



(11) **EP 2 354 066 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
10.08.2011 Bulletin 2011/32

(51) Int Cl.:
B65H 29/04 (2006.01)

(21) Application number: **10152147.4**

(22) Date of filing: **29.01.2010**

(84) Designated Contracting States:
**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 SE SI SK SM TR**
Designated Extension States:
AL BA RS

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(54) **Apparatus and method for conveying paper sheets**

(57) An endless conveyor loop (1) is circulatable along a circulation path. Gripping arms (3₁-3₁₁) connected to the loop are each pivotable between an open position and a closed position for retaining an end of the sheet (13,14,18) at a gripping position circulatable with the conveyor loop along a gripping position path. A paper feeding path has a downstream end portion (7) spaced from the gripping position path (6). A prolongation (12) in line with the downstream end portion (7) of the paper feeding path intersects the gripping position path (6). A

gripping arm operating structure (15,16,17) is provided for causing each gripping arm to pivot towards the open position prior to passing the prolongation (12) in line with the downstream end portion (7) of the paper feeding path and, subsequently, to start pivoting back towards the closed position before a next one of the gripping arms passes the prolongation (12) in line with the downstream end portion of the paper feeding path.

EP 2 354 066 A1

Description

FIELD AND BACKGROUND OF THE INVENTION

[0001] The invention relates to an apparatus according to the introductory portion of claim 1. Such an apparatus is known from European patent application 2 107 021.

[0002] In this apparatus, sheets fed along a sheet feeding path are received one by one and entrained by gripping arms pivotably mounted to an endless conveyor loop extending and circulatable along a circulation path. The sheets can be released in one or a plurality of positions, where the sheets may be stacked and/or transported away. The gripping arms are each pivoted from the closed position to an open position for receiving a sheet fed along the sheet feeding path as the portion of the gripping arm in the circulation path reaches a return wheel. The gripping arms are each pivoted back from the open position to the closed position as the portion of the gripping arm in the circulation path leaves the return wheel.

[0003] To reliably feed each of the sheets, which may be of widely varying lengths, to a next one of the gripping positions between successive gripping arms, the speed of the circulating loop and/or the feeding speed of the paper feeding path are periodically increased and decreased.

SUMMARY OF THE INVENTION

[0004] It is an object of the present invention to provide a solution which allows sheets of widely varying lengths to be fed reliably to gripping positions distributed along a circulation path, even if the sheets are fed in a configuration in which successive sheets are partially overlapping each other.

[0005] According to the invention, this object is achieved by providing an apparatus according to claim 1. The invention can also be embodied in a method according to claim 7.

[0006] Because the gripping arm operating structure is arranged for starting the pivoting of each gripping arm relative to the directly adjacent portion of the conveyor loop in the sense contrary to the sense of circulation before a next one of the gripping arms passes the prolongation in line with a downstream end portion of the paper feeding path, the gripping arm is pivoted back relatively early. This allows the gripping arms to be pivoted from the closed position into the open position over a larger angle without interfering with a previously fed sheet. Thus, the gap between the gripping arm pivoted into the open position and a next gripping arm, into which gap a sheet S_n to be entrained should be fed, can be made larger, while the gripping arm does not interfere with a previously fed sheet S_{n-1} of which a trailing portion may still be held in the most downstream nip of the paper feeding path while the leading end is held in or being urged into one of the gripping positions downstream of

the gripping position to which the sheet S_n is to be fed.

[0007] Also, a relatively wide opening angle of the gripping arms allows the sheets to be fed along a path converging with the intended gripping position relatively early, so that a relatively low feeding speed is sufficient to reach the gripping position. Moreover, because the next gripping arm pivots back relatively early, the next gripping arm does not or to a lesser extent constitute an obstacle that needs to be circumvented by a sheet to reach the gripping position.

[0008] Particular embodiments of the invention are set forth in the dependent claims.

[0009] Further objects, features, effects and details of the invention are described below.

BRIEF DESCRIPTION OF THE DRAWING

[0010]

Figs. 1-8 are schematic, partial side view representations of successive stages of operation of an example of an apparatus according to the invention.

DETAILED DESCRIPTION

[0011] First various features of an example of apparatus according to the invention shown in the drawings are described with reference to Fig. 1. Reference to the other figures is made where and to the extent that this appears helpful for a better understanding of the operating stage depicted by that figure.

[0012] The apparatus for conveying paper sheets shown in Fig. 1 has an endless conveyor loop 1 of which only a left-hand portion is shown. The conveyor loop 1, which may for instance be provided in the form of a belt or a chain, extends along a circulation path and is circulatable in a sense of circulation indicated by arrow 2 along the circulation path. A right-hand portion of such a conveyor loop is preferably a loop closing continuation of the portion shown and may for instance extend along a sheet collector for collecting sheets as disclosed in European patent application 2 107 021.

[0013] A plurality of gripping arms 3_1-3_{11} , is located on the outside of the circulation path. The gripping arms 3_1-3_{11} are each connected to the loop 1 in positions 4 mutually spaced along the circulation path along which the loop 1 is displaceable. The connections 4 are not all designated by reference numerals. The gripping arms 3_1-3_{11} are each pivotable between an open position (arms 3_4-3_8) for receiving or releasing a sheet and a closed position (3_1-3_3 and 3_9-3_{10}) for retaining an end of the sheet at a gripping position 5. The gripping positions 5 are circulatable, in unison with the conveyor loop 1, along a gripping position path 6.

[0014] A paper feeding path constituting a trajectory through which paper sheets 13, 14 can be fed has a downstream end portion 7 oriented towards the gripping position path 6. A most downstream transport nip 8 of

the paper feeding path is formed between transport rollers 10, 11. This transport nip 8 is located in a position spaced at a distance D_{grip} from the gripping position path 6. Upstream of the transport nip 8, a guide 9 bounds the paper transport path 7. A prolongation 12 in line with the downstream end portion 7 of the paper feeding path intersects the gripping position path 6.

[0015] A gripping arm operating structure 15 is provided in the form of a cam surface for causing each of the gripping arms 3_1-3_{11} to pivot, relative to a directly adjacent portion of the conveyor loop 1 in the sense of circulation 2 towards the open position prior to passing the prolongation 12 in line with a downstream end portion 7 of the paper feeding path and, subsequently, to pivot, relative to the directly adjacent portion of the conveyor loop 1, contrary to the sense of circulation 2, towards the closed position. A lever 16 is fixedly connected to each of the arms 3_1-3_{11} and a cam follower 17 at the free end of the lever is engaged by the cam surface 15. For urging the arms 3_1-3_{11} to the closed position against force exerted by the cam surface 15, a spring member (not shown) is arranged between each of the arms and the loop 1.

[0016] When passing the prolongation 12 of the downstream end portion 7 of the feeding path, the arms 3_1-3_{11} extend towards the most downstream transport nip 8 of the feeding path up to a distance D_{arm} from the transport nip 8, such that $D_{grip} - D_{arm} > 1/4 * D_{grip}$. Preferably, $D_{grip} - D_{arm} > 1/3 * D_{grip}$ so that the distance over which the leading ends of sheets are not guided is reduced. On the other hand, it is preferred that $D_{grip} - D_{arm} < 2/3 * D_{grip}$ so that the distance from the gripping position 5 to which a sheet is to be fed where the leading edge of that sheet passes behind a passing gripping arm is fairly small. Thus, the arms 3_1-3_{11} each temporarily constitute a guide for guiding a sheet 13 arriving from the transport nip 8 to the gripping position 5 over a substantial distance $D_{grip} - D_{arm}$.

[0017] As is illustrated by the successive positions of the gripping arms $3_6, 3_7$ and 3_8 in Figs. 1-8, the gripping arm operating structure 15 is arranged for starting the pivoting of each gripping arm relative to the directly adjacent portion of the conveyor loop 1 in the sense contrary to the sense of circulation before a next one of the gripping arms passes the prolongation 12 in line with a downstream end portion 7 of the paper feeding path. For instance, in Fig. 1, the gripping arm 3_6 has just passed the prolongation 12 in line with a downstream end portion 7 of the paper feeding path and is approximately in its most extreme open position pivoted in circulation sense 2 relative to the directly adjacent portion of the loop 1. As can be seen in Fig. 2, the arm 3_6 has started to pivot back to its closed position in a sense opposite to the sense of circulation 2 as the next gripping arm 3_7 starts to pass the prolongation 12 of the downstream end portion 7 of the paper feeding path. Similarly, in Fig. 4 it can be seen that the gripping arm 3_7 has started to pivot back as the next arm 3_8 starts to pass the prolongation 12 and in Fig.

6 it can be seen that the gripping arm 3_8 has started to pivot back as the next arm 3_9 starts to pass the prolongation 12.

[0018] Thus, the gripping arm operating structure 15 causes the pivoting of each gripping arm 3_1-3_{11} relative to the directly adjacent portion of the conveyor loop 1 in the sense contrary to the sense of circulation to start relatively early. This allows the gripping arms 3_1-3_{11} to be pivoted from the closed position into the open position over a large angle without interfering with a previously fed sheet. For instance, Figs. 3-8 illustrate that the gripping arms 3_5 and 3_6 are pivoted away from the sheet 14 being fed into an opening between the more downstream arms 3_4 and 3_5 , so that these arms do not hold back the progress of the previously fed sheet 14 to the gripping position 5 between the arms 3_4 and 3_5 . Similarly, Figs. 4-8 illustrate that the gripping arms 3_7 and 3_8 are pivoted away from the sheet 13 being fed into an opening between the more downstream arms 3_6 and 3_7 , so that these arms do not hold back the progress of the leading edge of the previously fed sheet 13 to the gripping position 5 between the arms 3_6 and 3_7 .

[0019] As is illustrated by Fig. 1, the gap between the gripping arm 3_6 pivoted into the open position and a next gripping arm 3_7 , into which gap the sheet 13 to be entrained is fed, can be very large, while the gripping arm 3_6 does not interfere with the previously fed sheet 14 of which a trailing portion is still held in the most downstream nip 8 of the paper feeding path while its leading end is held in or being urged into one of the gripping positions 5 between the arms 3_4 and 3_5 downstream of the gripping position 5 between the arms 3_6 and 3_7 to which the sheet 13 is to be fed. Fig. 5 illustrates the same principle for a next sheet 18 being fed into a large opening between arms 3_8 and 3_9 of which the arm 3_8 is in a position pivoted to its most extreme open position.

[0020] The relatively wide opening angle of the gripping arms in the open position allows the sheets 13, 14, 18 to be fed along a path 7 converging with the intended gripping position 5 relatively early, so that a relatively low feeding speed is sufficient to allow the sheets 13, 14, 18 to reach the gripping positions 5. Since the gripping arm $3_5, 3_7, 3_9$ trailing the leading end of each sheet 13, 14 and respectively 18 pivots back relatively early, in spite of having been pivoted forward over a large angle, the next gripping arm $3_5, 3_7, 3_9$ does not or only to a minor extent constitute an obstacle that needs to be circumvented by the sheet 13, 14, 18 to reach the gripping position 5.

[0021] Particular advantage is taken from the increased opening angles of the arms 3_1-3_{11} in combination with the early return to the closed position by providing that the paper feeding path is arranged for feeding the sheets at a constant speed. Preferably, the loop 1 is also circulated at a constant speed, for instance by a suitable drive 19 as schematically shown in Fig. 1. Feeding the sheets at a constant speed and circulating the loop at a constant speed is advantageous for reducing

noise emissions and wear of the apparatus. Moreover, controlling the speed of feeding and, respectively, circulation is simplified so that manufacturing costs can be reduced.

[0022] The speed of feeding the sheets is preferably less than 150% and more preferably less than 130% of the speed of circulation of the loop, so that the extent to which the longest sheets buckle and a curve is formed in the sheets between the most downstream nip of the feeding path and the gripping position is small.

[0023] As discussed before, a large pivoting angle of the gripping arms is advantageous for obtaining a large opening into which sheets can be fed and to allow the leading end of each sheet to be fed relatively early in relation to the passage of the associated gripping position along the intersection with the prolongation of the sheet feeding path. More in particular, to achieve a large advantage using this effect, it is preferred that the gripping arm operating structure is arranged for causing each gripping arm to pivot, relative to the directly adjacent portion of the conveyor loop, over an angle of more than 45° and, more preferably, over an angle of more than 60°.

[0024] Also, to avoid that the gripping arms interfere with the feeding of a previously fed sheet, it is preferred that the gripping arm operating structure is arranged for pivoting each gripping arm relative to the directly adjacent portion of the conveyor loop in the sense contrary to the sense of circulation immediately after the gripping arm has passed the prolongation in line with a downstream end portion of the paper feeding path. Thus, the pivoting back of the gripping arm to stay clear from a previously fed sheet is started particularly early.

[0025] For reducing the difference in velocities between the circulation of the loop and the feeding of the sheets that is required to ensure that the leading ends of the sheets 13, 14, 18 reach the respective gripping positions 5, it is advantageous if the prolongation 12 in line with the downstream end portion 7 of the paper feeding path intersects the gripping position path 6 at an angle larger than 75°. Thus, the sheets 13, 14, 18 approach the gripping position path quickly while deflection of the leading ends of the sheets 13, 14, 18, which are entrained by gripping arms 3₅, 3₇ and, respectively 3₉, in the sense of circulation temporarily adds a velocity component in the direction of the respective gripping position 5 to the movement of the respective leading edge.

[0026] A further advantage of the relatively large openings between successive gripping arms into which the sheets are fed is that reliable feeding of each sheet to an associated gripping position is also possible if the sheets are fed along the paper feeding path in close succession, for instance in a shingled configuration in which each sheet of a series of sheets overlaps a preceding one of the sheets and wherein each sheet is fed in a separate one of spaces between the gripper arms. In the present example this is illustrated by the sheets 13, 14, 18 being fed in an overlapping configuration in which each next sheets 13, 18 is in a position off-set in upstream direction

relative to the position of the previous sheet 14 resp. 13 over a distance smaller than the length of the previous sheet 14 resp. 13. This in turn allows sheets to be fed at a high rate without resorting to a high feeding speed which would entail the formation of large buckles as the sheets are transferred from the most downstream feeding nip to the gripping position.

[0027] While the present invention is described in detail with reference to an example shown in the drawings, the skilled person will appreciate that many other embodiments are conceivable within the framework of the invention as set forth in the claims.

[0028] For instance, instead of a cam profile, the gripping arm operating structure may include other means for causing the gripping arms to pivot between the respective closed positions and the open positions, such as trigger pawls acting upon a bi-position spring or magnet controlled gripping arm suspension or solenoids activated in response to contact between a slide contact and a power feeding rail.

[0029] Also, the most downstream transport nip may be a nip between belts or strings or a position where grippers release sheets that are being fed.

[0030] Furthermore, in the example shown in the drawings, a sheet is fed into each second opening between successive gripping arms. It is however also possible to feed sheets into openings in another pattern, for example by feeding a sheet into each opening or each third opening passing the prolongation of the paper sheet feeding path. It may also be that regularly or irregularly varying numbers of openings are skipped between successive feedings of a sheet into an opening between successive gripping arms.

[0031] In the present example, the sheets are fed to a curved portion of the gripping position path. It is however also possible to feed the sheets to a straight section of the gripping position path. Since a gripping arm operating structure is provided, it is not necessary to rely on passing the gripping arms through a curved section of the gripping position path for causing openings between successive gripping arms to open for receiving a sheet therein.

[0032] 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. An apparatus for conveying paper sheets, comprising:

an endless conveyor loop (1) extending along a circulation path and circulatable in a sense of circulation (2) along the circulation path;
a plurality of gripping arms (3₁-3₁₁) on the outside of the circulation path, the gripping arms (3₁-3₁₁) each being connected to the loop (1) in

positions mutually spaced along the circulation path, the gripping arms (3₁-3₁₁) each being pivotable between an open position for receiving or releasing a sheet (13, 14, 18) and a closed position for retaining an end of the sheet (13, 14, 18) at a gripping position (5) circulatable along a gripping position path (6);

a paper feeding path having a downstream end portion (7) oriented towards the gripping position path (6), for feeding the paper sheets (13, 14, 18), and having a most downstream transport nip (8) in a position spaced at a distance D_{grip} from the gripping position path (6), a prolongation (12) in line with the downstream end portion (7) of the paper feeding path intersecting the gripping position path (6); and

a gripping arm operating structure (15, 16, 17) for causing each gripping arms (3₁-3₁₁) to pivot, relative to a directly adjacent portion of the conveyor loop (1), in the sense of circulation (2) towards the open position prior to passing the prolongation (12) in line with the downstream end portion (7) of the paper feeding path and, subsequently, to pivot, relative to the directly adjacent portion of the conveyor loop (1), contrary to the sense of circulation (2), towards the closed position;

wherein the gripping arms (3₁-3₁₁) each, when passing the prolongation (12) of the downstream end portion (7) of the feeding path, extend towards the most downstream transport nip (8) of the feeding path up to a distance D_{arm} from said transport nip (8), such that $D_{grip} - D_{arm} > 1/4 * D_{grip}$;

characterized in that the gripping arm operating structure (15, 16, 17) is arranged for starting the pivoting of each of the gripping arms (3₁-3₁₁) relative to the directly adjacent portion of the conveyor loop (1) in the sense contrary to the sense of circulation (2), towards the closed position, before a next one of the gripping arms (3₁-3₁₁) passes the prolongation (12) in line with the downstream end portion (7) of the paper feeding path.

2. An apparatus according to claim 1, wherein the paper feeding path is arranged for feeding the sheets (13, 14, 18) at a constant speed.
3. An apparatus according to claim 1 or 2, further comprising a drive (19) for driving circulation of the loop (1) at a constant speed.
4. An apparatus according to any of the preceding claims, wherein the gripping arm operating structure (15, 16, 17) is arranged for causing each of the gripping arms (3₁-3₁₁) to pivot, relative to the directly adjacent portion of the conveyor loop (1), over an

angle of more than 45°.

5. An apparatus according to any of the preceding claims, wherein the gripping arm operating structure (13, 14, 18) is arranged for starting the pivoting of each of the gripping arms (3₁-3₁₁) relative to the directly adjacent portion of the conveyor loop (1) in the sense contrary to the sense of circulation (2), towards the closed position, immediately after the gripping arm (3₁-3₁₁) has passed the prolongation (12) in line with the downstream end portion (7) of the paper feeding path.

6. An apparatus according to any of the preceding claims, wherein the prolongation (12) in line with the downstream end portion (7) of the paper feeding path intersects the gripping position path (6) at an angle larger than 75°.

7. A method for conveying paper sheets, comprising:

circulating an endless conveyor loop (1) extending along a circulation path in a sense of circulation (2) along the circulation path;

pivoting each one of a plurality of gripping arms (3₁-3₁₁) in positions mutually spaced along the circulation path on the outside of the circulation path, between an open position and a closed position for retaining an end of the sheet (13, 14, 18) at a gripping position (5) circulatable along a gripping position path (6); and

feeding paper sheets (13, 14, 18) along a paper feeding path having a downstream end portion (7) oriented towards the gripping position path (6) and having a most downstream transport nip (8) in a position spaced at a distance D_{grip} from the gripping position path (6), a prolongation (12) in line with the downstream end portion (7) of the paper feeding path intersecting the gripping position path (6);

wherein the gripping arms (3₁-3₁₁) each, when passing the prolongation (12) of the downstream end portion (7) of the feeding path, extend towards the most downstream transport nip (8) of the feeding path up to a distance D_{arm} from the transport nip, such that $D_{grip} - D_{arm} > 1/4 * D_{grip}$;

characterized in that the gripping arm operating structure (15, 16, 17) starts the pivoting of each of the gripping arms (3₁-3₁₁) relative to the directly adjacent portion of the conveyor loop (1) in the sense contrary to the sense of circulation (2), towards the closed position, before a next one of the gripping arms (3₁-3₁₁) passes the prolongation (12) in line with the downstream end portion (7) of the paper feeding path.

8. A method according to claim 7, wherein the paper feeding path feeds the sheets (13, 14, 18) at a con-

stant speed.

9. A method according to claim 7 or 8, wherein the loop (1) is circulated at a constant speed.

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10. A method according to any of the claims 7-9, wherein the sheets (13, 14, 18) are fed along the paper feeding path in a shingled configuration in which each sheet (13, 14, 18) of a series of sheets overlaps a preceding one of the sheets and wherein each sheet (13, 14, 18) is fed in a separate one of spaces between the gripper arms (3₁-3₁₁).

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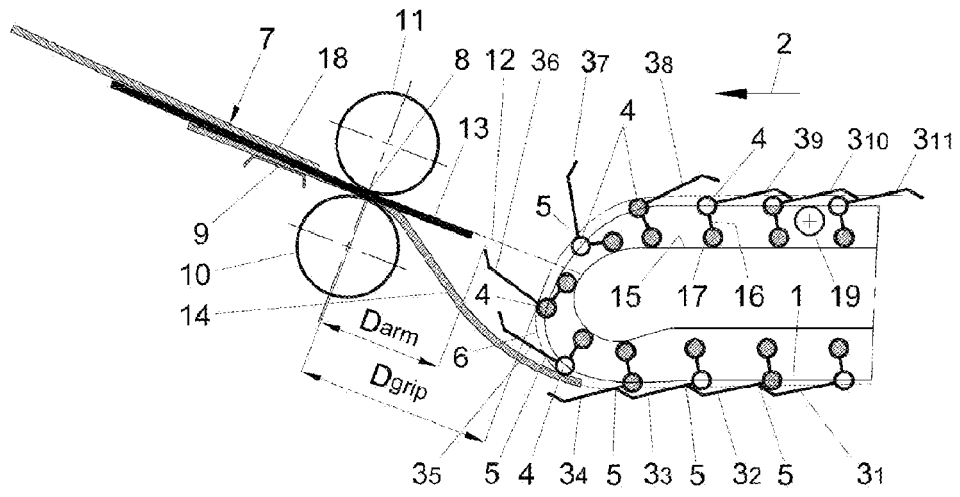


Fig. 1

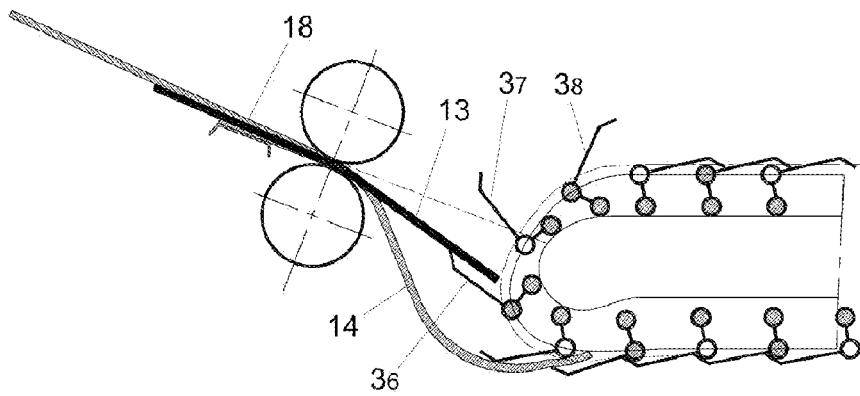


Fig. 2

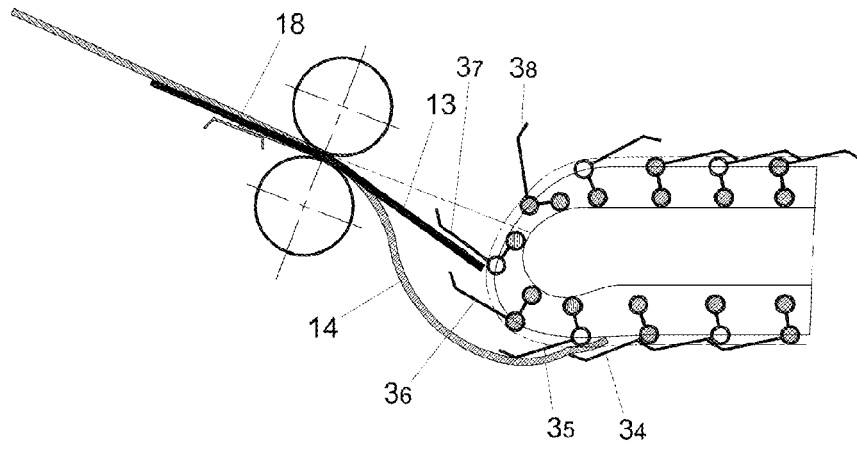


Fig. 3

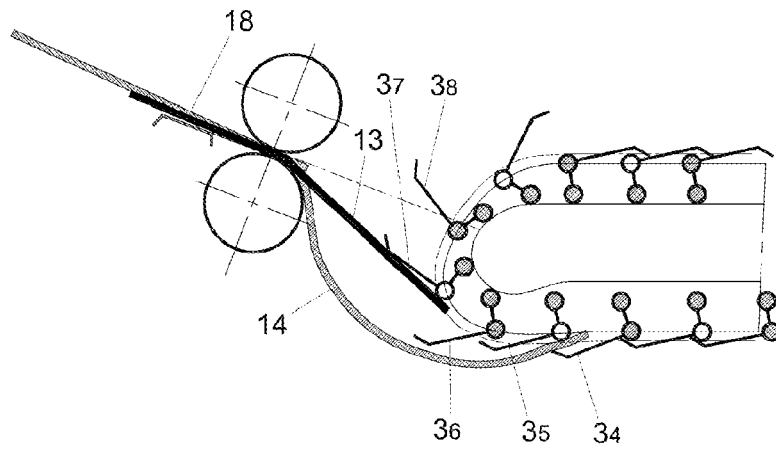


Fig. 4

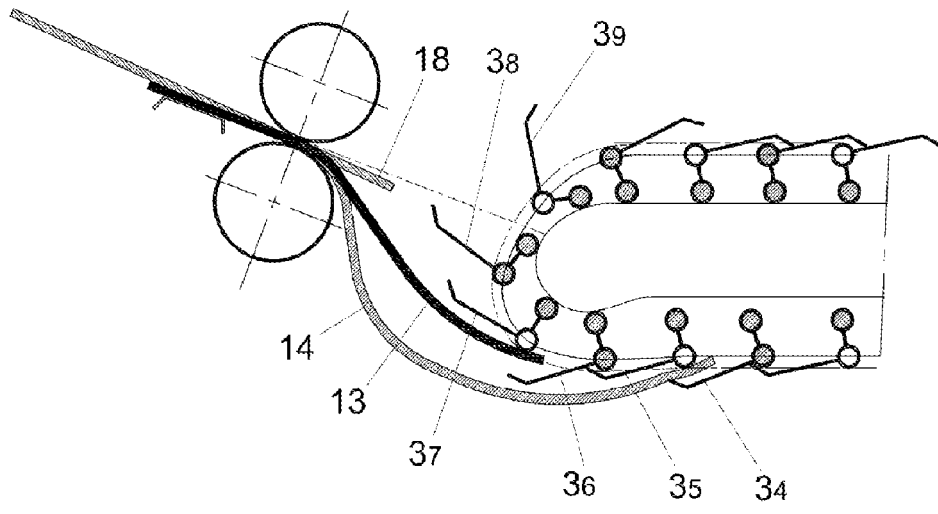


Fig. 5

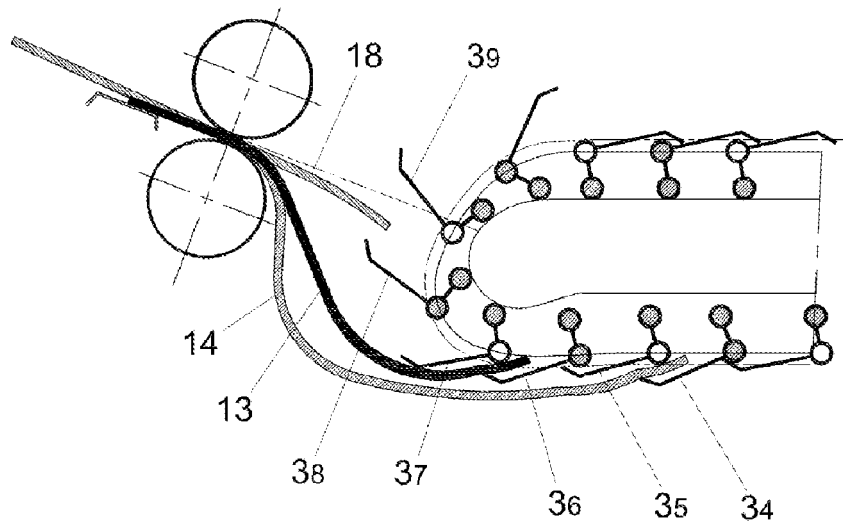


Fig. 6

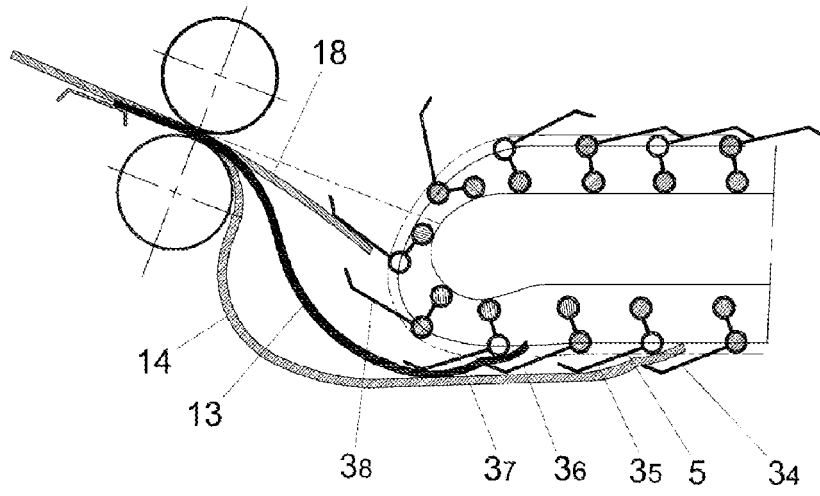


Fig. 7

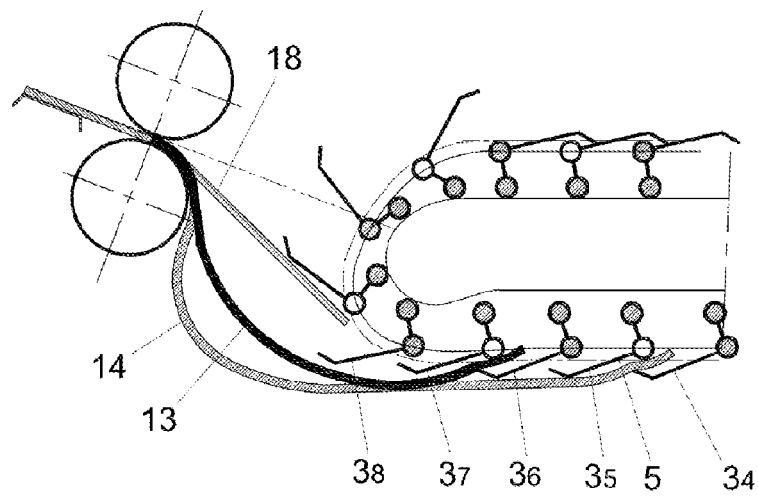


Fig. 8



EUROPEAN SEARCH REPORT

Application Number
EP 10 15 2147

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	DE 199 16 668 A1 (HOERAUF MICHAEL MASCHF [DE]) 26 October 2000 (2000-10-26)	1,4-7	INV. B65H29/04
Y	* column 2, line 32 - column 3, line 7; figures 1,2 *	10	
Y	DE 41 14 095 C1 (MAN ROLAND) 30 July 1992 (1992-07-30) * figures 5,6 *	10	
X	US 3 174 749 A (WILLIAM CHILDS GEORGE) 23 March 1965 (1965-03-23) * column 2, lines 16-46; figure 2 *	1,4-7	
A	US 3 116 924 A (HUCK WILLIAM F) 7 January 1964 (1964-01-07) * column 4, lines 15-20,49-54 * * column 4, line 69 - column 5, line 5; figures *	1,7	
A,D	EP 2 107 021 A1 (NEOPOST TECHNOLOGIES [FR]) 7 October 2009 (2009-10-07) * figures *	1,7	TECHNICAL FIELDS SEARCHED (IPC)
A	FR 2 514 686 A1 (RENGO CO LTD [JP]) 22 April 1983 (1983-04-22) * figures 1,5,6 *	1,7	B65H
A	US 1 569 256 A (HENRI BOBST) 12 January 1926 (1926-01-12) * figures 1,4,5,7 *	1,7	
A	FR 2 507 165 A1 (ADVANCE ENTERPRISES INC [US]) 10 December 1982 (1982-12-10) * figure 5 *	1,7	
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 8 July 2010	Examiner Lemmen, René
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	

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EPO FORM 1503 03.82 (P04C01)

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

EP 10 15 2147

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.

08-07-2010

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
DE 19916668	A1	26-10-2000	IT MI20000482 A1	16-10-2000
			KR 20010006714 A	26-01-2001
			US 6478297 B1	12-11-2002

DE 4114095	C1	30-07-1992	EP 0511534 A2	04-11-1992
			JP 5132187 A	28-05-1993
			US 5228670 A	20-07-1993

US 3174749	A	23-03-1965	NONE	

US 3116924	A	07-01-1964	NONE	

EP 2107021	A1	07-10-2009	US 2009250862 A1	08-10-2009

FR 2514686	A1	22-04-1983	AU 548226 B2	28-11-1985
			AU 8948282 A	28-04-1983
			CA 1190847 A1	23-07-1985
			CH 649495 A5	31-05-1985
			DE 3238296 A1	05-05-1983
			GB 2109285 A	02-06-1983
			IT 1152724 B	07-01-1987
			JP 1237851 C	31-10-1984
			JP 58071099 A	27-04-1983
			JP 59011440 B	15-03-1984
			MX 157071 A	26-10-1988
			NL 8203993 A	16-05-1983
			NZ 202177 A	31-01-1985
			SE 453285 B	25-01-1988
			SE 8205903 A	18-10-1982
			US 4466320 A	21-08-1984
			ZA 8207625 A	31-08-1983

US 1569256	A	12-01-1926	NONE	

FR 2507165	A1	10-12-1982	CA 1180361 A1	01-01-1985
			CH 652991 A5	13-12-1985
			DE 3221001 A1	23-12-1982
			GB 2102393 A	02-02-1983
			IT 1148317 B	03-12-1986
			JP 4213529 A	04-08-1992
			SE 455937 B	22-08-1988
			SE 8203002 A	05-12-1982
			US 4448408 A	15-05-1984

EPO FORM P0469

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

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 2107021 A [0001] [0012]