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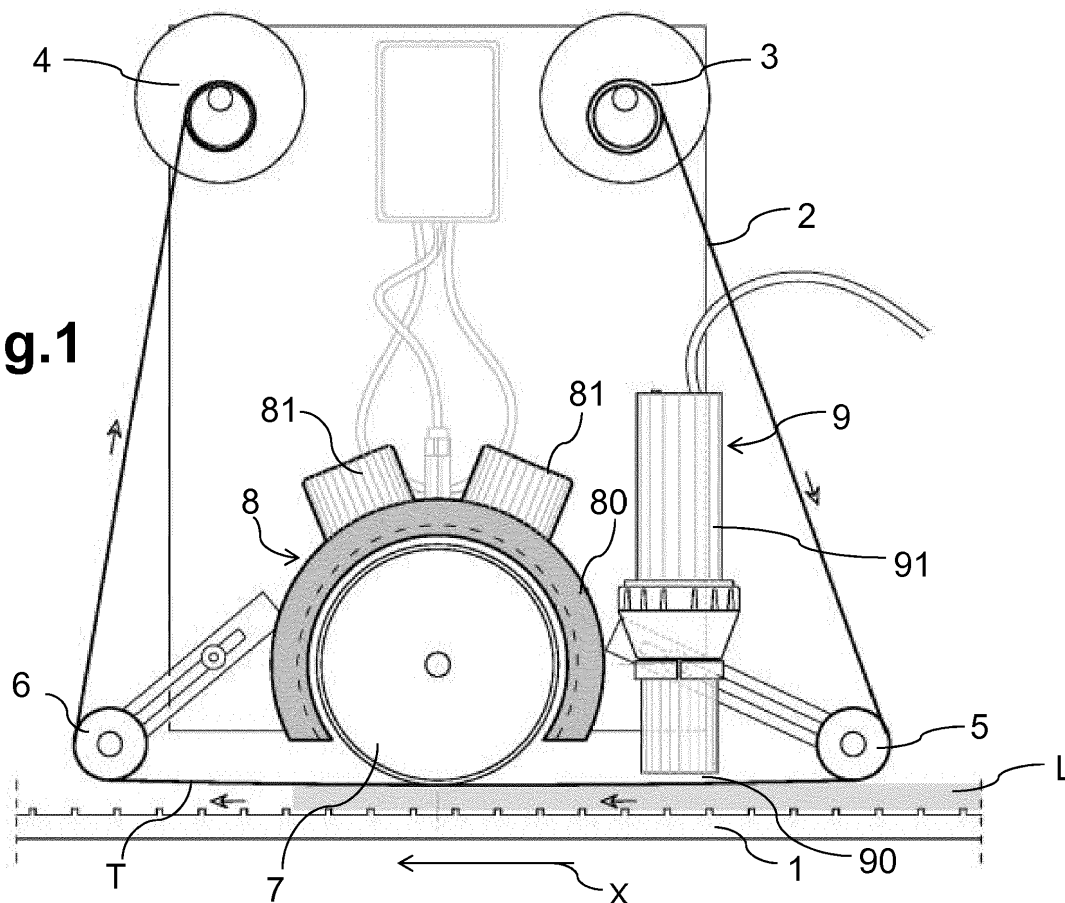
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(54) **Method for the continuous printing on a lath**

(57) The present invention in general refers to the field of printing on profiled members preferably like wooden laths for making frames or the like. More in particular

the present invention refers to a method for the continuous sublimation printing on such laths.

Fig.1



Description

[0001] The present invention refers to the field of printing on profiled surfaces preferably like wooden laths for making frames or the like. More in particular the present invention refers to a method for the continuous sublimation printing on such laths.

[0002] As known, sublimation is the direct passage of a material from the solid phase to the gas phase. Such a physical process is applied to the method of transferring colour to materials such as fabric, wood, plastic, etc. In greater detail, today it is frequent to use sublimation inks which are printed on a suitable paper support. Once they have been printed on such a support, the inks are transferred to the final product by applying hot pressure on the paper through pressers or printing presses; thanks to the heat, the inks are sublimed on the final product being permanently transferred on it.

[0003] The results of such a printing method are highly appreciated, for the quality of printing, as well as for the sharpness of the colours and for the definition of the image. Moreover, the printing thus obtained is particularly resistant.

[0004] Such a printing method however, cannot be used for certain applications. In particular, since presses are used, it is suitable for being used especially in products with low thickness and that are, in any case, substantially flat, like for example a T-shirt or fabrics in general. Moreover, the area of the press is limited, therefore particularly long pieces or, in any case, pieces having dimensions that are greater than the area of the printing press itself cannot be processed.

[0005] Considering for example wooden laths, such as those used in the production of frames (the term "wood" covering also similar products such as plywood, chipwood, compressed wood, etc.), such laths can have various geometry (they can be for example rounded or not perfectly smooth); these shapes are not suitable for the printing method described above. Again, they can be even several meters long (indeed they are produced in various sizes and are then cut to size according to the type of frame to be made), therefore they cannot be processed with a pressing system.

[0006] It is therefore an object of the present invention to provide a method for sublimation printing that is suitable for being also applied to products with irregular geometry or in any case with large dimensions, indeed like wooden laths.

[0007] A further object of the present invention is to provide a printing method that can also be applied to large scale mass production.

[0008] These objects are achieved with the method and the relative apparatus according to the present invention, the essential characteristics of which are defined in claim 1 and in claim 11, respectively. Further important characteristics are defined by the dependent claims.

[0009] The characteristics and the advantages of the method according to the present invention shall become

apparent from the following description of an embodiment thereof that is given as an example and not for limiting purposes with reference to the attached drawings, in which figure 1 is a front and schematic view, with parts that have been omitted for the sake of clarity, of an apparatus for the sublimation printing in continuous on wooden laths.

[0010] With reference to the above figure, an apparatus for the sublimation printing in continuous comprises a working or sliding plane 1, on which a lath L of wood (or other similar material) to be printed is made to slide in a continuous manner. The lath, during processing, moves according to a working direction X, defined as parallel to the working plane itself.

[0011] A film or strip 2 of a material suitable for supporting the sublimation ink to be impressed on the lath (like for example plasticised paper), is stretched between reel means, such as an unrolling reel 3 and a rolling up reel 4, which are arranged with an axis that is perpendicular to the working direction X. Between the two reels, in order to keep the strip suitably stretched, tending or deviation rolls are arranged, of which respectively a first roll 5 (immediately downstream of the unrolling reel) and a second roll 6 (upstream of the rolling up reel) that are arranged close to the working plane, also with an axis that is perpendicular with respect to the direction X. Between the two tending rolls therefore, the strip is placed in a configuration that is substantially straight and parallel with respect to the sliding plane 1, as well as near to it, so as to define a straight segment T.

[0012] The unrolling and rolling up reels 3, 4 are driven by external motor means, whereas the tending rolls are supported passively. Therefore, under the effect of the rotation of the two reels 3 and 4, the strip is moved in a clockwise direction (when seen as in the figure) and consequently the segment T can slide forward according to the direction X; the sliding of the segment T is carried out in a coordinate manner with respect to the movement of the lath and with the same speed, as discussed hereafter.

[0013] In greater detail, between the two tending rolls a pressing cylinder 7 is arranged that rests on the segment T so as to press it on the lath L.

[0014] The cylinder 7, preferably made of synthetic material, such as silicone, is associated with heating means 8 that are in the form of a sleeve 80, which is circumferentially arranged in the close vicinity of the cylinder 7 and is coaxial with respect thereto. The sleeve is provided with electric resistances 81 that heat the sleeve 80 and as result keep the cylinder 7 at a desired temperature suitable for transferring the ink onto the lath.

[0015] Thanks to the hot pressing action of the cylinder, the sublimation of the ink is obtained and it is consequently transferred to the lath.

[0016] Upstream of the cylinder 7 and downstream of the first tending roll 5 there are arranged pre-heating means 9 that affect the straight segment T; such pre-heating means 9 have the task of heating the segment

before it enters into contact with the cylinder so as to bring the ink to a temperature near to that of sublimation preliminary to the actual step of transferring the ink which is obtained, in fact, by the cylinder itself.

[0017] Such pre-heating means comprise at least one jet of hot air 90 that is emitted by a blowing device such as a blow dryer 91. The jet of hot air has a maximum temperature of 600°; preferably the working temperature used for having optimal printing quality is of 400°. The temperature of the cylinder on the other hand is comprised between 200° and 300° degrees and preferably the optimal working temperature is of around 270°.

[0018] With such conditions, it has been verified that the optimal sliding velocity of the lath, in order to obtain high quality printing is comprised between 1 and 1.50 m/min. Preferably, the sliding velocity of the lath is of 1.3 m/min.

[0019] Downstream of the cylinder 7 and upstream of the second tending roll 6, cooling means can be provided, which have the task of cooling the already printed segment of lath so as to promote the adhesion of ink.

[0020] With such working conditions, it has been verified that the amount of ink that is released on the lath reaches even 90% of that impressed on the film. Therefore, the printing method according to the invention is extremely effective; in particular, the image is clear and the colours are bright and well defined and an image with high resolution is obtained.

[0021] Moreover, a result is obtained that is extremely appreciated in terms of appearance like the so-called "ceramic effect".

[0022] The printing method according to the invention is then suitable for productions in series, since it achieves a continuous printing of laths even having great length.

[0023] The several parts of the apparatus, and in particular the cylinder, will have dimensions that are based upon the type of lath to be processed, and the width thereof. Even the strip and the length of the reel are determined based upon the dimensions of the lath.

[0024] Furthermore, what has been described above and shown in the drawing can also be taken as a modular element of a more complex apparatus, sized for laths that have even greater dimensions or for printing portions of laths in series. In machines that provide a plurality in series of such modular elements, it is possible to obtain more complicated prints; each modular element can indeed be equipped with a film that is loaded with different colour ink, or even showing different images, so as to provide segments with different prints on many laths in series or on different segments of a same lath.

[0025] Although in the figure only one blow dryer has been represented, solutions can also be foreseen having a greater number of pre-heating elements. Moreover, although the blow dryer is the preferred solution, it can also be provided for there to be different solutions, for example a nozzle with hot air that is produced externally with respect to the apparatus and generated from outside.

[0026] There can also be a system for automatically

controlling the apparatus, which manages both the sliding velocity of the lath and the temperature of the hot air jet and of the cylinder. It can also be provided for there to be systems in which the reel is supplied automatically, upon selection of the pattern by a user.

[0027] In the figure, electrical cables are moreover visible (shown with a thin line) for supplying the resistances and the blow dryer with the required power. Such components, being per se obvious for a man skilled in the art, has not been described in detail.

[0028] Finally, as mentioned above the lath can be made of wood or similar such as plywood, wood-chips compressed wood etc. Possibly, the lath can also be made of a plastic material. The lath can have a rough surface or a surface varnished with an epoxy and/or catalysed varnish. Concerning this last point, preliminary to the printing step it can also be provided for there to be a step for applying a preparatory layer of varnish on the lath.

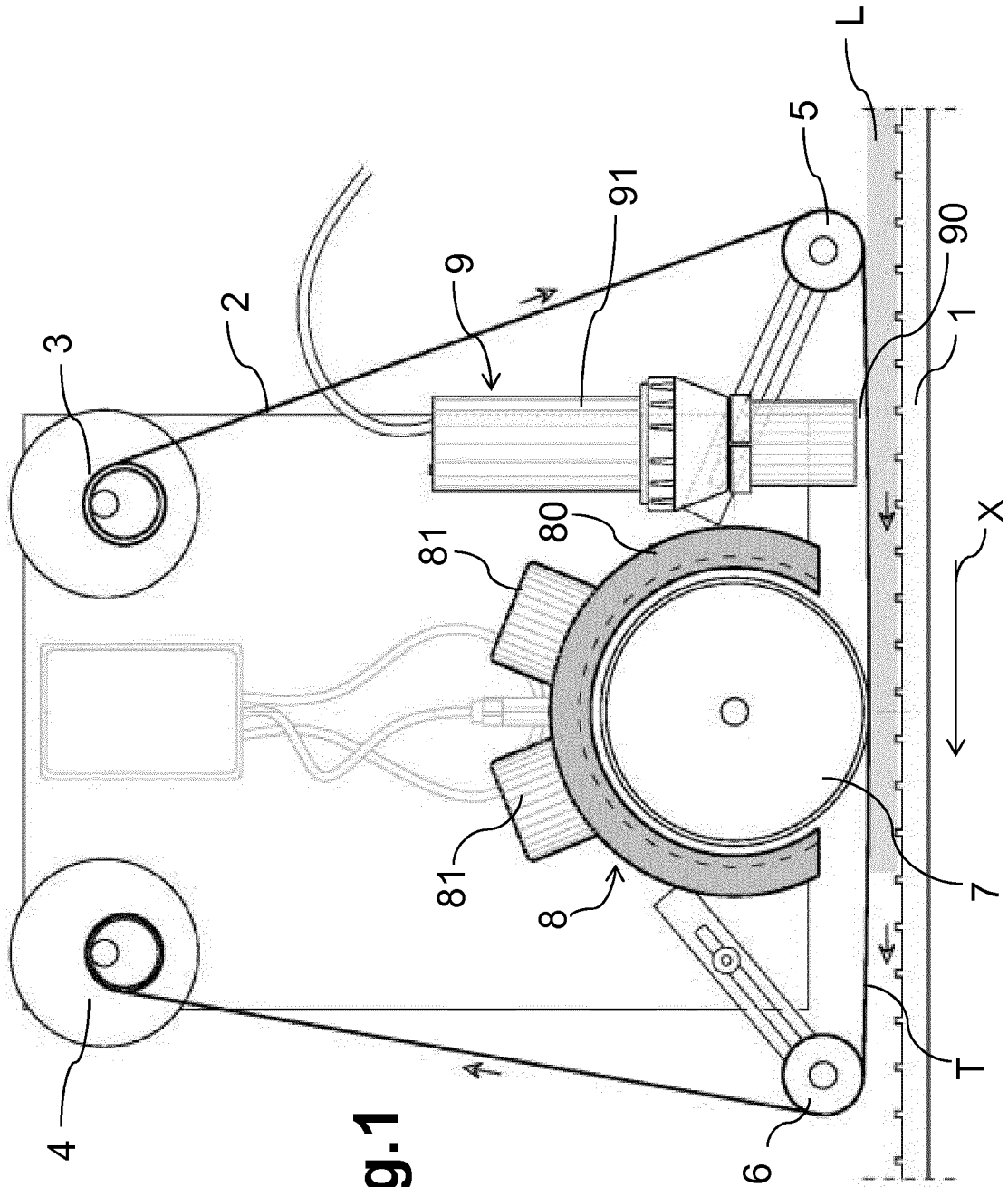
[0029] The present invention has been so far described with reference to preferred embodiments. It should be understood that there can be other embodiments falling within the same inventive concept, as defined by the scope of protection of the following claims.

Claims

1. A method for the continuous sublimation printing on a lath (L) comprising the steps of:
 - providing at least one segment (T) of a film (2) charged with sublimation ink adapted to be printed on said lath;
 - sliding said lath in a continuous manner on a sliding plane (1) according to a working direction (X);
 - sliding said segment (T) in a coordinate manner with said lath according to said working direction;
 - providing a hot pressing of said segment (T) on said lath (L) during said coordinate sliding so as to make said segment overlap to said film;
 - preliminary to said hot pressing step, providing a pre-heating of said segment (T) at a working temperature higher than the working temperature of the hot pressing step.
2. The method according to claim 1, wherein said the working temperature of said pre-heating step is comprised between 400° and 600°.
3. The method according to claim 2, wherein the working temperature of said hot pressing is comprised between 200° and 300°.
4. The method according to any of the previous claims, wherein the sliding velocity of said lath during said

hot pressing step and said pre-heating step is comprised between 1 and 1.5 m/min.

5. The method according to claim 3 or 4, wherein said hot pressing step is realised by a cylinder (7) that rests on said lath during said sliding on said working direction (X), heating means (8) being associated to said cylinder to keep said cylinder at said working temperature.
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6. The method according to claim 5, wherein said heating means comprise a sleeve (80) circumferentially arranged with respect to said cylinder and coaxial with it, electric resistance (81) being associated to said sleeve to heat said cylinder, as result said cylinder (7) is kept at the working temperature.
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7. The method according claim 5 or 6, wherein pre-heating means (9) are disposed in a upstream position with respect to said cylinder, said pre-heating means comprising a hot air flow (90) that affects said segment (T) to realised said pre-heating step, said hot air flow being at said working temperature.
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8. An apparatus for the sublimatic printing of a lath according the method of any of the claims from 5 to 7, further comprising reel means as a unrolling reel (3) and a rolling up reel (4) of said film (2), at least two tending rolls (5, 6) being disposed between said reels, said rolls being aligned reciprocally and with respect to said sliding plane (1), at least a straight segment (T) of said film (2) being defined between said rolls.
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9. An apparatus according to claim 8, wherein said cylinder is arranged between said notch (5, 6), said pre-heating means (9) being disposed in a upstream position with respect to said cylinder (7) and in a downstream position with respect to the roll (5) that follows said unrolling reel (3).
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10. An apparatus according to claim 9, wherein said pre-heating means (9) comprise a blowing device (91).
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EUROPEAN SEARCH REPORT

Application Number
EP 14 18 4317

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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	WO 2006/053730 A1 (LASA IMPIANTI S R L [IT]; BORTOLATO GIOVANNI [IT]) 26 May 2006 (2006-05-26) * page 1, line 1 - line 4 * * page 2, line 10 - page 3, line 12 * * claim 1; figure 1 *	1-10	INV. B41M5/035
A	US 2009/246466 A1 (MACEDO JOSEPH [US]) 1 October 2009 (2009-10-01) * paragraph [0002] * * paragraph [0051] - paragraph [0052] * * claim 1; figure 1 *	1-10	
			TECHNICAL FIELDS SEARCHED (IPC)
			B41M B44C
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 18 September 2014	Examiner Bacon, Alan
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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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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