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

(11) EP 1 136 600 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
26.09.2001 Bulletin 2001/39

(51) Int Cl.[7]: **D01G 25/00**

(21) Application number: **00830178.0**

(22) Date of filing: **13.03.2000**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(71) Applicant: **Automatex S.r.l.**
51100 Pistoia (IT)

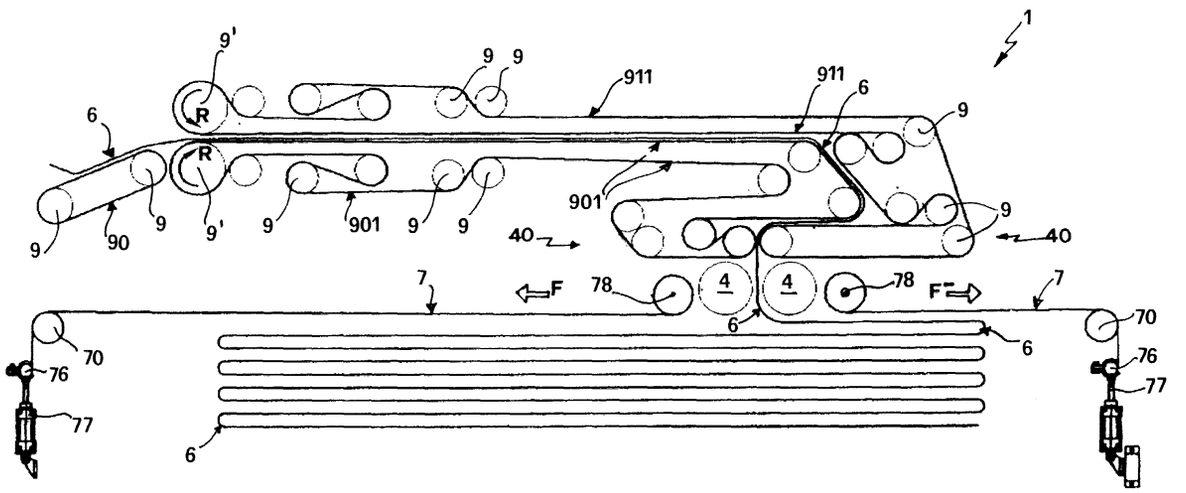
(72) Inventor: **Pratesi, Aldo**
51100 Pistoia (IT)

(74) Representative: **Martini, Lazzaro**
Studio Brevetti Ing. Dr. Lazzaro Martini s.r.l.
Via dei Rustici 5
50122 Firenze (IT)

(54) Lap-forming apparatus for card webs

(57) The invention relates to a lap-forming apparatus (1) for card webs, of a type that can be used downstream of a carding machine in order to place, onto a collecting surface, the card web (6) exiting from a carding machine in alternate superimposed layers by means of a sprading carriage (4) overhanging the collecting surface and reciprocating with respect thereto; the lap-forming apparatus (1) is provided with isolation means consisting of a partition wall (7) interposed between the carriage and the surface, thereby isolating the card web, going out of the sprading carriage (40), from the any air displacement or pressure wave, generated by the same carriage when moving along.

Fig. 2



EP 1 136 600 A1

Description

[0001] The present invention relates to a lap-forming apparatus for card webs. Lap-forming apparatuses are used downstream of card machines in order to lay down the card web exiting from these machines into alternate superimposed layers so as to make the card web suited for applications such as stuffing and the like.

[0002] To dispose the card web into layers, the lap forming apparatuses are provided with a sprading or lap-forming carriage which comprises suitable conveyor belts and sprading cylinders located above a collecting surface consiting of a table driven into a slow feeding motion. In use, the card web, coming from the carding machine located upstream, goes through a path defined by a succession of guiding cylinders and conveyor belts supported and driven by the same cylinders, to arrive at a pair of laminar cylinders which form the final member sprading the web onto the collecting surface. Said laminar cylinders, together with a part of the driving-out cylinders and a part of the conveyor belts, are driven into an alternate straight motion over a length that defines the corresponding dimension of the lapped, that is folded over, web.

[0003] The drawbacks of lap-forming apparatuses derive to a significant extent from the difficulty of treating such an extremely peculiar material as the card web. In fact, by way of example, the web may have a width of 2 to 3 metres, an extremely low weight (in the order of 8-20 gr/m2) and is made up of fibres of different nature (for example, acrylic, synthetic polyesters, rayon, wool, cotton, etc.) having various length and finesess or denier number. In other words, the material to be laid down in superimposed laps is formed by a layer which is very thin with respect to the width, relatively uniform, very light-weight and likely to be affected by even minor interventions. In particular, the lap-forming carriage, in its reciprocating motion, determines the formation of air vortexes that may negatively affect the underlying web by causing, for example, huge irregularities in the article, such as wrinkles and ripples, which result the more important the higher the working speed. In order to limit such drawbacks, the lap-forming apparatuses of known type cannot exceed a given working speed. The present invention overcomes the above drawbacks by providing a lap-forming apparatus having the characteristics disclosed in claim 1. Further characteristics being set forth in the dependent claims.

[0004] One of the advantages of the present invention lies in the fact that it is possible to produce an article which is extremely uniform and does not exhibit imperfections even when working at a relatively high speed, that the lap-forming apparatus is simple to operate and easy to service, that it maintains its characteristics unchanged even after a prolonged operating life, and that it has a relatively moderate manufacturing cost.

[0005] These and other advantages and characteristics of the invention will be best understood by anyone skilled in the art from a reading of the following description in conjunction with the attached drawings given as a practical exemplification of the invention, but not to be considered in a limitative sense, wherein:

- Fig. 1 is a perspective view showing diagrammatically an example of a possible embodiment of the present invention;
- Fig. 2 is a schematic side view of the embodiment of Fig. 1.

[0006] With reference to the attached figures, a lap-formimg apparatus (1) is located downstream of a carding machine (not shown) from which it receives a card web (6). The introduction of the card web (6) into the lap-forming apparatus (1) is represented by the arrow (E) in the left side of Fig. 1. The web (6) is guided by a plurality of conveyor belts (90, 901, 911) supported by relevant, suitably driven cylindrical rollers (9, 9'). The members for driving the cylindrical rollers (9) are not shown as they are of a type similar to those known in the art. Upon its introduction into the lap-forming apparatus (1) the web (6) is supported from below by the first belt (90) and then goes through two opposite rollers (9') which rotate in the directions indicated by relevant arrows (R). The rollers (9') move together with respective belts (901) and (911) and the other rollers (9) which support the webs; the movement of the upper web (911) is represented by the arrow (V) on the outer part of the path followed by the same web. The two webs (901) and (911), upon the step immediately following the travel of web (6), are disposed above and below the same web (6), by moving from left to right in the illustrated example. The conveyor belts (901) and (911) has the dual function of transporting and stretching the web (6) during its travel up to the two laminar cylinders (4) which are driven, in a known manner together with a part of the rollers (9) suppoirting the webs (901) and (911), into a straight, reciprocating motion along the trajectory indicated by (F) and (F-) in Fig. 2. The assembly of laminar cylinders (4) and part of rollers (9) which move therewith, makes up the so-called sprading carriage, and is represented as a whole by 40 in Fig. 2. The web (6) outputting from laminar cylinders (4) is laid down (in a known manner), into alternately superimposed layers, onto a relevant collecting surface defined by a table (not shown) slowly moving forward, for example in the direction indicated by arrow (U) in Fig. 1.

The lap-forming apparatus (1) according to the present invention is provided with isolation means consisting of a partition wall (7) interposed between the carriage (40) and the underlying collecting surface, so as to isolate the card web going out of the sprading carriage (40) from any air displacement generated by the carriage as this is moving along.

[0007] The partition wall may be differently constructed. In the illustrated embodiment, the partition wall is formed by two mats (7) bilaterally secured to the lap-

forming apparatus so as to result solid and thus move together with the laminar cylinders (4) of the sprading carriage (40). In particular, the mats (7) are secured to a second pair of cylinders (78) provided with motorization means synchronized with those of the sprading carriage. The motorization means are not described for sake of simplicity as they are similar to those provided for driving the sprading carriage (40). For example, they may include gears and/or belt racks to allow the cylinders (78) to be translated in conjunction with the sprading carriage (40) and the simultaneous rotation of the cylinders (78) about their own axes so that, during the translation, one cylinder (78) unwinds the mat (7) fixed thereto while the other cylinder (78) winds up the other mat (7).

The mats (7) are fixed, at the end opposite to that of engagement with cylinders (78), to return means (77) able to keep the mats (7) in tension during their alternate motion (F, F-) in conjunction with the sprading carriage. In practice, the return means, in the embodiment above described, recover and yield portions of mat of a length substantially corresponding to the difference between the instantaneous radiuses of the mats winding over the cylinders (78). The return means may consist of pneumatic or hydraulic cylinders (77) connected to two rollers (76) on which the external ends of mats (7) are secured. Moreover, in order to reduce the lateral dimensions, driving-out cylinders (70) may be provided around which the mats (7) are made to pass to allow a substantially vertical disposition of the two portions of mats (7) temporarily not involved in the covering of the lapped card web. In practice, during the operation of the lap-forming apparatus, the two mats (7) move to the right or to the left, in the direction F or (F-) following the laminar cylinders (4) while the respective vertical portions of the mats move, alternately, either upward or downward being stretched by the cylinders (78) which act upon rollers (76) having the external ends of the mats fixed thereon.

[0008] Alternatively, provision may be made for having the taps unwound and being kept in tension by the sole agency of jacks (77) .

[0009] A further embodiment may exhibit mats (7) wound over two rollers disposed, for example, in the position of the those illustrated at (76). Such rollers will be provided of return means, for example of elastic type, so as to keep the mats (7) in tension likewise above described. In this case, the pneumatic or hydraulic cylinders used in the previous case will not be necessary.

The mats (7) may be constructed either in a single element or by means of more listels or plates hinged to each other so as to define a mat.

Claims

1. Lap-forming apparatus for card webs, of a type that can be used downstream of a carding machine in order to place, onto a collecting surface, the card web (6) exiting from a carding machine in alternate superimposed layers by means of a sprading carriage overhanging the collecting surface and reciprocating with respect thereto; lap-forming apparatus (1) **characterized in that** it is provided with isolation means consisting of a partition wall (7) interposed between the carriage and said surface, thereby isolating the card web going out of the sprading carriage (40) from any air displacement, that is pressure wave, generated by the same carriage when moving along.

2. Lap-forming apparatus according to claim 1, **characterized in that** said partition wall consists of two mats (7) bilaterally secured to the lap-forming apparatus so as to result solid to and thus move together with the laminar cylinders (4) of the sprading carriage (40).

3. Lap-forming apparatus according to claim 2, **characterized in that** said mats (7) are fixed, at the end which is closer to the sprading carriage (40), to a pair of cylinders (78) one of which winds up and the other unwinds the respective mat secured thereto during said motion together with the sprading carriage (40).

4. Lap-forming apparatus according to claim 2 and/or 3, **characterized in that** said mats (7) are fixed, at end opposite to that of engagement with the cylinders of the sprading carriage (40), to return means (77) able to keep the mat (7) in tension during their alternate motion (F, F-) togeteher with the sprading carriage (40).

5. Lap-forming apparatus according to claim 4, **characterized in that** said return means (77) are of pneumatic or hydraulic type.

6. Lap-forming apparatus according to claim 2, **characterized in that** said mats (7) are wound over two rollers provided with return means able to keep said mats (7) in tension during their alternate motion (F, F-) togeteher with the sprading carriage (40).

7. Lap-forming apparatus according to claim 4, **characterized in that** said return means are of elastic type.

8. Lap-forming apparatus according to claim 2, **characterized in that** it comprises driving-out cylinders (70) around which the mats (7) are made to pass to allow a substantially vertical disposition of the two portions of mats (7) temporarily not involved in the covering of the lapped card web exiting from the sprading carriage (40).

9. Lap-forming apparatus according to claim 2, **char-**

acterized in that each of said mats (7) is made up of a single element.

10. Lap-forming apparatus according to claim 2, **characterized in that** said mats (7) are made up of a plurality of listels or plates hinged to each other so as to define a mat.

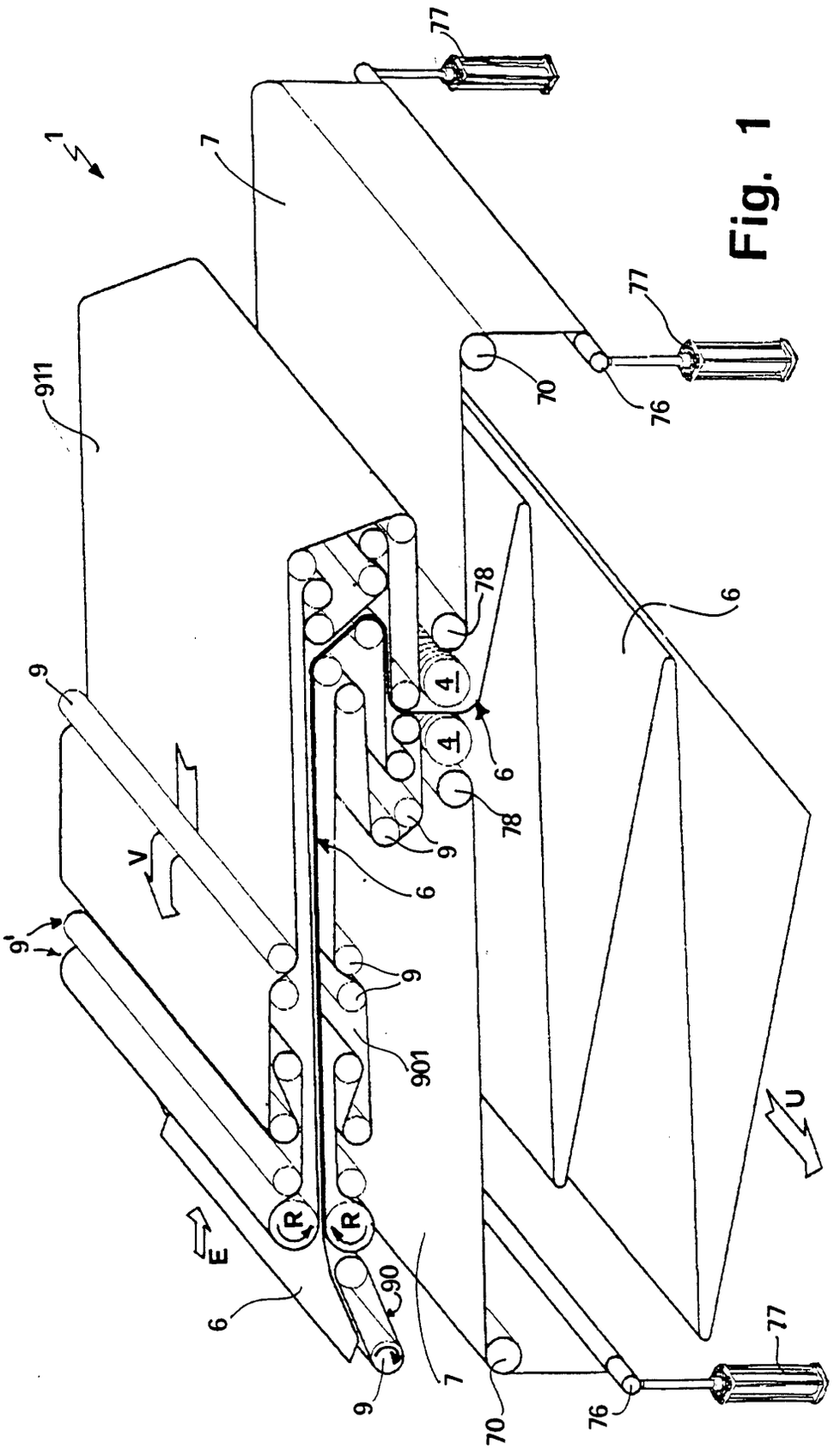
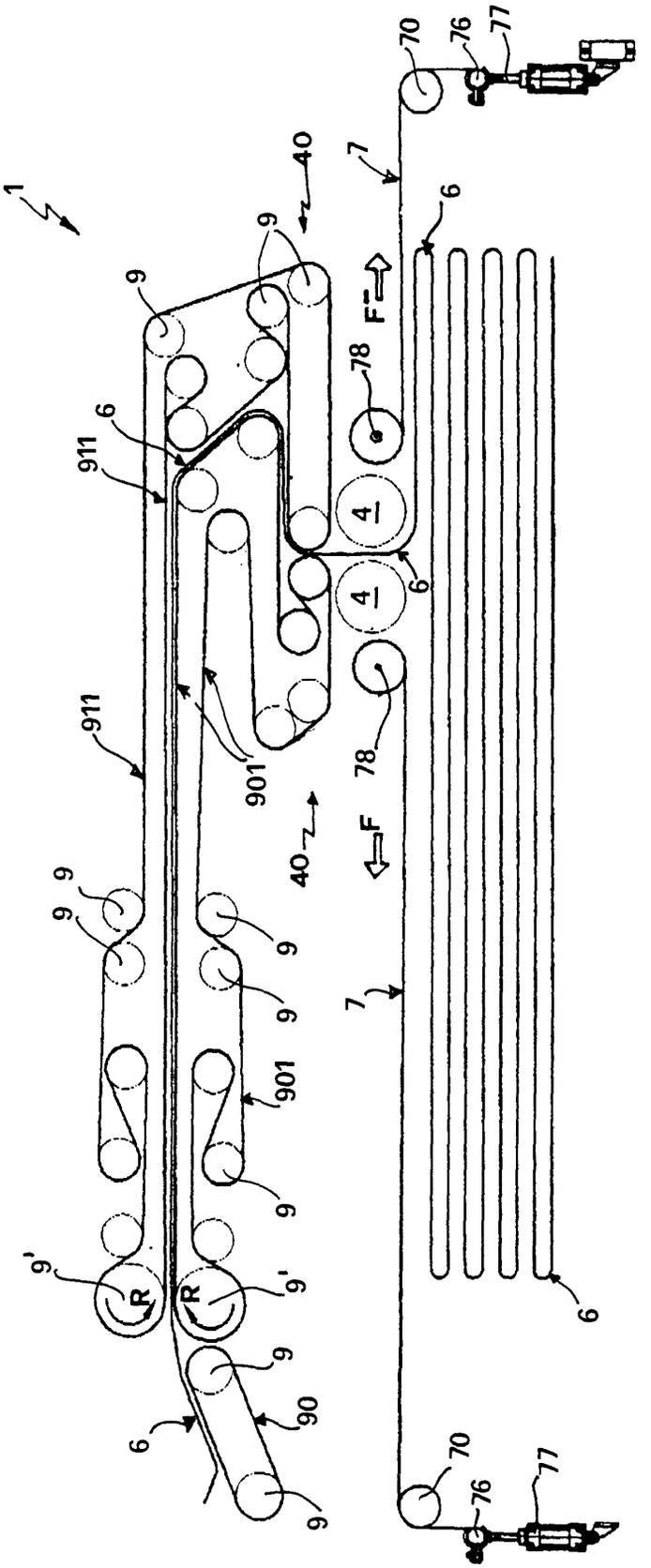


Fig. 1

Fig. 2



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 00 83 0178

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
Y	DE 92 12 215 U (AUTEFA MASCHINENFABRIK GMBH) 13 January 1994 (1994-01-13) * page 5, paragraph 3 - page 9, paragraph 3; claim 1; figure 1 *	1,2,8,9	D01G25/00
A	---	4	
Y	US 3 997 942 A (BUCK,G.S. ET AL) 21 December 1976 (1976-12-21) * column 4, line 15 - line 42; claim 1; figures 1,8-10 *	1,2,8,9	

A	DE 39 08 987 A (ROCKWOOL AB) 5 October 1989 (1989-10-05) * the whole document *	1,2	

A	FR 2 332 348 A (FRIED. KRUPP GMBH) 17 June 1977 (1977-06-17) * page 4, line 16 - page 5, line 12; claims 5-8; figure 1 *	1	

A	US 1 642 178 A (SCHORSCH,L.) 13 September 1927 (1927-09-13) * page 2, line 13 - line 33; claim 1; figure 1 *	1	TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			D01G D04H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	10 August 2000	Munzer, E

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 00 83 0178

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.

10-08-2000

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 9212215 U	13-01-1994	DE 59307901 D	05-02-1998
		WO 9405836 A	17-03-1994
		EP 0659220 A	28-06-1995
		US 5590442 A	07-01-1997
US 3997942 A	21-12-1976	NONE	
DE 3908987 A	05-10-1989	SE 466910 B	27-04-1992
		DK 138289 A	23-09-1989
		FR 2629068 A	29-09-1989
		SE 8801055 A	23-09-1989
FR 2332348 A	17-06-1977	DE 2551898 A	02-06-1977
		BE 848414 A	16-03-1977
		US 4074395 A	21-02-1978
US 1642178 A	13-09-1927	NONE	

EPO FORM P0459

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