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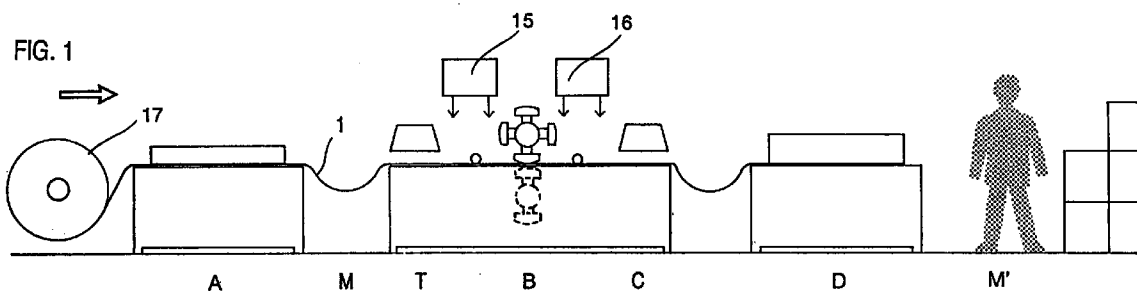
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(54) Method for the printing of packing parts

(57) A method for the printing of packaging parts, and which comprises packaging parts 2 which constitute a part of a continuous web of foil 1, in that the individual packaging parts 2 lie at a distance from each other and are in connection with each other via the foil, whereby said continuous web of foil with the packaging parts is fed forward to a printing section B, where the printing of the packaging parts 2 in the printing section is effected with print-pads 10, and each printing cycle comprises a packaging part or several packaging parts lying parallel and at the side of each other with a dis-

tance between them, and where the printed packaging parts are then fed forward to a separation section D where the individual packaging parts are separated from the foil web by a separation process.

There is hereby achieved a rational handling of the packaging parts with a minimum of working operations, in that the separation process is carried out after the printing of the packaging parts has taken place.



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Description

Background of the invention

The invention concerns a method for the printing of packaging parts of the kind disclosed in the preamble to claim 1.

In connection with dry offset printing of packaging parts, particularly plastic lids, it is commonly known to feed the lids individually via carriers/chain cassettes, in which the individual lid parts are placed, forward to a printing section where the dry offset printing takes place. The carriers are disposed on chains at a distance corresponding to about the length of two lids. Normally, there are 20 to 30 carriers for conveying the lids from the insertion stacks and forward to the restacking. Before the printing, there is thus performed a punching out of the lids and a stacking operation. The actual printing is effected by feeding a single lid forward with the carriers to the printing section, where a printing pad is fed down on to the surface of the lid and deposits its print. The packaging is then conveyed further and, after having been dried, a stacking takes place.

This known technique thus suffers the disadvantage that it involves two stacking operations, and also that the printing is carried out on the individual lids when these are fed forward in cassettes. With the known methods, the lids are mounted singly in cassettes from which they are hereafter removed again. This means that a lot of mechanics are involved in the form of stacking, re-stacking and cassettes. In practice, this means that the stability is not satisfactory when the speed needs to be high. Consequently, the process is inexpediently resource-demanding, time-consuming and costly.

It is known from US-A-3,539,085 to guide foils in the form of webbing through, for example, a printing press, and where among other things the control system takes into account and controls the tensions in the webbing by controlling the speed of the rollers. The method does not solve the problem involved in the placing of print on the packaging parts, which packaging parts are not produced in one plane and are consequently unsuitable for the mass production as described in the publication.

From WO 91/15342 there is known an apparatus and a method for the placing of irregularly demarcated pictures on a foil. The publication does not solve the problem involved in the clear control of the individual parts which are desired to be provided with print, and consequently does not permit a mass production in connection with the packaging parts.

It is the object of the invention to provide a method which is not encumbered with the disadvantages of the known technique, and thus where it is not necessary to stamp-out the packaging before it is printed, and whereby a rational handling of the packaging parts with a minimum of operations is achieved. Among other

things, the number of stacking operations is reduced, in that the method enables the printing of foil webs with packaging parts by feeding direct from the machine which produces the packaging parts.

This object is achieved with a method of the kind disclosed in the introduction, and where the packaging parts comprise a part of a continuous web of foil, in that the individual packaging parts lie at a distance from one another and are in connection with one another via the foil web, where the continuous foil web with the packaging parts is fed forward to a printing section where the printing of the packaging parts takes place in the printing section with printing pads, and each offset print comprises a packaging part or several packaging parts lying parallel at the side of one another with a distance between them, and where the packaging parts are then fed forward to a separation section where the individual packaging parts are separated from the foil web by a separation process.

The foil web with the formed packaging parts is conveyed directly forward to the printing section, whereby the necessity is avoided of having to stack and subsequently place the packaging parts in the cassettes, which will then transport these forward to the printing section in the manner which is commonly known. The printing according to the invention takes place down in the packaging parts, which can lie expediently along the same line seen in the transverse direction. The foil is hereafter positioned in relation to the next row of printing pads, so that the next transversely-lying row of packaging parts is placed opposite the next row of printing pads. The printed packaging parts are removed from the foil web by a separation process at a time at which the foil web part with the printed data is stationary, and the packaging part can now be stacked or handled as required, in that it is now ready for use.

The process is thus characterized by being a continuous process, where the need for manual operation is minimal.

By using the method according to the invention as disclosed in claim 2, there is achieved an expedient and definite positioning of the packaging in relation to the further handling process and the tool in use, while at the same time a high production of printed packaging is possible.

By using the method according to the invention as disclosed in claims 3 and 4, in the forwards and backwards movement of the foil it is achieved that this is constantly correctly centred in relation to the positioning of the printing pads.

By using the method according to the invention as disclosed in claim 5, there is achieved an expedient configuration of the gripping elements at the same time that a drive mechanism for the reciprocating movement of the foil track is provided. The spring loading ensures a correct pressure on the foil so that this follows the peripheral speed of the lower set of wheels.

By using the method according to the invention as

disclosed in claim 6, an expedient configuration of the printing section is achieved, which makes it possible to effect a high production of the printed packaging parts per unit of time.

By using the method according to the invention as disclosed in claim 7, an effective and time-saving printing of packaging parts is achieved when, as disclosed, these are formed in plastic material and comprise the lid parts.

By using the method according to the invention as disclosed in claim 8, it is achieved that the packaging parts can be formed closely at the side of one another in the foil web, in that the positioning movement ensures that there is room for the subsequent print-pad section in the subsequent packaging part's section.

By using the method according to the invention as disclosed in claim 9, the possibility is achieved by means of the optical sensors to register the front edge and the rear edge of the individual packaging parts, and thus to position the packaging parts correctly in relation to the print-pads. The CNC system ensures that the speed of the print-pads is controlled, while at the same time the CNC system regulates the motors for the driving of the foil web as a function of the speed of the print-pads.

By using the method according to the invention as disclosed in claim 10, an effective and low-priced separation process is achieved.

By using the method according to the invention as disclosed in claim 11, it is achieved that the printing is dry before the actual separation process takes place, whereby it is ensured that the printing does not get smudged.

The invention will now be described in more detail with reference to the drawing, in that

- fig. 1 shows a side view of the process in outline form,
- fig. 2 shows the printing process,
- fig. 3 shows the printing roller with print-pads,
- fig. 4 shows a section of a foil web with packaging parts seen from above,
- fig. 5 shows a typical packaging part with printing on the lid surface, and
- fig. 6 shows a section of a foil web with packaging parts and printing roller seen from above.

The various stages involved in the production of a printed packaging part appear in fig. 1, which shows section A comprising the forming of lids from a roll of foil 17 by a thermoplastic moulding process. The feeding can also be effected directly from an extruder. Typical materials are polypropylene PP, polystyrene PS, poly-

ethylene PE and polyvinylchloride PVC, which in the heated condition, for example by a vacuum-or pressure-moulding process, is formed into the desired product. Hereafter, the foil web with the formed packaging parts is led to the printing section B, and in order to avoid that the handling of the foil from the one section is imparted to the second section, the foil 1 with the packaging parts hangs expediently down in an arc.

In connection with the printing of the packaging, a semi-manual process stage M is incorporated for the adjustment and control of the colours. After printing, the foil and packaging parts are conveyed further to the drying section C and thereafter further to the separation section D, where the punching-out of the packaging parts is performed. Hereafter, a manual or automatic handling M' of the packaging parts is carried out, for example in the form of stacking, packing etc.

Before printing, certain foils - especially PP - must be exposed to a heating T, whereby the surface tension of the foil is adjusted. The heating can be effected either as gas or electrical heating.

The printing section will be described in more detail with reference to fig. 2, which shows a foil web 1 with packaging parts 2 which, in this case, are packaging lids which comprise a central surface 3 on which the printing is to be applied, plus a surrounding edge 4.

The foil web is fed forward by means of gripping elements 5 which consist of two upper wheel sets 6 and two lower wheel sets 7, comprising eight wheels in all. The upper wheel set 6 is spring-loaded and presses against the upper side of the foil opposite the place where the lower wheel set 7 lies up against the underside of the foil web 1. The wheel sets are disposed between the individual lid tracks or at each side outside the outermost lid tracks. The lower set of wheels 7 are locked together mechanically and driven by a highly dynamic motor, which thus regulates the forward feeding and the return movement of the foil web simultaneously with the gripping of the foil web.

However, the number of wheel sets can vary from one set of wheels up to several, depending among other things on the number of rows, the weight of the foil and the speed at which it is fed.

Depending on the configuration of the lid parts, guide rails 15 are provided on the upper or the underside of the foil web 1, said rails extending up between two rows of packaging parts or at each side outside the outermost rows of packaging parts, hereby ensuring lateral stability of the foil web.

Long guide rails can also be mounted if they are required. The rails can be disposed between the wheel sets 6 or on the outer side in relation to these wheels.

The printing equipment comprises a printing roller 8 and a counter-pressure roller 9. The printing roller 8 is provided with print-pads 10, preferably four print-pads placed on the same circumference of the roller's periphery and displaced 90° from each other. However, the number can vary from a single pad to several, depend-

ing among other things on the foil part which is to be printed. Several rows of print-pads lying at the side of one another, preferably four, may well be provided. The print-pads are expediently placed so that they form rows lying parallel with the centre axis of the roller.

The actual surface 11 of the print-pads, which must apply the printing and which deposits the ink from so-called block rollers, is slightly convex. The printing is the so-called dry offset printing. By means of the CNC system 15, it is ensured that the speed of the surface 3 of the lid when the offset print is applied corresponds to the peripheral speed of the print-pad 10, in that the print-pad 10 runs as master, and the motor which regulates the feeding speed of the foil runs as so-called slave in relation hereto. The motor for the foil web and the motor for print-pads and inking devices are appropriately controlled via a multi-spindled servomotor control similar to those used on CNC machine tools, robots etc. It is herewith possible to handle the foil web with reciprocating movements, adjustment of speed, position etc., so that this is synchronized electrically together with the current position and speed of the print-pad.

In order to ensure a certain printing pressure, a roller 9 equipped with counter-pressure dollies 12, preferably two dollies displaced 180° in relation to each other on the same peripheral circumference, are provided under the foil. The number of rows which follow the circumference of the roller 9 corresponds to the number of rows of print-pads, whereby the counter-pressure dollies are eight in number when there are sixteen print-pads. The speed of the counter-pressure dollies is adjusted in accordance with the speed of the print-pads, so that the dollies 12 serve to provide a counter-pressure when the offset printing is applied to the packaging, and lie directly opposite the print-pads 10 when these apply their print, and have the same peripheral speed as the print-pads 10. The cycle time can be as short as approx. 500 milliseconds, which corresponds to 120 cycles per minute. If 4 print-pads are used in a transverse row, it will thus be possible to print up to approx. 28,800 lids per hour.

When a transverse row of lids 14 has been printed, the foil web is fed backwards slightly, in that the next row of packaging parts lies so close to the printed packaging parts that there will not be room for the print-pad to apply its print correctly in the new row of lid surfaces. Sensors 16, preferably optical sensors, for example light-diodes or lasers, register the front edge and/or the rear edge of the packaging, so that the next row is positioned correctly in relation to the print-pad 10 and printing can now take place, in that the mutual speed of the foil and the print-pad is adjusted as described earlier.

Fig. 4 shows the foil web seen from above and with rectangular lids. The foil web could naturally also comprise packaging parts of other shapes, such as round, triangular, oval parts etc., and the packaging parts could be other than lids, e.g. trays, tubs etc.

The packaging parts lie relatively close to one

another, and in the concrete case at a distance of about 10 mm. This distance will naturally depend on the shape of the packaging part. The upper wheel set 6 is seen gripping down on the foil between the rows or at each side outside the outermost row of lids, and with a pair placed on each its side of the printing section. The packaging parts are formed in the foil so that they form longitudinal, parallel rows 13 and also parallel rows 14 in the lateral direction.

As will appear from fig. 1, after the foil has been printed it will then move further forwards to a drying section, shown with a C, hereby ensuring that the applied print remains permanently on the lid. By allowing the foil to hang in a loop after the drying section, it is achieved that the punching-out process in the separation section D, which follows after the drying, can take place continuously and irrespective of the reciprocating feeding movements which take place in the printing section in order to ensure the correct positioning of the packaging parts 2 in relation to the print-pads 10 as described earlier, in that the hanging foil ensures that tension in the foil stemming from the handling in the one section is not transferred to the next section with subsequent disturbing effects.

The foil is controlled in the punching-out section following the same principle as that in the printing machine, so that setting-up time can also be saved here when changing over to lids of another shape, in that expedient use is made of a twin-spindle motor control whereby various calculations can be made. The sorting out of bad lids can be effected by skipping the punching-out section, and instead feed the whole web further to granulators or roll winders. Bad lids can, for example, be lids where the foil, the forming or the printing are not in order. Optical equipment can be mounted for the checking of the items produced, whereby the optical equipment compares the picture of the foil web with another picture which has previously been scanned, and hereby registers any irregularities.

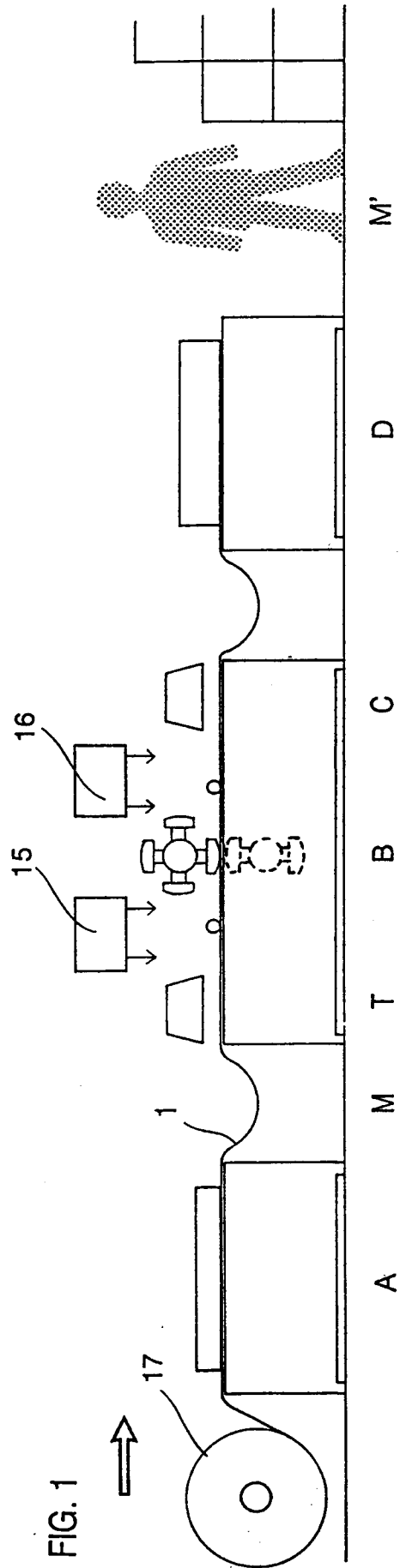
After the punching-out, a manual or automatic packing of the packaging parts is performed. In addition to the packing, this process can also include the checking of the packaging parts.

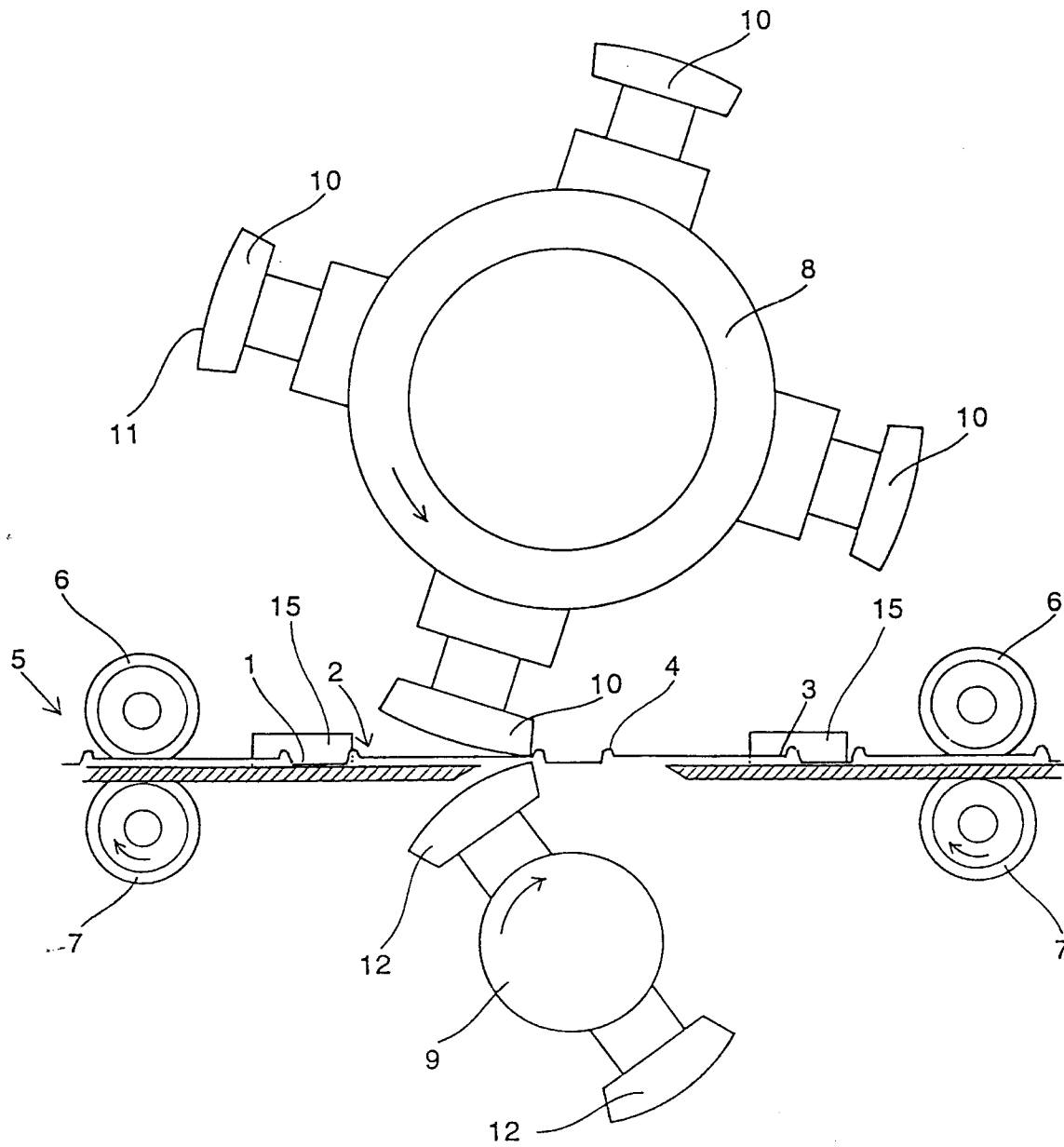
As will appear from fig. 5, the packaging part can be a rectangular lid comprising a lid surface 3 and an edge 4, the underside of which engages in or grips around the container on which the lid is mounted.

Fig. 6 shows the printing roller 8 and the foil web with packaging parts 2 seen from above, and where the formed lids are fed from the one side, provided with the required print and continue further towards the drying and separation section for further handling. The dry offset printing itself is applied to the surface of the lid, and the disclosed method according to the invention ensures that the print lies correctly centred.

Claims

1. Method for the printing of packaging parts (2), said packaging parts comprising at least two differently-disposed surface levels (3, 4) in the vertical direction, **characterized** in that
 - the packaging parts (2) comprise a part of a continuous foil web (1), in that the individual packaging parts (2) lie at a distance from each other and are in connection with one another via the foil web,
 - the continuous foil web with the packaging parts is fed forward to a printing section B,
 - the printing of the packaging parts (2) in the printing section is effected with print-pads (10), and each printing cycle comprises a packaging part or several packaging parts lying parallel and at a distance at the side of each other, and
 - the printed packaging parts are thereafter fed forward to a separation section D, where the individual packaging parts are separated from the foil web by a separation process.
2. Method according to claim 1, **characterized** in that the packaging parts (2) form longitudinal, preferably parallel rows (13), said rows comprising at least one and preferably four rows, and that in the lateral direction the rows similarly form preferably parallel rows (14).
3. Method according to any of the foregoing claims, **characterized** in that when moved forwards and backwards via a feeding underlayer, the continuous foil web with packaging parts (2) is retained on this in the lateral direction by means of guiding elements (15).
4. Method according to any of the foregoing claims, **characterized** in that during the forwards and backwards movements, the continuous foil web with packaging parts is retained and controlled in the longitudinal direction by means of gripping elements (5).
5. Method according to claim 4, **characterized** in that the gripping elements (5) comprise wheel sets, said wheel sets preferably comprising four pairs of wheels, and in that the wheels in each pair are placed on each side of the foil web (1) and in contact with this, forming an upper wheel set (6) and a lower wheel set (7) lying opposite each other, said upper wheel set (6) being spring-loaded, and said lower wheel set (7) being motor-driven.
6. Method according to any of the foregoing claims, **characterized** in that the printing section B comprises at least one print-pad (10), preferably four per longitudinal row of packaging parts, and a counter-pressure dolly (12), preferably two, said print-pad and counter-pressure dolly being mounted on each its rotatable drum (8, 9), and where a print-pad (10) and a counter-pressure dolly (12) lie opposite each other during the printing.
7. Method according to any of the foregoing claims, **characterized** in that the packaging parts (2) are lids for packing and preferably made of plastic, and comprise a lid surface (3) and an edge (4) displaced on another level in relation to the lid surface (3).
8. Method according to any of the foregoing claims, **characterized** in that during the printing the packaging parts move forwards and at a speed which corresponds to the peripheral speed of the print-pad, and that after the printing of a row of packaging parts the foil web stops its movement, after which the foil web is preferably moved a distance backwards and is positioned in relation to the subsequent print-pad(s), and thereafter in the printing of the subsequent packaging row in the transverse direction moves at a speed which corresponds to the peripheral speed of the print-pad.
9. Method according to any of the foregoing claims, **characterized** in that the printing and the feeding forward to the printing section B are controlled and regulated in relation to each other by a control system and a positioning system, said control system preferably comprising CNC technique (15), and said positioning system preferably comprising sensors (16).
10. Method according to any of the foregoing claims, **characterized** in that the separation section D comprises a punching machine, in that said punching machine blanks the packaging parts out of the foil.
11. Method according to any of the foregoing claims, **characterized** in that the process also includes a drying process C, said drying process taking place after the printing B and before the separation section D.





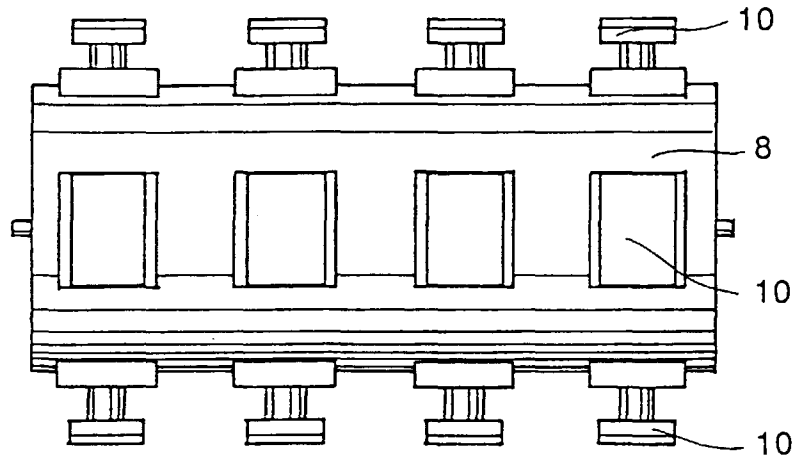


FIG. 3

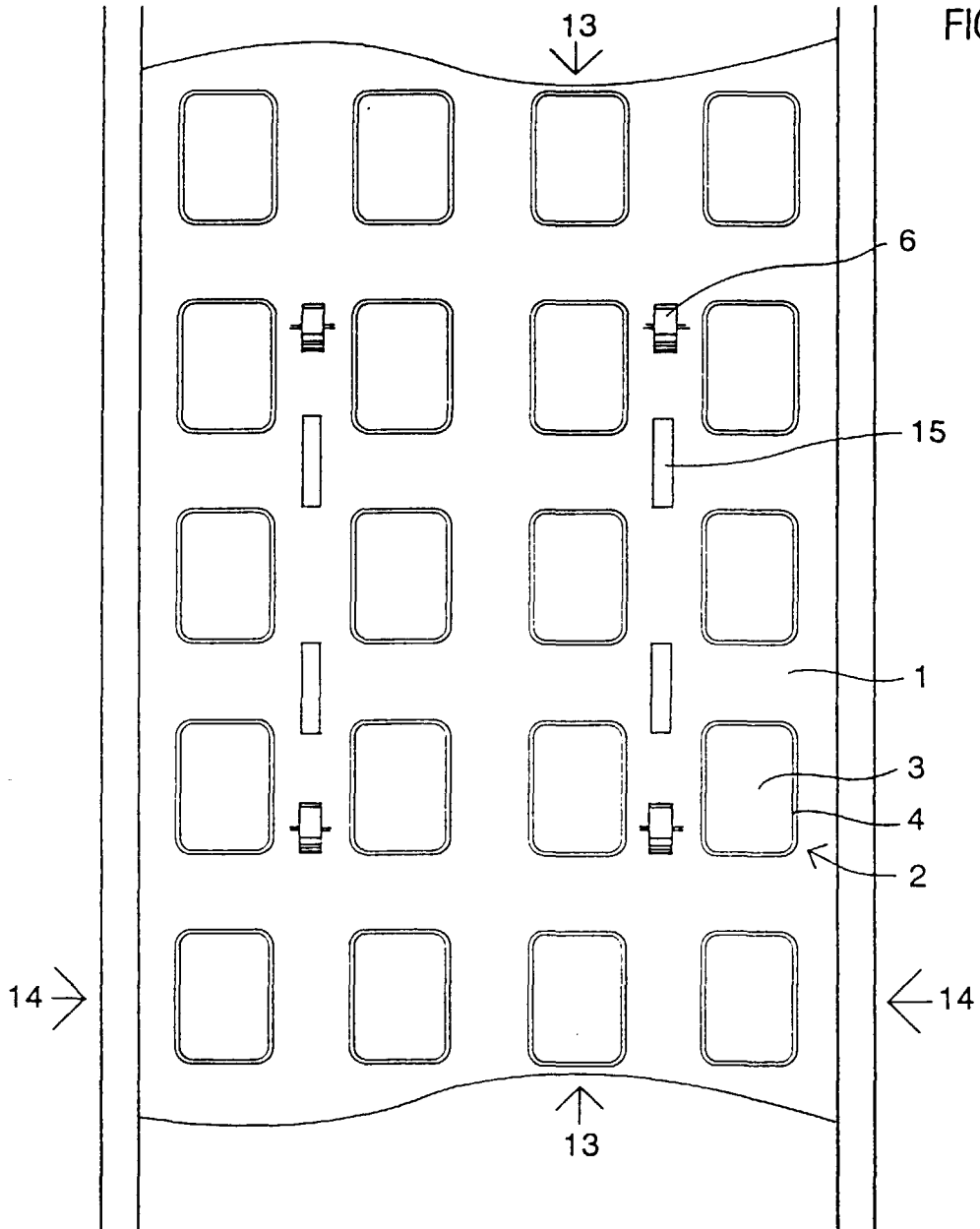


FIG. 4

FIG. 5

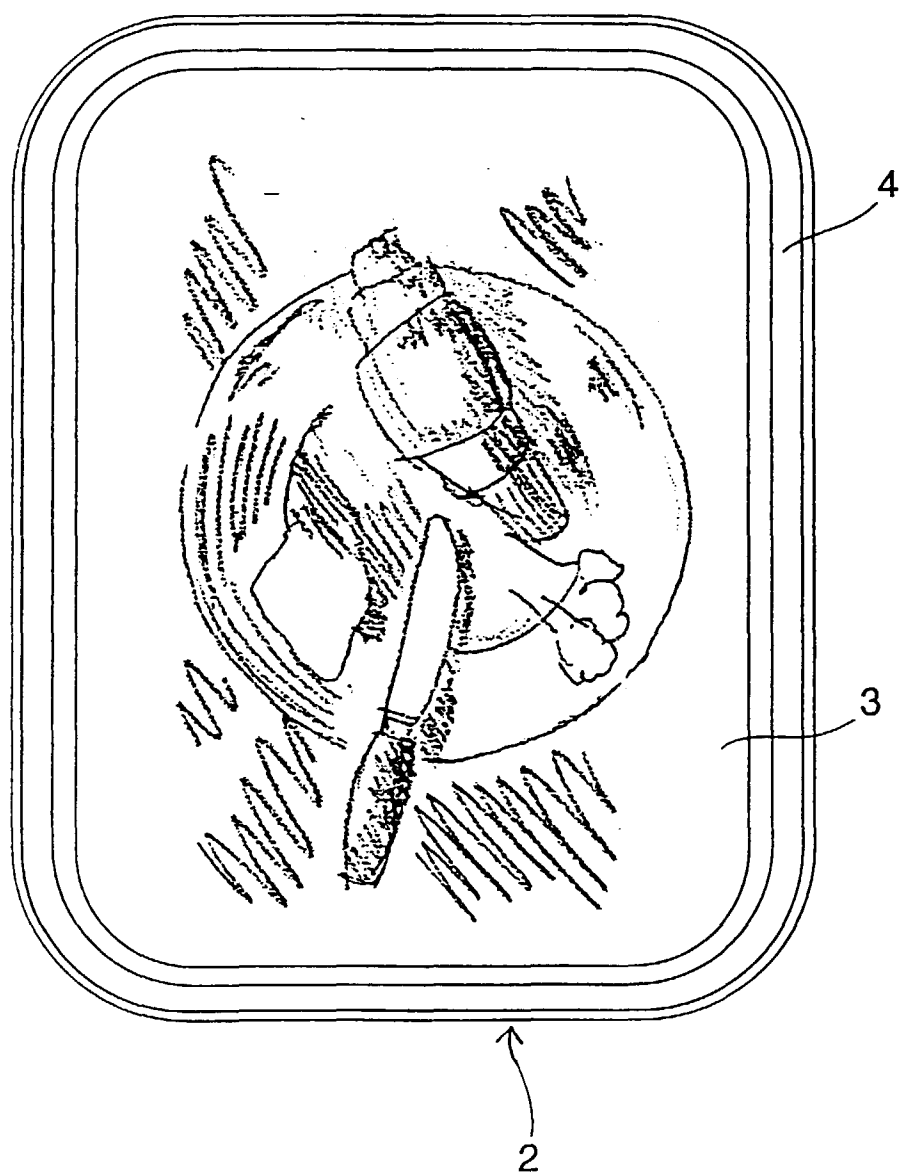
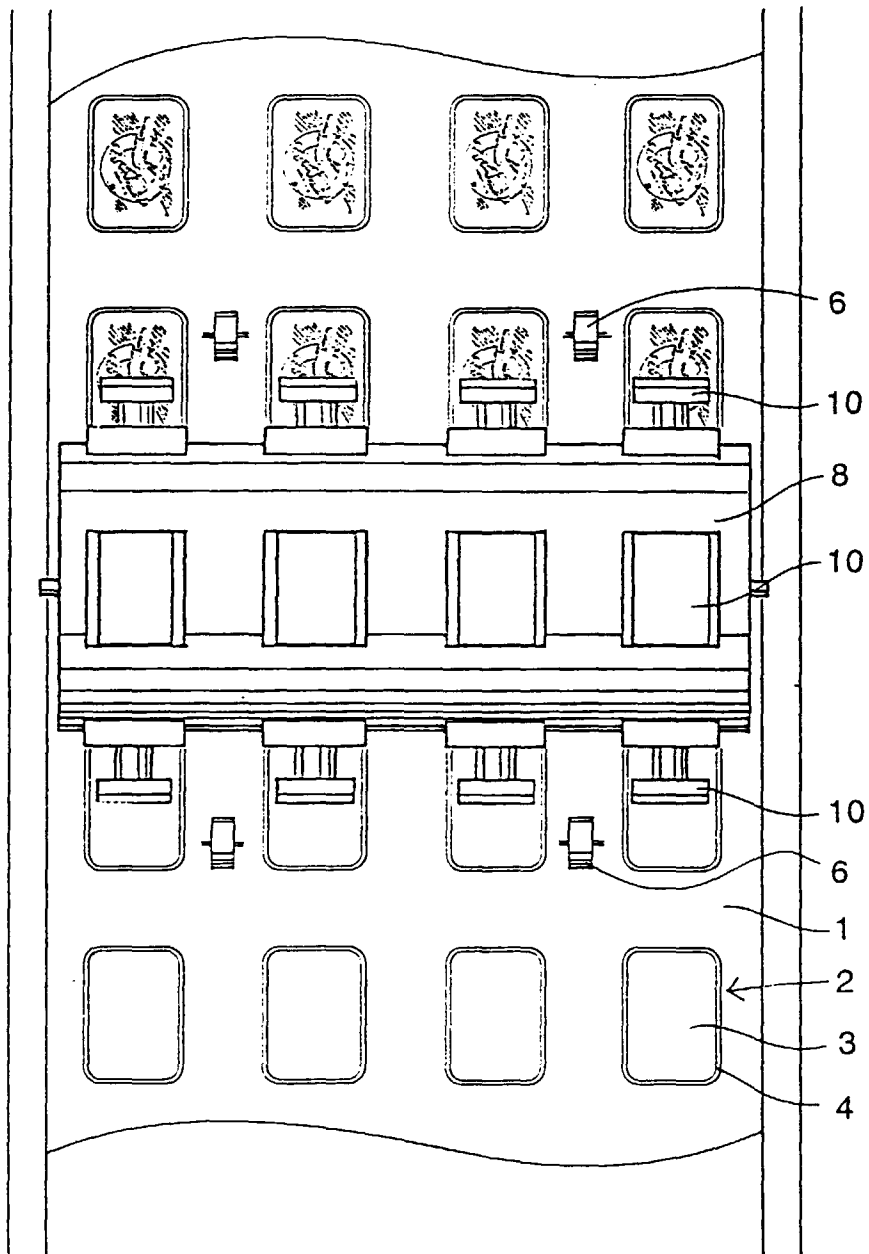


FIG. 6





European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 97 61 0009

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)
X	US 4 271 757 A (MAXWELL ET AL.) * column 6, line 3 - line 15; figures 1-23 *	1	B41F17/26 B65B7/28
A	US 3 735 697 A (PROVAN) ---		
A	US 3 662 511 A (ELIASBERG) ---		
A	DE 20 21 917 A (KOMMANDITGESELLSCHAFT NEUPACK GMBH) -----		
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.6) B41F B65B
Place of search THE HAGUE		Date of completion of the search 26 August 1997	Examiner DIAZ-MAROTO, V
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			

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