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(54) **DEVICE FOR APPLYING ORNAMENTS ON SUBSTANTIALLY PLANE SURFACES OF OBJECTS, PARTICULARLY COMPACT DISKS**

VORRICHTUNG ZUM AUFBRINGEN VON ORNAMENTEN AUF IM WESENTLICHEN EBENEN FLÄCHEN VON OBJEKTEN, INSBESONDERE CDS

DISPOSITIF PERMETTANT D'APPLIQUER DES DECORATIONS SUR DES SURFACES SENSIBLEMENT PLANES D'OBJETS, EN PARTICULIER DE DISQUES COMPACTS

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Description

[0001] The present invention relates to a device for applying ornaments on substantially plane surfaces of objects, particularly compact disks.

[0002] With particular reference to compact disks, one of the two faces thereof, in addition to having data pertaining to contained programs, is particularly useful for being decorated both for capturing, by using particular and appealing graphics, the user attention, and for being an efficient advertising means.

[0003] It is for such reasons that the application of particularly appealing ornaments on compact disks has long been used; such application so far has been realised particularly either through silk-screen printing or through jet printing.

[0004] The silk-screen method, in particular, is the most used one and consists in a process in which liquid ink is used and such ink is compelled, through a spatula or the like, to pass through the thickness of a member, called screen, on whose surface clogged portions and unclogged portions coexist; the suitable alternation of such portions makes ink pass through the screen thickness only through well defined and desired areas of the screen itself, resulting then in the desired ornament.

[0005] The ink jet printing method also provides using ink at liquid state.

[0006] Though allowing to obtain good general results, these printing methods have some inconveniences.

[0007] A first inconvenience of the silk-screen printing is the printing accuracy limitation as direct consequence of the minimum possible screen size, more precisely the minimum possible surface size of holes obtained on the screen surface.

[0008] Other inconvenience of the current silk-screen printing, also limiting the ornament accuracy, is due to the need of following colour depositions, particularly in the four-colour printing, and even more in six-colour printing, such following colour depositions generating a non-uniform thickness of ornamental printing.

[0009] Another inconvenience is the need of drying ink deposited on the object to be decorated; such inconvenience bringing about an increase of production times and an increase of decoration costs.

[0010] Other inconvenience is the difficult action of obtaining blurred colours; such difficulty deriving from the already mentioned minimum possible surface size of holes obtained on the screen surface.

[0011] Another problem is the toxicity of solvents used both when diluting inks and when cleaning the equipment.

[0012] As regards ink jet printing, it also has the inconveniences due to liquid ink drying: production times length, ornament costs increase, printing devices cleaning.

[0013] Another inconvenience is the lack of printing sharpness, particularly in writings.

[0014] In order to solve the mentioned inconveniences, arrangements have been studied using non-liquid inks that employ the most up-to-date types of digital printers.

[0015] Document WO 02/042092A is known, according to the preamble of claim 1 whose teaching refers to a device and related process for transferring ornaments from an adhesion-resistant film to surfaces of objects to be decorated, using dry thermoplastic inks and digital electrostatic printers; in order to obtain the transfer of images from the mentioned film to objects to be decorated, the mentioned film is stricken by a jet of hot air next to a presser member.

[0016] A first object of the device of the present invention is the chance of obtaining ornaments for substantially plane surfaces by using dry thermoplastic inks, through two operating stations only.

[0017] Another object is obtaining a quick printing method capable, at the same time, of providing a photographic printing quality as when using digital electrostatic printers.

[0018] A further object is decorating at least two objects simultaneously.

[0019] Another object is the economical production with the consequent chance of making also quantitatively reduced batches.

[0020] In particular, the device for applying images on substantially plane surfaces of objects, of the type with image transfer from an adhesion-resistant film to the above objects, comprising:

- two reels, at least one of which is motorized, to each one of said reels an end of the adhesion-resistant film being constrained, this latter one being adapted to operate as support for images to be applied on objects;
- a first station placed between the at least two reels, said first station being adapted to transfer images from the adhesion-resistant film to objects;

characterized in comprising:

- a second station in a following position to the first mentioned station, said second station being adapted to secure and polish the images deposited onto objects.

[0021] These and other characteristics will be better pointed out by the following description of a preferred embodiment shown, purely as a non-limiting example, in the enclosed table of drawing, in which:

- figure 1 shows a schematic overall view of the device.

[0022] With reference to figure 1, reference 1 shows an adhesion-resistant unstretchable film adapted to be reeled, composed of a known material, for example paper material coated with silicone on both surfaces. Images 2, aimed to be reproduced on objects 3 are deposited,

regularly spaced one from the other, onto said film. Reference 4 shows the advancement direction of the adhesion-resistant film.

[0023] Said film is included between two reels 5, of which at least one is motored. Between these reels a first station 6 is placed, composed of two mutually overlapped rollers: a first upper roller 7, able to be heated, and a first lower roller 8.

[0024] A second station 9 is placed after the first mentioned station and such second station too is equipped with two mutually overlapped rollers: a second upper roller 10, also able to be heated, and a second lower roller 11.

[0025] All rollers 7, 8, 10, 11 are made of siliconed rubber.

[0026] Rollers 7 and 8 are spaced by an adjustable gap 12, while the two rollers 10 and 11 are spaced by a gap 13, that is also adjustable.

[0027] Through the gaps 12 and 13 there is an advancement axis 14 for the objects 3; reference 15 points out an advancement direction of said objects.

[0028] It must be noted that rollers 7, 8, 10, 11 can be of a suitable length to allow decorating at least two objects 3 simultaneously.

[0029] The operation of the present invention will now be described, using the references shown in figure 1.

[0030] After having started one of the two reels 5, the adhesion-resistant film 1 starts moving according to an advancement direction 4 and simultaneously the objects 3 move, according to axis 14, following the advancement direction 15. Movements of the adhesion-resistant film 1 and the objects 3 are mutually synchronous : in such a way, when an image 2 passes through the first station 6, there is a position correspondence in the gap 12 between it and one of the mentioned objects.

[0031] Next to the gap 12 the adhesion- resistant film 1 and the surface of the object 3 to be decorated are heated in this order; the temperature of the first upper roller 7, heated at a temperature of about 190 °C, makes the thermoplastic ink, with which images 2 are realised that are present on one side of the adhesion-resistant film 1 facing the first lower roller 8, pass from powdery state to semiliquid state and, due to the pressure exerted by the mutual contrast of the first two rollers 7 and 8, each one of said images is transferred to the object 3 that synchronously is in position with the image itself. It must be noted that the heating temperature of roller 7 is such as to prevent peeling of the adhesion-resistant film 1, the term peeling meaning the detachment of portions of the adhesion-resistant layer, for example silicone, that can be found on the mentioned film; in such a way, the adhesion-resistant film 1 can be used again for following uses.

[0032] Only the objects 3 pass through the second following station 9, since the adhesion-resistant film 1, after having passed through the first station 6, is wound onto one of the reels 5; in the second mentioned station, next to the gap 13, only the surface of object 3 is heated, on which, in the first previous station 6, the image 2 had been transferred.

[0033] Heating performed by the second upper roller 10 is approximately 170 °C and is used to secure and polish the images 2 previously transferred onto the object 3. At the same time, in order to prevent the possible sticking of the second upper roller 10 to ink composing the images 2 deposited onto the object 3, such roller is continuously moistened with silicone oil.

[0034] By using rollers 7, 8, 10, 11 equipped with a suitable length, it is possible to decorate two or more objects 3 simultaneously, at least doubling the production capability of the device of the present invention.

[0035] The device of the present invention is adapted to decorate also slightly convex surfaces.

[0036] The device so far described is adapted to perform a process that has, in succession, the following two operating steps:

- transferring images 2 from adhesion-resistant film 1 to substantially plane surfaces of each one of the objects 3 to be decorated; said transferring occurring under the action both of heat generated by the first upper roller and of pressure exerted by the combined action of the first rollers 7, 8 simultaneously on adhesion-resistant film 1 and object 3;
- securing and polishing the image 2 on the surface of the object 3 to be decorated; said securing and polishing occurring under the action both of heat generated by the second upper roller and pressure exerted by the combined action of second rollers 10, 11 on the object 3.

[0037] A first advantage offered by the device of the present invention is the chance of decorating substantially plane surfaces, using thermoplastic dry inks, through two operating stations only.

[0038] A second advantage is that the low temperature at which, in the first station 6, the transfer of images from support film to surface of objects to be decorated is carried out, avoids peeling the adhesion-resistant layer of the film itself; in other words, during the mentioned transfer, only images detach and not the corresponding adhesion-resistant layer, for example silicone, on which they are temporarily secured.

[0039] Another advantage is obtaining a quick printing method capable, at the same time, to give a photographic printing quality due to the use of digital electrostatic printers.

[0040] A further advantage is obtaining the decoration of at least two objects simultaneously.

[0041] A further advantage is the economical production with following chance of making also quantitatively reduced batches.

Claims

1. Device for applying images (2) on substantially plane

surfaces of objects (3), of the type with image transfer from an adhesion-resistant film (1) onto said objects, comprising:

- two reels (5), at least one of which is motorized, to each one of said reels an end of the adhesion-resistant film (1) being constrained, this latter one being adapted to operate as support for images (2) to be applied onto objects (3);
- a first station (6) placed between the at least two reels (5), said first station being adapted to transfer images (2) from the adhesion-resistant film (1) to objects (3) ;

charactesized in comprising:

- a second station (9) in a following position to said first station, said second station being adapted to secure and polish the images (2) deposited onto objects (3).

2. Device according to claim 1, **characterised in that** the first station (6) is composed of a first upper roller (7) and a first lower roller (8) having mutually parallel rotation axes and spaced so that the mutually faced portions of external surface of the rollers themselves are spaced only by a gap (12) substantially corresponding to the sum of thicknesses of adhesion-resistant film (1) and objects (3) to be decorated, the gap (12) being adjustable.

3. Device according to claims 1 and 2, **characterised in** means for heating the first upper roller (7) at a temperature of about 190 °C.

4. Device according to claim 1, **characterised in that** the second station (9) is composed of a second upper roller (10) and a second lower roller (11) having mutually parallel rotation axes and spaced so that the mutually faced portions of external surface of the rollers themselves are spaced only by a gap (13) substantially corresponding to the thickness of the object (3) to be decorated, the gap (13) being adjustable.

5. Device according to claims 1 and 4, **characterised in** means for heating the second upper roller (10) at a temperature of about 170 °C.

6. Device according to claims 1, 2 and 4, **characterised in that** the rollers (7, 8, 10, 11) are all made of a high temperature resisting material, for example siliconed rubber.

7. Device according to the previous claims, **characterised in that** the rollers (7, 8, 10, 11) have enough length to allow applying images (2) on at least two objects (3) simultaneously.

8. Device according to claim 1, **characterised in that** the adhesion-resistant film (1) is composed of unstretchable material, for example paper material, said material being coated with silicone or other adhesion-resistant material on both surfaces.

9. Device according to claim 1, **characterised in that** it allows applying images (2) on surfaces being slightly convex.

10. Process for applying images (2) on substantially plane surfaces of objects (3), using the device of claim 1, the process using dry thermoplastic inks and adhesion-resistant film (1) of the non-stretchable type coated on both sides with adhesion-resistant material, for example paper material coated with silicone, adapted to operate as support for said images, the process comprising the two following steps:

- transferring images (2) from the adhesion-resistant film (1) to the surface of the objects (3);
- securing and polishing the transferred images (2).

11. Process according to claim 10 using the device of claim 2, **characterised in that** the adhesion-resistant film (1) has images (2) on its surface facing the first lower roller (8).

12. Process according to claim 10 using the device of claim 2, **characterised in that** the first upper roller (7) is heated at a temperature of about 190 °C.

13. Process according to claim 12, **characterised in that** the transfer of images (2) occurs by passing the thermoplastic inks from powdery dry state to semi-liquid plastic state, under the action both of heat generated by the first upper roller (7) and of pressure exerted by the combined action of the first two rollers (7, 8) simultaneously on adhesion-resistant film (1) and object (3).

14. Process according to claim 13, **characterised in that** the heating temperature of the roller (7) is such as to keep substantially intact, during the transfer of images (2) from adhesion-resistant film (1) to surface of objects (3) to be decorated, the layer of adhesion-resistant material, for example silicone, that coats said film, thereby avoiding to peel said adhesion-resistant film, thereby the adhesion-resistant film (1) remaining substantially healthy, being then able to be used again for following uses.

15. Process according to claim 10 using the device of claim 4, **characterised in that** the second upper roller (10) is heated at a temperature of about 170 °C.

16. Process according to claim 15, **characterised in**

that securing and polishing of images (2) on the surface of the object (3) to be decorated occur under the combined action of heat generated by the second upper roller (10) and pressure exerted by the combined action of the second rollers (10, 11).

17. Process according to claim 16, **characterised in that** the second upper roller (10) is moistened with silicone oil, said moistening being adapted to prevent sticking onto said second upper roller of ink with which images (2) deposited on the object (3) are composed.

18. Process according to claim 10, **characterised in that** it can also be applied to surfaces that are slightly convex.

Patentansprüche

1. Vorrichtung zum Aufbringen von Bildern (2) auf im Wesentlichen ebenen Flächen von Objekten (3) von der Art, bei der Bilder von einer haftungsverhindernden Folie (1) auf die Objekte übertragen werden, aufweisend:

zwei Wickelspulen (5), von denen mindestens eine mit einem Motor ausgestattet ist, wobei an jeder der Wickelspulen ein Ende der haftungsverhindernden Folie (1) unter Spannung angebracht ist, wobei diese Folie angepasst ist, als Träger für Bilder (2) zu dienen, die auf Objekten (3) aufgebracht werden sollen;
eine erste Station (6), die zwischen den mindestens zwei Wickelspulen (5) angeordnet ist, wobei die erste Station angepasst ist, Bilder (2) von der haftungsverhindernden Folie (1) auf Objekte (3) zu übertragen;
dadurch gekennzeichnet, dass sie aufweist:
eine zweite Station (9) an einer der ersten Station nachgeschalteten. Stelle, wobei die zweite Station angepasst ist, die auf Objekten (3) abgesetzten Bilder (2) zu sichern und zu polieren.

2. Vorrichtung gemäß Anspruch 1, **dadurch gekennzeichnet, dass** die erste Station (6) aus einer ersten oberen Rolle (7) und einer ersten unteren Rolle (8) zusammengesetzt ist, die zueinander parallele Drehachsen haben und so im Abstand angeordnet sind, dass die einander zugewandten Teile der Außenfläche der Rollen nur durch einen Spalt (12) getrennt sind, der im Wesentlichen der Summe der Dikken der haftungsverhindernden Folie (1) und den zu dekorierenden Objekten (3) entspricht, wobei der Spalt (12) verstellbar ist.

3. Vorrichtung gemäß den Ansprüchen 1 und 2, **gekennzeichnet durch** eine Einrichtung zum Erwärmen der ersten oberen Rolle (7) auf eine Temperatur von etwa 190 °C.

4. Vorrichtung gemäß Anspruch 1, **dadurch gekennzeichnet, dass** die zweite Station (9) aus einer zweiten oberen Rolle (10) und einer zweite unteren Rolle (11) zusammengesetzt ist, die zueinander parallele Drehachsen haben und so im Abstand angeordnet sind, dass die einander zugewandten Teile der Außenfläche der Rollen nur durch einen Spalt (13) getrennt sind, der im Wesentlichen der Dicke des zu dekorierenden Objekts (3) entspricht, wobei der Spalt (13) verstellbar ist.

5. Vorrichtung gemäß den Ansprüchen 1 und 4, **gekennzeichnet durch** eine Einrichtung zum Erwärmen der zweiten oberen Rolle (10) auf eine Temperatur von etwa 170 °C.

6. Vorrichtung gemäß den Ansprüchen 1, 2 und 4, **dadurch gekennzeichnet, dass** die Rollen (7, 8, 10, 11) allesamt aus einem hochtemperaturbeständigen Material hergestellt sind, zum Beispiel Silikonkautschuk.

7. Vorrichtung gemäß den vorausgehenden Ansprüchen, **dadurch gekennzeichnet, dass** die Rollen (7, 8, 10, 11) lang genug sind, um das Aufbringen von Bildern (2) auf mindestens zwei Objekten (3) gleichzeitig zu erlauben.

8. Vorrichtung gemäß Anspruch 1, **dadurch gekennzeichnet, dass** die haftungsverhindernde Folie (1) aus einem nicht dehnbaren Material zusammengesetzt ist, zum Beispiel Papiermaterial, wobei das Material auf beiden Oberflächen mit Silikon oder einem sonstigen haftungsverhindernden Material beschichtet ist.

9. Vorrichtung gemäß Anspruch 1, **dadurch gekennzeichnet, dass** sie das Aufbringen von Bildern (2) auf leicht konvexen Flächen erlaubt.

10. Verfahren zum Aufbringen von Bildern (2) auf im Wesentlichen ebenen Flächen von Objekten (3) unter Verwendung der Vorrichtung gemäß Anspruch 1, wobei bei dem Verfahren trockene, thermoplastische Druckfarben und eine haftungsverhindernde Folie (1) von nicht dehnbarer Art, auf beiden Seiten mit haftungsverhinderndem Material beschichtet, zum Beispiel mit Silikon beschichtetes Papiermaterial, das angepasst ist, als Träger für die Bilder zu dienen, zum Einsatz kommen, wobei das Verfahren folgende zwei Schritte aufweist:

Übertragen der Bilder (2) von der haftungsverhindernden Folie (1) auf die Fläche der Objekte (3);

Sichern und Polieren der übertragenen Bilder (2).

11. Verfahren gemäß Anspruch 10 unter Verwendung der Vorrichtung gemäß Anspruch 2, **dadurch gekennzeichnet, dass** die haftungsverhindernde Folie (1) Bilder (2) auf ihrer Oberfläche trägt, die der ersten Rolle (8) zugewandt ist.

12. Verfahren gemäß Anspruch 10 unter Verwendung der Vorrichtung gemäß Anspruch 2, **dadurch gekennzeichnet, dass** die erste obere Rolle (7) auf eine Temperatur von etwa 190 °C erwärmt wird.

13. Verfahren gemäß Anspruch 12, **dadurch gekennzeichnet, dass** die Übertragung der Bilder (2) durch den Übergang der thermoplastischen Druckfarben vom pulvrigen, trockenen Zustand in den halbflüssigen, plastischen Zustand unter dem Einfluss sowohl der von der ersten oberen Rolle (7) erzeugten Wärme als auch des von den ersten zwei Rollen (7, 8) gleichzeitig auf die haftungsverhindernde Folie (1) und das Objekt (3) gemeinsam ausgeübten Drucks geschieht.

14. Verfahren gemäß Anspruch 13, **dadurch gekennzeichnet, dass** die Erwärmungstemperatur der Rolle (7) dafür sorgt, dass während der Übertragung der Bilder (2) von der haftungsverhindernden Folie (1) auf die Fläche der zu dekorierenden Objekte (3) die Schicht des haftungsverhindernden Materials, zum Beispiel Silikon, mit dem die Folie beschichtet ist, im Wesentlichen unversehrt bleibt, wodurch ein Schälen der haftungsverhindernden Folie vermieden wird, wodurch die haftungsverhindernde Folie (1) im Wesentlichen gesund bleibt und anschließend für weitere Einsätze wiederverwendet werden kann.

15. Verfahren gemäß Anspruch 10 unter Verwendung der Vorrichtung gemäß Anspruch 4, **dadurch gekennzeichnet, dass** die zweite obere Rolle (10) auf eine Temperatur von etwa 170 °C erwärmt wird.

16. Verfahren gemäß Anspruch 15, **dadurch gekennzeichnet, dass** das Sichern und Polieren der Bilder (2) auf der Fläche des zu dekorierenden Objekts (3) unter der gemeinsamen Wirkung der von der zweiten oberen Rolle (10) erzeugten Wärme und des von den zweiten Rollen (10, 11) gemeinsam ausgeübten Drucks geschieht.

17. Verfahren gemäß Anspruch 16, **dadurch gekennzeichnet, dass** die zweite obere Rolle (10) mit Silikonöl befeuchtet wird, wobei das Befeuchten angepasst ist, ein Festkleben von Druckfarbe, aus der die auf dem Objekt (3) abgesetzten Bilder (2) zusammengesetzt sind, an der zweiten oberen Rolle zu verhindern.

18. Verfahren gemäß Anspruch 10, **dadurch gekennzeichnet, dass** es auch bei leicht konvexen Flächen angewandt werden kann.

Revendications

1. Dispositif pour appliquer des images (2) sur des surfaces sensiblement planes d'objets (3), du type à transfert d'image d'un film anti-adhérant (1) sur lesdits objets, comprenant:

deux bobines (5), dont au moins une des deux est motorisée, les extrémités du film anti-adhérait (1) étant liées à chacune desdites bobines, ledit film étant adapté pour supporter les images (2) que l'on doit appliquer sur les objets (3);
- une première station (6) placée entre les au moins deux bobines (5), ladite première station étant apte au transfert des images (2), à partir du film anti-adhérant (1) vers des objets (3), ***caractérisé en ce qu'***il comprend :
- une deuxième station (9) dans une position successive par rapport à ladite première station, ladite deuxième station étant apte à fixer et polir les images (2) déposées sur les objets (3).

2. Dispositif selon la revendication 1, ***caractérisé en ce que*** la première station (6) est composée d'un premier rouleau supérieur (7) et d'un premier rouleau inférieur (8) présentant des axes de rotation parallèles et espacés mutuellement de telle façon que les parties de surface externe desdits rouleaux, les unes en face des autres, soient espacées seulement par un espace (12) correspondant sensiblement à la somme des épaisseurs du film anti-adhérant (1) et des objets (3) que l'on doit décorner, l'espace (12) étant réglable.

3. Dispositif selon les revendications 1 et 2, ***caractérisé par*** des moyens de réchauffement du premier rouleau supérieur (7) à une température d'environ 190 °C.

4. Dispositif selon la revendication 1, ***caractérisé en ce que*** la deuxième station (9) est composée d'un deuxième rouleau supérieur (10) et d'un deuxième rouleau inférieur (11) présentant des axes de rotation parallèles et espacés mutuellement de telle façon que les parties de surface externe desdits rouleaux, les unes en face des autres, soient espacées seulement par un espace (13) correspondant sensiblement à l'épaisseur de l'objet (3) que l'on doit décorer, l'espace (13) étant réglable.

5. Dispositif selon les revendications 1 et 4, ***caractérisé par*** des moyens de réchauffement du deuxième rouleau supérieur (10) à une température d'environ

170 °C.

6. Dispositif selon les revendications 1, 2 et 4, ***caraciérisé en ce que*** les rouleaux (7, 8, 10, 11) sont tous faits d'un matériau résistant à haute température, par exemple en caoutchouc de silicone.

7. Dispositif selon les revendications précédentes, ***caractérisé en ce que*** les bouleaux (7, 8,10,11) ont une longueur suffisante pour permettre l'application des images (2) sur au moins deux objets (3) simultanément.

8. Dispositif selon la revendication 1, ***caractérisé en ce que*** le film anti-adhérant (1) est composé d'un matériau non extensible, par exemple avec du papier, ledit matériau étant recouvert de silicone ou d'autre matériau anti-adhérant sur les deux faces.

9. Dispositif selon la revendication 1, ***caractérisé en ce qu'***il permet l'application d'images (2) sur des surfaces étant légèrement convexes.

10. Procédé pour appliquer des images (2) sur des surfaces d'objets (3) sensiblement planes, utilisant le dispositif de la revendication 1, le procédé utilisant des encres sèches thermoplastiques et un film anti-adhérant (1) du type non-extensible, recouvert sur les deux faces avec un matériau anti-adhérant, par exemple avec du papier recouvert de silicone, adapté à agir comme soutien de ces images, le procédé comprenant les deux étapes suivantes:

- transfert d'images (2) du film anti-adhérant (1) vers la surface des objets (3);
- fixage et polissage des images transférées (2).

11. Procédé selon la revendication 10, utilisant le dispositif de la revendication 2, ***caractérisé en ce que*** le film anti-adhérant (1) a des images (2) sur sa face tournée vers le premier rouleau inférieur (8).

12. Procédé selon la revendication 10, utilisant le dispositif de la revendication 2, ***caractérisé en ce que*** le premier rouleau supérieur (7) est chauffé à une température d'environ 190 °C.

13. Procédé selon la revendication 12, ***caractérisé en ce que*** le transfert d'images (2) se produit en faisant passer les encres thermoplastiques de l'état en poudre sèche à un état plastique semi-liquide sous l'action soit de la chaleur produite par le premier rouleau supérieur (7) soit de la pression exercée par l'action combinée des deux premiers rouleaux (7, 8) simultanément sur le film anti-adhérant (1) et sur l'objet (3).

14. Procédé selon la revendication 13, ***caractérisé en ce que*** la température de chauffage du rouleau (7), pendant le transfert d'images (2) du film anti-adhérant (1) vers la surface des objets (3) que l'on doit décorer, permet de garder sensiblement intacte la couche du matériau anti-adhérant, par exemple en silicone, qui recouvre ledit film, ce qui évite d'éplucher ce film anfi-adhéraut ; de telle façon, le film anti-adhérant (1) reste sensiblement intact, étant donc apte à être utilisé à nouveau pour des utilisations successives.

15. Procédé selon la revendication 10, utilisant le dispositif de la revendication 4, ***caractérisé en ce que*** le deuxième rouleau supérieur (10) est chauffé à une température d'environ 170 °C.

16. Procédé selon la revendication 15, ***caractérisé en ce que*** le fixage et le polissage des images (2) sur la surface de l'objet (3) que l'on doit décorer, se produisent sous l'action combinée de la chaleur générée par le deuxième rouleau supérieur (10) et la pression exercée par l'action combinée des deuxièmes rouleaux (10, 11).

17. Procédé selon la revendication 16, ***caractérisé en ce que*** le deuxième rouleau supérieur (10) est humidifié avec de l'huile de silicone, ladite humidification étant adaptée pour empêcher le collage, sur ledit deuxième rouleau supérieur, de l'encre avec laquelle les images (2) déposées sur l'objet (3) sont constituées.

18. Procédé selon la revendication 10, ***caractérisé en ce qu'***il peut aussi être appliqué sur des surfaces qui sont légèrement convexes.

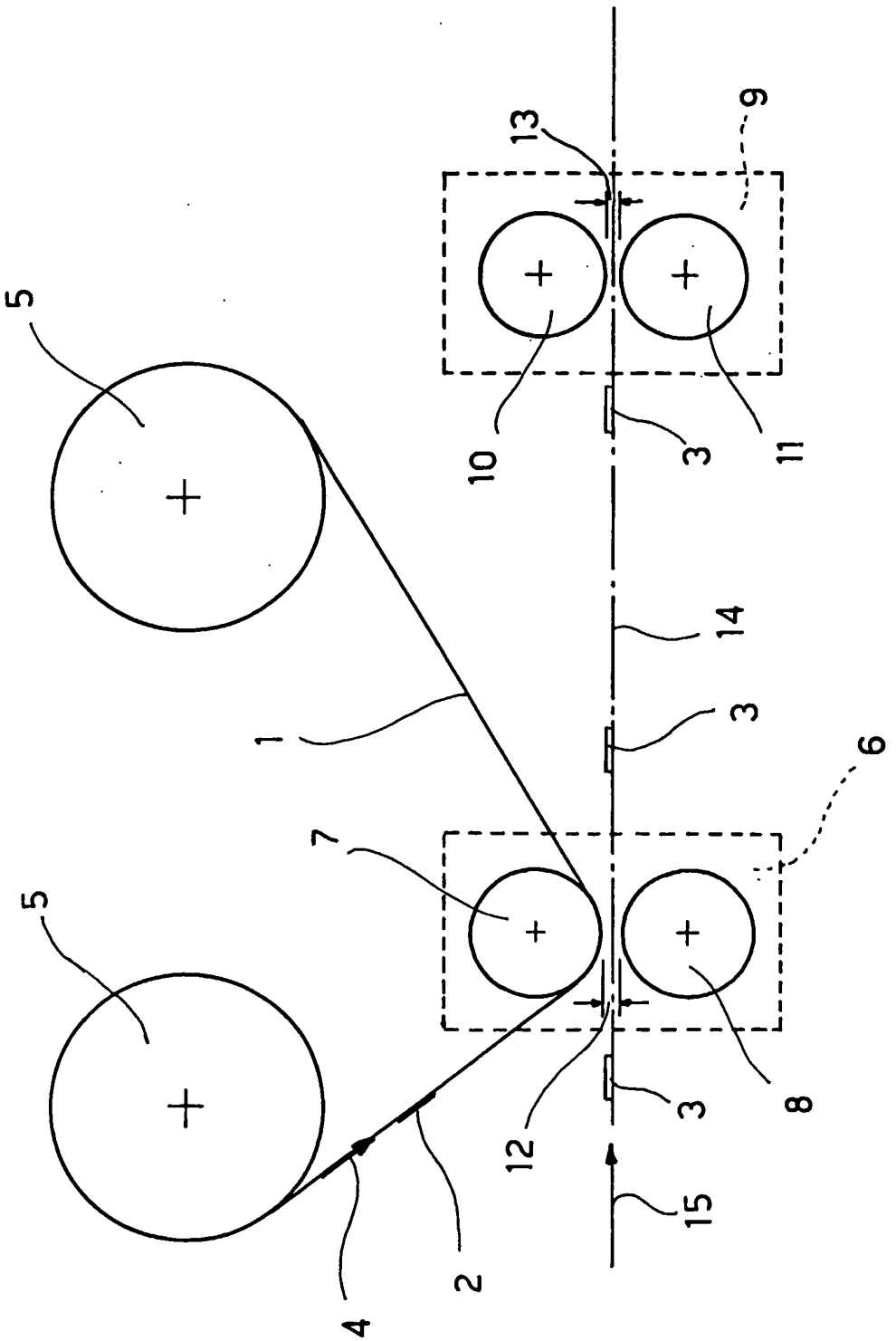

FIG.1

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- WO 02042092 A **[0015]**