



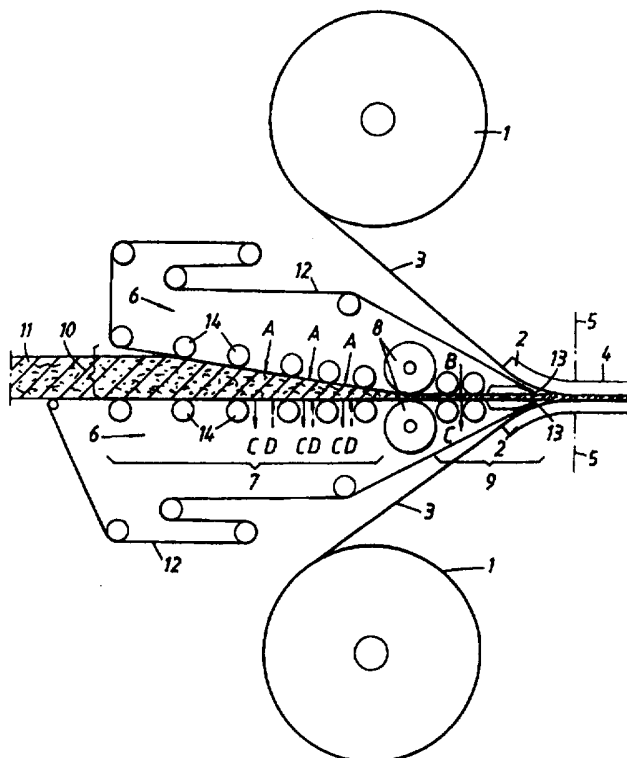
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(21) International Application Number: PCT/SE97/00386 (22) International Filing Date: 6 March 1997 (06.03.97) (30) Priority Data: 9600901-4 7 March 1996 (07.03.96) SE (71) Applicant (for all designated States except US): SUNDS DEFIBRATOR INDUSTRIES AB [SE/SE]; S-851 94 Sundsvall (SE). (72) Inventor; and (75) Inventor/Applicant (for US only): THORBJÖRNSSON, Sven-Ingvar [SE/SE]; Herr Arnes väg 3, S-653 46 Karlstad (SE). (74) Agent: STOLT, Lars; L.A. Groth & Co.KB, P.O. Box 6107, S-102 32 Stockholm (SE).		(81) Designated States: AU, BG, BR, CA, CN, CZ, EE, HU, JP, KP, KR, LT, LV, MX, NO, NZ, PL, RO, RU, SG, SI, SK, TR, UA, US, VN, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report.</i>

(54) Title: A METHOD OF PRE-PRESSING FIBRE MATERIAL IN THE MANUFACTURE OF BOARD PRODUCTS

(57) Abstract

In a method of pre-pressing a formed web of finely-divided lignocellulosic fibre material prior to pressing the web to a finished state in the continuous manufacture of board material, the fibre material is compacted and pressed successively in an entry section (7) of a pre-press (6) subsequent to being formed into a web (11) and subsequent to a first compression and expansion. The web is compressed in this latter pressing process to a density close to the density of the web after the first compression, whereafter the web is allowed to expand to a controlled limited extent in a pre-press expansion section (9), and thereafter transferred to the finishing press. Steam (A, B) is injected into the web (9) when the web is located in the pre-press (6).



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**A METHOD OF PRE-PRESSING FIBRE MATERIAL IN THE
MANUFACTURE OF BOARD PRODUCTS**

The present invention relates to a method according to the
5 preamble of Claim 1 for pre-pressing a formed web of finely-
divided lignocellulosic fibre material prior to finish-pressing
the web in the continuous manufacture of board products.

In the manufacture of different types of board products, there is
10 formed a web or mat which is pre-pressed prior to being passed
into the heat press, in which the web or mat is pressed under a
controlled surface pressure and/or controlled thickness at a
temperature of 150-230°C, while using glue. In order to obtain
requisite board properties, there is required a continuous press
15 which is flexible and with which a high surface pressure, among
other things, can be applied at an early stage in the press.
Thus, the thickness of the web or mat shall lie very close to the
final press thickness already at this early stage of the process,
i.e. the mat thickness must be very greatly reduced in the press
20 entry section.

With the intention of avoiding excessive pre-hardening of the
surface layers without risk of surface bulging or cracking in the
material, due to enclosed air being rapidly pressed out, it has
25 been proposed in SE 502 202 that subsequent to forming the fibre
material into a web with subsequent first compression and
expansion of the web, the web is successively re-compressed in an
entry section of a pre-press to a density close to the density of
the web after the first compression, and that the web is then
30 transferred to the finishing press while controlling limited
expansion of the web in a pre-press expansion section.

The object of the present invention is to further improve this
method, so as to enable the use of a shorter and less expensive

hot press and to reduce the power requirement of said press. This object is achieved with the inventive method having the characteristic features set forth in the following Claims.

- 5 The invention will now be described in more detail with reference to the accompanying drawing which is a schematic side view of apparatus for applying the inventive method.

10 Shown on the drawing, is the entry section of a continuous hot press which typically includes front deflecting rollers 1 and hot plates 2. These hot plates 2 have an inlet radius in the same order of magnitude as the radius of the deflecting rollers 1, said plates merging with a generally rectilinear, parallel section 4. A steel band tensioned over deflecting and driving
15 rollers slides or rolls on the hot plates 2. The transition between the entry radius and the parallel section 4 is marked with the centre line 5, i.e. the line between the centres of curvature of the press entry section.

- 20 A pre-press 6 is mounted in this entry section. The pre-press is comprised of three main parts: a convergent entrance and compression part 7, one or more pairs of roll nips 8, and a slightly divergent expansion section 9. The entry opening 10 of the entry section can be adjusted in a convenient manner, either automati-
25 cally or manually, so as to be adapted to the height or thickness of the incoming fibre mat 11. This, together with an entry section of suitable length, enables air to be pressed from the mat 11 in a gentle manner without risk of damage. The upper, vertically movable nip roll 8 is suitably loaded in a manner
30 compress or compact the mat 11 to the extent desired. In this regard, the mat is preferably compressed to a density close to and preferably immediately beneath the density that was achieved in the previous compression process after forming. Such recompression requires a relatively moderate load. The load is

conveniently applied with the aid of pneumatic or hydraulic piston-cylinder devices or the like. The end of the entry section 7 closest to the upper nip roll 8 is suitably connected mechanically to the nip roll so as to follow the vertical movements of said roll.

The mat is allowed to expand slightly, eg to an extent corresponding to 5-15%, in the downstream divergent expansion section 9, this force reducing the force required to keep the mat compressed. This enables this section to be given moderate dimensions. The ends of the expansion section 9 nearest the nip rolls 8 are also suitably coupled mechanically to their respective nip rolls.

The mat 11 is transported through the pre-press between two endless belts 12, which may be solid, air-permeable or in the form of wires. The bands are supported in the entry section 7 on rollers 14 and/or slide surfaces. The belts are deflected at the outlet end of the expansion section 9 around a slide nose or on rollers. The belts 12 are driven and guided in a known manner. If considered appropriate in view of the forces acting on the belts in the entry section 7 and the nip rolls 8, a stronger, inner belt may be used.

Hitherto, the pre-press 6 has operated in the absence of heating and this method has therefore been designated "cold entry". However, according to the present invention, the mat is heated, preferably to about 60-80°C, with the aid of steam. The mat is heated by blowing steam into the entry section 7, as indicated by arrows A, and/or into the expansion section 9, indicated by arrow B. It is also feasible to blow-in a mixture of air and steam. This also enables the moisture content of the web or mat to be regulated and restricted.

According to a first alternative, a regulated flow of steam is blown, or injected, solely into one location in the pre-press and drawn from the web on the underside of the press, as indicated by arrows C. This can be achieved with the aid of a short steam box on the upper side of the press web and a suction box on the underside thereof. Such boxes need only have a length of about 50 centimeters. Steam rollers may be used as an alternative to steam boxes, for instance, wherein the support rollers 14 may also function as steam rollers. When injecting a mixture of air and steam, the volume of the air/steam mixture drawn from the press web is adapted so as to control the pressure in the web.

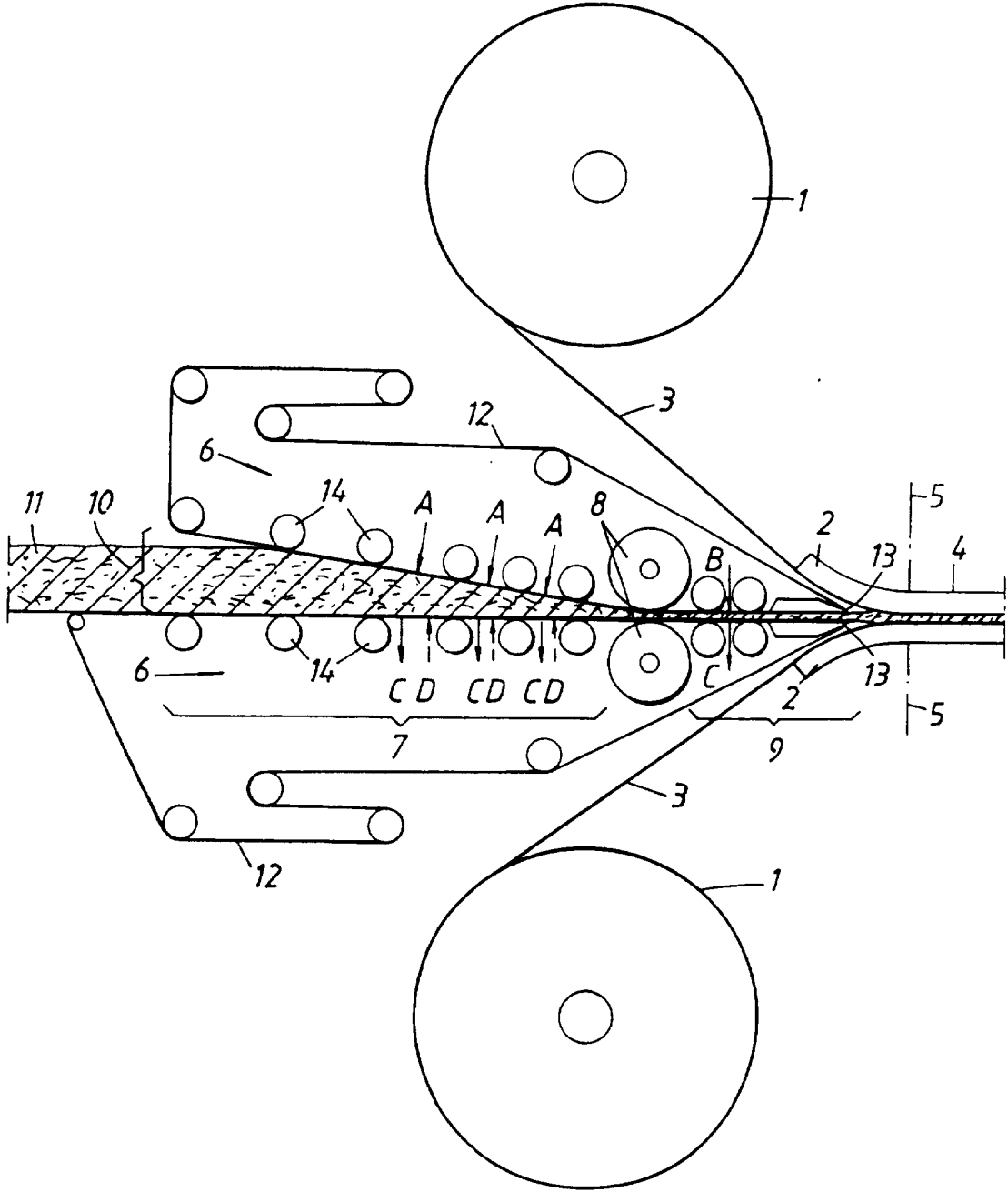
The advantages afforded by this steam injection reside firstly in a much shorter press time in the downstream hot press, because the fibre mat has already been heated through to a temperature of 80°C, and because the heating balance required to heat the mat to about 110°C only requires a fraction of the normal power. This enables the hot press to be made much shorter and thus much more cheaply, and the capacity of an existing longer hot press is greatly improved. Secondly, the mat is compressed more easily as a result of heating the mat and as a result of the slightly higher moisture quotient, therewith reducing the power requirement in the following hot press. Thirdly, the resiliency of the mat in the transition between the pre-press and the entry to the hot press decreases. Fourthly, the density profile can be configured, by virtue of the fact that a stronger press force can be applied directly in the hot press.

According to a second alternative, steam or air/steam is injected into both the entry sections 7 and the expansion section 9, thus in accordance with the arrows A and B. In this case, steam is suitably injected into the entry section from both directions, thus also in accordance with the broken arrows D. The steam flow is adapted so that only the surface layers of the web or mat are

- moistened and heated. This results in heavy compression of the surface layers in the nip. When desiring a much shorter press time, the centre layer may be heated in the expansion section. In this regard, it may be unnecessary to inject steam into the expansion section 9, since the moist surface layer has a steam rejecting effect in the hot-pressing process, therewith shortening the press time. The compressed surface layer also facilitates achievement of the desired density profile.
- 10 In the earlier known "cold entry", expansion of the fibre mat is restricted and the risk of blow-out in the hot press entry is avoided and pre-hardening thereby reduced. The injection of steam carried out in accordance with the invention also reduces the requisite press force in the pre-press 6 and greatly reduces
15 resiliency in the expansion section. The mat is also heated, which enables a shorter hot press to be used.

CLAIMS

1. A method of pre-pressing a formed web of finely-divided lignocellulosic fibre material prior to finish-pressing the web in the continuous manufacture of board material, wherein subsequent to forming the fibre material into a web (11) with subsequent first compression and expansion, the fibre material is successively re-compressed and pressed in an entry section (7) of a pre-press (6) to a density close to the density of the web after the first compression, and wherein the web is then subjected to a controlled, limited expansion in an expansion section (9) of the pre-press (6) and then transferred to the finishing press, **characterized** by injecting steam (A, B) into the web (11) when said web is located in the pre-press.
2. A method according to Claim 1, **characterized** by injecting steam (A, B) onto the upper side of the web (11) at one location in the pre-press and withdrawing said steam by suction (C) on the underside of the web (11).
3. A method according to Claim 1, **characterized** by injecting steam (A, B) into the entry section (7) of the pre-press from both the upper side and the underside of the web (11).
4. A method according to Claim 3, **characterized** by also injecting steam (B) into the pre-press expansion section (9).
5. A method according to any one of Claims 1-4, **characterized** by injecting air together with said steam.



INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 97/00386

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: B27N 3/18, B27N 3/24

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: B27N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 9426488 A1 (SUNDS DEFIBRATOR INDUSTRIES AB), 24 November 1994 (24.11.94) -----	1

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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