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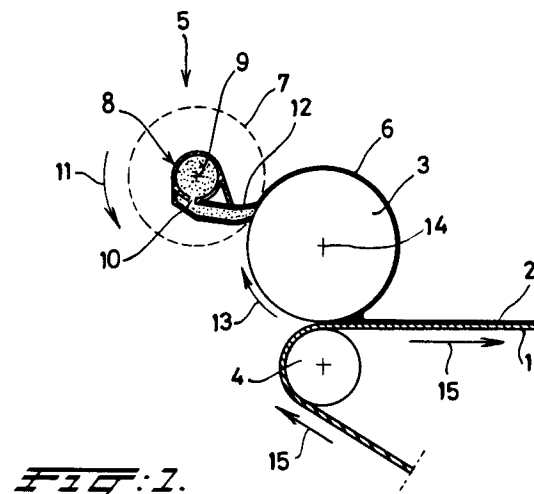
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NL-2280 GE Rijswijk (NL)(54) **Device for applying a coating layer to a substrate web.**

(57) A device for applying a coating layer (2) to a substrate web (1) comprises an application roll (3) for applying the coating layer to the substrate web, a counterpressure roll (4) interacting with the application roll (3) in order to support a substrate web (1) passing through between the application roll and the counterpressure roll, the application roll (3) being designed to rotate in the same direction as the counterpressure roll (4), so that at the position of the counterpressure roll the direction of movement of the periphery of the application roll is opposite to that of the counterpressure roll, and a metering device (5) for applying a coating material in a layer to the application roll, which metering device (5) comprises a rotating cylindrical screen (7) and a squeegee (8) disposed inside the cylindrical screen (7).

**EP 0 678 338 A1**

The invention relates to a device for applying a coating layer to a substrate web, comprising an application roll for applying the coating layer to the substrate web, a counterpressure roll interacting with the application roll in order to support a substrate web passing through between the application roll and the counterpressure roll, and a metering device for applying a coating material in a layer to the application roll, the application roll being designed to rotate in the same direction as the counterpressure roll, so that at the position of the counterpressure roll the direction of movement of the periphery of the application roll is opposite to that of the counterpressure roll.

Such devices are known and are called reverse-roll coaters. Two types of devices can be distinguished here, depending on the type of metering device which is used.

In the case of the first type the metering device consists of a metering roll which interacts with the application roll. The metering roll runs through a bath of the coating material and takes up this material in the process. The material taken up is then transferred to the application roll. This type of device is suitable in particular for applying coating materials of relatively low viscosity. The disadvantage of the device is that the quantity of coating material taken up from the bath cannot be regulated well. Additional measures are necessary to regulate the quantity of coating material on the application roll, for example using a scraper knife.

In the case of another type of device, which is more suitable for high-viscosity coating materials, the metering device also consists of a metering roll interacting with the application roll. Said metering device is situated a short distance away from the application roll. The relatively highly viscous coating material lies in the channel formed by the metering roll and application roll, and is taken up through the gap between the application roll and the metering roll. The disadvantage of this type of device is that the quantity of coating material on the application roll depends on the distance between the metering roll and the application roll. When substrate webs of great width (for example, 3 to 4 metres) are being coated, the accuracy and the stability of the metering roll and application roll need to be high over the full width in order to obtain a uniform thickness of coating layer.

The object of the invention is to provide a device for the application of a coating layer to a substrate web, in which the disadvantages of the known devices are overcome.

This object is achieved in the case of a device of the type mentioned in the preamble through the fact that the metering device comprises a rotating cylindrical screen and supply means for supplying the coating material.

With the device according to the invention it is possible to regulate the thickness of the coating layer within very narrow limits, so that very low layer thicknesses, corresponding to a quantity of coating material of 5 - 6 grammes per m² can be achieved. The thickness of the coating layer can be regulated easily by the choice of type of screen and the speed of the application roll relative to the counterpressure roll.

Preferred embodiments of the device according to the invention are laid down in the sub-claims.

The invention is explained in greater detail by the exemplary embodiment below with reference to the drawings, in which:

Fig. 1 shows diagrammatically the layout of a device according to the invention, and

Figs 2 and 3 show diagrammatically other applications of the device according to the invention.

Fig. 1 shows diagrammatically the layout of a device for applying the coating layer to a substrate web. In Fig. 1 the substrate web is indicated by the reference number 1 and the coating layer by the reference number 2. The device comprises an application roll 3 for applying the coating layer 2 to the substrate web 1, a counterpressure roll 4 interacting with the application roll 3 in order to support the substrate web 1 passing through between the application roll 3 and the counterpressure roll 4, and also a metering device 5 for applying the coating material in a layer 6 to the application roll 3.

The metering device 5 consists of a rotating cylindrical screen 7 and a squeegee 8, preferably of the closed type, disposed inside the screen. However, other types of squeegees, such as open-type squeegees, roller squeegees etc., can also be used.

The device operates as follows. The coating material 9 is supplied through the inside of the squeegee 8. The coating material 9 flows through a gap 10, extending in the lengthwise direction of the squeegee 8, into the inside of the cylindrical screen 7. The screen 7 rotates in the direction of the arrow 11. At the position of a flexible squeegee blade 12, the coating material is forced through the screen and thus applied in a layer 6 to the outside of the application roll 3, which rotates in the direction of the arrow 13. The free edge of the squeegee blade 12 preferably lies in the plane through the axis of the rotating screen 7 and the axis 14 of the application roll 3. Very good metering of the coating material can be achieved in this way.

The coating material is then applied by the application roll 3 to the substrate web 1, which is passed around the counterpressure roll 4 and runs through between the application roll 3 and the counterpressure roll 4 in the direction of the arrows

15. This means that at the position of the substrate web 1 the directions of movement of the application roll 3 and the substrate web 1 are opposite to each other. Such a type of device is therefore often known as a reverse-roll coater.

The application roll 3, at least at the periphery, is made of a shape-retaining (hard) material, i.e. a material which is shape-retaining under the loads occurring upon the roll. The shape-retaining material used is, for example, metal or ceramic material.

The counterpressure roll 4, at least at the periphery, is made of a resilient material, i.e. a material which can eliminate slight unevennesses in the substrate web to be coated and slight deviations in the parallelism of the application roll 3 and the counterpressure roll 4. Moreover, the coefficient of friction of the resilient material of the counterpressure roll 4 should be greater than that of the shape-retaining material of the application roll 3, so that the substrate web to be coated is conveyed through the counterpressure roll 4. The resilient material used is, for example, rubber.

The gap between the application roll 3 and the counterpressure roll 4 is preferably slightly smaller than the thickness of the substrate web to be coated.

The thickness of the coating layer 2 can be regulated by means of three parameters: the type of screen (mesh, thickness and open area), the squeegee pressure and the speed of the application roll 3 relative to the counterpressure roll 4, and thus the substrate web 1. A low weight of coating material can be applied to the application roll 3 by selecting a screen with a high mesh number (many holes), in conjunction with a low wall thickness and a relatively small open area. The reverse applies to a screen with a low mesh number (fewer holes), a greater wall thickness and a large open area. In this case the squeegee pressure, i.e. the pressure of the squeegee blade 12 against the screen 7 also plays a role.

The thickness of the coating layer 2 can also be regulated by regulating the speed of the application roll 3 relative to the speed of the substrate web 1. The higher the speed of the application roll 3 relative to the speed of the substrate web 1, the thicker will be the coating layer 2.

The advantages of the device according to the invention are:

- very suitable for applying coating layers with a low weight per m^2 ,
- suitable for applying coating materials of differing viscosity (low and high viscosity),
- virtually no penetration of the coating material into the substrate web,
- relatively simple and cheap, particularly for greater widths,

- rolls not susceptible to damage,
- changing coating material is simple,
- capacity of the system is relatively small,
- can also be used for printing (direct or indirect),
- suitable for the application of foamed coating materials (with foam squeegee).

The specific advantages of the device according to the invention over the known devices (reverse-roll coaters) for the production of waterproof and breathing coating layers are:

- very suitable for applying coating layers with a low weight per m^2 (approx. 5 - 6 grammes per m^2), while the textile properties of the substrate are retained,
- constant and regulable layer thicknesses, the regulation being through selection of the screen, squeegee pressure and speed of the application roll (less waste and high reproducibility).

It is pointed out that the device according to the invention can also be used more generally, for example for direct screen printing and indirect screen printing.

In the case of the first-mentioned application, direct screen printing, the substrate web 1 is passed through between the rotating screen 7 and the application roll 3, as shown diagrammatically in Fig. 2, and a pattern is printed on the substrate web.

In the case of the second application, indirect screen printing, which is shown diagrammatically in Fig. 3, as in the case of the device of Fig. 1, the substrate web 1 is passed through between the application roll 3 and the counterpressure roll 4. However, in the case of this application, the application roll 3 is used to transfer to the substrate web 1 a pattern which has been forced through the screen onto the application roll. The application roll 3 in this case rotates in a direction opposite to the direction of rotation of the application roll 3 shown in Fig. 1. At the position of the substrate web 1, the direction of movement of the application roll 3 is the same as that of the substrate web 1, and the direction of rotation of the cylindrical screen 7 is reversed.

In the case of the last-mentioned application, indirect screen printing, the diameter of the cylindrical screen 7 is preferably the same as the diameter of the application roll 3, and provision is made for drive means by which the cylindrical screen 7 and the application roll 3 can be driven in such a way that they rotate at the same peripheral speed, but in opposite directions of rotation.

The device according to the invention is therefore such that it can be used for several purposes, possibly with minor adjustments.

Claims

1. Device for applying a coating layer (2) to a substrate web (1), comprising an application roll (3) for applying the coating layer to the substrate web, a counterpressure roll (4) interacting with the application roll in order to support a substrate web passing through between the application roll and the counterpressure roll, and a metering device (5) for applying a coating material in a layer to the application roll, the application roll being designed to rotate in the same direction as the counterpressure roll, so that at the position of the counterpressure roll the direction of movement of the periphery of the application roll is opposite to that of the counterpressure roll, **characterized in that** the metering device (5) comprises a rotating cylindrical screen (7) and supply means (8) for supplying the coating material (2). 5 10 15 20
2. Device according to claim 1, **characterized in that** the supply means comprise a squeegee (8) disposed inside the cylindrical screen (7). 25
3. Device according to claim 2, **characterized in that** the squeegee (8) is of the closed type.
4. Device according to claim 2 or 3, **characterized in that** the free edge of the squeegee blade (12) of the squeegee (8) lies essentially in the plane in which the axes of the cylindrical screen (7) and the application roll (3) are situated. 30 35
5. Device according to one of claims 1 - 4, **characterized in that** the application roll (3), at least at the periphery, is made of a shape-retaining material. 40
6. Device according to one of claims 1 - 5, **characterized in that** the counterpressure roll (4), at least at the periphery, is made of a resilient material. 45
7. Device according to one of claims 1 - 6, **characterized in that** the gap between the application roll (3) and the counterpressure roll (4) is slightly smaller than the thickness of the substrate web (1) to be coated. 50
8. Device according to one of claims 1 - 7, **characterized in that** the diameter of the cylindrical screen (7) is the same as the diameter of the application roll (3), and in that provision is made for drive means, by which the cylindrical screen (7) and the application roll (3) can be driven in such a way that they rotate at the same peripheral speed, but in opposite directions of rotation. 55
9. Device according to one of claims 1 - 8, **characterized in that** means are present for conveying the substrate web (1) through between the cylindrical screen (7) and the application roll (3).

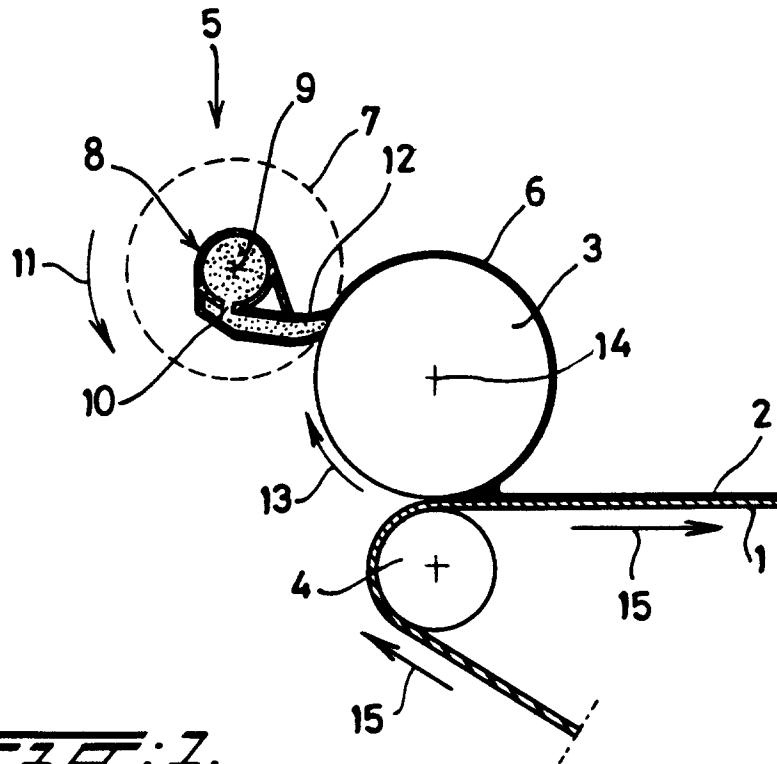


FIG. 1.

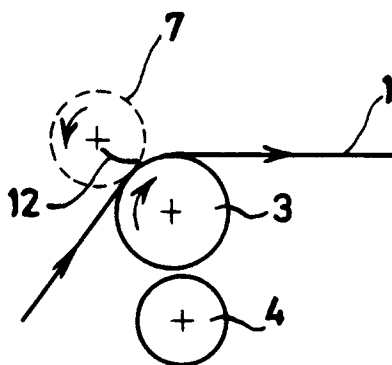


FIG. 2.

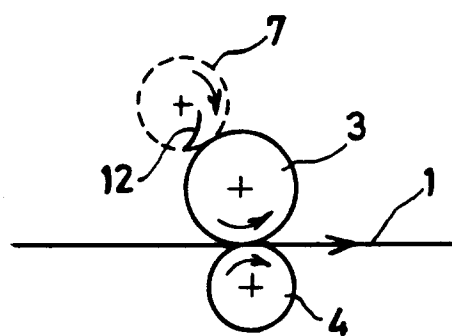


FIG. 3.



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EUROPEAN SEARCH REPORT

Application Number
EP 95 20 1006

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
Y	EP,A,0 095 819 (STORK BRABANT B.V.) 7 December 1983 * the whole document * ---	1,2,4,8,9	B05C1/10
Y	US,A,3 511 696 (MURRAY) 12 May 1970 * the whole document * -----	1,2,4,8,9	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B05C D21H
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 17 July 1995	Examiner Juguet, J
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			