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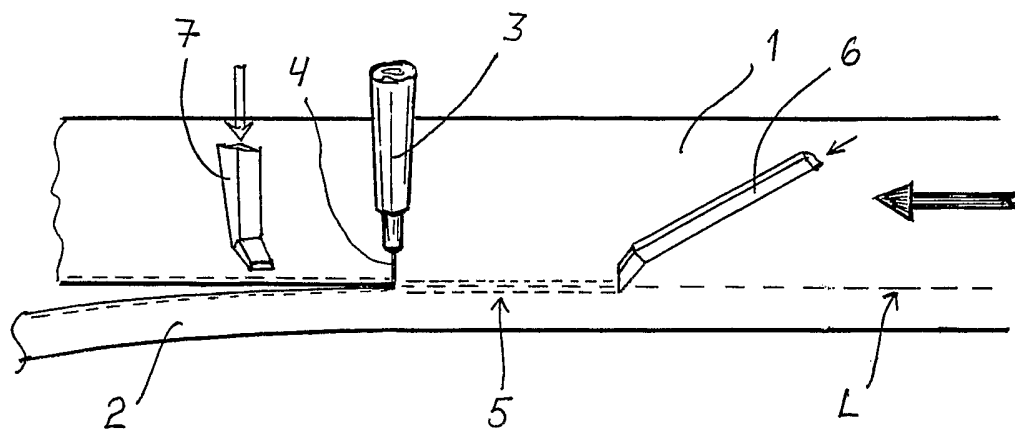
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For two-letter codes and other abbreviations, refer to the "Guid-
ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.

(54) Title: METHOD FOR CUTTING OF PAPER WEB



(57) Abstract: A method for cutting of a paper web (1) by means of an abrasive water jet (4), in which method the effectiveness of water cutting is improved, absorption of cutting water into paper (1) reduced and removal of water splash and fog from the intersection. Improved. In the method on the paper web surface, at least to intended cutting line (L), substance that changes the quality of the paper surface is sprayed, which substance remains on said surface.

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METHOD FOR CUTTING OF PAPER WEB

The invention relates to a method of cutting a paper web by means of an abrasive water jet, in which method the efficiency of the water cutting jet is improved, absorption of water into the paper is reduced and removal of water splash and water fog from the intersection is improved

Generally paper has been cut by means of a high pressure jet. In these cuttings the disadvantage has been absorption of cutting water into the edges of cut webs and further from there some millimetres sideways in the web. When the web after cutting has been rolled to a paper roll the moist edges of the roll have stuck together. After cutting it has been tried to remove the moist off the edge by means of blasting and heating. Due to the very short time available between cutting and rolling it has not been possible to remove from the web edge the moisture that has got into the paper. Nor have it been possible to find a solution, by means of which absorption of water into the web could be avoided.

By means of the method according to the invention the presented problem is solved and the intention of the new method is to prevent water from absorbing into the cutting edge of the web and to ease removal of splash from the web surface. The method according to the invention is characterized in that on the paper web surface, at least to the intended cutting line, substance is sprayed that changes the quality of the paper surface, and which stays on said surface.

The other embodiments according to the invention are characterized in what is presented in the independent claims.

The advantage of the invention is that at the intersection the web surface can be made water-repellent or otherwise such a surface, where the cutting jet makes a sharp cut without removing hardly any useless material, which as splash would spread on the web surface. Also the splash itself becomes less according to the solution of the invention. When both web surfaces at the intersection, and a little outside, is treated in a way as per the invention, in the cutting edges of the web only a very low portion remains, from

which the water can absorb into the web fibres. This dampness on the web portion does not anymore have effect in rolling situation, since the treated line on the surface of the web edges gets always in contact with the corresponding line from the former cycle,
5 which by rolling does not cause the edges to stick together.

In the following the method according to the invention is disclosed with reference to the enclosed drawing, 1 which shows the moving web and the water jet cutting device and implementation of the method according to the invention.

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In figure 1 the paper moves from the right to the left and by means of jet 4 caused by water jet cutting device 3 and edge line 2 is cut off web 1. On line L the intended cutting line is illustrated before cutting jet 4. The web to be cut is usually broad, several metres and stable sideways. Thus cutting line L is accurately calculable already several
15 metres before cutting device 3.

In the method according to the invention from the surface such a line 5 is treated, for which cutting takes place in cutting situation. Also a line on the web underside in the corresponding spot can be treated in the same way. As width for line 5 about 3-6 mm is
20 chosen and the aim of cutting is to hit almost the middle of the line. The length of line 5 from the front side of the cutting spot is chosen so that the substance sprayed on line 5 can achieve the intended properties before it is at cutting device 3. Figure 1 shows a device 6, by means of which the substance according to the invention is sprayed on line L of the web surface and a little on its both sides forming line 5. Device 6 is a nozzle or
25 it can also be an atomizer, a wiper, a drag, a rotating feed roll etc.

The substance itself that is sprayed on line 5 is of such kind, which on the web surface forms a water repellent surface, whereby water drops onto the surface. Such substances are, among others, substances containing oil, paraffin, silicones, latex, polymers, as
30 PVA, butadiene styrene or fluoric polymers and UV-hardened polymers. These materials are sprayed as fluid to the web surface. The substances can be two-component substances, whereby the components react quickly before cutting device 3. Both components can be fluid. The other component can also be air or special gas which can be sprayed on the line. So that the substance to be sprayed on line 5 would on the web

surface achieve quickly enough the properties wanted, line 5 can, for instance, by means of special devices heated, cooled, protected by means of a gas screen, be sprayed with reactive gas, UV- radiated or given other radiation. These because the substance sprayed on line 5 would quickly form a wanted coat or in some other way change the surface quality on line 5.

The coat formed on line 5 must not necessarily be water repellent, it can also be waterproof, whereby it carries the water drops, splash etc. and prevent water from absorbing into the paper fibres. The waterproof coat or surface can be achieved mainly using substances of same substance groups presented above in order to form a water repellent surface.

When line 5 is coated or treated according to the invention it is possible after cutting to blow water and water splash from the surface by means of an air jet. Figure 1 shows for this purpose a blowing device⁷, the blowing nozzle part of which is directed to blow water off the web against the edge.

In addition to web treating the outcome of water jet cutting can be improved adding to the cutting liquid, usually to water, some emulsion-additive, as polymer. This causes growth of the water surface tension and also increases the specific weight. Because of said additive absorption of substance into the fibres reduces, as reduces also the splash. The cutting effect also grows and the nozzle and even water consumption can be made smaller.

The method according to the invention is suited for paper web cutting in any place of the web, since the blast after cutting can be done together with the collecting unit, which sucks blasted waters, splash and blast air.

CLAIMS

1. A method for cutting of a paper web (1) by means of an abrasive water jet (4), in which method the effectiveness of water cutting is improved, absorption of cutting water into paper (1) reduced and removal of water splash and water fog from the intersection is improved, characterized in that in the method on the paper web surface, at least to intended cutting line (L), substance that changes the quality of the paper surface is sprayed, which substance remains on said surface.
2. A method according to claim 1, characterized in that on the surface substance is sprayed, which to its properties is water repellent.
3. A method according to claim 1, characterized in that on the surface substance is sprayed that forms a layer meant to be water impermeable.
4. A method according to claim 1, characterized in that on the surface substance is sprayed that causes dripping of the water on the surface.
5. A method according to claim 1, characterized in that after cutting splash/drops are blasted off intersection (L).
6. A method according to claim 1, characterized in that the substance to be sprayed on the surface is to be steered to line (L) and next to it so far before cutting jet (4) so that it has been able to achieve the properties wanted on arriving at cutting jet (4), either by means of the effects of equipment activating different reactions or by means of the effects of the substances.
7. A method according to claim 1, characterized in that water cutting is carried out with liquid mixed with fixative in order to emulate water with the aim to reduce the formation of water splash and fog.
8. A method according to claim 1, characterized in that substance improving the surface quality is sprayed to the upper and the lower part of the web.

AMENDED CLAIMS**Received by the International Bureau on 01 March 2006 (01.03.2006)**

- 5 1. A method for cutting of a paper web (1) by means of an abrasive water jet (4), in which method the effectiveness of water cutting is improved, absorption of cutting water into paper (1) reduced and removal of water splash and water fog from the intersection is improved, c h a r a c t e r i z e d in that in the method on the paper web surface, at least to intended cutting line (L) before the water jet nozzle (4), substance that changes
10 the quality of the paper surface is sprayed, which substance remains on said surface.
2. A method according to claim 1, c h a r a c t e r i z e d in that on the surface substance is sprayed, which to its properties is water repellent.
- 15 3. A method according to claim 1, c h a r a c t e r i z e d in that on the surface substance is sprayed that forms a layer meant to be water impermeable.
4. A method according to claim 1, c h a r a c t e r i z e d in that on the surface substance is sprayed that causes dripping of the water on the surface.
- 20 5. A method according to claim 1, c h a r a c t e r i z e d in that after cutting splash/drops are blasted off intersection (L).
6. A method according to claim 1, c h a r a c t e r i z e d in that the substance to be
25 sprayed on the surface is to be steered to line (L) and next to it so far before cutting jet (4) so that it has been able to achieve the properties wanted on arriving at cutting jet (4), either by means of the effects of equipment activating different reactions or by means of the effects of the substances.
- 30 7. A method according to claim 1, c h a r a c t e r i z e d in that water cutting is carried out with liquid mixed with fixative in order to emulate water with the aim to reduce the formation of water splash and fog.
8. A method according to claim 1, c h a r a c t e r i z e d in that substance improving the
35 surface quality is sprayed to the upper and the lower part of the web.

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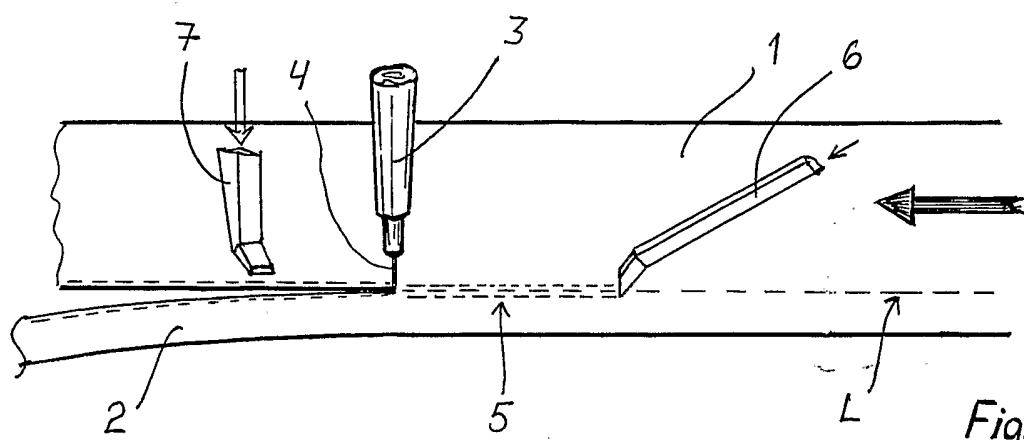


Fig. 1

INTERNATIONAL SEARCH REPORT

International application No.

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A. CLASSIFICATION OF SUBJECT MATTER

IPC7: B26F 1/26, B26F 3/00, D21F 7/00

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)

IPC7: B26F, B26D, D21F

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)

EPO-INTERNAL, WPI DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3532014 A (NORMAN C. FRANZ), 6 October 1970 (06.10.1970), column 1, line 71 - column 2, line 19, figure 1 --	1-8
X	US 6103049 A (BATDORF), 15 August 2000 (15.08.2000), column 1, line 44 - column 2, line 21, figure 1 --	1-8
A	EP 0870583 A2 (CASPAR, ROMAN C.), 14 October 1998 (14.10.1998), figure 2, abstract -- -----	1-8

 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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