sorting of the postal articles by means of optical or acoustic indications, activated by the automatic recognition of the destination of the postal articles rendered possible in particular by the use of RFID technology. The sorting errors are consequently considerably reduced for all the embodiments described, and practically eliminated in the case of use of a sorting unit provided with retention means. Finally, since the sorting operation has a low dependence upon the personal knowledge or capacity of the operator, it is not necessary to envisage use of particularly skilled operators.

Finally, it is clear that modifications and variations may be made to the system for sorting postal articles described and illustrated herein without thereby departing from the sphere of protection of the present invention, as defined in the annexed claims.

For example, the RF-tag reader can be replaced by a barcode reader, and the RF tags can be replaced by barcodes. In addition, the containers 7 can be different from the one represented, and be constituted by boxes, trays, drawers, or bags.

In addition, the sorting system 1 can be operated with different degrees of autonomy by the operator. For example, a particularly skilled operator may deem preferable (for example, because he deems that he can speed up the sorting operations) to skip the step of reading of the RF tags 35 of the postal articles 2 by means of the data-reading device 3. In this case, the operator can insert the postal article 2 into the housing 18 that he deems correct. The RF sensor 45 of the respective housing 18 reads then the destination identifier Id, and, by accessing the tracking unit 5 via the sorting-assisting block 20, effective matching between the destination identifier Id read and the destination set for that particular housing 18 is verified.

As further alternative, with particular reference to the case in which the destination identifier is a unique code for each postal article 2, it is possible to use the sorting unit 15 as counter of pieces, for creating a list (dispatch) of the postal articles 2 for each container 7. In this case, reading of the RF tags 35 present on the postal articles 2 enables acquisition of the unique destination identifier Id, which is then stored in the list corresponding to the respective container 7 to form the respective dispatch.

CLAIMS

1. A system (1) for sorting postal articles (2), comprising:
a data-acquisition unit (3), for acquiring a first identifier parameter (Id) of a postal article (2);
a sorting unit (15), comprising a plurality of housings (18) each designed to house a respective container (7) of postal articles (2); and
a tracking unit (5), connected to the data-acquisition unit (3) and to the sorting unit (15),
said sorting unit (15) comprising:
acquisition means (21) for acquiring a second identifier parameter (Ic), said second identifier parameter (Ic) uniquely identifying a container (7) housed in a respective housing (18); and
insertion-authorization means (22, 24, 46), configured to authorize insertion of said postal article (2) into said container (7) on the basis of a result of a comparison between the first identifier parameter (Id) and the second identifier parameter (Ic).

2. The sorting system (1) according to Claim 1, wherein said insertion-authorization means (22, 24, 46) comprise at least one among an optical warning device (22), an acoustic warning device (24) and retention means (46), configured to prevent access of said postal article into said container (7).

3. The sorting system (1) according to Claim 1 or Claim 2, wherein each housing (18) is identified by a third identifier parameter (Ia) and wherein said tracking unit (5) comprises logic means (8, 9) configured for generating a unique association between the second identifier parameter (Ic) and the third identifier parameter (Ia).

4. The sorting system (1) according to Claim 3, wherein said data-acquisition unit (3) comprises data-input means (32) for

setting a destination parameter associated to a respective housing (18) and wherein said logic means (8, 9) uniquely associate said second and/or third identifier parameter to said destination parameter.

5. The sorting system (1) according to Claim 4, wherein the sorting unit (15) moreover comprises display means (23) configured to display said destination parameter.

6. The sorting system (1) according to any one of the preceding claims, wherein said postal articles (2) and said containers (7) comprise first and second RFID tags (35, 39), which store the first and second identifier parameters (Id, Ic), said data-acquisition unit (3) and said acquisition means (21) comprising an RFID-tag reader (30, 21).

7. The sorting system (1) according to any one of the preceding claims, wherein said first identifier parameter identifies the destination of the respective postal article (2).

8. The sorting system (1) according to any one of the preceding claims, wherein said tracking unit (5) moreover comprises a memory (9) for storing a list of postal articles (2) deposited in a respective container (7).

9. The sorting system (1) according to any one of the preceding claims, wherein the sorting unit (15) moreover comprises display means (23) designed to display a destination associated to a respective container (7).

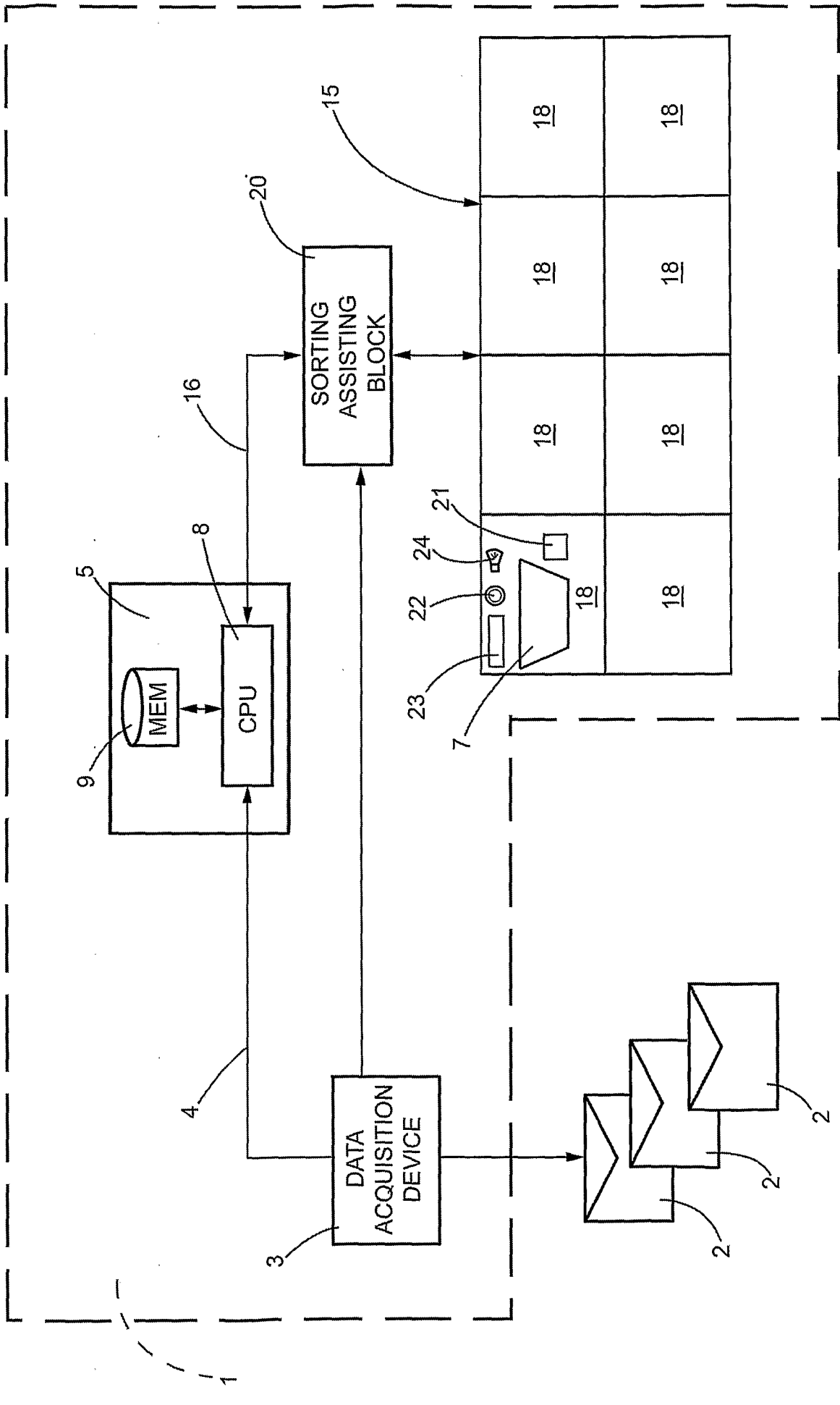
10. A method for sorting postal articles (2), comprising the steps of:
associating (50) a first identifier parameter (Id) to a postal article (2);
associating a second identifier parameter (Ic) to a container

(7) for said postal articles (2);
arranging said container (7) in a respective housing (18) of a sorting unit (15);
reading said first identifier parameter;
determining whether said postal article associated to said first identifier parameter belongs to said container; and
if it does, authorizing insertion of said postal article (2) into said container (7).

11. The method according to Claim 10, further comprising, in the case where the determination step has a negative outcome, at least one between the steps of: activating a light warning, activating an acoustic warning, and preventing access of said postal article (2) into said container (7).

12. The method according to either Claim 10 or Claim 11, wherein said housing (18) is identified by a third identifier parameter (Ia), said method further comprising the steps of:
uniquely associating said second and third identifier parameters (Ic, Ia) to one another; and
uniquely associating a destination parameter to at least one between said second identifier parameter (Ic) and said third identifier parameter (Ia);
and wherein the determination step comprises verifying a matching between said first identifier parameter and said destination parameter.

13. The method according to any one of Claims 10-12, wherein said step of associating (50) a first identifier parameter to a postal article (2) comprises affixing a first RFID tag (35) to said postal article, and said step of associating a second identifier parameter (Ic) to a container (7) comprises affixing a second tag RFID (39) to said container.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20
21
22
23
24
CPU
MEM
SORTING ASSISTING BLOCK
DATA ACQUISITION DEVICE

FIG. 1

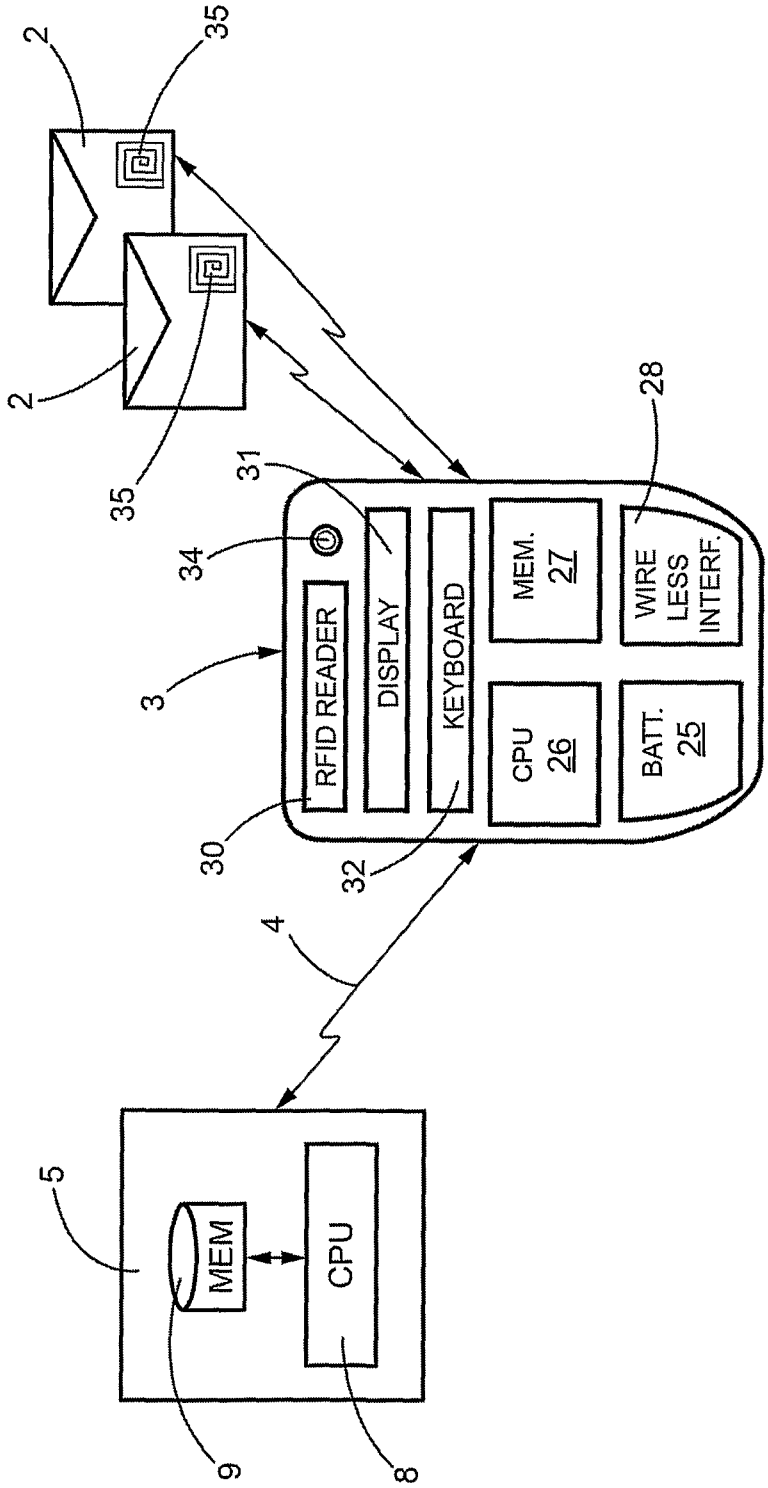
2
35
2
35
31
34
28
3
RFID READER
DISPLAY
KEYBOARD
MEM. 27
WIRE LESS INTERF.
CPU 26
BATT. 25
30
32
4
5
MEM
CPU
9
8

FIG. 2

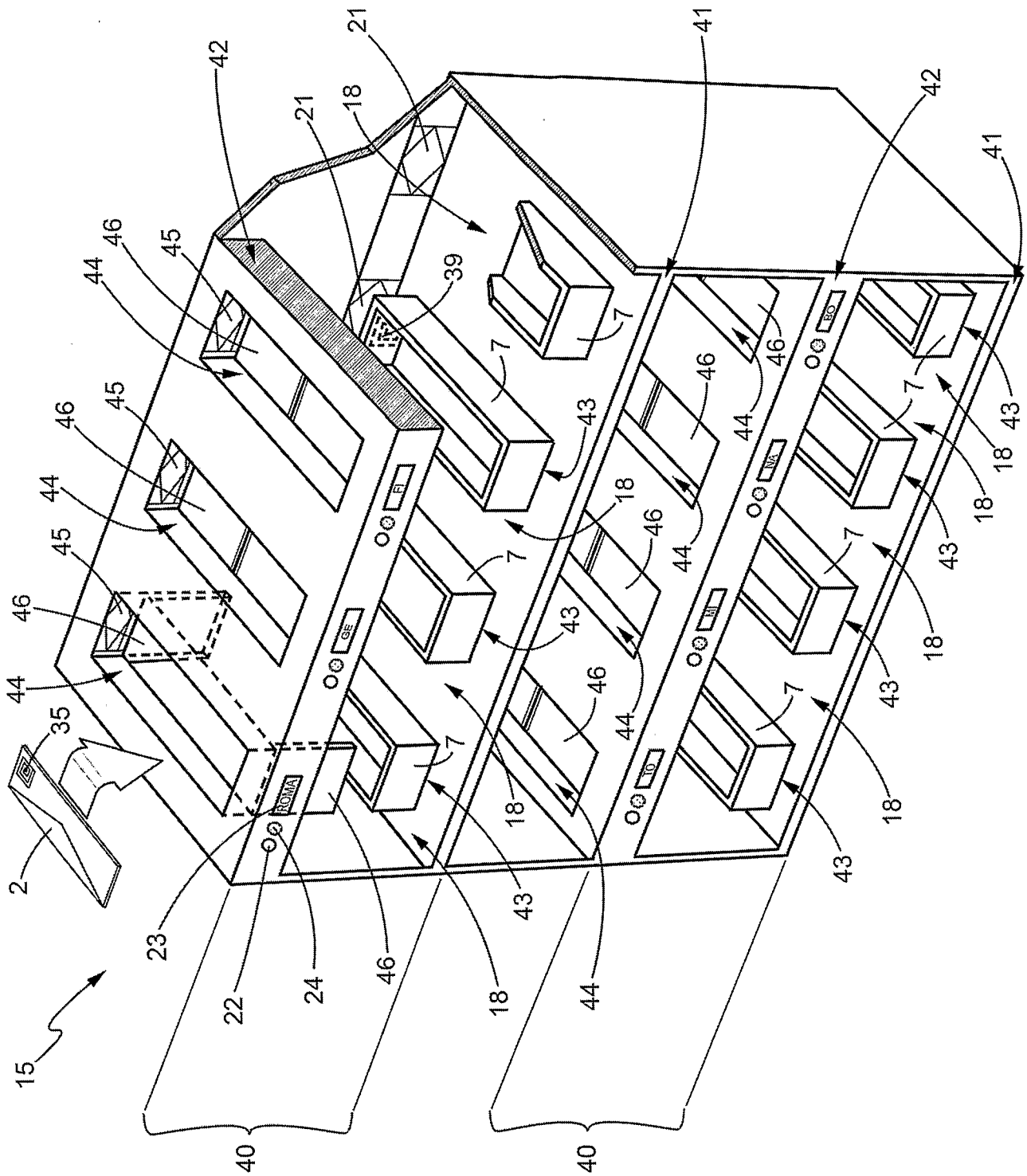

FIG. 3

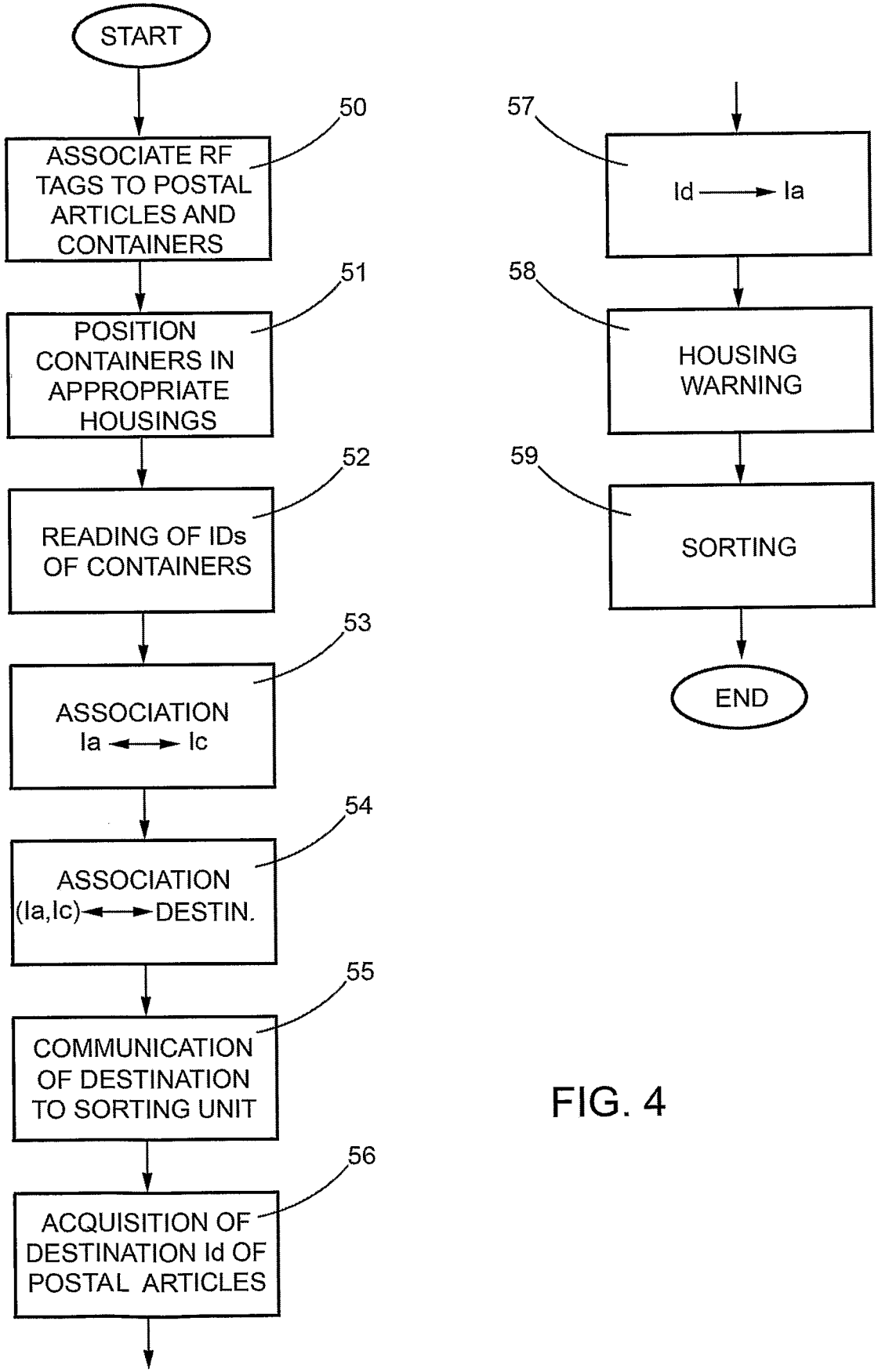
START
ASSOCIATE RF TAGS TO POSTAL ARTICLES AND CONTAINERS
50
POSITION CONTAINERS IN APPROPRIATE HOUSINGS
51
READING OF IDs OF CONTAINERS
52
ASSOCIATION Ia ⟷ Ic
53
ASSOCIATION (Ia,Ic) ⟷ DESTIN.
54
COMMUNICATION OF DESTINATION TO SORTING UNIT
55
ACQUISITION OF DESTINATION Id OF POSTAL ARTICLES
56
57
Id ⟶ Ia
58
HOUSING WARNING
59
SORTING
END

FIG. 4

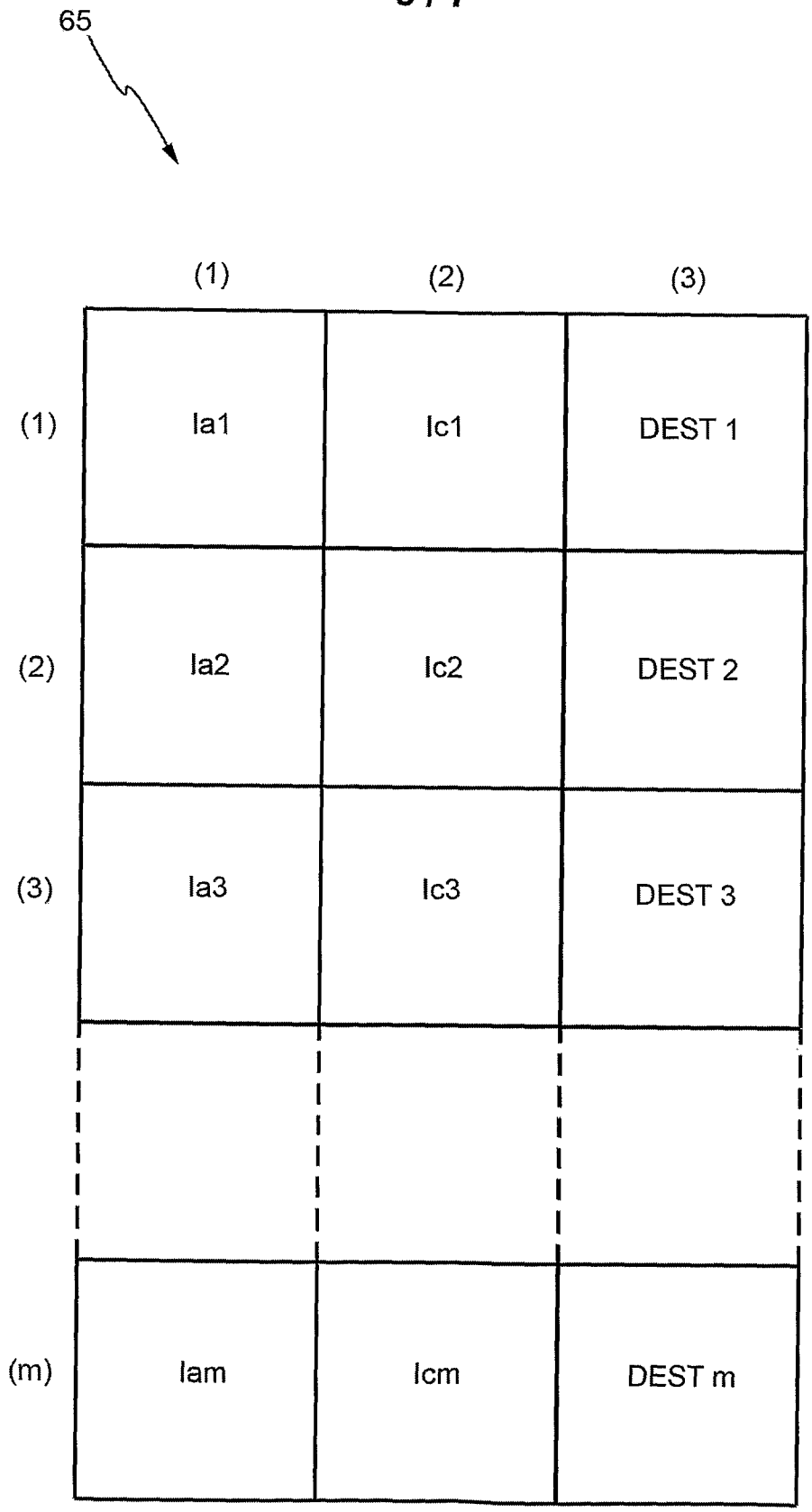
65
(1)
(2)
(3)
(1)
Ia1
Ic1
DEST 1
(2)
Ia2
Ic2
DEST 2
(3)
Ia3
Ic3
DEST 3
(m)
Iam
Icm
DEST m

FIG. 5

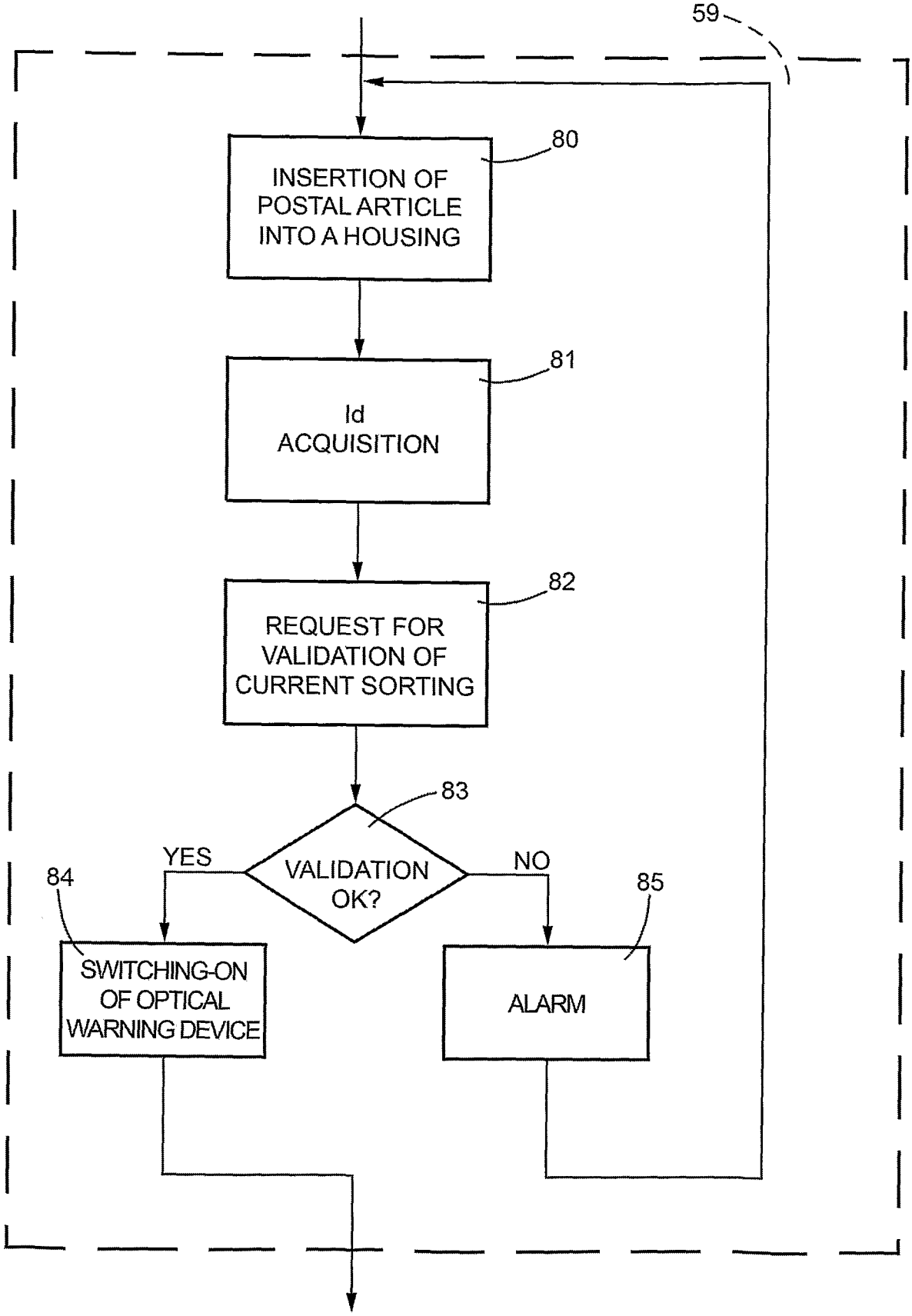
59
INSERTION OF POSTAL ARTICLE INTO A HOUSING
80
Id ACQUISITION
81
REQUEST FOR VALIDATION OF CURRENT SORTING
82
VALIDATION OK?
83
YES
NO
84
SWITCHING-ON OF OPTICAL WARNING DEVICE
ALARM
85

FIG. 6

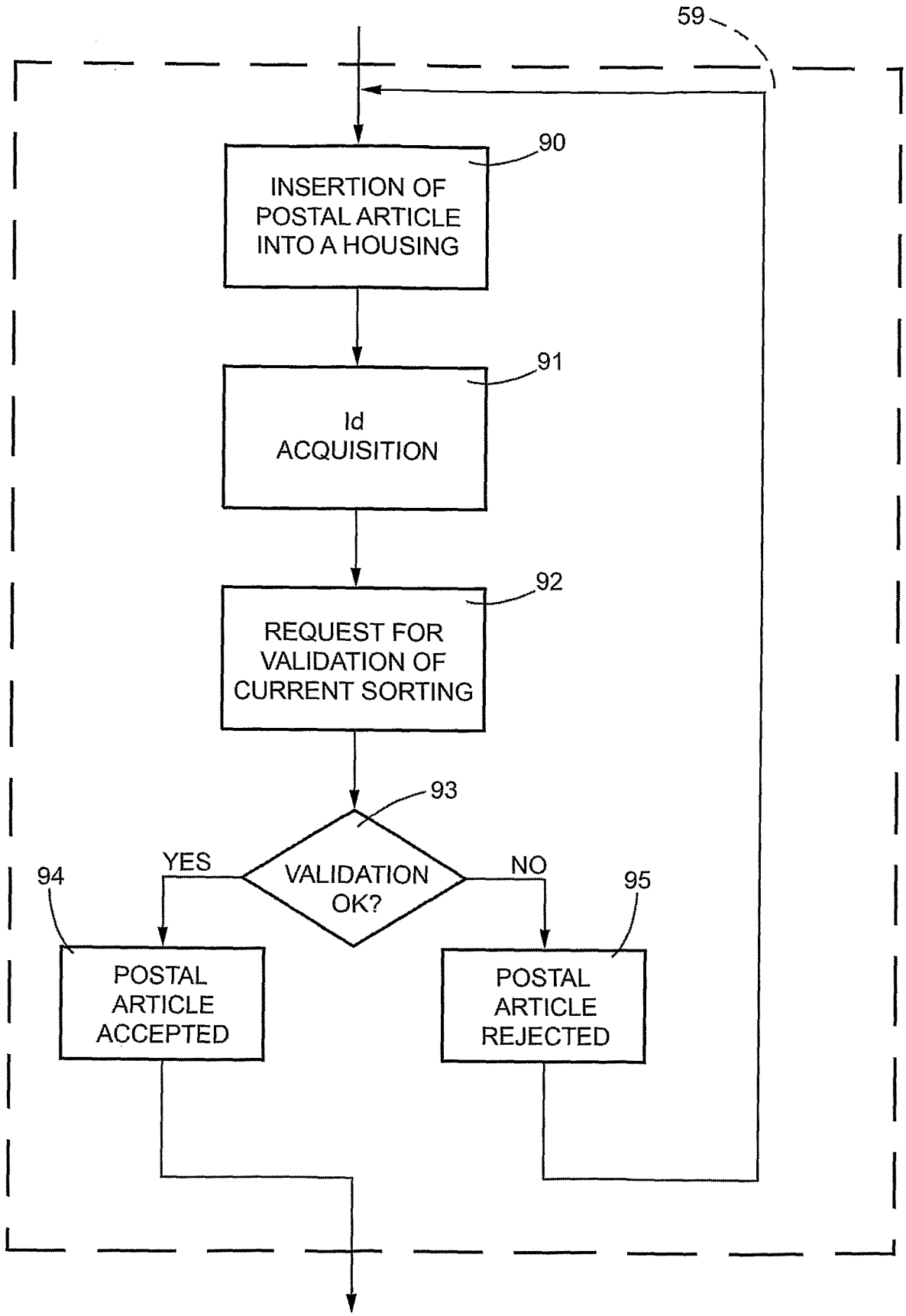
59
90
INSERTION OF POSTAL ARTICLE INTO A HOUSING
91
Id ACQUISITION
92
REQUEST FOR VALIDATION OF CURRENT SORTING
93
VALIDATION OK?
YES
NO
94
95
POSTAL ARTICLE ACCEPTED
POSTAL ARTICLE REJECTED

FIG. 7

INTERNATIONAL SEARCH REPORT

International application No
PCT/IT2009/000044

A. CLASSIFICATION OF SUBJECT MATTER
INV. B07C7/00

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)
B07C

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 practical, 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.
Y	WO 2008/089150 A (OPEX CORP [US]; HAYDUCHOK GEORGE [US]; DEWITT ROBERT R [US]) 24 July 2008 (2008-07-24) paragraph [0073] paragraph [0083]	1-13
Y	US 7 331 471 B1 (SHAKES JONATHAN J [US]; HANSSENS NICHOLAS M [US]; BOHLMANN JAN [US]; J) 19 February 2008 (2008-02-19) column 20, paragraph 26 - paragraph 44; figure 13	1-13
A	WO 2004/009257 A (UNITED PARCEL SERVICE INC [US]) 29 January 2004 (2004-01-29) abstract	1-13
A	EP 0 495 661 A (PITNEY BOWES INC [US]) 22 July 1992 (1992-07-22) figures	1-13

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"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

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
1 October 2009	16/10/2009

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Wich, Roland

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IT2009/000044

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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