

(19)



(11)

**EP 3 339 047 A1**

(12)

**EUROPEAN PATENT APPLICATION**

(43) Date of publication:  
**27.06.2018 Bulletin 2018/26**

(51) Int Cl.:  
**B42D 25/305** (2014.01) **B41F 33/00** (2006.01)  
**B41M 3/14** (2006.01) **B65H 26/02** (2006.01)  
**B42D 25/21** (2014.01)

(21) Application number: **17382626.4**

(22) Date of filing: **20.09.2017**

(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**

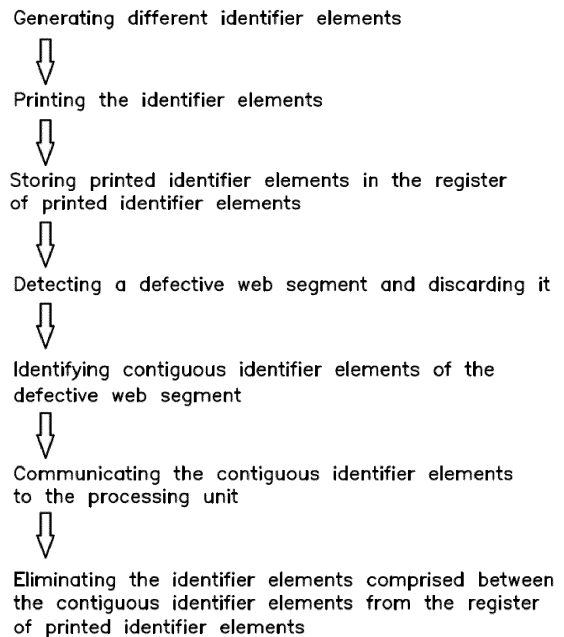
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(54) **METHOD FOR CONTINUOUS PRINTING OF CERTIFIED IDENTIFICATION ELEMENTS ON A BAND**

(57) The present invention relates to a method for continuously printing certified identification elements on a web, which method comprises randomly generating a register of identification elements to be printed, continuously printing said identification elements on a web and transferring the printed identification elements from the register of identification elements to be printed to a register of printed identification elements. When a defective web segment is detected, the method also comprises discarding that web segment, identifying the contiguous identification elements of the defective web segment, and eliminating from the register of printed identification elements all the identification elements comprised between the contiguous identification elements.



**Fig. 1**

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**Description**Field of the Art

**[0001]** The present invention relates to a method for continuously printing certified identification elements on a web, thereby obtaining a web with a sequence of printed identification elements, where the identification elements that are actually printed on defect-free web segments can be certified, which thereby allows one to be certain that no identification element is lost as a result of being printed on a defective web segment, and generally allows assuring that all the elements of a given set of identification elements have actually been printed.

**[0002]** The method is applicable for the promotion of products with identification elements that can be used to give out a prize, or to allow a return, or for the biunivocal identification of a group of pharmaceutical products, or for other similar uses.

State of the Art

**[0003]** The individual printing of unique and distinctive identification elements is known in the industry. For example, a code or number including the printing or manufacturing date, the product batch or the like is usually included, but in such case the codes used are typically sequential, and therefore predictable, which is of no interest for carrying out drawings or giving out prizes since it allows for counterfeiting.

**[0004]** The inclusion of random identification elements, such as alphanumeric codes, precisely for the purpose of participating in drawings or handing out prizes, is also known. The randomness of the identification elements makes it very unlikely for a counterfeiter to use a code which would by chance correspond with one of the codes actually used in the drawing or prize.

**[0005]** However, precisely because they are unpredictable, random codes, there is a need to maintain a register of the generated identification elements to be able to subsequently carry out the drawing from among the generated and printed identification elements.

**[0006]** However, there is currently the risk of printing defects occurring which, due to the continuous printing speed, can cause hundreds or thousands of identification elements to be printed on defective web segments that cannot be put on the market, where it can lead to changes or errors in the probability of obtaining a prize, or to giving out prizes to identification elements not put on the market as they were damaged during the printing tasks.

**[0007]** There is still no known document or prior art which offers a solution to this problem that allows automatically obtaining a register of printed certified identification elements corresponding with absolute certainty to correctly printed identification elements that are ready to be put on the market on packages or bags of unitary products obtained from the printed web.

Brief Description of the Invention

**[0008]** The present invention relates to a method for continuously printing certified identification elements on a web.

**[0009]** It will be understood that the continuously-printed web is a web of material that continuously moves in one direction, and that the identification elements are printed on said web without said web stopping.

**[0010]** The identification elements are symbols, signs, codes, sequences of numbers, letters or combinations thereof that are not repeated, where they are different every time they are printed, and are therefore univocal identifiers.

**[0011]** Said identification elements will be printed in pre-established areas of the web. Typically, the web will then be cut into sections corresponding to product units, for example, for forming packets, bags or wrappers for consumables. The identification elements will be printed on the web for each product unit to contain an identification element distinguishing it from the rest of the product units that will have different identification elements.

**[0012]** This can be useful, for example, for carrying out drawings which assign a prize to a specific product unit associated with an identification element, or for assuring the authenticity of the product, which allows assuring that a product unit is not a fraudulent copy thereof, checking that the identification element corresponds to a certified identification element.

**[0013]** Said web will usually contain other prints other than the print of the identification elements, for example the identification of the product which the future packet or bag will contain. Said former print can be made in the same printing unit in which the identification elements are printed or in another printing unit where the web wound onto reels which subsequently feed it into the unit in which the identification elements are printed. In any case, the web will preferably include a former print.

**[0014]** The proposed method for continuously printing certified identification elements on a web therefore includes randomly generating, by means of a computing unit, identification elements that are all different from one another.

**[0015]** Said identification elements are printed in series on the web under the control of a processing unit.

**[0016]** In a novel manner, the invention proposes storing in a register of printed identifiers a copy of the series of identification elements that have been printed on the web, including the printing order. Said register of printed identifiers is obtained with the processing unit.

**[0017]** The processing unit can be part of the computing unit or independent thereof.

**[0018]** During the printing process the method contemplates detecting a defective printed web segment including a defect selected from:

- defect in the identification element printing process;
- defect in the position or state of the web, including

- tears therein;
- defect in a former print of the web;

and in response to said detection of a defective web segment:

- identifying the contiguous identification elements which are contiguous to the defective web segment and communicating said contiguous identification elements to the processing unit;
- the processing unit eliminating all the identification elements comprised between the contiguous identification elements from the register of printed identifiers;
- discarding the defective web segment;

such that the register of printed identifiers contains all the identification elements printed on the defect-free web, assuring the certified condition thereof.

**[0019]** Defects in the web will preferably be detected automatically. For example, the printing unit in charge of printing the identification elements can communicate the correct operation thereof to the processing unit, where any incident is thus detected, or the correct position of the web can be detected at all times by means of optical sensors, where any deviation is detected. Notwithstanding the foregoing, the invention also contemplates an operator being able to indicate any detected incident to the processing unit.

**[0020]** It will be understood that the contiguous identification elements of the defective web segment are the last identification element printed outside or the first identification element printed inside the defective web segment, which demarcate one of the ends of the defective web segment, and the first identification element again printed outside or the last identification element printed inside the defective web segment, demarcating the other end of the defective web segment.

**[0021]** Therefore, the contiguous identification elements can be the first and last identification elements printed on the defective web segment, and the last identification element correctly printed before the defective web segment and the first identification element again correctly printed after the end of the defective web segment.

**[0022]** The entire defective web segment and all the identification elements printed thereon will therefore be comprised between both identification elements.

**[0023]** Said defective web segment will be discarded since it cannot be used for production as it contains errors or defects; therefore all the identification elements that have been printed on that defective web segment will also be discarded and will not reach consumers. The physical elimination of said defective web segment will be performed by an operator who will discard said defective web segment and join the web segments before and after the defective web segment, giving continuity back to the web.

**[0024]** To prevent the register of printed identification elements from containing identification elements that do not actually end up reaching consumers, which can be problematic in the case of using said identification elements to carry out drawings, for example, the contiguous identification elements mentioned above are identified, communicating them to the processing unit which will eliminate from the register of printed identification elements all those identification elements comprised between the contiguous identification elements, also including said contiguous identification elements if they correspond to identification elements printed on the defective web segment.

**[0025]** In this manner, only those identification elements that have actually been printed on the defect-free web segments and that will reach consumers remain in the register of printed identification elements.

**[0026]** According to one embodiment, the processing unit can deduce the contiguous identification elements based on the moment the inspection device detects a defect. In such case, the processing unit will indicate the contiguous identification elements to the aforementioned operator so that said operator can correctly identify the defective web segment to be eliminated.

**[0027]** It is also contemplated for the processing unit to be connected to a recognition device aimed at the area of the web where the identification elements are printed, such that upon detecting a printing defect, said recognition device can identify the contiguous identification elements by combining its readings with the readings of the inspection device.

**[0028]** According to another embodiment, it is also contemplated for the aforementioned operator to be in charge of identifying the beginning and the end of the defective web segment during elimination, and therefore to be in charge of communicating the contiguous identification elements to the processing unit, either by means of manual input or by showing said contiguous identification elements to an identification element reader connected to said processing unit.

**[0029]** This allows the register of printed identification elements to certify the correctly printed identification elements, where the presence of a person in charge of performing such certification, such as a notary or the like, is therefore unnecessary.

**[0030]** According to a proposed embodiment, the identification elements are all generated by the computing unit before starting the printing process and stored in a register of identifiers to be printed that can be accessed by the processing unit, and from which the identifiers to be printed are gradually eliminated after printing, therefore the already printed identification elements contained in the register of printed identification elements, as well as the identification elements still to be printed contained in the register of identification elements to be printed, are known at all times.

**[0031]** In such case, as the identification elements eliminated from the register of printed identifiers have

been printed on a defective web segment, they can be re-entered in the register of identifiers to be printed for subsequent printing, which thereby allows one to be certain at the end of the process that all the identification elements initially included in the register of identification elements to be printed have finally been printed correctly.

**[0032]** It is proposed for the identification elements to be numeric codes, alphabetic codes, or alphanumeric codes, which can be readily entered in the processing unit manually for communicating the contiguous identification elements, or alternatively it is contemplated for them to be barcodes or QR codes, which can be readily communicated to the processing unit by means of an optical reader.

**[0033]** According to another embodiment, the web with correctly printed identification elements is wound in a winding unit generating several reels of printed web, and wherein the register of printed identifiers also stores, in association with the register of identification elements, the sub-sets of identification elements contained in each individual reel, which thereby allows knowing exactly which correctly printed identification elements are contained in each individual reel.

**[0034]** Each individual reel can furthermore receive an identification label associated with the sub-set of identification elements from the register of printed identifiers.

**[0035]** Preferably, the identification elements are printed by means of a laser printing unit, which allows quick and precise continuous printing on the web, changing the identification elements in each printing. The laser printing unit can communicate the printed identification elements to the processing unit as it prints them on the web.

**[0036]** It is also proposed for an image capturing units to analyze at least the area of the web where the identification elements have been printed, delivering the captured images to the processing unit for analysis for identifying a defective web segment, for example detecting a web movement, an incorrect printing of the identification element or a tear in the web. Said image capturing unit may be configured to capture stroboscopic images in coordination with the speed of movement of the web, i.e., it would capture images in which the position of the identification elements within the image would always be the same in all the captured images, despite the continuous movement of the web.

**[0037]** It will be understood that references to geometric positions, such as, for example, parallel, perpendicular, tangent, etc., allow deviations up to  $\pm 5^\circ$  with respect to the theoretical position defined by said nomenclature.

**[0038]** It will also be understood that the end values of any offered range of values may not be optimal and may require adaptations of the invention so that said end values are applicable, said adaptations being within reach of a person skilled in the art.

**[0039]** Other features of the invention will be seen in the following detailed description of an embodiment.

#### Brief Description of the Drawings

**[0040]** The foregoing and other advantages and features will be more clearly understood based on the following detailed description of an embodiment in reference to the attached drawings which must be interpreted in an illustrative and non-limiting manner, in which:

Figure 1 shows a list of the main steps of the proposed method, briefly outlining said method;

Figure 2 shows a schematic view of a device envisaged for applying the proposed method.

#### Detailed Description of an Embodiment

**[0041]** The attached drawings show illustrative and non-limiting embodiments of the present invention.

**[0042]** According to one embodiment, the proposed method commences by printing, in a flexographic printing unit, a web 1 of flexible material with a repeating motif. Said web 1 is envisaged to be cut into pieces, each piece corresponding to a product unit printed with said motif, for example, to form a box, bag or wrapper for a product that can be put on the market. The printed flexible web 1 is wound onto reels.

**[0043]** Said reels are then unwound, feeding a unit in which identification elements 2 are printed. When one reel finishes, a new reel is fed by joining the end of one reel to the beginning of the next reel, thereby achieving continuous feeding.

**[0044]** The flexible web 1 that is fed goes through a laser printing unit 30 configured for printing an identification element 2 on the flexible web 1 in coincidence with the repeating motif previously printed on the web 1, printing a single identification element 2 on each product unit.

**[0045]** A computing unit generates a list of random, unique and non-repeating identification elements 2 and stores them in a register 11 of identification elements to be printed. In this example, the identification elements 2 are alphanumeric codes having 10 digits, but it is understood that said codes can have a different number of digits, or can be another type of code.

**[0046]** The register 11 of identification elements to be printed is communicated with a processing unit 10 connected to the laser printing unit 30.

**[0047]** As the flexible web 1 goes through the laser printing unit 30, different identification elements 2 present in the register 11 of identification elements to be printed are printed on the web 1 by means of the laser printing unit 30. Every time an identification element 2 is printed, the processing unit 10 eliminates said identification element 2 from the register 11 of identification elements to be printed, and transfers it to a register 12 of printed identification elements, where it is stored by printing order.

**[0048]** After the printing of the identification elements 2, the web 1 is wound up again generating reels with identification elements 2. When a reel is complete, the web is cut and winding onto a different reel follows.

**[0049]** In this embodiment, the machine has an inspection device 20 implemented, for example, by means of optical sensors which detect if the flexible web 1 moves laterally with respect to the forward movement direction, or if the identification element 2 has been correctly printed or printed in the correct position. Said optical sensors can also detect a tear in the flexible web 1.

**[0050]** If a deviation greater than threshold values indicative of a defect is detected, printing is stopped.

**[0051]** An operator eliminates the web segment 1 containing said defect and joins the defect-free web segments to one another again. The operator then communicates the contiguous identification elements of the defective web segment to the processing unit 10 by means of an interface. In this example, the operator enters in the interface the last correctly printed identification element 2 before the defective web segment and the first correctly printed identification element 2 after the defective web segment.

**[0052]** Said interface can be a screen with a keypad, or an optical reader for reading alphanumeric codes, barcodes or QR codes, or other identification elements used.

**[0053]** Alternatively, the interface can be in charge of communicating to the operator where the detected defective web segment begins and ends, communicating the contiguous identification elements to said operator.

**[0054]** The processing unit 10, knowing the contiguous identification elements, identifies all the identification elements 2 that have been printed on the defective web segment, eliminates them from the register 12 of printed identification elements and incorporates them again in the register 11 of identification elements to be printed so that they are reprinted on a defect-free web segment 1.

**[0055]** This thereby allows one to be certain that all the identification elements 2 initially contained in the register 11 of identification elements to be printed will end up being printed on a defect-free web segment 1, and will therefore end up reaching consumers.

**[0056]** This allows obtaining a certified register 12 of printed identification elements.

**[0057]** The present embodiment also contemplates communicating to the processing unit at least the first and/or the last identification element 2 of a web segment forming a reel. This allows the processing unit 10 to also store in the register 12 of printed identification elements information about which reel contains each identification element 2, creating sub-sets of identification elements 2 in the register 12 of printed identification elements.

**[0058]** The processing unit 10 can generate a label associated with each of said sub-sets, and identify each reel with one of said labels.

**[0059]** This invention is particularly useful for including unique codes relating to drawings or promotions included in packages for products, for example edible products, as it allows having a certified register 12 of printed identification elements without a certifying person who records the identification elements 2 that have actually been printed correctly having to be present during the

printing process.

**[0060]** It will be understood that the different parts forming the invention described in one embodiment can be freely combined with the parts described in other different embodiments even though said combination has not been explicitly described, provided that there is no drawback to the combination.

## 10 Claims

1. A method for continuously printing certified identification elements on a web, wherein said identification elements are all different and randomly generated by a computing unit, where said method comprises:

- printing the set of said generated identification elements (2) in series on the web (1) under the control of a processing unit (10),

**characterized by** comprising:

- the processing unit (10) storing a copy of the series of identification elements (2) that have been printed on the web (1) in a register of printed identifiers (12), including the printing order;
- an inspection device (20) detecting in the printed web a defective web segment including a defect selected from:

- defect in the identification element printing process;
- defect in the position or state of the web, including tears therein;
- defect in a former print of the web;

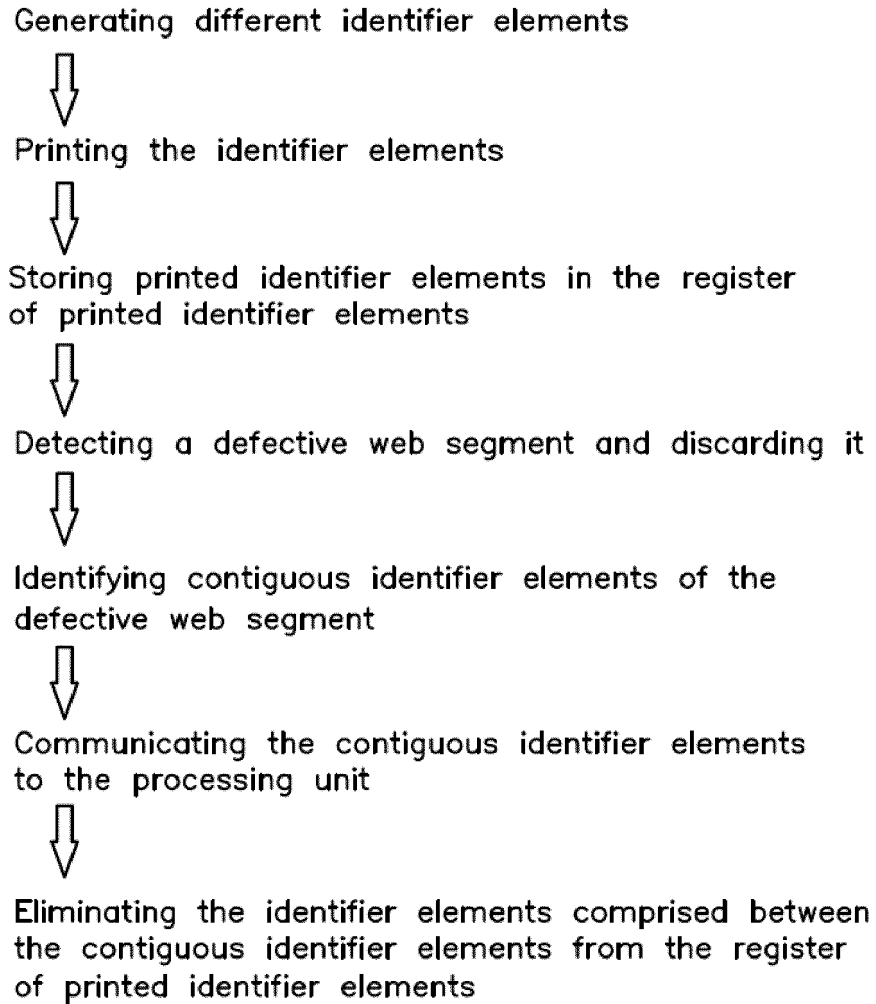
in response to said detection of a defective web segment:

- identifying contiguous identification elements contiguous to the defective web segment and communicating said contiguous identification elements to the processing unit (10);
- the processing unit (10) eliminating all the identification elements (2) comprised between the contiguous identification elements from the register of printed identifiers (12); and
- discarding the defective web segment and reconstructing the web to continue printing;

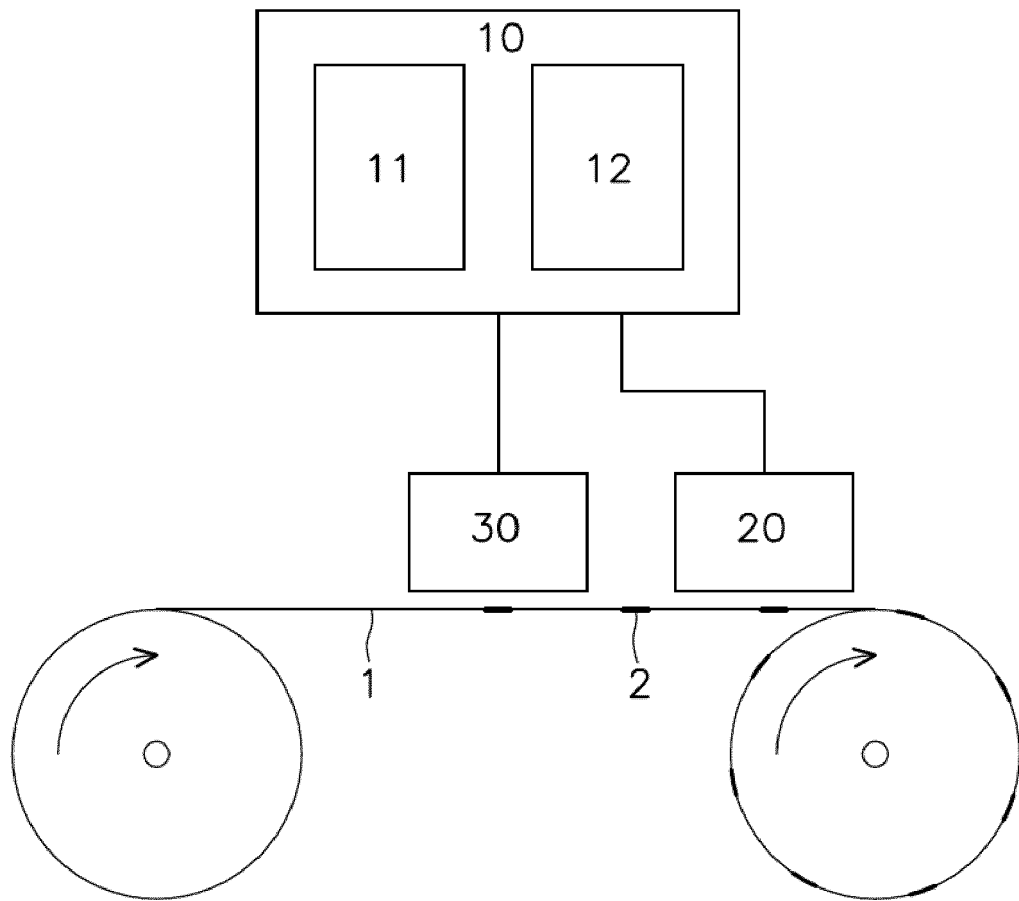
such that the register of printed identifiers (12) contains all the identification elements (2) printed on the defect-free web, assuring the certified condition thereof.

2. The method according to claim 1, wherein the identification elements (2) are all generated by the computing unit before starting the printing process and

- are stored in a register (11) of identifiers to be printed that can be accessed by the processing unit (10), and from which the identifiers to be printed are gradually eliminated after printing.
3. The method according to claim 2, wherein the identification elements (2) eliminated from the register of printed identifiers (12) as they have been printed on a defective web segment are re-entered in the register (11) of identifiers to be printed for subsequent printing, thereby assuring that the register of printed identifiers (12) includes the set of all the generated identification elements (2) when printing is completed.
  4. The method according to claim 1, 2 or 3, wherein the contiguous identification elements of the defective web segment are the last correctly printed identification element (2) before the beginning of the defective web segment and the first correctly printed identification element (2) after the end of the defective web segment, in the forward movement direction of the web (1).
  5. The method according to claim 1, 2 or 3, wherein the contiguous identification elements of the defective web segment are the first and the last identification elements (2) printed on the defective web segment, in the forward movement direction of the web (1), and all the identification elements (2) comprised between the contiguous identification elements, including said contiguous identification elements, being eliminated from the register (12) of printed identifiers.
  6. The method according to any one of the preceding claims, wherein the processing unit (10) deduces the contiguous identification elements based on the moment the inspection device (20) detects a defect.
  7. The method according to any one of the preceding claims, wherein the identification elements (2) are numeric codes, alphabetic codes, alphanumeric codes, barcodes or QR codes.
  8. The method according to any one of the preceding claims, wherein the web (1) with correctly printed identification elements (2) is wound in a winding unit generating several reels of printed web, and wherein the register (12) of printed identifiers also stores, in association with the register of identification elements (2), the sub-sets of identification elements (2) contained in each individual reel of printed web.
  9. The method according to claim 8, wherein said each individual reel receives an identification label associated with a sub-set of identification elements (2) from the register (12) of printed identifiers.
  10. The method according to any one of the preceding claims, wherein the identification elements are printed by means of a laser printing unit (30).
  11. The method according to claim 10, wherein the laser printing unit (30) is connected to the processing unit (10) and communicates the printed identification elements (2) to the latter as it prints them on the web (1).
  12. The method according to any one of the preceding claims, wherein the inspection device (20) is an image capturing units analyzing at least the area of the web where the identification elements (2) have been printed, and wherein the processing unit (10) analyzes the captured images for identifying a defective web segment.
  13. The method according to claim 12, wherein the image capturing units captures stroboscopic images, coinciding with the area containing the printed identification elements (2), in coordination with the speed of movement of the web (1).



***Fig. 1***



**Fig.2**





EUROPEAN SEARCH REPORT

Application Number  
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DOCUMENTS CONSIDERED TO BE RELEVANT			
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Place of search Munich		Date of completion of the search 5 March 2018	Examiner Callan, Feargal
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