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(54) A system and a method for fixation a web printable substrate on a central impression cylinder of a printing machine and printing machine incorporating such system

(57) The system comprises an electrostatic charge unit (C) for applying a controlled electrostatic charge on a surface which whether belongs to the web printable substrate (B) or forms part of a surface of the central impression cylinder (1) supporting said web printable substrate (B) of an offset printing machine.

The printing machine comprises the system of the first aspect.

The method comprises applying a controlled electrostatic charge on a surface of the web printable substrate (B) and/or of the central impression cylinder (1) for fixation the web printable substrate (B) thereon.

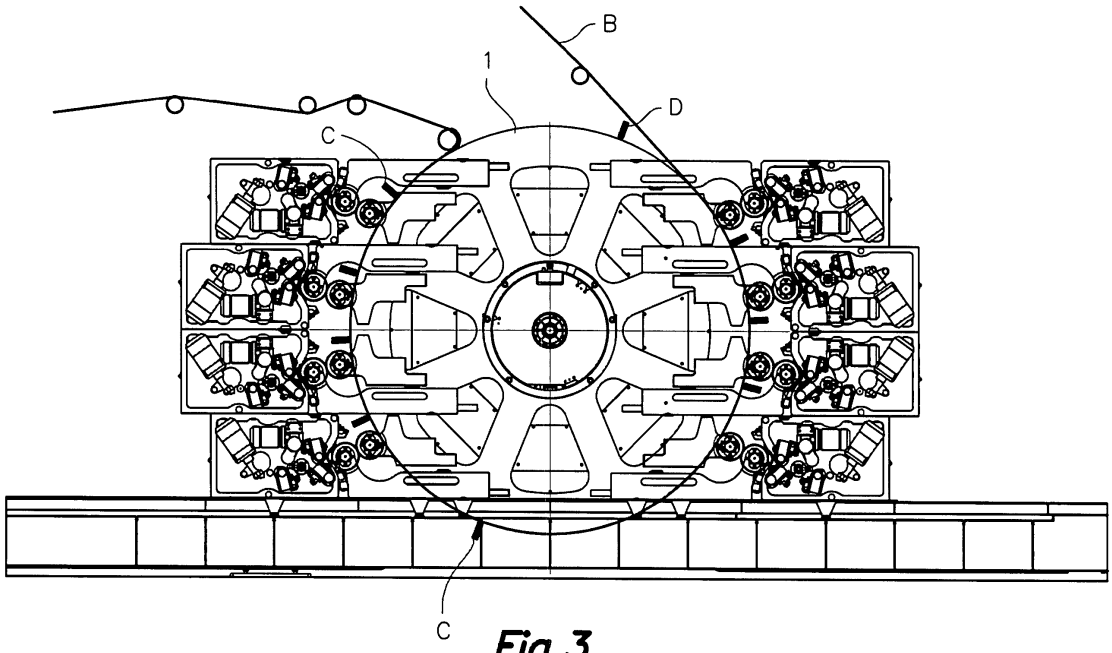

Fig.3

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Description

Field of the invention

[0001] The present invention generally relates, in a first aspect, to a system for fixation a web printable substrate on a central impression cylinder (CI cylinder) of a printing machine, and more particularly to a system which comprises electrostatic charging means for performing said fixation.

[0002] A second aspect of the invention comprises a printing machine with a central impression cylinder comprising the system of the first aspect.

[0003] A third aspect of the invention relates to a method for fixation a web printable substrate on a central impression cylinder of a printing machine, by applying a controlled electrostatic charge on a surface of the web printable substrate and/or of the central impression cylinder.

Previous state of the art

[0004] EP 1034078 discusses an electrostatic arrangement for rotogravure and flexographic printing that uses HV electrode fitted to outside of impression cylinder or printing form cylinder at one end intended for polarising printing ink droplets to provide improved printing quality.

[0005] A similar proposal can be found in EP 115611 that discloses an electrostatically-assisted, rotogravure printer using HV inductor at end of pressure roller.

[0006] In both cases electrostatic charge obtained from an electrostatic field is used to increasing the flow and incorporation of the ink into the material to be printed.

[0007] The present invention provides provides a different application of electrostatic charge in a printing press with a CI cylinder which will be explained below.

Description of the invention

[0008] It is necessary to provide an alternative to the state of the art which covers the gaps found therein, providing an enhanced manner of fixation the web printing substrate to the central impression cylinder.

[0009] The system provides a solution for the printing of thin and/or elastic web shaped film materials on a central impression cylinder type press in order to avoid web lifting that can occur due to the fact that:

- Relative lineal or surface speed between printing cylinders non equal to 0, due to the deformation of the cylinders because of the pressure and different lineal or surface speed between printing cylinders (blanket in offset or plate cylinder in flexography) and CI cylinder. (whatever it is offset or flexography).
- Using inks of high viscosity or tack (the maximum tensile stress (or negative pressure) that the ink can withstand in the nip exit before split). - In fact tack is the property that really counts. Tack may be described as the ability of the ink to act as an adhesive. It is by definition the force required to split an ink film between two rollers.

[0010] To that end, the present invention provides, in a first aspect, a system for fixation a web printable substrate on a central impression cylinder of a printing machine, said printing machine comprising said central impression cylinder on which said web printable substrate is supported and a plurality of printing stations arranged around the central impression cylinder and comprising respective printing elements.

[0011] On contrary to known systems, the system of the invention comprises, in a characteristic manner, at least one electrostatic charge unit for applying a controlled electrostatic charge on a surface which whether belongs to the web printable substrate or forms part of a surface of the central impression cylinder supporting said web printable substrate.

[0012] Other embodiments of the system of the first aspect of the invention are described according in a subsequent section regarding the detailed description of several embodiments.

[0013] A second aspect of the invention comprises a printing machine with a central impression cylinder, in particular an offset printing machine with a central impression cylinder as the one disclosed in the patent application EP 10014329 comprising the referred system.

[0014] A third aspect of the invention relates to a method for fixation a web printable substrate on a central impression cylinder of an offset printing machine, where said printing machine comprises said central impression cylinder on which said web printable substrate is supported and a plurality of printing stations arranged around the central impression cylinder and comprising respective printing elements.

[0015] On contrary to known methods, the method of the invention comprises performing said fixation by applying a controlled electrostatic charge on a non-conducting surface (using well known means) which whether belongs to the web printable substrate or forms part of a surface of the central impression cylinder supporting said web printable substrate.

[0016] Other embodiments of the method of the third aspect of the invention are described in a subsequent section regarding the detailed description of several embodiments.

Brief description of the drawing

[0017] The previous and other advantages and features will be more fully understood from the following detailed description of embodiments, with reference to the attached drawing which must be considered in an illustrative and non-limiting manner, in which:

Figure 1 shows an offset printing machine with a central impression cylinder as the one disclosed in the

patent application EP 10014329 incorporating the system for fixation a web printable substrate on a central impression cylinder.

Figures 2 and 3 are two alternative embodiments where only the means for applying electrostatic charge have been modified.

Detailed description of several embodiments

[0018] As shown in Figure 1, the system of the invention is applied to a printing machine which comprises a central impression cylinder 1 on which a web printable substrate B is supported and a plurality of offset printing stations P1-P4 arranged around the central impression cylinder 1 and comprising respective printing elements, including at least blankets, although for some embodiments, not illustrated, it also includes one or more flexographic plates and/or a continuous sleeve for offset printing or flexographic printing.

[0019] The system comprises, for the illustrated embodiment, one electrostatic charge unit C placed at an entry zone E of the central impression cylinder 1, for the web printable substrate B, and configured for transferring a controlled electrostatic charge to a region of the web printable substrate B at said entry zone E before it contacts the external surface of central impression cylinder 1.

[0020] The electrostatic charge unit (C) comprises or is associated to at least one electrostatic charge generator (not illustrated) placed near the web printing substrate (B) wherein said charge generator is configured for generating up to 50 KV.

[0021] For another embodiment the electrostatic charge unit C applies a controlled electrostatic charge on a non-conducting surface of the central impression cylinder 1 supporting said web printable substrate B, alternatively or in addition to the electrostatic charge application on the web printable substrate B.

[0022] The system of the invention further comprises an electrostatically discharge unit D for discharging said non-conducting surface once charged, which, for the illustrated embodiment, is placed at an exit zone S of the central impression cylinder 1, for the web printable substrate B, and configured for discharging an already charged region of the web printable substrate B at said exit zone S after it stops contacting the external surface of the central impression cylinder 1.

[0023] For other embodiments, illustrated in Figures 2 and 3 the system comprises several electrostatic charge units configured for transferring electrostatic charges to the web printable substrate B on more than one zone along its development over the external surface of the central impression cylinder 1 which supports it.

[0024] For an embodiment, the central impression cylinder 1 is coated with a material (not shown) which electrically isolates it from the web printable substrate B making difficult the electrical surface charge dissipation and then avoiding losses of electrical charge.

[0025] For another embodiment, both the central impression cylinder 1 and the web printable substrate B are electrically isolating, the electrostatic charge unit C being configured for applying electrostatic charges on both, the central impression cylinder 1 and the web printable substrate B.

[0026] The system of the invention comprises control means for controlling the operation the electrostatic charge unit C and of the electrostatic discharge unit D, which may be external or internal to the units C, D.

[0027] The electrostatic charging and/or discharging obtained by units C and D of the system of the invention provides a tightening of the web printing substrate B against the external surface of the central impression cylinder 1 is also achieved.

[0028] A person skilled in the art could introduce changes and modifications in the embodiments described without departing from the scope of the invention as it is defined in the attached claims.

Claims

1. A system for fixation a web printable substrate on a central impression cylinder of a printing machine, said printing machine comprising said central impression cylinder (1) on which said web printable substrate (B) is supported and a plurality of printing stations (P1-P4) arranged around the central impression cylinder (1) and comprising respective printing elements, **characterized in that** said system comprises at least one electrostatic charge unit (C) for applying a controlled electrostatic charge on a surface which whether belongs to the web printable substrate (B) or forms part of a surface of the central impression cylinder (1) supporting said web printable substrate (B).

2. The system of claim 1, wherein said at least one electrostatic charge unit (C) is placed at an entry zone (E) of the central impression cylinder (1), for the web printable substrate (B), and configured for transferring a controlled electrostatic charge to a region of the web printable substrate (B) at said entry zone (E) before it contacts the external surface of central impression cylinder (1).

3. The system of claim 1 or 2, wherein said at least one electrostatic charge unit (C) is a first electrostatic charge unit, the system further comprising at least a second electrostatic charge unit configured for transferring an additional electrostatic charge to the web printable substrate (B) on more than one zone along its development over the external surface of the central impression cylinder (1) which supports it.

4. The system of any of the previous claims, wherein the surface of said central impression cylinder (1) is coated with a material which electrically isolates it

from the web printable substrate (B).

5. The system of claim 4, wherein both the central impression cylinder (1) and the web printable substrate (B) are electrically isolating, said at least one electrostatic charge unit (C) being configured for applying electrostatic charges on both, the central impression cylinder (1) and the web printable substrate (B).

6. The system of claim 2, wherein said at least one electrostatic charge unit (C) is configured for transferring electrostatic charges with predetermined values in a controlled manner over one or more selected zones of the web printable substrate (B), with a controlled width and electric power and the system further comprising at least one electrostatically discharge unit (D) for discharging said non-conducting surface once charged.

7. The system of claim 6, wherein said at least one electrostatic discharge unit (D) is placed at an exit zone (S) of the central impression cylinder (1), for the web printable substrate (B), and configured for discharging an already charged region of the web printable substrate (B) at said exit zone (S) after it stops contacting the external surface of the central impression cylinder (1).

8. The system of any of the previous claims, wherein said at least one printing element is selected from a blanket of an offset machine, a flexographic plate, a letter-press plate or a rotogravure cylinder.

9. The system of any of the previous claims, comprising control means for controlling the operation of said at least one electrostatic charge unit (C) and/or of said at least one electrostatic discharge unit (D).

10. A printing machine with a central impression cylinder, comprising a system for fixation a web printable substrate (B) on a central impression cylinder (1) according to any of the previous claims.

11. A method for fixation a web printable substrate on a central impression cylinder of a printing machine, where said printing machine comprises said central impression cylinder (1) on which said web printable substrate (B) is supported and a plurality of printing stations arranged around the central impression cylinder (1) and comprising respective printing elements, wherein the method is **characterized in that** it comprises performing said fixation by applying a controlled electrostatic charge on a non-conducting surface which whether belongs to the web printable substrate (B) or forms part of a surface of the central impression cylinder (1) supporting said web printable substrate (B).

12. The method of claim 11, comprising applying said controlled electrostatic charge to a region of the web printable substrate (B) immediately before entering and contacting the external surface of the central impression cylinder (1), wherein said entering is caused by the pulling of the web printable substrate (B) by the central impression cylinder (1) when rotating in a predetermined direction.

13. The method of claim 12, comprising applying said electrostatic discharge to said already charged region of the web printing substrate (B) immediately after exiting the central impression cylinder (1) stopping the contact with the external surface thereof, wherein said exiting is caused by the pulling of the web printable substrate (B) by the central impression cylinder (1) when rotating in said predetermined direction.

14. The method of any of claims 11 to 13, comprising performing said electrostatic charging and/or discharging for tightening the web printing substrate (B) against the external surface of the central impression cylinder (1).

15. The method of any of claims 11 to 14, comprising controlling said electrostatic charging on the basis of at least one of: the intrinsic characteristics of the ink to be used, the kind and/or thickness of the material the web printing substrate (B) is made of and the required printing speed, or a combination thereof.

16. The method of claim 15, wherein said control comprises controlling at least one of: the number of electrostatic charges applied, the number and locations of regions of the web printing substrate (B) on which applying electrostatic charges and the electrical power of the electrostatic charge or charges.

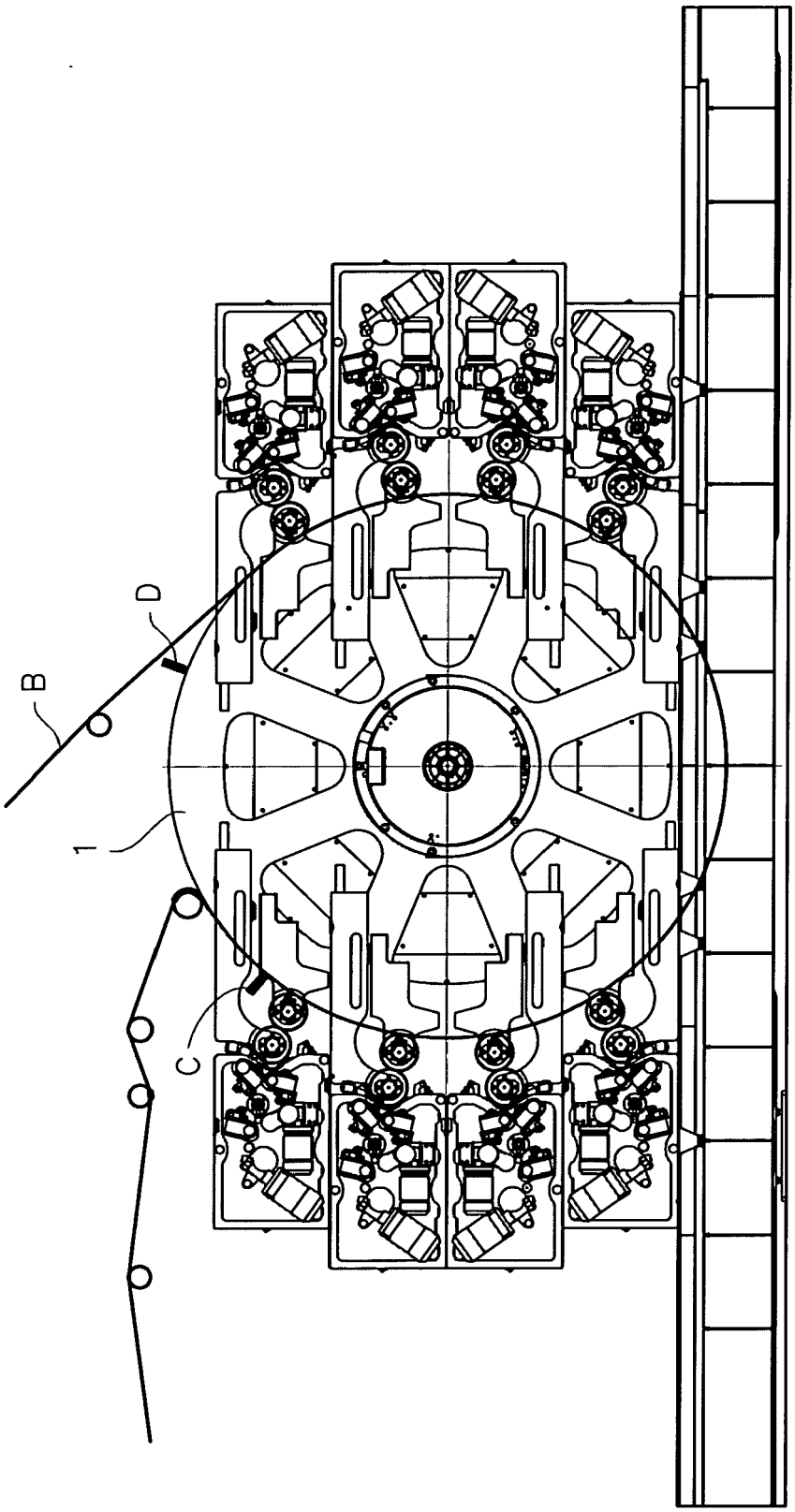

Fig. 1

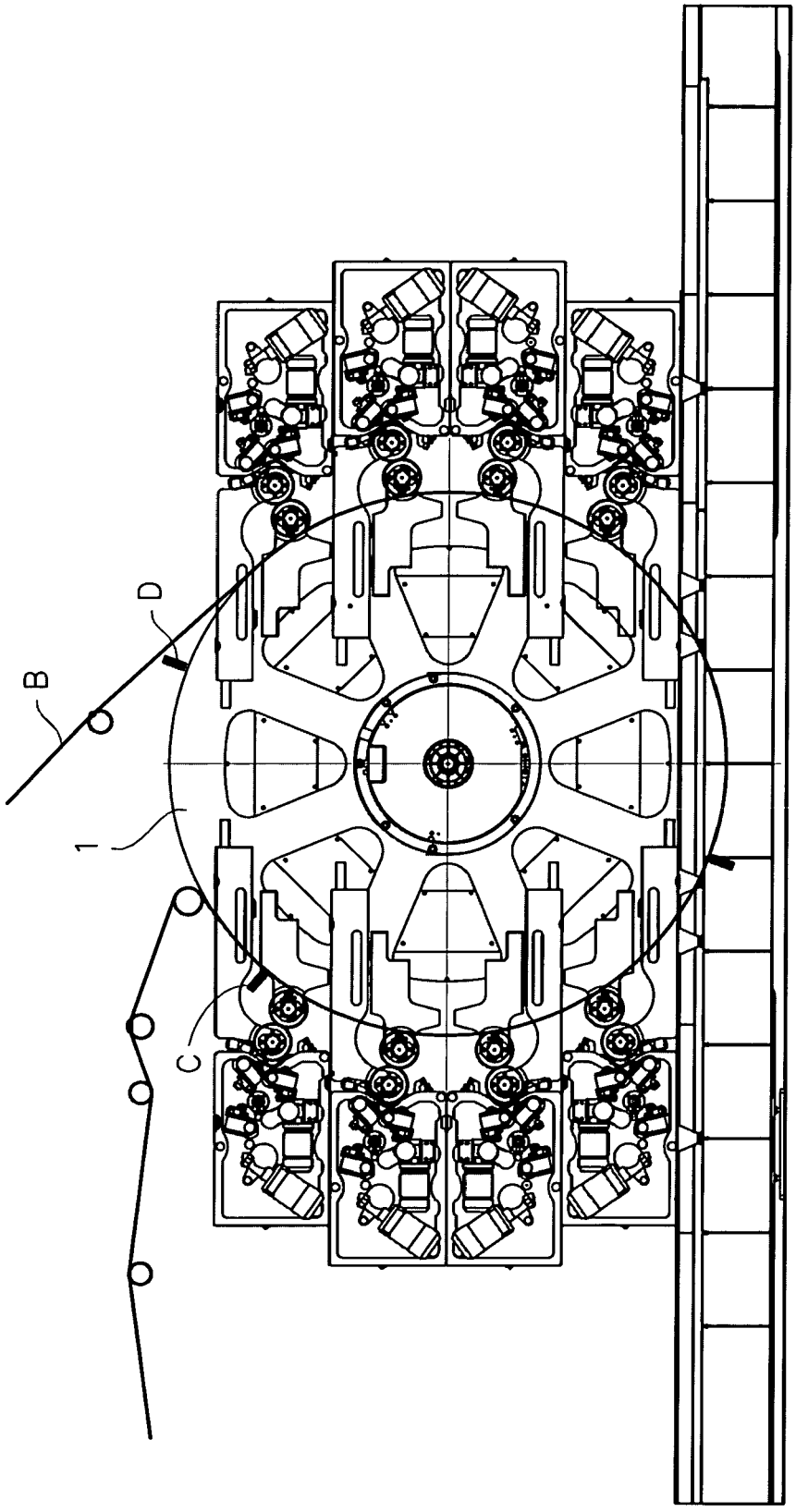

Fig.2

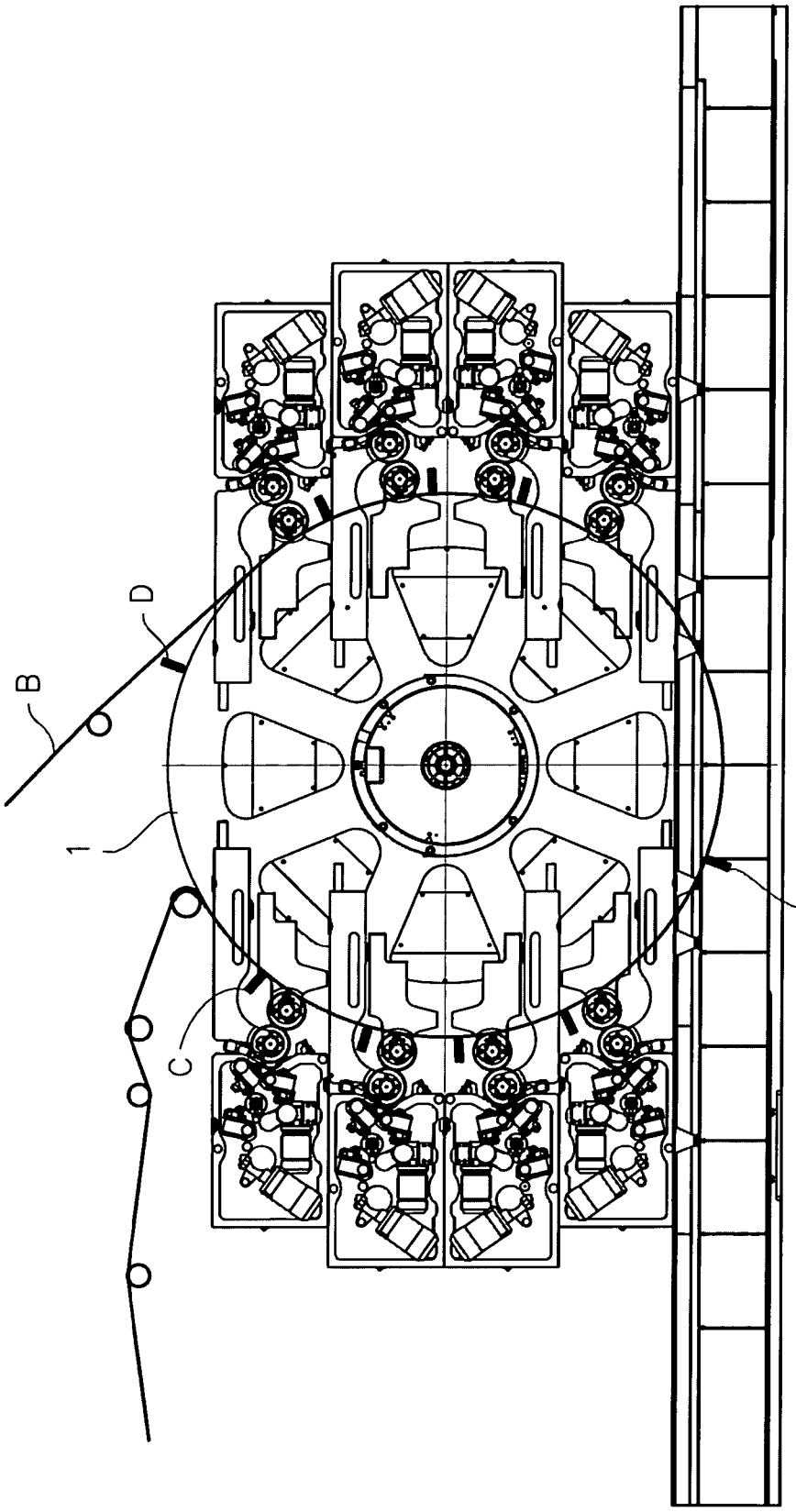

Fig.3

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EUROPEAN SEARCH REPORT

Application Number
EP 12 00 3023

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 1 318 014 A1 (ELTEX ELEKTROSTATIK GMBH [DE]) 11 June 2003 (2003-06-11) * column 14 - column 20; figure 3 *	1,3,4, 8-11,14, 16	INV. B41F5/24 B41F23/00
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TECHNICAL FIELDS SEARCHED (IPC)

B41F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	24 October 2012	Fox, Thomas

CATEGORY OF CITED DOCUMENTS

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24-10-2012

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REFERENCES CITED IN THE DESCRIPTION

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