(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 1 953 102 A1**

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
06.08.2008 Bulletin 2008/32

(51) Int Cl.:
B65H 3/06 *(2006.01)* ***B65H 3/52*** *(2006.01)*

(21) Application number: **07002072.2**

(22) Date of filing: **31.01.2007**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK RS

(71) Applicant: **Neopost Technologies**
92220 Bagneux (FR)

(72) Inventors:
- **Feijen, Fransiscus Hermannus**
  8926 RM Leeuwarden (NL)
- **Sytema, Herman**
  8493 RD Terhorne (NL)

(74) Representative: **van Loon, C.J.J. et al**
c/o VEREENIGDE
Johan de Wittlaan 7
2517 JR Den Haag (NL)

(54) Separator for separating sheets from a stack

(57) A separator (1, 21) for separating envelopes (5) from a stack (2) has a feeding roller (4, 24) for exerting a force onto the envelope (5), urging it in a direction (6) tangential to its circumference and parallel to a separating plane (5), and a deflecting surface (7, 27) for deflecting a leading edge of the envelope (5) as it is urged in the tangential direction. The feeding roller (4, 24) and the deflecting surface (7, 27) bound a feeding path having a width, and starting at the separating position. Both feeding roller (4, 24) and deflecting surface (7, 27) include portions each extending from or from beyond opposite lateral sides of the feeding path inwardly across a lateral outer portion of the feeding path.

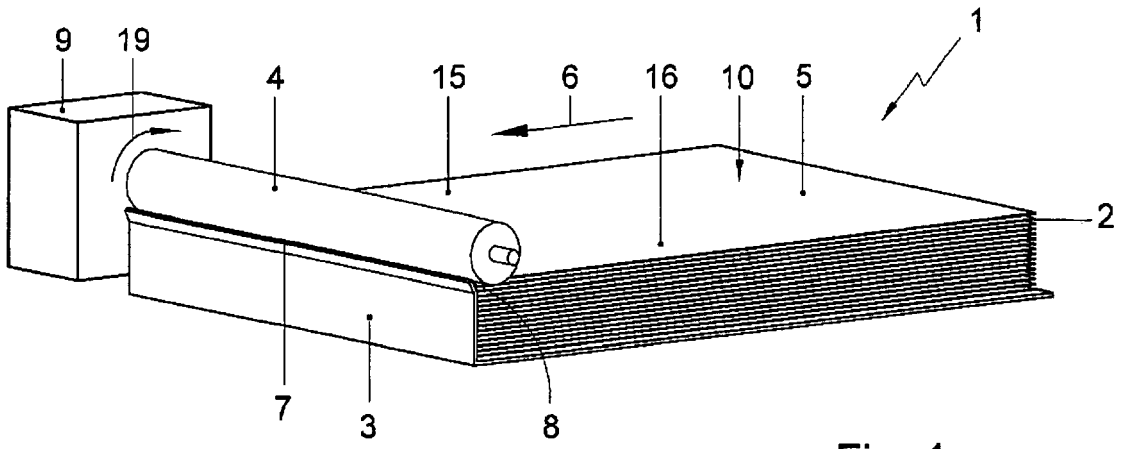

Fig. 1

EP 1 953 102 A1

Description

FIELD AND BACKGROUND OF THE INVENTION

[0001] The invention relates to a separator for separating envelopes from a stack. Some examples of separators for separating sheets from a stack by bending sheets are described in European patent application 0 615 937, U.S. patent 6 883 798 and Japanese patent application 632 888 41. In such separators, a feeding roller is positioned relative to a sheet holder for contacting an outer sheet of a stack and for exerting a friction force onto the sheet for urging the sheet in a direction tangential to the circumference of the roller. A deflecting surface is located spaced from the contact area in the tangential direction and extends at an angle to the sheet to be separated for deflecting a leading edge of the sheet in the separating position as it is urged past the deflecting surface.

[0002] In such separators, the separation is enhanced by the stiffness of the sheets that refrains sheets from passing through the curved passage bound by the deflecting surface. To accommodate for variations in the stiffness of the sheets, it is described to provide moveably attached corner prowls and a pivotably mounted friction pads to ensure reliable separation of the outer sheet from a stack from the next sheets.

SUMMARY OF THE INVENTION

[0003] It is an object of the present invention to provide a simple separator, which is specifically suitable for separating envelopes from a stack.

[0004] According to the present invention, this object is achieved by providing a separator according to claim 1.

[0005] The feeding roller and deflection surface sections extending from both lateral edges of the feeding path inwardly contact the envelope to be separated in areas along opposite lateral side edges of the envelope. The edge areas of the envelope, where the front and rear walls of the envelope are connected to each other, are the stiffest areas of the envelope and therefore have the greatest resistance against bending. Accordingly, by bending the envelope around the feeding roller in these areas, the greatest resistance against passing the deflection surface is caused, which is favorable for avoiding double feeds in which an outer envelope to be separated entrains a next envelope. Also, engaging the envelopes in an area where the bending stiffness is greatest makes the separation relatively insensitive to variations in bending stiffness between envelopes and proper adjustment of the deflecting surface.

[0006] Particular elaborations and embodiments of the invention are set forth in the dependent claims.

[0007] Further features, effects and details of the invention appear from the detailed description and the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008]

Fig. 1 is a schematic perspective view of an example of a separator according to the invention;
Fig. 2 is a schematic side view of the separator of Fig. 1;
Fig. 3 is schematic front view of the separator of Figs. 1 and 2; and
Fig. 4 is a schematic perspective view of another example of a separator according to the invention.

DETAILED DESCRIPTION

[0009] The invention is first described with reference to the example shown in Figs. 1-3.

[0010] The separator 1 according to the present example is equipped with a holder 3 for holding a stack of envelopes 2 with an outer envelope 5 in a separating position, a feeding roller 4 and a deflecting surface 7. The feeding roller 4 and the deflecting surface 7 bound a feeding path having a width, and starting at the separating position.

[0011] The holder 3 supports the stack 2 of envelopes to be separated. The holder 3 has lateral guides 11 (not shown in Fig. 1) for maintaining the envelopes positioned by contacting lateral edges of the envelopes. The guides 11 are adjustable in the lateral direction by rotating a threaded spindle 12, for adapting the mutual distance between the guides 11 to envelopes of different sizes. Stops 13 define the maximum outer position of the guides 11.

[0012] The stack of envelopes 2 is positioned with one edge against a front (downstream) wall of the holder 3 for aligning the envelopes in relation to the feeding roller 4 and the deflecting surface 7 And for refraining the envelopes form displacement in transport direction 6.

[0013] The holder 3 is may be positioned in an inclined orientation, such that the stack of envelopes is leans against the front wall of the holder by gravity.

[0014] The holder 3 is provided with a moveable bottom surface and with a biasing member (not shown) for urging the stack 2 against the feeding roller 4 while maintaining the outer envelope 5 generally in the separating plane 10. Thus, the outer envelope 5 of the stack 2 is brought in a separating position in a separating plane 10 at the top of the stack 2, and is positioned with its leading edge 8 just above the front wall of the holder 3 and near the deflecting surface 7.

[0015] The feeding roller 4 has a circumference and is positioned relative to the holder 3 for contacting the envelope 5 in a contact area of its circumference. The feeding roller 4 extends from beyond opposite lateral sides of the feeding path inwardly. It therefore contacts the envelope 5 in side areas 15, 16 along opposite side edges of the envelope 5.

[0016] Spaced from the contact position between feed-

ing roller 4 and the envelope 5, the deflecting surface 7 is positioned, preferably as a continuation of the wall of the holder 3. As the feeding roller 4, the deflecting surface 7 extends in lateral direction from beyond the lateral sides of the feeding path inwardly across lateral outer portions of the feeding path.

[0017] In the embodiment shown, the feeding roller 4 and the deflection surface 7 both extends continuously from one lateral side of the feeding path inwardly across the feeding path to the other, opposite lateral side of the feeding path. In alternative embodiment, shown in Fig. 4, feeding rollers 24 and deflection surfaces 27 of a separator 21 extend along outer zones of the feeding path only.

[0018] Returning to the separator according to Figs. 1-3, the feeding roller 4 is connected to a drive 9 for driving rotation of the roller 4 about a heart line thereof. When the roller 4 is rotated, a friction force is exerted onto the outer envelope 5 and urges the envelope in a feeding direction 6 tangential to the circumference of the feeding roller 4 and parallel to the separating plane 10.

[0019] For separating the envelope 5 from the stack 2, the feeding roller 4 is driven by the drive 9 in a sense of rotation indicated by an arrow 19, exerting a friction force onto the outer envelope 5 in the separating position in the feeding direction 6 tangential to the feeding roller 4 and parallel to the separating plane 10. This causes the outer envelope 5 to be displaced in the separating plane 10 along the feeding path in the feeding direction 6 and causes the leading edge 8 of the envelope 5 to be urged against the deflecting surface 7 located downstream in the feeding direction 6 of the contact area of the circumference of the feeding roller 4. Accordingly, the outer envelope 5 encounters resistance depending on the bending stiffness of the envelope 5 and increasing as the envelope is bent.

[0020] However, the friction force exerted by the feeding roller 4 onto the envelope 5 causes the envelope to be urged along the deflecting surface 7, which causes the envelope to bend out of the separating plane 10 as it is urged along the deflecting surface 7. The circumferential surface of the feeding roller 4 has a friction coefficient relative to paper that is larger than the friction between the envelope in the separating position and the next envelope in the stack of envelopes 2. The maximum friction force exerted on the next envelope in the stack 2 is therefore lower than the maximum friction force the feeding roller 4 can exert on the outer envelope 5 and insufficient for overcoming the resistance encountered when urged against the deflecting surface 7.

[0021] Since the feeding roller 4 and the deflection surface 7 engage the outer envelope 5 in its lateral side areas 15, 16, which are the stiffest areas of the envelope, a relatively high resistance is encountered when the outer envelope 5 contacts the deflection surface 7. This resistance can be overcome easily by the fraction force exerted by the feeding roller 4, but reliably refrains a next envelope, similarly subjected to bending forces in edge areas where it is relatively stiff, from being entrained by the outer envelope 5.

[0022] Furthermore, by bending the envelope along its side edges, it is ensured that envelope is bent over its entire width and not only in the more flexible centre part.

[0023] Since the feeding roller 4 and the deflection surface 7 extend across the feeding path without interruption, the effect of engaging envelopes in areas along the side edges is achieved for envelopes of widely varying sizes and the bending stiffness of the envelopes is used over the entire width of the envelope.

[0024] The deflecting surface 7 extends at an angle to the separating plane. The angle between the deflecting surface 7 and the separating plane is selected such that an outer envelope 5 entrained by the rotating feeding roller 4 is urged past the deflecting surface, whereas friction forces between envelopes, by which a next envelope is entrained are insufficient to overcome the resistance the next envelope encounters when it is deflected by the deflection surface. In practice, the angle between the deflecting surface and the separating plane is preferably between 85 and 140° and more preferably between 110 and 130°.

[0025] When envelopes of different width are processed, the relatively stiff side edge areas of the envelopes engage different sections of the deflection surface. By providing that the deflecting surface has a friction coefficient that is uniform across its width, the resistance encountered by envelopes being separated varies only little with width of the envelopes of the envelopes.

[0026] The bending distance, that is the distance between the point of contact area of the circumference of the feeding roller 4 and the most remote point of contact between the envelope being separated and the deflecting surface 7, is preferably between 6 and 12 mm, and more preferably between 7,5 and 10,5 mm, for a feeding roller 4 having a diameter of 25 mm.

[0027] Once the leading edge 8 of the envelope 5 is deflected out of the separating plane 10, the leading edge 8 is for example led into a nip of a transport track 14 formed by pairs of opposite conveyor belts.

[0028] Other variations to the disclosed embodiments can be understood and effected by those skilled in the art in practicing the claimed invention, from a study of the drawings, the disclosure, and the appended claims.

Claims

1. A separator for separating envelopes from a stack (2), comprising:

a holder (3) including a support, for holding the stack (2) with an outer one (5) of the envelopes in a separating position in a separating plane (10),

at least one feeding roller (4; 24) having a circumference and positioned relative to the holder

(3) for contacting the envelope (5) in the separating position in a contact area of its circumference, and for exerting a friction force onto the envelope (5) for urging the envelope in a direction (6) tangential to the circumference and parallel to the separating plane (5); and
at least one deflecting surface (7; 27) spaced from the contact area in said tangential direction (6), the at least one deflecting surface (7; 27) extending at an angle to said separating plane (10) at least from a position in the separating plane (10), for deflecting the leading edge of the envelope (5) in the separating position as it is urged in said tangential direction along the separating plane and passes along the at least one deflecting surface (7; 27);

wherein the at least one feeding roller (4; 24) and the at least one deflecting surface (7; 27) bound a feeding path starting at said separating position, said feeding path having a width;
wherein the at least one feeding roller (4; 24) includes two portions extending from or from beyond opposite lateral sides of the feeding path inwardly across at least lateral outer portions of the feeding path; and
wherein the at least one deflecting surface (7; 27) includes two portions extending from or from beyond opposite lateral sides of the feeding path inwardly across at least lateral outer portions of the feeding path.

2. A separator according to claim 1, wherein the deflecting surface (7; 27) has a friction coefficient uniform across its width.

3. A separator according to claim 1 or 2, wherein the at least one feeding roller (4) extends continuously across the feeding path.

4. A separator according to any one of the preceding claims, wherein the at least one deflecting surface (7) extends continuously across the feeding path.

5. A separator according to any one of the preceding claims, wherein the angle between the deflecting surface (7; 27) and the separating plane (10) is between 85 and 140° and preferably between 110 and 130°.

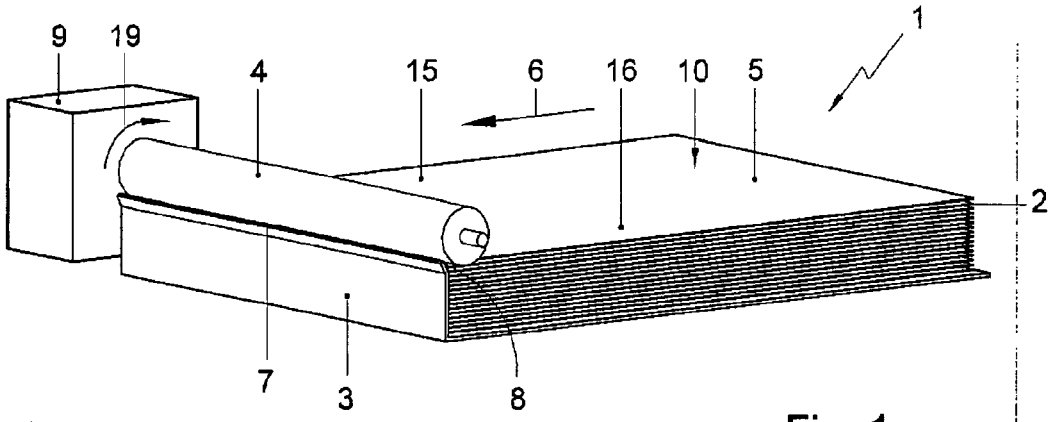

Fig. 1

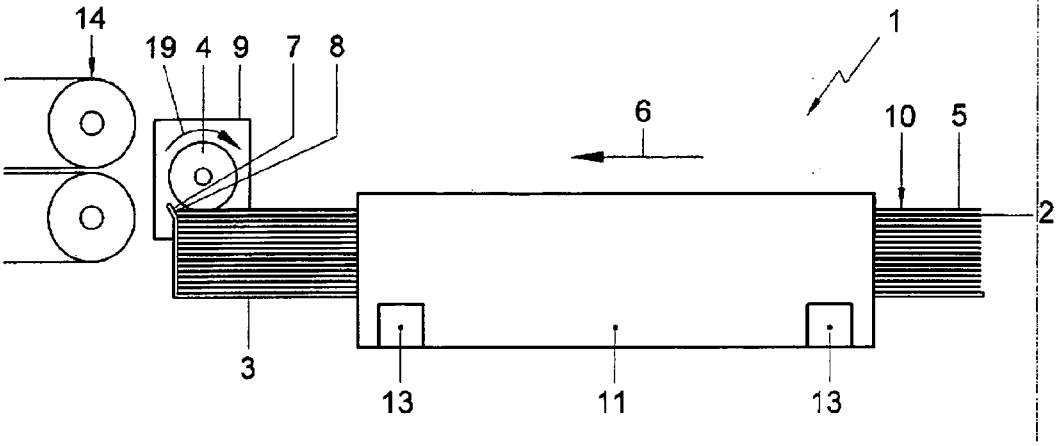

Fig. 2

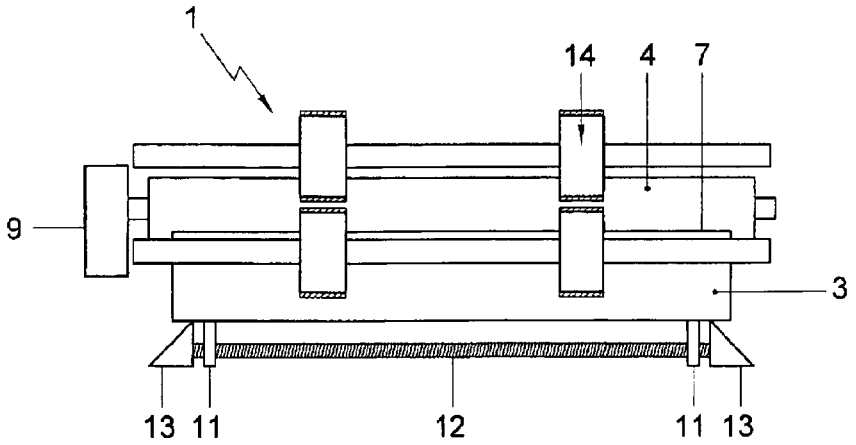

Fig. 3

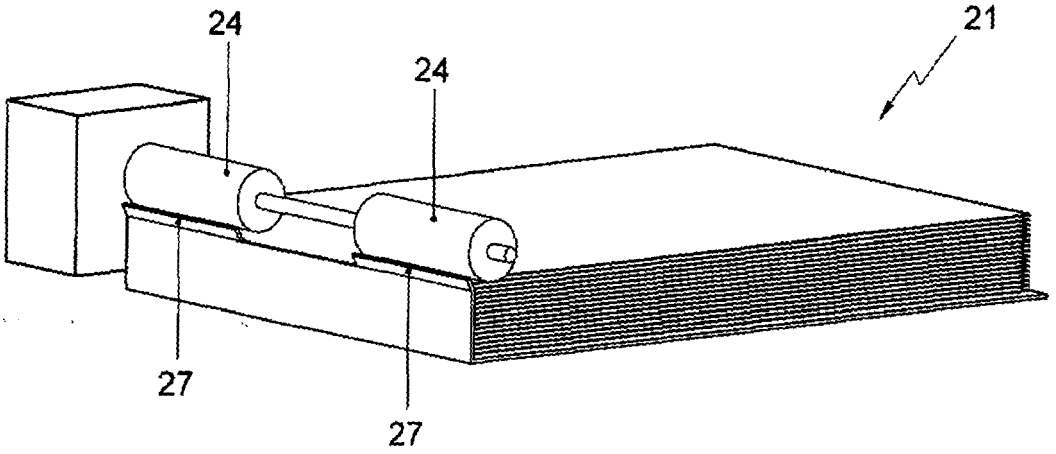

Fig. 4

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 00 2072

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 5 277 417 A (MORITAKE MAKOTO [JP] ET AL) 11 January 1994 (1994-01-11) * figures 2,3 *	1,3	INV. B65H3/06 B65H3/52
A,D	US 6 883 798 B2 (HSIEH YEN-SUNG [TW] HSIEH YEN-SUNG [CH]) 26 April 2005 (2005-04-26) * the whole document *	1	
A,D	EP 0 615 937 A2 (NIPPON ELECTRIC CO [JP]) 21 September 1994 (1994-09-21) * the whole document *	1	

TECHNICAL FIELDS SEARCHED (IPC)

B65H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	3 July 2007	Stroppa, Giovanni

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

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 07 00 2072

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.

03-07-2007

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5277417 A	11-01-1994	JP 2660181 B2	08-10-1997
		JP 4313532 A	05-11-1992
US 6883798 B2	26-04-2005	DE 10302159 A1	09-10-2003
		TW 528713 B	21-04-2003
		US 2003137094 A1	24-07-2003
EP 0615937 A2	21-09-1994	JP 7109037 A	25-04-1995

EPO FORM P0459

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

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 0615937 A **[0001]**
- US 6883798 B **[0001]**
- JP 63288841 B **[0001]**