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(54) **Method and apparatus for enveloping printed sheets**

(57) An add-on to a standard multi-tray duplex printer (7) directs, from the printer to a holding and creasing station (14, 15, 16), a standard envelope-size sheet (1) (e.g. A3+) printed with at least a sealer toner frame (4) on the inside and a printed address on the outside. Content sheets (5) (e.g. A4) are then printed and stacked at a collection station and the complete stack (5b) is then folded into the envelope sheet (1) as rollers (15, 16) press and seal the toner borders together, delivering a sealed and addressed finished envelope packet (1b) in a single line from a standard printer using standard paper sizes in standard magazines. The invention includes the add-on unit, the printer with add-on and the enveloping method.

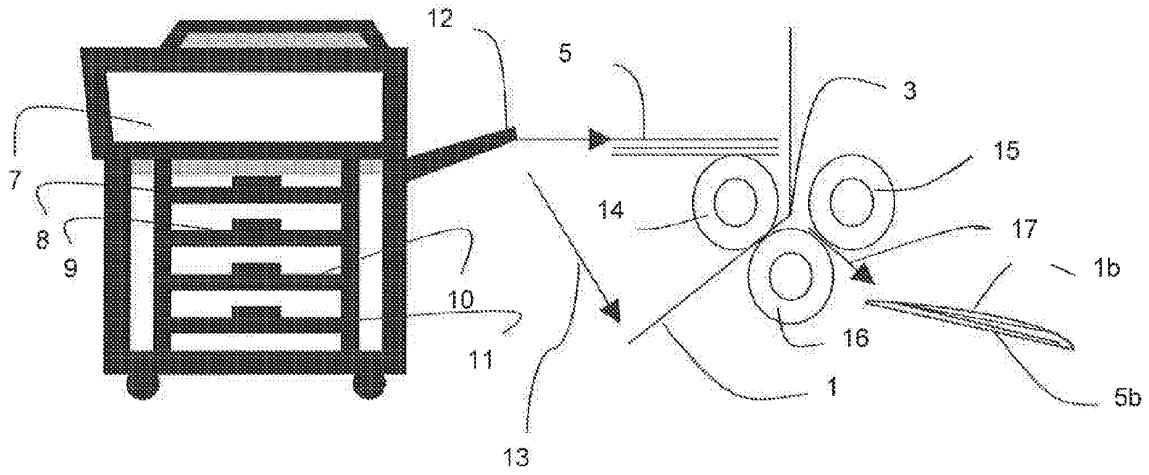

Fig. 2

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Description

Technical Field

[0001] The present invention relates to a method and apparatus for enveloping printed sheets. The present invention relates to a method according to the preamble to Claim 1, to an apparatus according to the preamble of Claim 6, and to a printer according to Claim 9. The method and apparatus are particularly well suited to use in or with a standard printer, having multiple standard trays carrying standard paper of different formats.

Background Art

[0002] Xerox Disclosure Journal Vol. 14, No. 6, November/December 1989, 315 in an article entitled Toner Gluing, describes the use of toner to glue together two paper surfaces. This makes possible the creation of an envelope from two sheets of paper, one provided with a border of toner, whereafter pressure and heat are applied to create the seal.

[0003] Such a solution sealing multiple sheets to each other by heating and/or pressing together toner borders on the sheets is shown in WHO 96/09935.

[0004] EP 0 514 699 A1 describes a system where a toner border is applied to a paper sheet, is heated and then folded and then forced through heated rollers, thereby providing a sealed document.

[0005] Such previously known solutions do not provided for the automatic printing of both the envelope and sheets to be enclosed in the envelope. The previously known solutions do not achieve this in a standard laser-jet printer, nor do they provide automatic assurance that the correct contents are enclosed in the envelope. Previously know solutions have required several lines, separate envelope blank feeders and coding means to make sure that the correct contents are enclosed in the correct envelope. These and other shortcomings of the previously known solutions are remedied with a method and an apparatus of the type described by way of introduction which have the characterizing features of the main claims. The present invention provides a very cost effective solution which utilizes an existing standard printer with standard grade paper of standard sizes.

Brief Description of Drawings

[0006] The present invention will be described in the following with reference to the drawings of which,

Fig. 1 shows schematically how the present invention could be realized in one embodiment using standard paper sizes printed. A paper sheet 1 of size A3+ in this specific example is printed in a standard laser printer with a toner border 4 on the side facing the viewer. A text 6 is also printed on the same side. The reverse side of the A3+ sheet can be provided with an address for example, as indicated by the address "SENATUM POPULUMQUE ROMANUM" 2 visible in reverse. It is of course possible to print any texts available with a standard duplex printer. The numeral 5 indicates printed standard A4 sheets of any reasonable number which are to be enclosed in the envelope created from the A3+ sheet 1 in this example, by folding along the crease 3, whereupon the toner border will adhere to itself and seal the envelope, as will be described below.

[0007] One particularly advantageous embodiment of the method and apparatus of the present invention is illustrated schematically in Fig. 2, which shows a standard duplex laser printer 7, which in many cases today is a copier and a scanner as well. The printer 7 is provided in this case with a number of trays 8, 9, 10 and 11 for different sheets of standard paper, in this case, for example, tray 11 may contain standard A3+ paper (329 x 483 mm) and tray 10 may contain standard A4 paper (210 x 297 mm). In the process according to the invention an A3+ sheet is duplex printed on one side with an address, return address and/or other desired text and the other side is printed with a toner border frame 4 (see Fig. 1) as well as any desired text, for example the salutation "Ave, Amici et Senatori" 6 in Fig. 1. Any large A3+ sheet is automatically guided after printing and is fed out downwards in the figure (arrow 13) to rollers 14 and 16, which crease it at crease line 3 and feed it upwards to a collecting station, The filler, i.e. and desired printed A4 sheets 5 are then printed one by one on both sides (Here with the bread text "Gallia est omnis divisa ....") sand are fed individually (arrow 12) and stacked at the collecting station above the roller 14 in the figure here. When all the desired A4 sheets have been printed and collected, the stack is fed into the crease of the waiting A3+ sheet and the complete packet is fed (arrow 17) through between the rollers 15 and 16, which will press the toner border sections against each other thereby sealing the entire envelope with the printed A4 sheets inside. The sealed envelope 1b with contents 5b can be seen to the right in Fig. 2. The rollers may be heated to increase the sealing effect but this is not at all necessary for the invention.

[0008] One important advantage of the method and apparatus of the present invention is that, since a single standard duplex printer is used to produce both the printed envelope 1b and the printed sheet contents 5b, this makes it possible to guarantee that the correct contents are inserted into the correct envelope. Previously known enveloping methods and apparatuses have had to rely on numbered envelopes and contents to make sure that the correct contents have been inserted into the proper envelope, thus adding extra steps to the process and still not eliminating the risk of mismatched contents.

[0009] With the present method it is possible to produce finished printed enveloped packets at a very rapid rate, with assured correct contents, with a standard laser

printer, since both the envelope with printed text, address etc, as well as toner adhesive edges, and the printed content sheets are produced by single standard printer in a single sequence. First the A3+ sheet is printed with the address 2 on one side and the toner edges 4 and possibly a printed text 6 on the other, and it is advanced to the creasing and pausing station by the rolls 14 and 16, white the A4 content sheets 5 are printed and collected. When the content sheets are completely printed and collected, the stack 5 is advanced toward the crease 3 in the waiting printed A3+ sheet and the entire folded packet is pressed forward through the rollers 16 and 17 sealing the toner edges 4 to each other. The laser printer signal for starting the printing of the next A3+ envelope sheet is simultaneous with the signal to advance the stack of printed A4 content sheets 5 towards its waiting creased A3+ sheet. There is thus a completely continuous printing process at the maximum rate for the printer.

[0010] It should be emphasized that this is merely one method, apparatus and printer for realizing the present invention. Other dimensions and grades of non-standard paper can also be used according to the invention with advantage. It is also envisioned that the enveloping method can easily be combined with a perforation step to facilitate opening the delivered missive. The apparatus can easily be incorporated and built into a printer at its output.

Claims

1. Method for creating a sealed envelope (1b) from a laser printed sheet (1), comprising:

   a. Printing (6, 2) in a printer (7) a standard envelope-width printed sheet (1) with printed toner borders (4) along its edges,
   b. feeding out (13) from the printer (7) said standard envelope-width printed sheet (1)
   c. creasing (3) said standard envelope-width printed sheet (1),
   d. folding over (17) said standard envelope-width printed sheet (1), bringing said toner borders (4) into mutual contact,
   e. applying pressure to the toner borders (4) in mutual contact, sealing the folded printed sheet into an envelope (17),
   characterized by the additional steps of:
   f. halting advance of the standard envelope-width printed sheet (1) after feeding out (13) from the printer,
   g. printing and collecting from the printer one or more insert sheets (5) having a transverse dimension smaller than the width between the toner borders (4) on the envelope-width printed sheet (1),
   h. inserting said collected insert sheets (5b) as the standard envelope width printed sheet is folded, completely avoiding contact with the toner borders, which are folded against each other.

2. Method for creating a sealed envelope according to Claim 1, **characterized by** the additional step of:

   g. Pressure sealing the toner borders folded against each other.

3. Method for creating a sealed envelope according to Claim 1, **characterized in that** feed out (13) from the printer (7) of a standard envelope-width printed sheet triggers the insertion of collected insert sheets (5b) into a preceding envelope width printed sheet (1) being folded.

4. Method for creating a sealed envelope according to Claim 1, **characterized in that** the printer (7) is a duplex printer and text is provided in the printer (7) on both sides of the printed sheet.

5. Method for creating a sealed envelope according to Claim 1, **characterized by** the further step of perforating tear indications around three edges of the sealed envelope (1b).

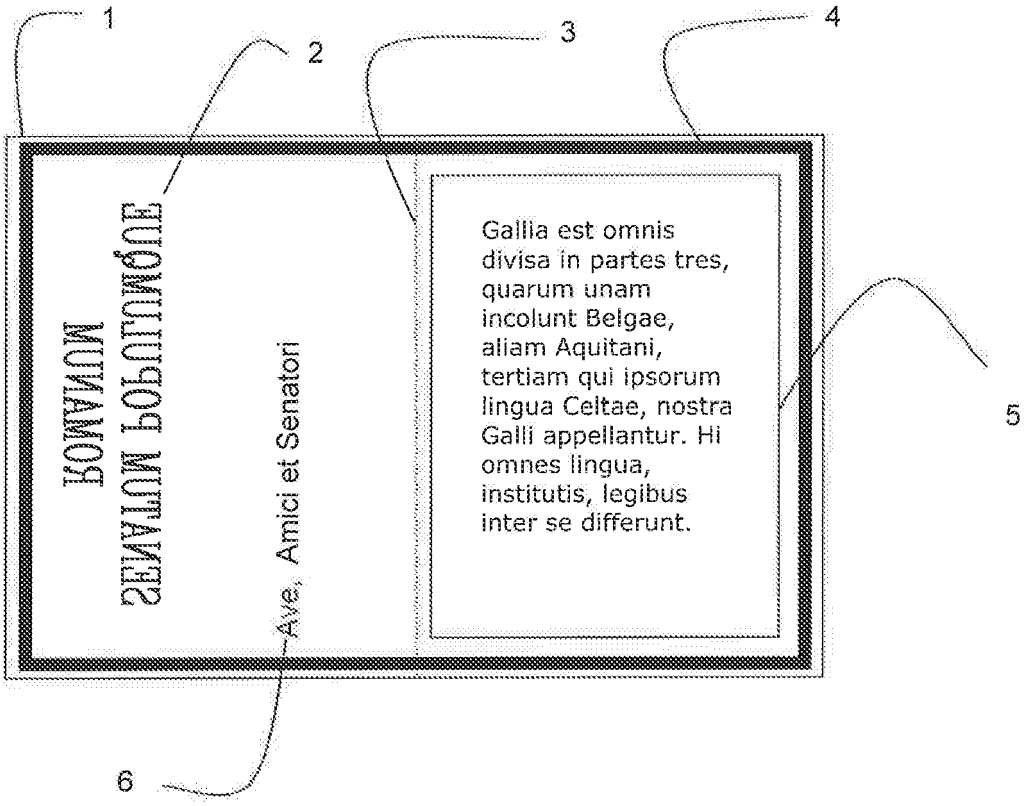
6. Enveloping apparatus suitable for coupling to the output of a standard multi-tray printer, **characterized by**:

   a. means for advancing (13), holding (14, 16) and folding (3) over an envelope-width sheet (1), printed with toner borders (4), when fed out of said printer (7)
   b. means for collecting, when fed out of said printer, printed sheets (5) of a width smaller than the width between said toner borders (4),
   c. means for inserting said collection of printed sheets into the folded over envelope width sheet,
   d. means (15, 16) for pressing together the folded over toner borders (4) against each other.

7. Enveloping apparatus according to Claim 6, **characterized in that** said means for pressing together the folded toner borders against each other comprise heated rollers (15, 16), providing enhanced sealing effect to the toner.

8. Enveloping apparatus according to Claim 6, **characterized in that** said apparatus is built into a multi-tray printer.

9. Multi-tray printer encorporating an enveloping apparatus according to one of claims 6-8.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Gallia est omnis divisa in partes tres, quarum unam incolunt Belgae, aliam Aquitani, tertiam qui ipsorum lingua Celtae, nostra Galli appellantur. Hi omnes lingua, institutis, legibus inter se differunt.
Ave, Amici et Senatori
SENATUS POPULUSQUE ROMANUS

Fig. 1

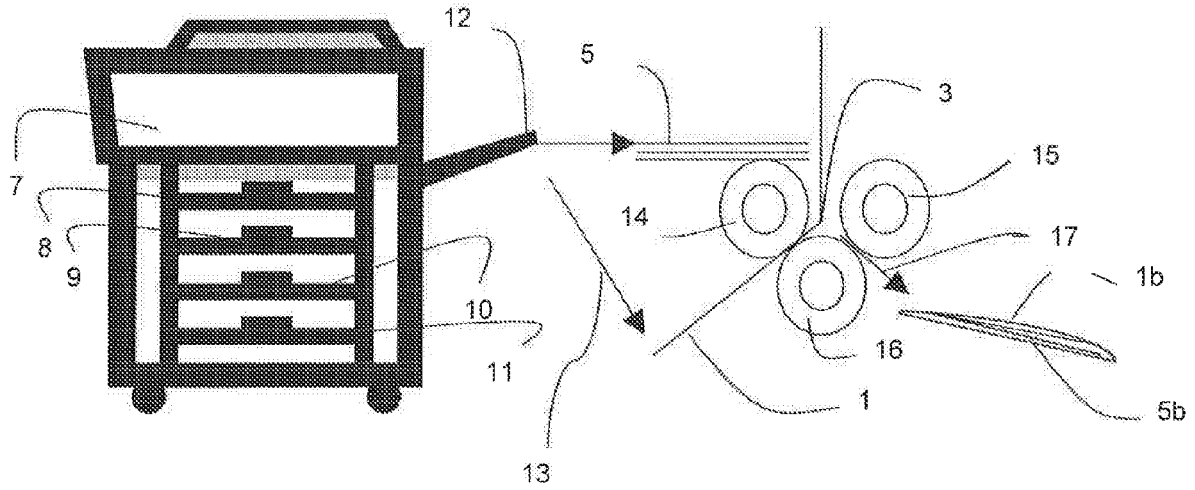

Fig. 2

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EUROPEAN SEARCH REPORT

Application Number
EP 11 18 2394

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2011/220557 A1 (SASAKI TAKESHI [JP] ET AL) 15 September 2011 (2011-09-15) * paragraph [0048] - paragraph [0169]; figures 6,13,23,31 * -----	6,9	INV. G03G15/00
A	US 6 980 767 B1 (CAHILL DANIEL P [US] ET AL) 27 December 2005 (2005-12-27) * the whole document * -----	1-9	

TECHNICAL FIELDS SEARCHED (IPC)

G03G

1 The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	13 February 2012	Götsch, Stefan

CATEGORY OF CITED DOCUMENTS

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13-02-2012

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2011220557 A1	15-09-2011	JP 2011190064 A	29-09-2011
		US 2011220557 A1	15-09-2011
US 6980767 B1	27-12-2005	NONE	

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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Patent documents cited in the description

- WO 9609935 A **[0003]**
- EP 0514699 A1 **[0004]**

Non-patent literature cited in the description

- *Xerox Disclosure Journal,* November 1989, vol. 14 (6), 315 **[0002]**