

(19)



(11)

EP 2 990 194 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
02.03.2016 Bulletin 2016/09

(51) Int Cl.:
B31F 1/07 (2006.01) B31F 5/02 (2006.01)

(21) Application number: **15002521.1**

(22) Date of filing: **25.08.2015**

(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

(71) Applicant: **Industrie Cartarie Tronchetti S.p.A.**
55023 Borgo a Mozzano (Lucca) (IT)

(72) Inventor: **Rosati, Lido**
55014 Marlia (Lucca) (IT)

(74) Representative: **Forattini, Amelia**
Internazionale Brevetti
Ingg. ZINI, MARANESI & C. S.r.l.
Piazza Castello 1
20121 Milano (IT)

(30) Priority: **29.08.2014 IT MI20141522**

(54) **LAMINATING UNIT FOR JOINING TWO OR MORE PLIES FOR PRODUCING PAPER ITEMS**

(57) A laminating unit (1) or joining two or more plies for producing paper items, comprising a plurality of knurling tools (3) adapted to act on a contrast roller (2) to join two or more plies arranged between the contrast roller (2) and the knurling tools (3); each knurling tool (3) is constituted by a roller having a smaller longitudinal dimensions than the contrast roller (2); the unit (1) com-

prises a flexible pressure tube (4) that extends longitudinally along a first supporting beam (5) which supports the flexible pressure tube (4) so as to press the knurling tools (3) onto the contrast roller (2) when the flexible tube (4) is inflated by means of a pressure fluid; the knurling tools (3) are mounted on a second beam (8) by means of oscillating bearings (7).

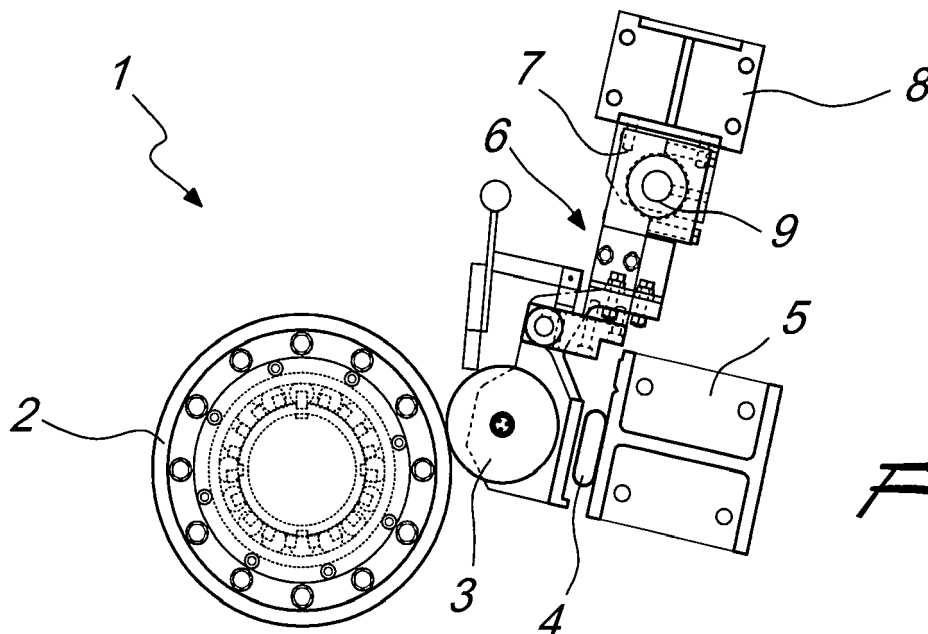


Fig. 1

EP 2 990 194 A1

Description

[0001] The present invention relates to a laminating unit for joining two or more plies to produce paper items.

[0002] Products of the tissue type, such as toilet paper, napkins, handkerchiefs, blotting paper, etcetera are normally made by laminating multiple plies of paper and there are many different systems for coupling them.

[0003] One commonly used method is to pass the paper plies between a series of small rollers provided with spikes, known as knurling tools, and a contrast roller; the two plies are joined by the pressure of the spikes on the paper. EP1533112 discloses an apparatus of the above type.

[0004] Figures 3 and 4 schematically show a system of the type described above, comprising a contrast roller 200, constituted by a motorized roller with a hardened outer surface, and a set of knurling tools 300, each of which is constituted by a small roller provided with many small hardened spikes and driven by the contrast roller 200.

[0005] Each knurling tool 300 is pushed toward the contrast roller 200 by introducing compressed air in a flexible tube 400 mounted on a beam 500.

[0006] By passing two or more plies of paper between the contrast roller 200 and the knurling tool 300, the plies are joined by means of the pressure applied by the spikes to the paper.

[0007] The knurling tools 300 are mounted on the beam 500 by means of respective supports 600 and are locked by means of locking screws 700.

[0008] This structure has functional problems.

[0009] When compressed air is introduced in the flexible tube 400, the knurling tools 300 are arranged against the contrast roller 200 with such pressure that they cause a bend of approximately 3 millimeters at the center of the beam 500. The arrow 800 of Figure 3 indicates this bending.

[0010] This bending is transferred to the knurling tools mounted on the beam causing uneven pressure along the extension of each knurling tool, indicated by the symbols "+" where the pressure is higher and "-" where the pressure is lower.

[0011] This uneven pressure causes an uneven degree of lamination of the plies and causes aesthetic and functional defects of the product.

[0012] The aim of the present invention is to provide a laminating unit that overcomes the drawbacks of the cited prior art.

[0013] Within the scope of this aim, an object of the invention is to provide a laminating unit that ensures substantial uniformity of the degree of pressure along the entire extension of each knurling tool.

[0014] Another object of the present invention is to provide a structure which, by virtue of its particular constructive characteristics, is capable of giving the greatest assurances of reliability and safety in use.

[0015] This aim and these and other objects that will

become better apparent hereinafter are achieved by a laminating unit for joining two or more plies for producing paper items, comprising a plurality of knurling tools adapted to act on a contrast roller to join two or more plies arranged between said contrast roller and said knurling tools; each of said knurling tools being constituted by a roller having smaller longitudinal dimensions than said contrast roller; said unit comprising a flexible pressure tube extending longitudinally along a first supporting beam; said first beam supporting said flexible pressure tube which is adapted to press said knurling tools onto said contrast roller when said flexible tube is inflated by means of a pressure fluid; said laminating unit being characterized in that said knurling tools are mounted on a second beam.

[0016] Further characteristics and advantages will become better apparent from the description of preferred but not exclusive embodiments of the invention, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a partially sectional and transparent side view of a laminating unit according to the present invention;

Figure 2 is a front view of the supporting beam and of the knurling tools of the laminating unit of the preceding figure;

Figure 3 is a plan view of a laminating unit of the prior art;

Figure 4 is a side view of the prior art unit of the preceding figure.

[0017] With reference to the cited figures, the laminating unit for joining two or more plies, according to the invention, generally designated by the reference numeral 1, comprises a contrast roller 2, which is constituted by a motorized roller with a hardened outer surface, and a set of knurling tools 3, each of which is constituted by a small roller provided with many small hardened spikes and driven by the contrast roller 2.

[0018] The unit 1 comprises a flexible tube 4 which extends longitudinally along a first supporting beam 5.

[0019] The first beam 5 supports the flexible pressure tube 4 so as to press the knurling tools 3 onto the contrast roller 2 when the flexible tube is inflated by means of a pressure fluid.

[0020] Each knurling tool 3 is mounted on a supporting element 6, which in turn is mounted on a second beam 8 by means of oscillating bearings 7.

[0021] The bearings 7 oscillate on a longitudinal bar 9, which is mounted on the second beam 8 by means of a plurality of brackets 10.

[0022] In practice it has been found that the invention achieves the intended aim and objects, providing a laminating unit in which the knurling tools are mounted on an additional beam that does not bend.

[0023] Differently from the prior art, according to which the knurling tools are mounted on the same beam that

supports the pressure tube by means of locking screws, the present invention has the knurling tools mounted on oscillating supports, which in turn are associated with a fixed beam.

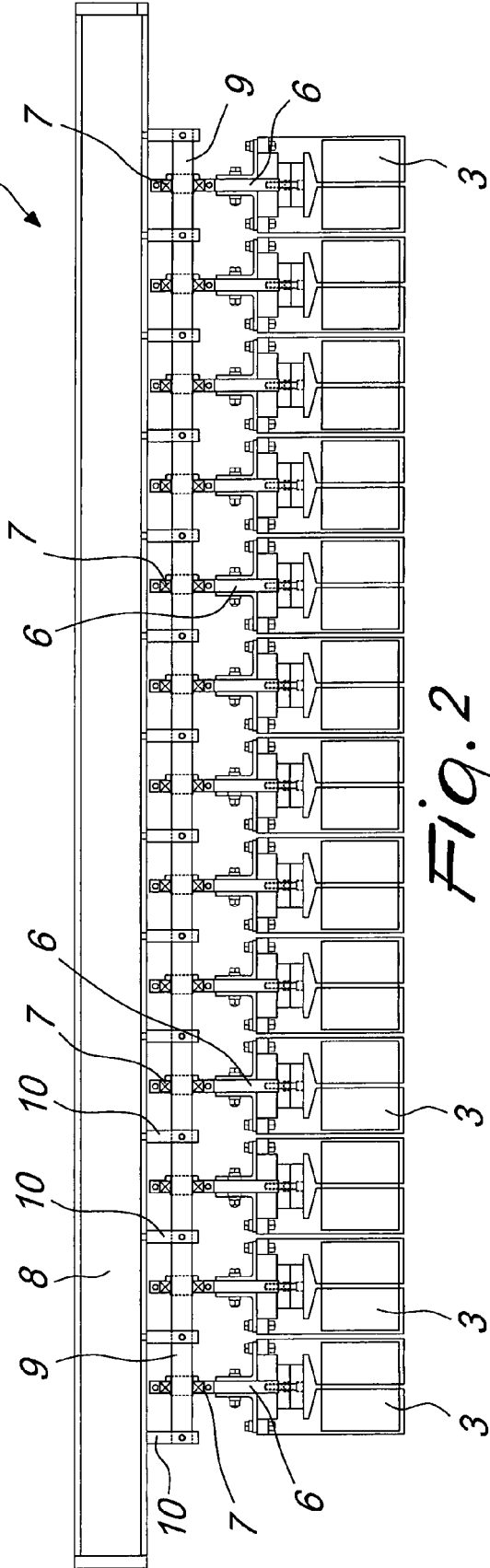
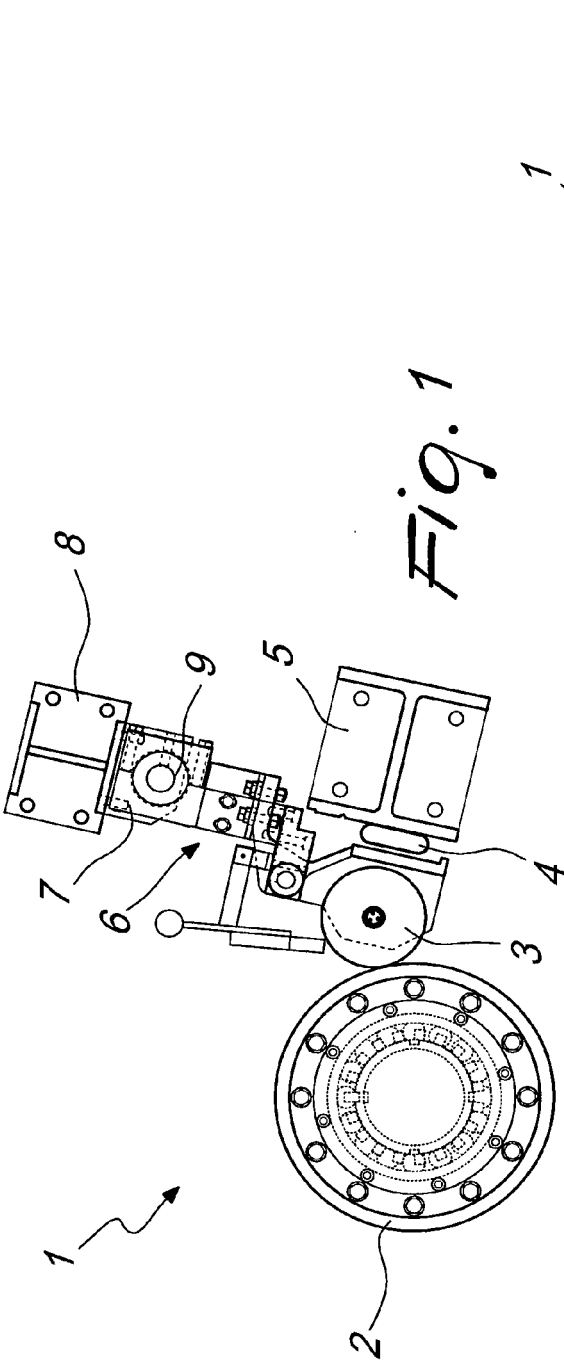
[0024] The oscillating supports allow to transfer the pressure force applied by the flexible tube to the individual knurling tools, which can thus act on the contrast roller with uniform pressure over the entire surface of each knurling tool. 5

[0025] The materials used, as well as the dimensions, may of course be any according to the requirements and the state of the art. 10

Claims

15

1. A laminating unit for joining two or more plies for producing paper items, comprising a plurality of knurling tools adapted to act on a contrast roller to join two or more plies arranged between said contrast roller and said knurling tools; each of said knurling tools being constituted by a roller having smaller longitudinal dimensions than said contrast roller; said unit comprising a flexible pressure tube extending longitudinally along a first supporting beam; said first beam supporting said flexible pressure tube which is adapted to press said knurling tools onto said contrast roller when said flexible tube is inflated by means of a pressure fluid; said laminating unit being **characterized in that** said knurling tools are mounted on a second beam. 20 25 30
2. The laminating unit according to claim 1, **characterized in that** said knurling tools are mounted on said second beam so that they can oscillate. 35
3. The laminating unit according to claim 1, **characterized in that** each one of said knurling tools is mounted on a supporting element; said supporting element being mounted on said second beam by means of an oscillating bearing. 40
4. The laminating unit according to claim 3, **characterized in that** said oscillating bearing is associated with a longitudinal bar; said longitudinal bar being mounted on said second beam by means of a plurality of brackets. 45
5. The laminating unit according to claim 1, **characterized in that** said contrast roller is a motorized roller and has a hardened outer surface. 50
6. The laminating unit according to claim 1, **characterized in that** each one of said knurling tools is constituted by a small roller provided with a large number of small hardened spikes. 55



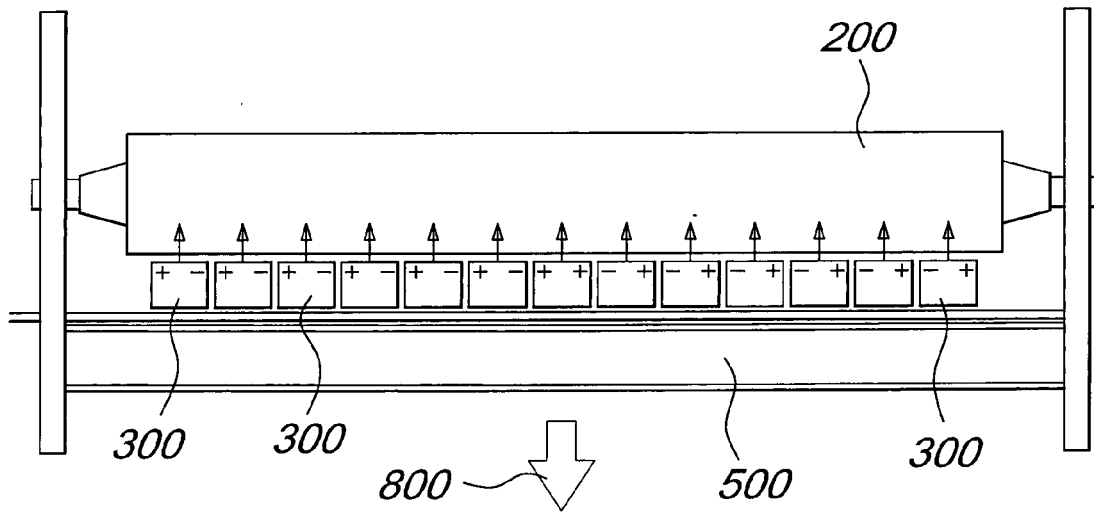


Fig. 3 PRIOR ART

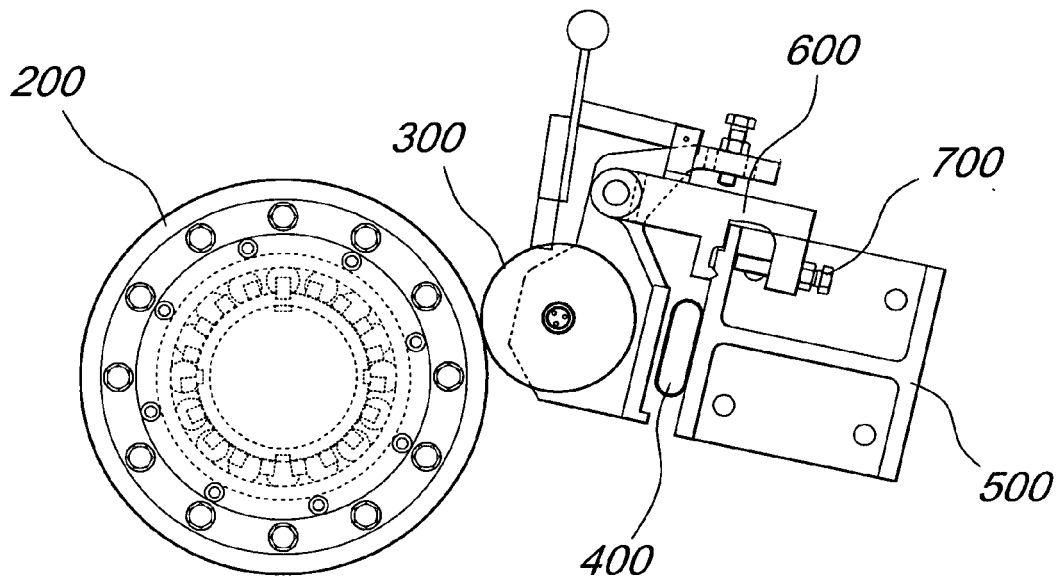


Fig. 4 PRIOR ART



EUROPEAN SEARCH REPORT

Application Number
EP 15 00 2521

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 1 533 112 A1 (IND CARTARIE TRONCHETTI SPA [IT]) 25 May 2005 (2005-05-25) * paragraph [0028] - paragraph [0029]; figure 6 *	1-6	INV. B31F1/07 B31F5/02
			TECHNICAL FIELDS SEARCHED (IPC)
			B31F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 20 November 2015	Examiner Schelle, Joseph
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			

 1
EPO FORM 1503 03.82 (P04C01)

20-11-2015

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 1533112 A [0003]