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(54) **Apparatus and method for transferring graphic representations on an object by sublimation**

Vorrichtung und Verfahren zum Übertragen von grafischen Darstellungen auf Gegenstände durch Sublimation

Appareil et procédé pour transférer des représentations graphiques sur un objet par sublimation

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Description

[0001] The present invention relates to an apparatus and a method for transferring graphic representations on an object by sublimation.

[0002] It is currently known to transfer drawings or decorations, by sublimating inks on semifinished articles, extrudates, drafts, and other metallic and non-metallic objects, by wrapping the object to be decorated with an inked foil and, after making the foil adhere to the object by means of vacuum, for example, by heating sufficiently to sublimate the inks so that the graphic representation on the foil is transferred to the object.

[0003] Usually, vacuum is generated by one or more adapted sheaths of elastic material and templates or shapes are used to optimize the adhesion to the object.

[0004] Several people are generally required for wrapping the object with the foil.

[0005] For example, in case of a metal draft, or section bar, of 6 or 7 metres, at least ten people are necessary for the operation, and such expenditure of man power considerably increases manufacturing costs.

[0006] Furthermore, the use of templates or shapes entails their making and installation as well as the provision of a heat barrier which causes a less perfect sublimation of the inks or an excessive time for heating the foil and the object with the consequent waste of energy and slowing down of the operation.

[0007] The decorated object must also be properly packaged in order to protect its graphic representation during handling and storage.

[0008] DE-A-39 35 605 discloses an apparatus for transferring a colour pattern onto the surface of metallic hollow bodies. The pattern is carried by single sheets, which are picked up from a stack to be wrapped around the body to be decorated. The film-wrapped body is then heated in order to transfer the decoration by sublimation of the colour molecules.

[0009] WO 98/08694 discloses a method for decorating objects by thermal transfer of a pattern from a film, which is applied to the objects just on some portions of their surfaces. Adhesion of the film to said surfaces is obtained through the action of heated, rotating nip rolls suitably shaped to match with the shape of the corresponding surface portions.

[0010] WO 96/00658 discloses a device for decorating the surface of an object by sublimation, wherein the object with two decoration sheets is manually inserted into a bag made of a frame and two elastic membranes manually fastened to said frame to allow vacuum be generated inside the bag, so as to enable the elastic membranes to press the decorated sheets against the surface of the object.

[0011] An aim of the present invention is to eliminate the above cited drawbacks of the prior art.

[0012] An object of the invention is to provide an apparatus and a method, for transferring graphic representations on an object by sublimation, that allow to reduce

the heating time of the inked foil and the wrapped object and to improve or optimize the transfer by sublimation of the inks from the foil to the object, thereby increasing the production rate and reducing the costs.

[0013] A further object of the invention is to provide an apparatus and a method, for transferring graphic representations on an object by sublimation, that completely eliminate the use of labor for wrapping the article with the foil.

[0014] Still a further object of the invention is to provide an apparatus and a method, for transferring graphic representations on an object by sublimation, that eliminate the use of shapes and templates for decorating the article.

[0015] The above aims, and other aims that will be more apparent hereinafter, are achieved according to the invention by an apparatus for transferring graphic representations on an object by sublimation, as claimed by claim 1.

[0016] The present invention also relates to a method for transferring graphic representations on an object by sublimation, as claimed by claim 12.

[0017] Further characteristics and advantages of the invention will be more apparent by the following description of an apparatus and a method for transferring graphic representations on an object by sublimation, according to the invention, illustrated, by way of example in the enclosed drawings in which

FIG. 1 is a schematic top plan view of the apparatus according to the invention;

FIGs 2 and 3 are schematic side views of the apparatus showing the packing, sealing and tensioning means;

FIG. 4 schematically shows the vibrating heads for the ultrasound welding of the inked foil, according to the invention;

FIG. 5 schematically shows the composition of the inked foil, according to the invention; and

FIGs. 6, 7 and 8 schematically show how the inks are sublimated on the object according to the invention.

[0018] With reference to the above figures, the apparatus for transferring graphic representations on an object by sublimation, according to the invention, globally designated by the reference numeral 1, comprises vacuum means for generating a vacuum for allowing a graphic representation, provided on a foil shaped support 3, to adhere to an object, for example a section bar 2.

[0019] The apparatus also comprises a transfer means 4 for transferring the graphic representation provided on the foil to the object 2 by sublimation.

[0020] The apparatus comprises a packing means for automatically wrap an object, for example the section bar 2 with the foil 3.

[0021] In particular, the packing means comprises seal means 6 of the front portion 7 and lower portion 8 of the foil, with respect of section bar 2.

[0022] The packing means also comprises a tensioning means for the foil 3, as explained in greater detail later.

[0023] In particular, the packing means comprises at least one frictioned roll 9 adapted to allow the foil 3 to unroll continuously above a foil guide 10, substantially shaped as a tubular cylinder, with the aid of a deflector cylinder 11.

[0024] The section bar 2, or the object, to be decorated is passed inside the foil guide 10 so that the foil 3 is arranged across the foil guide 10 with its front and lower portions presented to the seal means 6. In this manner the portions are sealed together, preferably by thermal welding, thus providing a tubular bag wherein the section bar 2 is arranged.

[0025] According to a first embodiment, the seal means comprises a pair of heated rolls 12 having a rotation speed substantially equal to the feed rate of the section bar 2 inside the foil guide 10.

[0026] According to a variated embodiment, the seal means 6 comprises at least one vibrating head and a counter-head 13 adapted to seal the foil edges by means of ultrasound. In this case, the vibrating speed of the vibrating head 13 is suited to the feed rate of the section bar 2 inside the foil guide 10 so that the sealing operation is continuous.

[0027] The tensioning means of foil 3 comprises a first tensioning gripper 15 adapted to grip the two front edges of foil 3 in order to tension foil 3 longitudinally and transversely along the entire extension of the object, in this case along the extension of the section bar 2.

[0028] In this manner, the first gripper 15 prevents the foil 3 from folding or creasing along the section bar 2 thus improving the formation of vacuum between the foil 3 and the surfaces of the section bar 2, thereby optimizing the foil/object coupling and allowing all the decoration surfaces to be in contact with all the object surfaces.

[0029] The tensioning means also comprises at least a second gripper 16 for retaining the foil 3 in the back of the object and particularly, in the illustrated cases, in the back of the section bar as illustrated in FIG. 4.

[0030] The vacuum means comprises a vacuum pump 17 connected to the foil 3 and particularly to the tubular bag defined around the section bar 2, by means of a channel 18 having an opening in the bag formed by foil 3.

[0031] Channel 18 may be arranged inside or outside the cylindrical foil guide 10 and may be fixed or extensible as preferred.

[0032] The second gripper 16 tends to close the back edges 20 of the foil 3 together, at the opening 19 of channel 18, in order to generate a seal between the edges

20 and the channel 18 thus generating a vacuum inside the bag formed by the foil. This allows the foil 3 to perfectly adhere to the entire surface of section bar 2 to be inked, regardless of the shape of the section bar and without using shapes or templates.

[0033] Once the apparatus has completed the wrapping of foil 3 around the object to be decorated, for example a section bar 2, the section bar 2 and the foil 3 are heated by a transfer means 4 adapted to transfer the graphic representation provided on the foil 3 to the section bar 2 by sublimation.

[0034] In particular, according to a preferred embodiment of the invention, the transfer means 4 comprises at least one solenoid 23 which effects the heating of foil 3 and of section bar 2 optimizing the transfer of ink on the section bar by virtue of the heating by induction that heats the metallic support and therefore promotes the transfer of ink by sublimation to the support without any inconvenience in contrast to the heating by hot air.

[0035] In fact, the use of hot air, for example by means of an oven, entails a greater energy consumption and more heating time.

[0036] On the contrary, the heating by induction is faster and therefore lowers the production costs.

[0037] Furthermore, solenoid 23 may run along the section bar 2 or may be fixed.

[0038] According to a preferred embodiment, the section bar is heated by passing a current through it, of a preset magnitude and for a certain time, making the section bar behave as a resistance.

[0039] The heating temperature of the section bar, when the current flows through it, may be conveniently measured by computing its resistivity by means of a PLC in order to monitor the temperature of the metal directly rather than indirectly as in the conventional measurement systems.

[0040] Furthermore, the present system for heating the section bar entails a reduced energy consumption, as well as rapid detecting and heating times, with respect of conventional methods.

[0041] Foil 3 is made of a thermoresistant plastics which may be thermo-retracting or thermo-expanding.

[0042] In particular, foil 3 has at least a first polyester layer 30, a second layer 31 having an aluminum metalization, and a third layer 32 having the sublimation ink to contact the surfaces of the object to be decorated.

[0043] Occasionally, when heating the section bar, moisture contained in the polymerized paint evaporates generating gas pockets that may detach foil 3 from the surfaces to be decorated. In such cases, to prevent this inconvenience, foil 3 has at least one layer of porous material adapted to absorb the moisture and thus to prevent the formation of gas and/or to ease its removal by means of the vacuum pump.

[0044] In particular foil 3 has at least an intermediate layer after the first impermeable layer 30, made for example of polyester, polyurethane, silicone rubber, etc., and the second layer 31 having an aluminum metaliza-

tion or similar. The intermediate layer may be of MAT fiber, cotton, etc., and is comprised between the second layer 31 and the third layer 32 having the sublimation ink.

[0045] Preferably foil 3 has the intermediate layer made of permeable material instead of the second layer 31 (metalization), i.e. directly between the first impermeable layer 30 and the third layer 32 having the sublimation ink.

[0046] In this manner, foil 3 allows the thermal welding of its edges and a perfect adherence to the metallic section bar 2 without the use of shapes, templates or elastic sheaths. The foil 3 thus provided also allows to use the induction heating, thus saving energy and speeding up the production process. The foil 3 thus conceived also provides a protection around the object during its handling and storage thus preventing a supplemental operation of packaging of the object once treated.

[0047] The method according to the invention is also advantageous in allowing to automatically put the object or section bar 2 into a bag made of the inked foil and to generate a vacuum between the section bar 2 and the foil before transferring the graphic representation on the section bar by sublimation.

[0048] Conveniently, during the transfer by sublimation of the graphic representation on the section bar 2, which occurs by induction heating the section bar 2 and the foil 3 by means of a solenoid, a vacuum is constantly kept between the foil and the section bar in order to prevent the formation of air pockets that by heating would increase their volume thus generating a non precise transfer of the ink from the foil 3 to the section bar 2.

[0049] The operation of the apparatus according to the invention is apparent from the above description.

[0050] In particular, it is noted that after pre-treating the object or section bar 2 by degreasing, chroming, anode oxidation or other paint pre-treating processes, the object is painted with liquid paints or curing powders or paint adapted to the sublimation process or transfer print.

[0051] Then, the section bar 2 is passed inside the tubular foil guide 10 and at the same time the foil 3 is unwound from the roll 9 above the foil guide 10 so that its lower edges 8 may be welded in order to provide a bag shaped as a tubular film wrapped around the section bar.

[0052] As the section bar 2 advances, the bag formed by the foil 3 is pulled by a first gripper 15 in order to prevent the formation of folds or creases along its transversal and longitudinal extension.

[0053] When the section bar 2 exits the foil guide 10, as illustrated in FIG. 4, the second gripper 16 closes the back edges 20 of the bag, defined by the foil 3, above channel 18 through which vacuum will be generated inside the bag.

[0054] According to a further embodiment, by means of the first tensioning gripper 15, foil 3 is laid on a plane having a sucking means adapted to keep the foil into

position. In particular, foil 3 has a first portion lying on the plane while a second portion protrudes outside the plane and rests on a bar of suitable length and parallel to the plane. The bar too has sucking means adapted to keep the second edge of the second portion of foil lying outside said plane.

[0055] Section bar 2 is laid on the first portion of the foil which is laid down on said plane and by means of two arms - not illustrated in the drawings - pivoted on the plane, said bar is rotated through 180°, about the pivot axis of the arms, in order to cover the section bar 2 with the second portion of the foil external to said plane. In this manner, the second edge of the second portion of foil, born by the bar, protrudes from the first edge of the first portion laid on the plane.

[0056] The sucking on the bar is stopped and sucking is activated below the second edge of the foil protruding from the first edge.

[0057] Then, the first edge is sealingly secured to the second edge of the foil by means, for example, of a carriage - not illustrated in the drawings - running along the plane. Such connection between the two edges of the foil may be performed, as preferred, by a double adhesive, ultrasound, thermal welding, etc.

[0058] Then, all the previously described operations are performed in order to obtain the packing of the section bar 2 inside the foil 3 and the transfer of ink by sublimation.

[0059] It has been seen in practice how the apparatus and the method according to the invention are particularly advantageous in completely eliminating manual labor for wrapping an object with an inked foil for transferring ink from one to the other by sublimation.

[0060] Furthermore, it is possible to optimize the transfer by sublimation of the inks from the foil to the object with respect to the time and the quality of the transfer.

[0061] In order to prevent the formation of folds and creases of the foil on the section bar, the thickness of the bag may be varied or an antifriction material may be used on the section bar or inside the bag.

[0062] Furthermore, the apparatus according to the invention may be provided, as preferred, in one piece or subdivided in several working stations.

[0063] For example, the packing means may be used separately from the vacuum and heating means which may be constituted by conventional machinery.

[0064] The materials employed, as well as the dimensions, may be any according to the specific needs and the state of the art.

Claims

1. An apparatus for transferring graphic representations from a foil shaped support (3) to an object (2) by sublimation, comprising transfer means (4) for transferring said graphic representations from the

foil (3) to the object (2) by sublimation and packing means for wrapping said object (2) with the foil (3), **characterized in that** it comprises vacuum means (17) for generating a vacuum for making the graphic representation, provided on said foil shaped support (3), adhere to the object (2), and **in that** the packing means allow foil to be continuously unwound for automatically wrapping said object (2) with the foil (3) to form a substantially tubular bag containing said object (2).

2. The apparatus according to claim 1, **characterized in that** said packing means comprises a sealing means (6) for sealing at least the lower (8) portions of said foil (3) with respect of said object (2).

3. The apparatus according to claim 1, **characterized in that** said packing means comprises tensioning means (15, 16) of said foil (3).

4. The apparatus according to claim 2, **characterized in that** said packing means comprises at least one roll (9) supporting said foil (3) which is continuously unwound from said roll (9) above a substantially cylindrical foil guide (10) wherein said object (2) is made to pass, said foil (3) having such a size as to have its edges engaging said sealing means (6).

5. The apparatus according to claim 4, **characterized in that** said sealing means (6) is adapted to sealingly thermally weld at least the lower (8) edges of said foil (3) in order to create a bag wherein said object (2) is arranged.

6. The apparatus according to claim 2, **characterized in that** said sealing means comprises at least one vibrating head (13) for sealing said foil (3) by ultrasound.

7. The apparatus according to claim 3, **characterized in that** said tensioning means comprises at least one first tensioning gripper (15) engaging the front edges (17) of said foil (3) to tension said foil longitudinally and transversely along said object (2).

8. The apparatus according to claim 3, **characterized in that** said tensioning means comprises at least one second gripper (16) for retaining said foil (3) behind said object (2).

9. The apparatus according to claim 1, **characterized in that** vacuum means comprises at least one vacuum pump (17) connected to said foil (3), arranged as a tubular bag around said object (2), through a channel (18) having an opening (19) inside said bag.

10. The apparatus according to claims 8 and 9, **char-**

acterized in that said second gripper (16) closes said bag in the back proximate to said opening (19) of said channel (18).

5 11. The apparatus according to claims 4 and 9, **characterized in that** said channel (18) is arranged inside said cylindrical foil guide (10).

10 12. A method for transferring graphic representations from a foil shaped support (3) to an object (2) by sublimation, **characterized by** comprising, after pre-treating and painting the object (2), automatically wrapping said object (2) with a continuously unwound foil (3) made of a substantially airtight material and having, on the surface thereof facing said object, the graphic representation to be transferred on the object, sealing said foil (3) in order to create a substantially closed, tubular bag containing said object (2) and generating vacuum between the foil (3) and the object (2) before transferring said graphic representation from the foil (3) to the object (2) by sublimation.

15 13. The method according to claim 12, **characterized in that** said transfer of graphic representation on said object (2) by sublimation is effected by induction and that during said transfer vacuum is maintained between said substantially closed foil (3) and said object (2).

20 14. The method according to claim 12, **characterized in that** it comprises resting said object (2) on a first portion of said foil (3) lying on a plane, covering said object (2) with the remaining second portion of said foil (3) so that a first edge of said first portion of the foil can be sealed with a second edge of said second portion of the foil, and sealing the head and tail of said foil (3) to provide vacuum between said foil (3) and said object (2).

25 15. The method according to claim 14, **characterized in that** said object (2) is covered by rotating a second edge retaining bar through about 180°, said bar being provided with sucking means to retain said second edge.

Patentansprüche

30 1. Vorrichtung zum Übertragen von graphischen Darstellungen von einer folienförmigen Unterlage (3) auf Gegenstände (2) durch Sublimation, umfassend Übertragungsmittel (4), um die graphischen Darstellungen durch Sublimation von der Folie (3) auf den Gegenstand (2) zu übertragen, und Einsackmittel, um den Gegenstand (2) mit der Folie (3) zu umhüllen, **dadurch gekennzeichnet dass** sie Vakuumerzeugungsmittel (17) umfasst, um am Ge-

- genstand (2) die an der folienförmigen Unterlage (3) vorhandene graphische Darstellung zum Anhaften zu bringen und dadurch, dass die Einsackmittel der Folie erlauben, durchgehend abgezogen zu werden, um den Gegenstand (2) mit der Folie (3) zur Bildung eines im wesentlichen schlauchförmigen, den Gegenstand (2) beinhaltenden Sack automatisch zu umhüllen.
2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Einsackmittel Versiegelungsmittel (6) zum Versiegeln mindestens der unteren Abschnitte (8) der Folie (3) gegenüber dem Gegenstand (2) zu versiegeln.
3. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Einsackmittel Spannmittel (15, 16) zum Spannen der Folie (3) umfassen.
4. Vorrichtung nach Anspruch 2, **dadurch gekennzeichnet, dass** die Einsackmittel mindestens eine die Folie (3) tragende Rolle (9) umfassen, wobei die Folie kontinuierlich von der Rolle (9) oberhalb eines im wesentlichen zylindrischen Folienführers (10) abgezogen wird, in dem der Gegenstand (2) hindurchgeführt wird, wobei die Folie (3) derartige Abmessungen aufweist, dass ihre Lappen mit den Versiegelungsmitteln (6) in Eingriff kommen.
5. Vorrichtung nach Anspruch 4, **dadurch gekennzeichnet, dass** die Versiegelungsmittel (6) fähig sind, mindestens die unteren Lappen (8) der Folie (3) derart dicht heiß zu verschweißen, dass ein Sack hergestellt wird, in dem der Gegenstand(2) aufgenommen ist.
6. Vorrichtung nach Anspruch 2, **dadurch gekennzeichnet, dass** die Versiegelungsmittel mindestens einen Vibrierkopf (13) zum Ultraschallversiegeln der Folie (3) umfassen.
7. Vorrichtung nach Anspruch 3, **dadurch gekennzeichnet, dass** die Spannmittel mindestens einen ersten Spanngreifer (15) erfassen, der die Vorderlappen (7) der Folie (3) ergreift, um die Folie längs und quer zum Gegenstand (2) in Spannung zu versetzen.
8. Vorrichtung nach Anspruch 3, **dadurch gekennzeichnet, dass** die Spannmittel mindestens einen zweiten Greifer (16) zur Behandlung der Folie (3) auf der Hinterseite des Gegenstandes (2) umfassen.
9. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Vakuumerzeugungsmittel mindestens eine Vakuumpumpe (17) umfassen, die mit der als Schlauchsack um den Gegenstand (29) herum angeordneten Folie (3) mittels eines Kanals (18) mit einer Öffnung (19) innerhalb des Sackes verbunden ist.
10. Vorrichtung nach Anspruch 8 und 9, **dadurch gekennzeichnet, dass** der zweite Greifer (16) den Sack hinten in der Nähe der Öffnung (19) des Kanals (18) schließt.
11. Vorrichtung nach Anspruch 4 und 9, **dadurch gekennzeichnet, dass** der Kanal (18) innerhalb des zylindrischen Folienführers (10) angeordnet ist.
12. Verfahren zum Übertragen von graphischen Darstellungen von einer folienförmigen Unterlage (3) auf Gegenstände (2) durch Sublimation, **dadurch gekennzeichnet, dass** es nach einer Vorbehandlung und der Lackierung des Gegenstandes (2) die automatische Umhüllung des Gegenstandes (2) mit einer durchgehend abgezogenen Folie (3) umfasst, die in einem wesentlichen luftdichten Material ausgeführt ist und auf ihrer in Richtung des Gegenstandes gerichteten Oberfläche die auf den Gegenstand zu übertragende graphische Darstellung aufweist, das Versiegeln der Folie (3) zur Schaffung eines im wesentlichen geschlossenen, den Gegenstand (2) aufnehmenden, schlauchförmigen Sackes und die Vakuumerzeugung zwischen der Folie (3) und dem Gegenstand (2) vor der Übertragung durch Sublimation der graphischen Darstellung von der Folie (3) auf den Gegenstand (2).
13. Verfahren nach Anspruch 12, **dadurch gekennzeichnet, dass** die Übertragung durch Sublimation der graphischen Darstellung auf den Gegenstand (2) durch Induktion erfolgt und dass während dieser Übertragung das Vakuum zwischen der im wesentlichen geschlossenen Folie (3) und dem Gegenstand (2) beibehalten wird.
14. Verfahren nach Anspruch 12, **dadurch gekennzeichnet, dass** der Gegenstand (2) zuerst auf einem ersten, auf einer Ebene angeordneten Abschnitt der Folie (3) zum Aufliegen gebracht wird, dann mit dem bleibenden, zweiten Abschnitt der Folie (3) derart überzogen wird, dass ein erster Lappen des ersten Abschnitts der Folie mit einem zweiten Lappen des zweiten Folienabschnittes versiegelt werden kann, wobei dann der Kopf und das Ende der Folie (3) versiegelt werden, um das Vakuum zwischen der Folie (3) und dem Gegenstand (2) zu erzeugen.
15. Verfahren nach Anspruch 14, **dadurch gekennzeichnet, dass** der Gegenstand (2) überzogen wird, indem ein Haltebalken des zweiten Lappens um 180° verschwenkt wird, wobei der Haltebalken mit Ansaugmitteln zum Zurückhalten des zweiten

Lappens versehen ist.

Revendications

1. Appareil pour transférer des représentations graphiques d'un support en forme de feuille (3) à un objet (2) par sublimation, comprenant des moyens de transfert (4) pour transférer lesdites représentations graphiques de la feuille (3) à l'objet (2) par sublimation et des moyens d'emballage pour envelopper ledit objet (2) dans la feuille (3), **caractérisé en ce qu'il** comporte des moyens à vide (17) pour créer le vide de manière à causer l'adhésion de la représentation graphique, prévue sur ledit support en forme de feuille (3), à l'objet (2), et **en ce que** les moyens d'emballage permettent à la feuille d'être déroulée en continu pour envelopper automatiquement ledit objet (2) dans la feuille (3) à former un sac essentiellement tubulaire contenant ledit objet (2).
2. Appareil selon la revendication 1, **caractérisé en ce que** lesdits moyens d'emballage comportent des moyens d'étanchéité (6) pour fermer de manière étanche au moins les portions inférieures (8) de ladite feuille (3) par rapport audit objet (2).
3. Appareil selon la revendication 1, **caractérisé en ce que** lesdits moyens d'emballage comportent des moyens de tensionnage (15, 16) destinés à tendre ladite feuille (3).
4. Appareil selon la revendication 2, **caractérisé en ce que** lesdits moyens d'emballage comportent au moyen un rouleau (9) supportant ladite feuille (3) qui est déroulée en continu dudit rouleau (9) au-dessus d'un guidage de feuille (10) essentiellement cylindrique dans lequel on cause le passage dudit objet (2), ladite feuille (3) ayant une telle dimension que ses bords engagent les moyens d'étanchéité (6).
5. Appareil selon la revendication 4, **caractérisé en ce que** lesdits moyens d'étanchéité (6) sont aptes à souder par voie thermique, de manière étanche, au moins les bords inférieurs (8) de ladite feuille (3) pour créer un sac dans lequel est disposé ledit objet (2).
6. Appareil selon la revendication 2, **caractérisé en ce que** lesdits moyens d'étanchéité comportent au moins une tête à vibration (13) pour la fermeture étanche de ladite feuille (3) par ultrasons.
7. Appareil selon la revendication 3, **caractérisé en ce que** lesdits moyens de tensionnage comportent au moins une première pince de tensionnage (15)

engageant les bords avant (17) de ladite feuille (3) pour tensionner ladite feuille en sens longitudinal et transversal le long dudit objet (2).

- 5 8. Appareil selon la revendication 3, **caractérisé en ce que** lesdits moyens de tensionnage comportent au moins une deuxième pince (16) pour retenir ladite feuille (3) derrière ledit objet (2).
- 10 9. Appareil selon la revendication 1, **caractérisé en ce que** les moyens à vide comportent au moins une pompe à vide (17) reliée à ladite feuille (3), disposée en forme de sac tubulaire autour dudit objet (2), à travers un canal (18) ayant une ouverture (19) à l'intérieur dudit sac.
- 15 10. Appareil selon les revendications 8 et 9, **caractérisé en ce que** ladite deuxième pince (16) ferme ledit sac à la partie arrière proche de ladite ouverture (19) dudit canal (18).
- 20 11. Appareil selon les revendications 4 et 9, **caractérisé en ce que** ledit canal (18) est disposé à l'intérieur dudit guidage de feuille cylindrique (10).
- 25 12. Procédé pour transférer des représentations graphiques depuis un support en forme de feuille (3) à un objet (2) par sublimation, **caractérisé en ce qu'il** comporte, après traitement préalable et peinture de l'objet (2), l'enveloppement automatique dudit objet (2) dans une feuille déroulée en continue (3) réalisée en une matière essentiellement étanche à l'air et ayant, sur sa surface en vis-à-vis de l'objet, la représentation graphique qui doit être transférée sur l'objet, la fermeture étanche de ladite feuille (3) pour créer un sac tubulaire essentiellement fermé contenant ledit objet (2), et la création du vide entre la feuille (3) et l'objet (2) avant de transférer ladite représentation graphique de la feuille (3) à l'objet (2) par sublimation.
- 30 13. Procédé selon la revendication 12, **caractérisé en ce que** ledit transfert de la représentation graphique sur ledit objet (2) par sublimation est effectué par induction et **en ce que** pendant ledit transfert on maintient le vide entre ladite feuille essentiellement fermée (3) et ledit objet (2).
- 35 14. Procédé selon la revendication 12, **caractérisé en ce qu'il** comporte la mise en appui dudit objet (2) sur une première portion de ladite feuille (3) disposée sur un plan, la couverture dudit objet (2) avec la deuxième portion restante de ladite feuille (3) de telle sorte qu'un premier bord de ladite première portion de la feuille peut être soudé à un deuxième bord de ladite deuxième portion de la feuille, et la fermeture étanche de la tête et de la queue de ladite feuille (3) pour créer le vide entre ladite feuille (3)
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et ledit objet (2).

15. Procédé selon la revendication 14, **caractérisé en ce que** la couverture dudit objet (2) a lieu par rotation de 180° d'une barre de retenue du deuxième bord, ladite barre étant munie de moyens d'aspiration pour retenir ledit deuxième bord.

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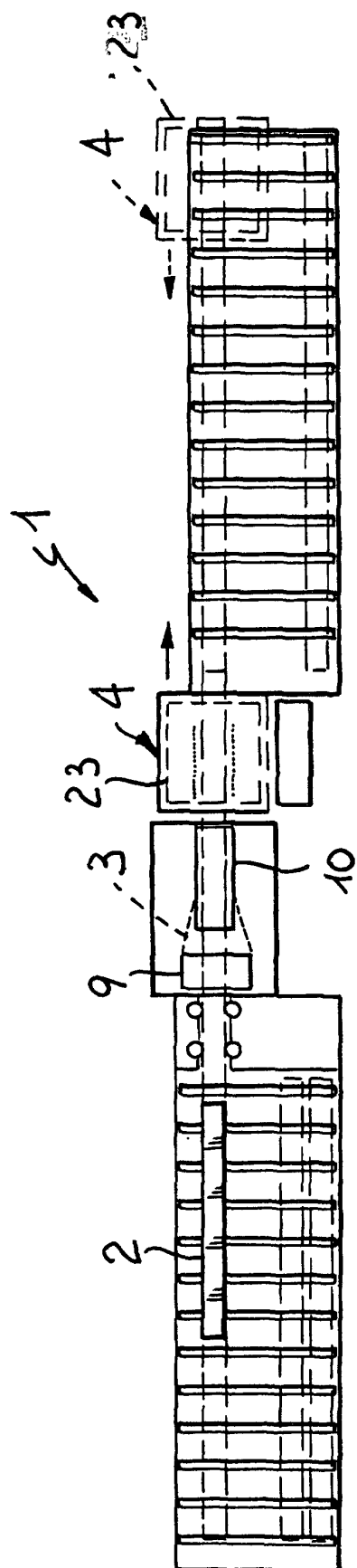


Fig. 1

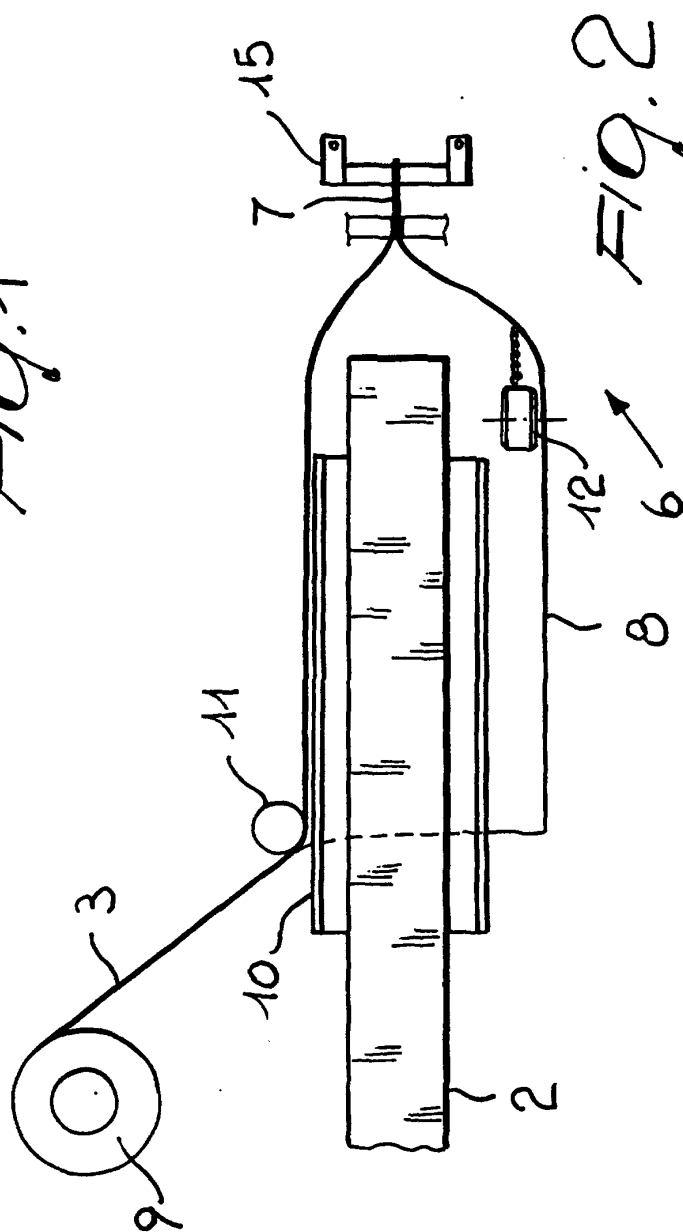
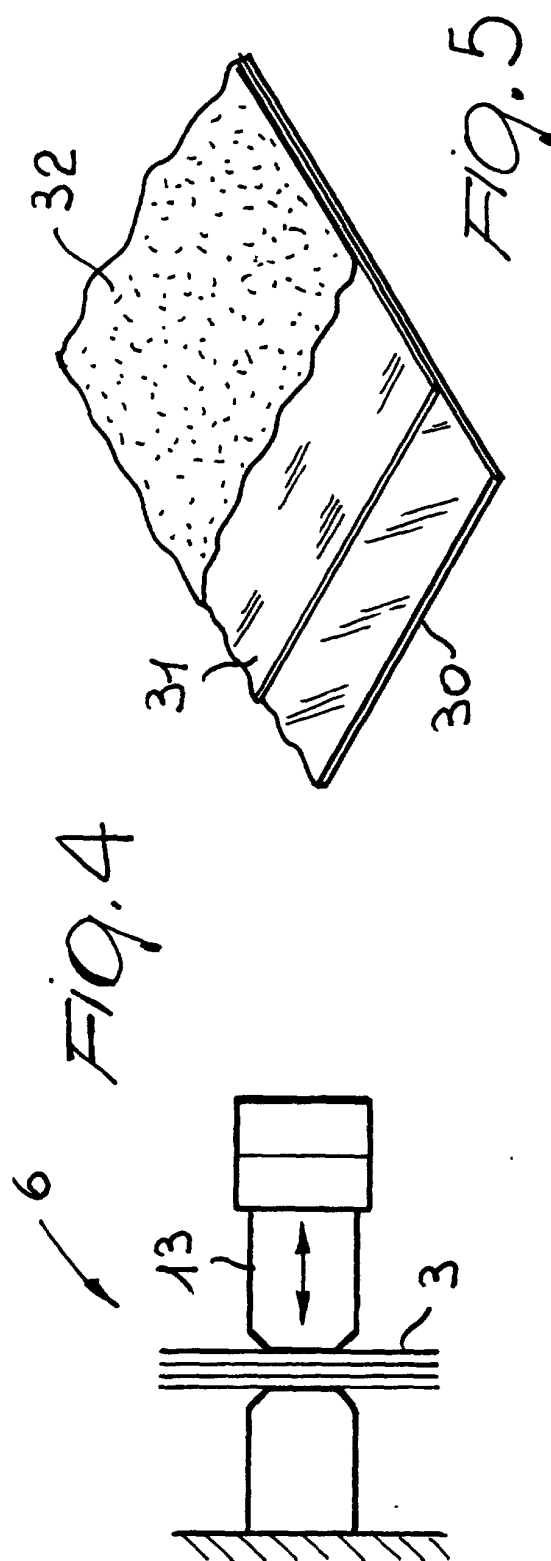
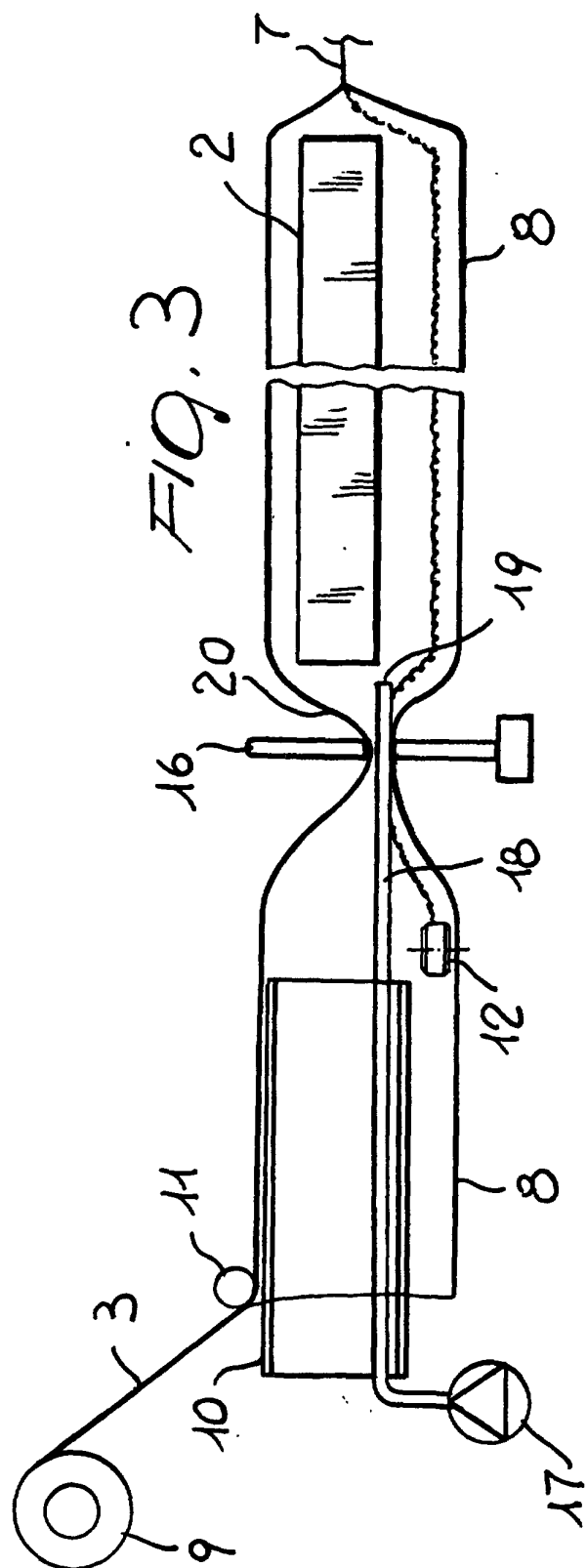


Fig. 2



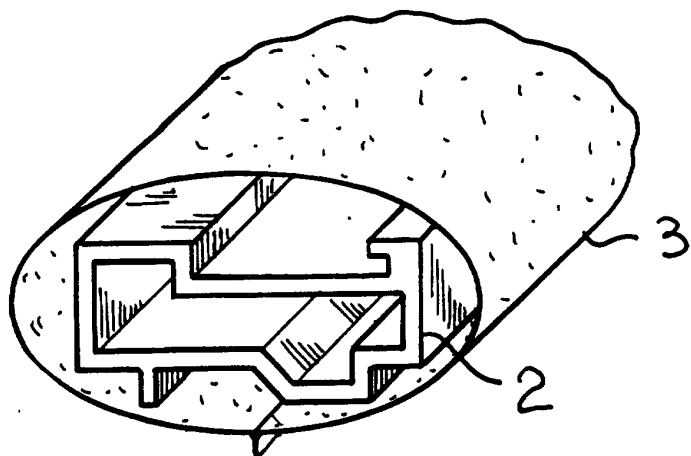


Fig. 6

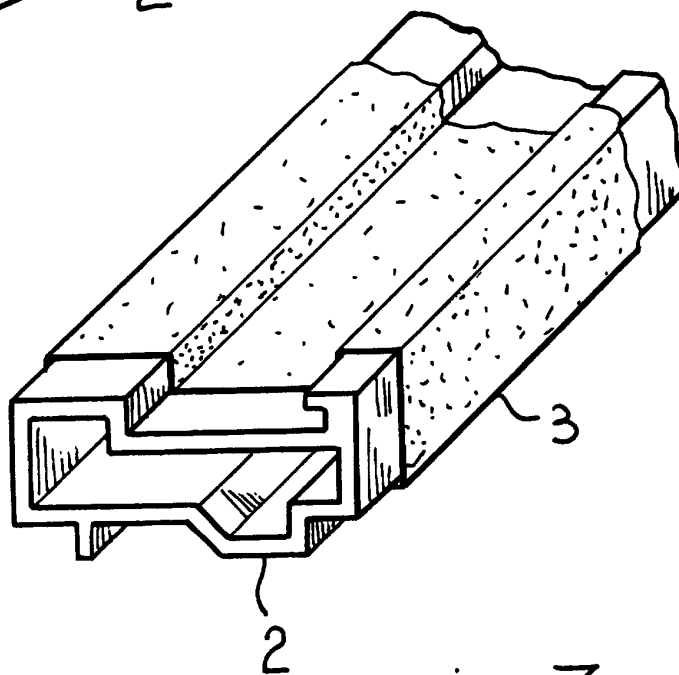


Fig. 7

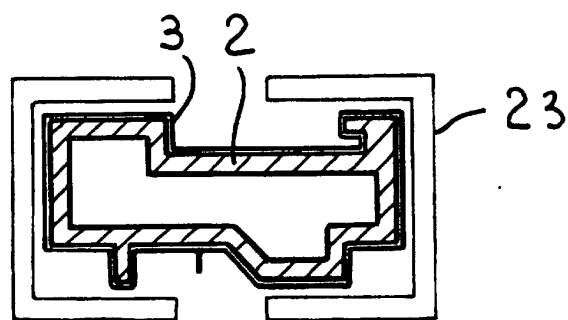


Fig. 8