



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
24.01.2018 Bulletin 2018/04

(51) Int Cl.:
B07C 7/00 (2006.01)

(21) Application number: **16180628.6**

(22) Date of filing: **21.07.2016**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA MD

(71) Applicant: **Siemens Aktiengesellschaft**
80333 München (DE)

(72) Inventors:
• **GIUGNO, Luciano**
78465 Konstanz (DE)
• **LI, Zhe**
78467 Konstanz (DE)

- **RICHARDSON, Samuel X.**
Arlington, TX 76013 (US)
- **RÖHM, Eberhard**
78224 Singen (DE)
- **SALEMIZADEH, Abdul Hamid**
Burleson, TX 76028 (US)
- **SCHAD, Jürgen**
78465 Konstanz (DE)
- **SCHULTE-AUSTUM, Matthias**
78315 Radolfzell (DE)
- **SIPE, Stanley W.**
North Richland Hills, TX 76180 (US)

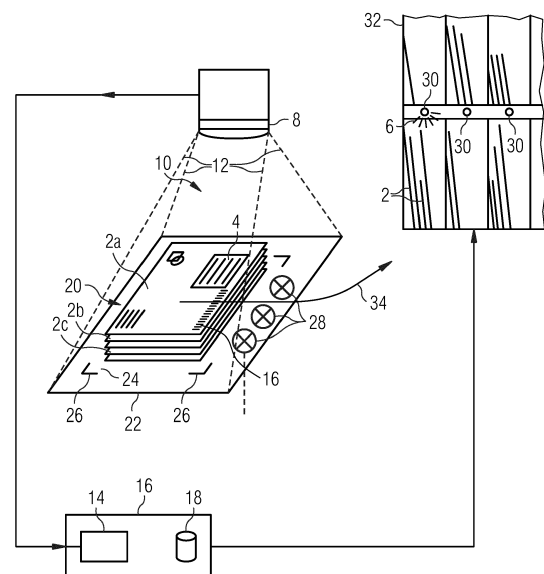
(74) Representative: **Maier, Daniel Oliver**
Siemens AG
Postfach 22 16 34
80506 München (DE)

(54) **METHOD FOR PROVIDING SORTING INFORMATION FOR POSTAL SORTING ITEMS**

(57) The present invention discloses a method for providing sorting information (6) for postal items (2), such as letters, brochures, parcels and the like, each postal item (2, 2a, 2b, 2c) comprising an address information (4), comprising the steps of:

- a) providing an overhead positioned camera (8); said camera (8) being capable of taking images of the postal items (2, 2a, 2b);
- b) providing an image recognition means (14) in order to extract the address information (4) from the postal item (2, 2a, 2b);
- c) providing a process control (16) being enabled to assign the sorting information (6) to the postal item (2, 2a, 2b) in response to the extracted address information (4);
- d) forming a stack (20) of postal items (2, 2a, 2b) wherein the postal items (2, 2a, 2b) are oriented to allow reading the respective address information (4) from the overhead positioned camera (8) wherein the stack (20) of postal items (2, 2a, 2b) is positioned in a determined area of view (24) with respect to the camera (8);
- e) disposing at least one optical mark (28) adjacent to the determined area of view (24);
- f) removing the postal item (2a) on top of the stack (20) and occlude the at least one optical mark (28) temporarily for the camera (8) during the movement for removing;
- g) detecting that the at least one optical mark (28) has been occluded temporarily by an evaluation of the imag-

es taken by the camera (8); and
h) in response to the detection deducing that the successive postal item (2b) is now present on the top of the stack (20), taking a new image of the successive postal item (2b) and extracting the address information (4) from this new image and assigning the respective sorting information (6) to the successive postal item (2b).



Description

[0001] The present invention relates to a method for providing sorting information for postal items, such as letters, brochures, parcels and the like, each comprising an address information.

[0002] Currently, postal sorting centers around the world use manual labor and highly trained personal to sort mail items which are rejected by automation or not able to be run on automated machines.

[0003] Postal processing applications require reading and recognition of the address of the postal items being processed, in order to prepare the items for delivery. For example, all of the postal items that will be delivered on the same delivery route would be separated from all of the other postal items, so that they can be loaded into a delivery vehicle in preparation for the delivery route. Manual methods of reading and recognition of postal items during processing requires a great deal of labor and expertise. Fully automatic methods of processing postal items can be large, inflexible, and can require significant volume of postal items to justify their cost. When space and volume of postal items are limited, the ideal system is small, flexible, adds productivity to manual processing steps, and reduces the expertise required to perform the processing. Automatic scanning and recognition equipment can be applied to postal processing in these situations. The scanning equipment captures an image of a postal item, automatic recognition software extracts and derives relevant processing information, and the information is provided in the form of simple instructions to the operator regarding processing of that postal item. An example for this postal processing is given in the European Patent Application EP 2 906 367 A1. Traditional methods of manually scanning postal items for automatic reading have required complex methods and systems to determine when a new item requires scanning, representing a signal to the automatic recognition software to extract and derive new processing information to be presented as instructions to the operator. The solution disclosed in EP 2 906 367 A1 exactly suffers the same problem.

[0004] The present invention therefore has the objective to provide a method for providing sorting information for postal sorting items allowing postal sorting centers to reduce manual labor and scheme knowledge throughout its networks, including but not limited to last mile delivery optimization. The invention shall further allow sortation of mail items to final destination or next destination via non-schemed trained personnel at very high throughputs from many different physical streams. This will represent a significant decrease in direct labor cost as well as training.

[0005] This objective is achieved according to the present invention by a method for providing sorting information for postal items, such as letters, brochures, parcels and the like, each postal item comprising an address information, comprising the steps of:

- a) providing an overhead positioned camera; said camera being capable of taking images of the postal items;
- b) providing an image recognition means in order to extract the address information from the postal item;
- c) providing a process control being enabled to assign the sorting information to the postal item in response to the extracted address information;
- d) forming a stack of postal items wherein the postal items are oriented to allow reading the respective address information from the overhead positioned camera wherein the stack of postal items is positioned in a determined area of view with respect to the camera;
- e) disposing at least one optical mark next to the determined area of view;
- f) removing the postal item on top of the stack and covering the at least one optical mark temporarily during the movement for removing;
- g) detecting that the at least one optical mark has been disappeared temporarily by an evaluation of the images taken by the camera; and
- h) in response to the detection deducting that the successive postal item is now present on the top of the stack, taking a new image of the successive postal item and extracting the address information from this new image and assigning the respective sorting information to the successive postal item.

[0006] This method allow the unanimous recognition of the address information of the next postal item once the topmost postal item has been removed for being further processed according to the sorting information. The sorting information thereby may comprise an optical and/or acoustical indication where to sort the current postal item. Just by occlusion and the re-appearance of the optical mark the image recognition is triggered to recognize the address information of the next postal item present on the top of the stack. Therefore, this process is more reliable as compared to prior art processes where low contrasts images of subsequent postal items have to be compared in order identify the presence of the subsequent postal item on top of the stack. In the present invention, just high contrast images taken from the optical mark have to be compared.

[0007] In order to sort more postal items, it is recommended to repeat the steps f) to h) a number of times in order to reduce the number of postal items present in the stack. Usually, one stack is sorted completely prior to loading the next stack into the predetermined area.

[0008] A preferred embodiment provides for an optical mark being in form of a symbol, such as a cross, an X or the like, having high contrast as compared to the surrounding area. Typically, a symbol, such as a letter or a cross, printed in black on a white paper or white underlay are a suitable pair of high contrast for the recognition of the occlusion and the re-appearance of the optical mark.

[0009] Typically, the address information is provided

in form of hand-and/or typewriting and/or fluorescent bar code being readable on one surface of the postal item.

[0010] Preferred embodiments of the present invention are hereinafter explained more detailed with respect to the attached drawing that depicts schematically the method for providing sorting information 6 for postal items 2, such as letters, brochures, newspapers, magazines and the like, each comprising an address information 4. The drawing shows an overhead positioned camera 8 having a field of view 10 illustrated by dotted lines 12. This camera 8 is used to take images of the postal items 2. The images taken by the camera 8 are processed by an image recognition module 14. The processing of the image recognition module 14 lead to the extraction of the address information 4 which is part of the video image taken by the camera 8. The address information 4 can be handwritten or machine-written but may also comprise a bar code 16 printed onto the postal item 2a in a preceding sorting process.

[0011] The image recognition module 14 forms logically a part of a process control module 16 which is enabled to assign the sorting information 6 to the postal item 2 in response to the extracted address information 4. In the present example, the sorting information 6 is contained in a database 18. The sorting process now works as follows:

Firstly, a stack 20 of postal items 2a, 2b, etc. is formed wherein the postal items 2a, 2b, etc. are oriented to allow reading the respective address information 4 from the overhead positioned camera 8 wherein the stack 20 of postal items 2a, 2b, etc. is positioned on a board 22 within the determined area 24 which corresponds to the area of view 10 with respect to the camera 8. The determined area 24 is defined by marks 26 which help an operator (here not shown) to position the stack 20 accordingly. Further, three optical marks 28, here three crossed circular boxes, are disposed adjacent to the determined area 24 on the board 22. These optical marks have (28) a high contrast as compared to the board 22. During the sorting process, the camera 8 take continuously images from these optical marks 28 and the image recognition module 14 determines for every image whether the optical marks 28 are present.

[0012] Once the address information 4 is extracted from the image taken from the postal item 2a on the top of the stack 20, the sorting information 6 is assigned to the postal item 2a. The sorting information 6 in this example is materialized in terms of a lamp 30 being illuminated in order to indicate to the operator the exact position for the postal item 2a in a sorting register 32. While now removing the postal item 2a on top of the stack 20 for sorting the postal item 2a into the indicated position in the sorting register 32, the optical marks 28 are temporarily occluded during the movement for removing the postal item 2a which shall be indicated by arrow 34. The

image recognition module 14 detects that the optical marks 28 have been disappeared temporarily during the removal movement of the postal item 2a by an evaluation of the images taken by the camera 8. In response to the detection, the re-appearance of the optical marks 28 in the images taken by the camera 8 for the specific area which domiciles the optical marks 28 leads to the deduction that the successive postal item 2b is now present on the top of the stack 20. Now, the camera 8 takes a new image (or a number of images) of the stack 20 and in particular of the postal item 2b now present on the top of the stack 20. The address information 4 for this postal item 2b is then extracted and the respective sorting information 6 is assigned to the successive postal item 2b. Consequently, a lamp 30 is illuminated thereby indicating the correct sorting position for the postal item 2b when being removed from the stack 20 and sorted into the sorting register 32.

[0013] This removal movement triggers then again a capture of a new image taken from the postal item 2c now on top of the stack 20. This process can repeated until all postal items 2 contained in the stack 20 are sorted into the sorting register 32.

[0014] It has to be mentioned that the sorting register 32 is only one possible recipient for the postal items 2. Alternatively, the postal items 2 can be sorted into all kind of suitable containers and the like according to the sorting logic applied by the process control module 16.

[0015] The present invention therefore utilizes a novel approach to detecting that the postal item being scanned has been changed. The components involved in this method are mobile allowing it to be used in more than one location and operation. Flexible destination sortation to cases, bins, trays or tubs based upon the postal operation requirements and the respective sorting logic is easily achievable. The method can easily be integrated into postal operations both physically and through IT networks. The destination sortation is programmable or can be supplied by the customer (visual point to light, graphic screens, Heads Up Displays and overlays, voice, etc) based upon customer specific requirements. This can be in the form of carrier designation, physical address location, geo-coordinates and a variety of other schemes such as What3Words.

[0016] The present invention therefore provides a self-contained scanning system with camera and lighting. It further provides for adjustable lighting for different environments (natural light, florescent, etc). It also provides height adjustment of the board 22 to accommodate the operator stature. The system and the method are adjustable with respect to the field of view 10 and the image resolution. One can provide a designed background pattern for the scanning camera 8. It allows the camera 8 to continuously scanning the surface of the board 22 with a certain frame rate and provides a mechanism for automatic brightness regulation of the camera. The image recognition module 14 can provide a method of automatically selecting the best image of each postal item 2 which

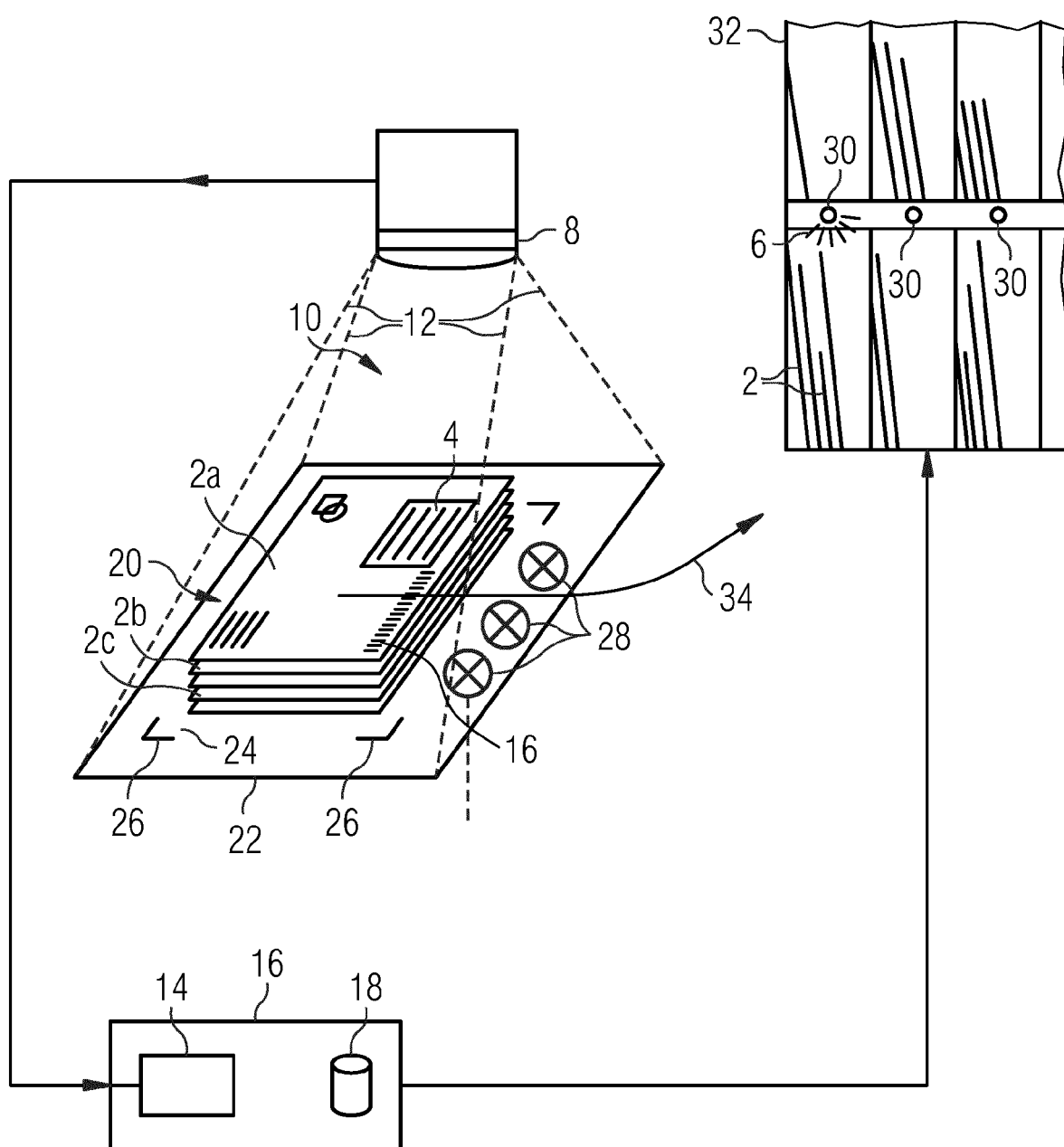
is visible in the field of view 10 for further processing. The sorting items 2 can be fed individually or - as shown - can be fed as a stack 20.

4. The method according to any of the preceding claims wherein the address information (4) is provided in form of hand- and/or typewriting and/or fluorescent bar code (16).

5

Claims

1. A method for providing sorting information (6) for postal items (2), such as letters, brochures, parcels and the like, each postal item (2, 2a, 2b, 2c) comprising an address information (4), said method comprising the steps of:
 - a) providing an overhead positioned camera (8); said camera (8) being capable of taking images of the postal items (2, 2a, 2b);
 - b) providing an image recognition means (14) in order to extract the address information (4) from the postal item (2, 2a, 2b);
 - c) providing a process control (16) being enabled to assign the sorting information (6) to the postal item (2, 2a, 2b) in response to the extracted address information (4);
 - d) forming a stack (20) of postal items (2, 2a, 2b) wherein the postal items (2, 2a, 2b) are oriented to allow reading the respective address information (4) from the overhead positioned camera (8) wherein the stack (20) of postal items (2, 2a, 2b) is positioned in a determined area of view (24) with respect to the camera (8);
 - e) disposing at least one optical mark (28) adjacent to the determined area of view (24);
 - f) removing the postal item (2a) on top of the stack (20) and occlude the at least one optical mark (28) temporarily for the camera (8) during the movement for removing;
 - g) detecting that the at least one optical mark (28) has been occluded temporarily by an evaluation of the images taken by the camera (8); and
 - h) in response to the detection deducting that the successive postal item (2b) is now present on the top of the stack (20), taking a new image of the successive postal item (2b) and extracting the address information (4) from this new image and assigning the respective sorting information (6) to the successive postal item (2b).
2. The method according to claim 1, wherein the steps f) to h) are repeated a number of times in order to reduce the number of postal items (2) present in the stack (20).
3. The method according to claim 1 or 2, wherein the optical mark (28) is provided in form of a symbol, such as a cross, an X or the like, having high contrast as compared to the surrounding area.





EUROPEAN SEARCH REPORT

 Application Number
 EP 16 18 0628

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,D	WO 2014/057185 A1 (SOLYSTIC [FR]) 17 April 2014 (2014-04-17) * page 6, line 24 - line 26; figures *	1-4	INV. B07C7/00
A	EP 2 260 952 A1 (SIEMENS AG [DE]) 15 December 2010 (2010-12-15) * paragraph [0037] *	1-4	
A	US 6 748 294 B1 (OVERMAN JOHN [US] ET AL) 8 June 2004 (2004-06-08) * column 10, line 1 - line 40 *	1-4	
A	US 5 794 789 A (PAYSON WILLIAM H [US] ET AL) 18 August 1998 (1998-08-18) * column 10, line 60 - column 11, line 37 *	1-4	
			TECHNICAL FIELDS SEARCHED (IPC)
			B07C
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 14 December 2016	Examiner Wich, Roland
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

 1
 EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 16 18 0628

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

14-12-2016

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2014057185 A1	17-04-2014	AU 2013328516 A1	02-04-2015
		CA 2887100 A1	17-04-2014
		EP 2906367 A1	19-08-2015
		FR 2996789 A1	18-04-2014
		US 2015209832 A1	30-07-2015
		WO 2014057185 A1	17-04-2014
EP 2260952 A1	15-12-2010	DE 102009024746 A1	16-12-2010
		EP 2260952 A1	15-12-2010
		US 2010318215 A1	16-12-2010
US 6748294 B1	08-06-2004	US 6748294 B1	08-06-2004
		US 2004186616 A1	23-09-2004
US 5794789 A	18-08-1998	NONE	

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- EP 2906367 A1 [0003]