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(54) Method to produce decorative lining sheet for furniture elements and lined elements for furniture items of a container type thus produced.

(57) Method to produce decorative lining sheet for furniture elements, the lining sheet (11) consisting of a neutral sheet of polyolefin or polystyrene (13) which is decorated thereafter by means of a rotogravure printing operation (22).

Method to produce decorative lining sheet for furniture elements, the lining sheet (11) consisting of a neutral sheet of polyolefin or polystyrene (13) which is decorated thereafter by means of a transfer printing operation (16).

Lined element for furniture items of a container type, which element consists of a filler core (21) lined with a lining sheet (11) consisting of a decorated sheet of polyolefin or polystyrene (13) made by one or the other of the above methods after application of a layer of thermo-activated adhesive.

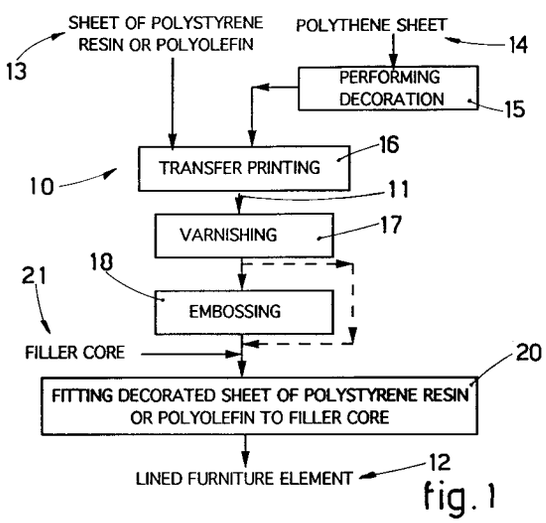

fig. 1

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This invention concerns a method to produce decorative lining sheet for furniture elements and lined elements thus produced for furniture items of a container type, such as cupboards, etc., as set forth in the respective main claims.

To be more exact, this invention concerns a method to produce a decorative lining sheet which is applied to suitably shaped filler cores so as to form lined elements for furniture items of a container type.

The invention is applied to the furniture industry and especially to the production of lined elements for furniture items of a container type, the elements including a filler core of compressed wood chips, medium density fibreboard or foamed material and having their front surface smooth or shaped with mouldings, cornices, ornaments, etc.

The lined elements made for furniture items of a container type by the method according to the invention can be used in the production of furniture either as sidewalls or work surfaces, or as small doors and/or doors for cupboards, etc.

Lined elements for furniture items of a container type, such as cupboards, etc., where the elements consist of a shaped filler core generally composed of compressed wood chips, medium density fibreboard or foamed material lined on one or more faces with a decorative sheet of a plastic material, are included in the state of the art.

The plastic material most commonly used nowadays is PVC. The PVC sheet is supplied at present in rolls and is printed with a roller that prints the desired decorative design on the PVC.

The decorated PVC sheet is varnished thereafter for protective purposes and is possibly embossed to obtain in relief the imprint of the design, with a view to designing the pores of the wood, for instance.

This method requires great investments owing to the high cost of the rollers that print the PVC sheet. These high costs do not allow the production of small quantities of PVC sheets decorated with a particular design inasmuch as only a considerable production of PVC sheets with a particular design can justify the investments involved by these printing rollers.

For this reason only big plants to produce decorated PVC sheets exist at the present time, and these big plants therefore supply only big quantities with resulting high plant costs and long delivery times for the material.

Moreover, the decoration and colours produced on the PVC sheets possess a definition which is not always satisfactory from an aesthetic point of view.

Furthermore, where the lined elements for furniture items of a container type include hollows and/or protrusions, the PVC sheet has to be deformed in the hot state so as to adhere to these complex surfaces.

This deformation produces stretching and division of the design and/or colours into small grains with an effect which may make the finished product unacceptable to users.

Besides, regulations which have been in force for some time now in some countries and which will be applied in other countries in the future have put PVC linings out of the market for reasons of toxicity, above all with a view to preventing contact between the PVC and foodstuffs.

For some time now the present applicants have tackled the problem of seeking a new material to replace PVC in the production of the decorative lining sheet; such new material has to be at the same time non-toxic and easy to decorate with good aesthetic results at relatively low costs and be available in lots of small dimensions.

The present applicants have investigated, tested and accomplished this invention so as to overcome the shortcomings of the state of the art and to achieve further advantages.

This invention is set forth and characterised in the respective main claims, while the dependent claims describe variants of the idea of the main solution.

The purpose of this invention is to provide a method for the production of decorative lining sheets for lined elements for use in furniture items of a container type and also to provide the lined elements for furniture items of a container type thus produced.

These lined elements can be employed as doors, work surfaces, walls, etc. in the construction of the furniture items of a container type.

According to the invention the decorative lining sheet consists of a neutral sheet of styrene resin or polyolefin which is decorated thereafter according to one of the methods described hereinafter.

The type of styrene resin employed may be, for instance, polystyrene, methacrylate or ABS, whereas the polyolefin used may consist, for instance, of polythene or polypropylene with some technical-productive contrivances according to the application in question.

The word "neutral" is used here to show that the sheet of polystyrene or polyolefin is without any decoration.

The neutral sheet of polystyrene or polyolefin is produced with techniques of the state of the art, for instance by extrusion of the granules of resin; the sheet thus obtained is then decorated with the desired decorative design.

The decorated sheet of polystyrene or polyolefin then undergoes a varnishing step for protective purposes and is possibly embossed to produce designs in relief on its surface.

According to a first arrangement of the invention the step of decoration of the sheet of polystyrene or polyolefin is carried out by transfer printing of the type employed for printing decorations on woven fabrics.

Transfer printing methods using dry heat of the Sublistatic, Thermochrome, conventional heat or infrared vacuum types may be employed.

Depending on the transfer printing method employed, the desired decorative design imparted in a counterpart form to a supporting substratum consisting, for instance, of a sheet of polythene or paper is transferred by the combined action of heat and pressure or by sublimation of dyes onto the sheet of polystyrene or polyolefin.

In the event of transfer printing by the combined action of heat and pressure, the transfer of the decorative design from the supporting substratum to the sheet of polystyrene or polyolefin is carried out by calendering, for instance, by passing the two facing sheets through a pair of suitably heated rollers pressed together.

The fields of pressure employed in the method according to the invention are between about 8 and 15 bar on the pressure roller, while the working temperature in the zone of contact is between about 105° and 130°C.

According to a second arrangement of the invention the step of decoration of the sheet of polystyrene or polyolefin is carried out by the rotogravure method used, for instance, to print newspapers.

Rotogravure for transfer of decorative designs to the sheet of polystyrene or polyolefin differs substantially from the printing of newspapers owing to the substantial difference of the inks employed, the working temperatures during drying of the inks and the different speeds of application.

Moreover, unlike the method for the printing of newspapers, the decorative designs in the method according to the invention are etched directly on the roller.

In both the first and second methods the ink employed to produce the design has to be suitable to produce designs on the sheet of polystyrene or polyolefin. In fact, the type of ink employed in the method according to the invention is different from those used at present in transfer printing on woven fabrics or hides owing to its greater mechanical strength and to its special feature of not becoming yellow in the long term.

The lining sheet thus produced is then applied by means of a method of the state of the art to a suitably shaped filler core consisting of compressed wood chips, medium density fibreboard or foamed material.

With the method according to the invention the costs of production of the decorative lining sheet are considerably less inasmuch as the cost of the roller to produce the decoration on the supporting substratum is much lower than the cost of the roller used to print the PVC.

Moreover, the lower cost of the equipment for the transfer printing or rotogravure enables smaller plants to be set up which are depreciated with much smaller quantities of decorated sheets.

Thus a much more flexible and versatile method is achieved, as it is enough to replace the roller that prints the design on the supporting substratum, such as a sheet of polythene or paper for instance, so as to change the type of decoration.

Moreover, the designs produced with this method possess a much better definition than those which can be produced with the methods of the state of the art, and the decorative lining sheets have aesthetic characteristics better than those of the present PVC decorative lining sheets.

Furthermore, the decorative lining sheet produced with the method according to the invention is such that, even when the sheet is deformed to adhere perfectly to the surface of the filler core, the design does not separate into small grains; this is so because the ink does not stretch even when the sheet of polystyrene or polyolefin is stretched.

The attached figures are given as a non-restrictive example and show a preferred arrangement of the invention as follows:

- Fig.1 is a block diagram of a first arrangement of the method according to the invention;
- Fig.2 is a block diagram of a second arrangement of the method according to the invention;
- Fig.3 is a diagram of a plant to carry out the method according to the invention;
- Fig.4 is a diagram of a plant to apply the decorative lining sheet made with the method according to the invention to a furniture element.

The reference numbers 10-110 in the attached figures denote generally a method to produce decorative lining sheet 11 employed to decorate a shaped filler core 21 so as to constitute an element for furniture items 12 of a container type, such as cupboards for instance.

The decorative lining sheet 11 consists of a neutral sheet 13 of polystyrene or polyolefin, to which the desired decoration is applied with the method according to the invention.

According to a first arrangement of the method 10 according to the invention, as shown in Fig.1, a design which reproduces a counterpart of the decoration to be produced on the neutral sheet 13 of polystyrene or polyolefin is made 15 by rotogravure on a supporting substratum consisting, for instance, of a sheet of polythene or paper 14.

In this case the transfer of the decoration from the polythene sheet 14 to the neutral sheet of polystyrene or polyolefin is carried out by transfer printing 16.

The decorated sheet 11 of polystyrene or polyolefin then undergoes a varnishing operation 17, whereby a layer of varnish to protect the design is applied by techniques of the state of the art.

After a possible embossing operation 18 to obtain the designs in relief, the decorated sheet 11 of polystyrene or polyolefin is now applied 20 to the filler core 21 with techniques of the state of the art so as to obtain a lined element 12 for furniture items of a container type, such as cupboards etc.

According to a second arrangement of the method 110 according to the invention, as shown in Fig.2, the design is transferred to the neutral sheet 13 of polystyrene or polyolefin by a rotogravure operation 22.

The transfer of the decoration to the neutral sheet 13 of polystyrene or polyolefin is performed with a suitably etched roller, which leaves the ink on the support to be decorated.

The decorated sheet 11 of polystyrene or polyolefin undergoes thereafter operations of varnishing 17 and possible embossing 18, as described above, before being fitted 20 to the filler core 21.

Fig.3 is a diagram of a plant 23 to produce lined furniture elements 12 according to the method of Fig.1.

In this case a sheet of polythene or paper 14 fed from a first roll 24 is brought to cooperate with a printing roller 28 to apply the decoration to one of its faces and is then brought to cooperate with a neutral sheet 13 of polystyrene or polyolefin fed from a second roll 25.

The sheet of polythene or paper 14 and the neutral sheet 13 of polystyrene or polyolefin are passed, face to face, between a pair of suitably heated calendering rolls 26 pressed together.

The fields of pressure used in the method according to the invention are between about 8 and 15 bar on the pressure roll, while the working temperature in the contact zone is between about 105 ° and 130 ° C.

The design is transferred from the sheet 14 of polythene or paper to the neutral sheet 13 of polystyrene or polyolefin owing to the heat and pressure.

On leaving the pair of calendering rolls 26 the sheet 14 of polythene or paper is now without any decoration and is separated from the decorated sheet 11 of polystyrene or polyolefin.

On the one hand, the sheet 14a of polythene or paper, now without any decoration, is re-wound on an appropriate take-up roll 30 for subsequent removal, while on the other hand the decorated sheet 11 of polystyrene or polyolefin is brought into cooperation with a varnishing means 27.

On leaving the varnishing means 27 the decorated sheet 11 of polystyrene or polyolefin cooperates with an embossing roll 19 before being wound up to form a wound decorated roll 29 of polystyrene or polyolefin 11.

This decorated roll 29 of polystyrene or polyolefin 11 is employed in plants to line filler cores 21, whereby the decorated sheet 11 of polystyrene or polyolefin is applied, for instance by adhesives, to the filler core 21 to produce a lined element 12 for furniture items of a container type according to the invention.

In the plant shown in the diagram of Fig.4 the wound decorated roll 29 of polystyrene or polyolefin is unwound to cover a filler core 21, to which a layer of thermo-activated adhesive has been applied beforehand.

The filler core 21 on which the decorated sheet 11 of polystyrene or polyolefin is supported is brought to cooperate with a press 31, for instance, of a type with a suitably heated diaphragm, which deforms the decorated sheet 11 of polystyrene or polyolefin so as to make it adhere to the outer surface of the filler core 21.

In this case the filler cores 21 are fed on a conveyor belt 33.

The decorated sheet 11 of polystyrene or polyolefin now adhering to the filler core 21 is then sheared by a momentarily activated shears 34, and the lined filler core 21 is sent to a trimming station 32 to provide a lined furniture element 12.

Claims

1. Method to produce decorative lining sheet for furniture elements, characterised in that the lining sheet (11) consists of a neutral sheet of polyolefin or polystyrene (13) which is decorated thereafter by means of a rotogravure printing operation (22).

2. Method to produce decorative lining sheet for furniture elements, characterised in that the lining sheet (11) consists of a neutral sheet of polyolefin or polystyrene (13) which is decorated thereafter by means of a transfer printing operation (16).

3. Method as in Claim 2, whereby the transfer printing operation (16) is carried out with a transfer printing method with dry heat of the Sublistatic or Thermochrome type.

4. Method as in Claim 2, whereby the transfer printing operation (16) is carried out with a hot conventional transfer printing method.

5. Method as in Claim 2, whereby the transfer printing operation (16) is carried out with an infrared transfer printing method under vacuum.

6. Method as in any of Claims 2 to 5 inclusive, whereby the transfer printing operation (16) is carried out with a pressure at the pressure rolls (26) between about 8 and 15 bar.

7. Method as in any of Claims 2 to 6 inclusive, whereby the transfer printing operation (16) is carried out with a temperature at the zone of contact of the pressure rolls (26) between about 105 ° C and 130 ° C.

8. Method as in any claim hereinbefore, whereby the decorated lining sheet (11) undergoes a varnishing step (17).

9. Method as in any claim hereinbefore, whereby the decorated and varnished lining sheet (11) undergoes an embossing step (18).

10. Lined element for furniture items of a container type, the element being characterised in that it consists of a filler core (21) lined with a lining sheet (11) consisting of a decorated sheet of polyolefin or polystyrene (13) made by one or another of the above methods after application of a layer of thermo-activated adhesive.

11. Lined element for furniture items of a container type as in Claim 10, in which the lining sheet (11) consisting of a decorated sheet of polyolefin or polystyrene (13) is applied to a filler core (21) by means of pressure and heating.

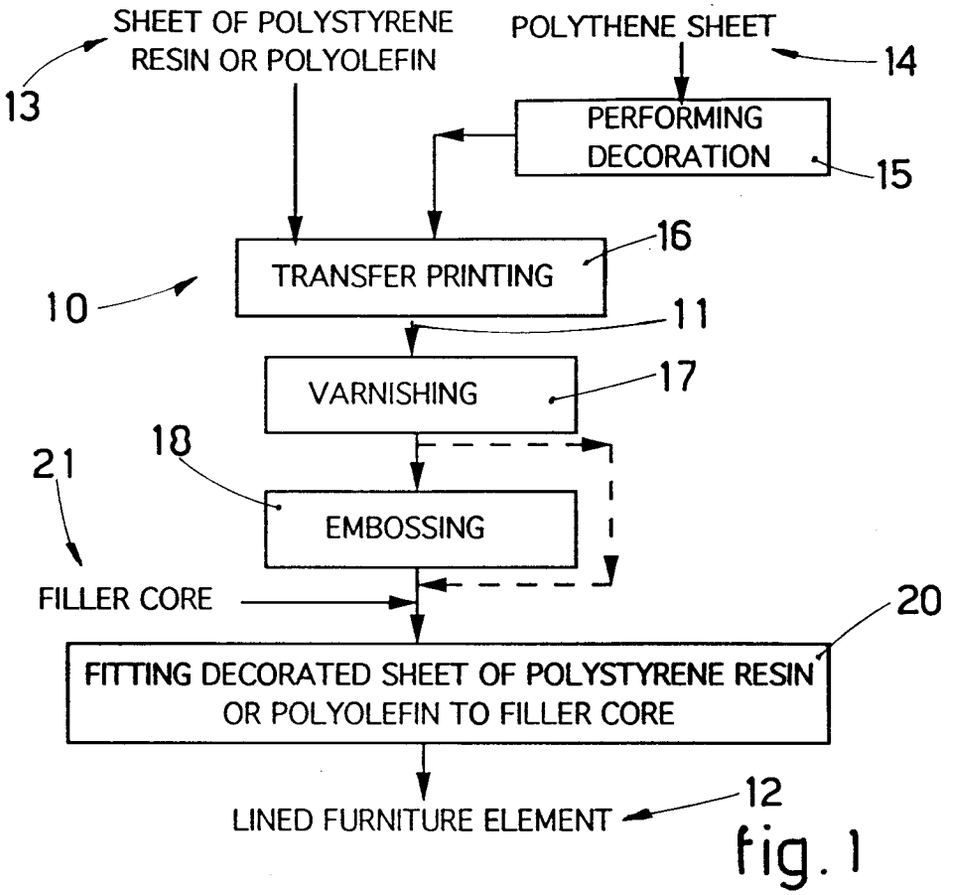
SHEET OF POLYSTYRENE RESIN OR POLYOLEFIN
13
POLYTHENE SHEET
14
PERFORMING DECORATION
15
TRANSFER PRINTING
16
10
11
VARNISHING
17
18
21
EMBOSSING
FILLER CORE
20
FITTING DECORATED SHEET OF POLYSTYRENE RESIN OR POLYOLEFIN TO FILLER CORE
LINED FURNITURE ELEMENT
12

fig. 1

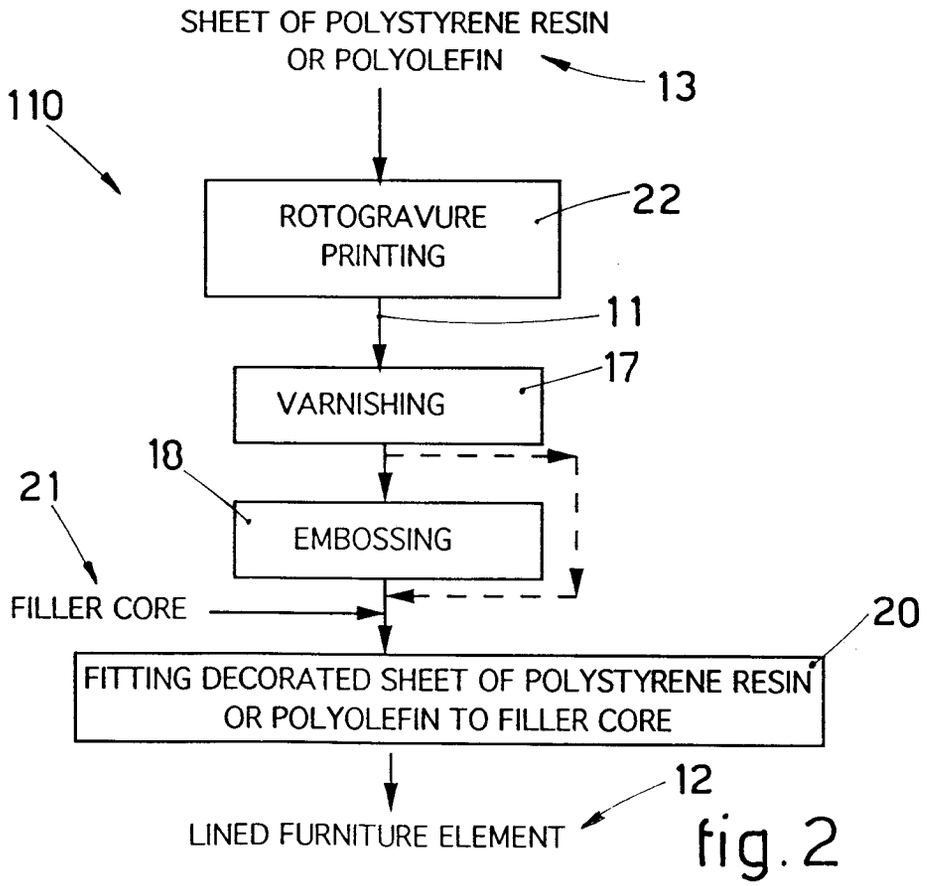
SHEET OF POLYSTYRENE RESIN OR POLYOLEFIN
13
110
ROTOGRAVURE PRINTING
22
11
VARNISHING
17
18
21
EMBOSSING
FILLER CORE
20
FITTING DECORATED SHEET OF POLYSTYRENE RESIN OR POLYOLEFIN TO FILLER CORE
LINED FURNITURE ELEMENT
12

fig. 2

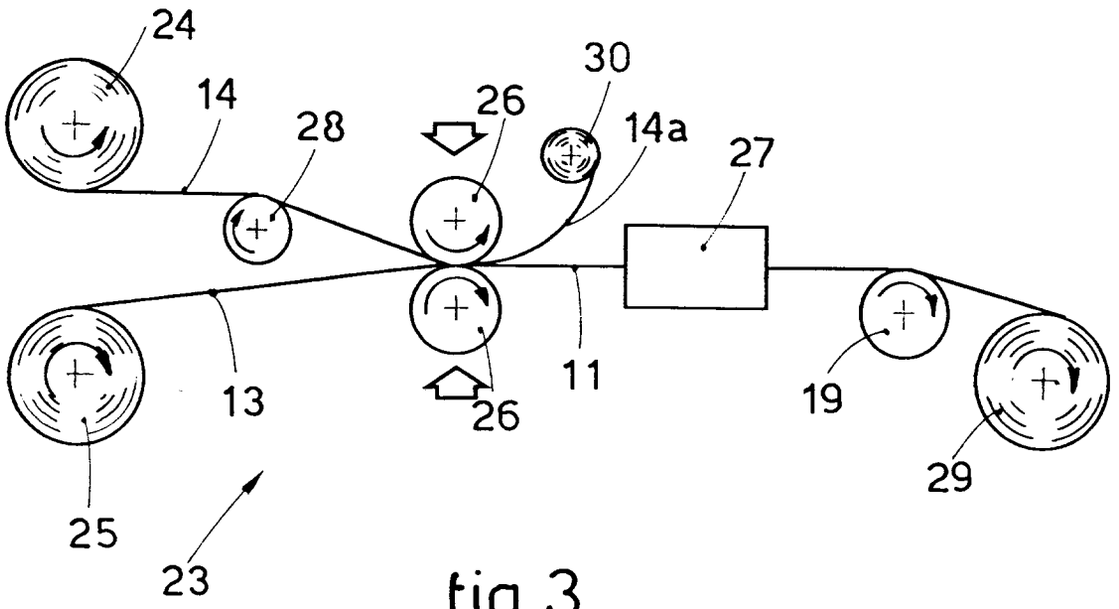

fig.3

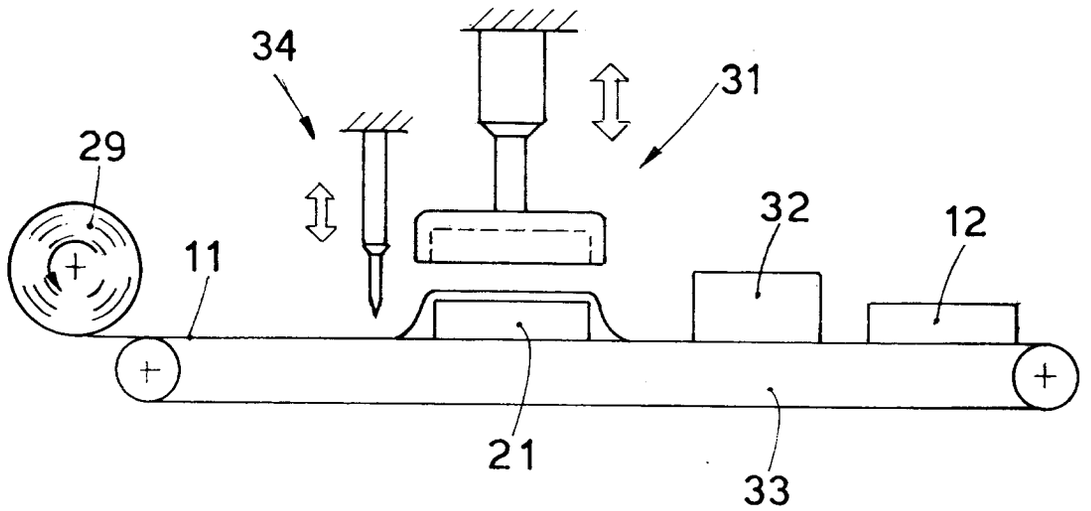

fig.4