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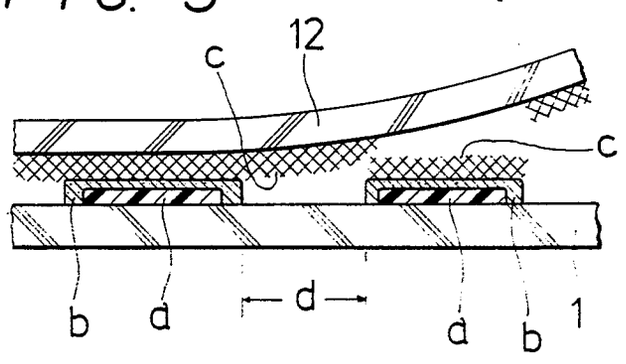
(54) A method for forming a design or representation by removing a predetermined portion or portions of a metallic film.

(57) The method comprises applying a vaporised metallic film (c), e.g. aluminium, which is adherent to a first substrate (12) to a second substrate (1) bearing a design or representation (a) selectively coated with a hardenable or curable bonding agent (b) in such a manner that the film (c) contacts the coated design or representation (a) and allowing the bonding agent (b) to harden or cure. Thereafter the film (c) together with the substrate (12) is stripped from the coated substrate (19) whereby the said design or representation is stamped out of the film (c) whereas the stamped out portion or portions of the film (c) remain adherent to the coated design or representation.

FIG. 3



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A method for forming a design or representation by removing a predetermined portion or portions of a metallic film.

This invention is especially concerned with the method of enhancing the quality feeling of commodities by providing letters and/or various kinds of patterns using a vaporised metallic film, e.g. aluminium, on to articles such as packaging bags, labels and bottles such as those to contain refreshing beverages.

With regard to the building up of a vaporised metallic film of suitably aluminium or zinc on to the surface of a plastic film, an appropriate vacuum evaporation technique is known that heats up and evaporates the aforesaid aluminium or zinc under high vacuum conditions and to condense its vapor onto the surface of plastic film that is placed under the same vacuum conditions. The plastic films where vaporised aluminium or zinc film is formed in this way have satisfactory gas permeability resistance, ultra violet ray shielding property and resistance to oil and serve to upgrade the quality sought, and thus are utilized to a great extent as packing materials for foodstuffs and confectionery.

In addition, concerning a plastic film where the aforesaid vaporised aluminium or zinc film has been formed thereon, such a condition with the plastic film not being covered entirely by the metallic film, namely with the plastics film being partially transparent or visible is sometimes required. This see-through area sometimes represents a region where the contents inside the bag is visible or in other cases where a letter and/or pattern itself is to be placed.

Since the method of forming a vaporised metallic film on the surface of plastic film is performed under vacuum conditions as earlier mentioned, it is technically impossible to prepare a region where the vaporised film is formed with such a see-through region or other region with a special purpose in mind.

For this reason, a technique as shown in Figure 11 of the accompanying drawings has been adopted traditionally.

According to the method (Figures 11 to 14), a letter or pattern is printed on the surface of a transparent plastic film 01 using a conventional ink 02 and a water-soluble ink 03, then a vaporised aluminium film 04 is built up on this printed surface, washed with water for flushing away only the printed face of water-soluble ink 03 area as shown in Figure 12, thus providing a transparent area where the aluminium has not been evaporated on to the said washed surface, namely providing the stamping work 05.

However, as the vaporised aluminium surface is directly exposed in case of the film that is produced as per the aforesaid method, the vaporised aluminium film is subject to flaws or friction when the film is formed into bags, with resultant break-away, and further the process is classified into printing, vaporisation and water-washing steps which requires the need for winding up products into a roll shape and for transferring the products to the site for the next stage of the process on each of such occasions, thus resulting in the demerits of higher cost and complicated operation.

Also, as another processing method, such a technique is known where, after the letter and/or pattern are printed on the vaporised aluminium surface 06 adherent to transparent plastic film 01 as shown in Figure 13, then an area other than the printed face is subjected to treatment by acid or alkali solution for providing a stamping region 05 thereon as shown in Figure 14 and further is pasted up with a transparent plastic film 08 on this surface as necessary.

However, even this further prior method involves the same demerits as aforementioned, and the need for another solution is desired.

A method of building up a vaporised aluminium film on the surface of paper and not of plastic film is conditions, and hence, if this formation is necessary, such a technique has to be adopted where the paper is united with a plastic film to which a vaporised aluminium film has been applied.

Even in this last mentioned prior method, however, such processing techniques as earlier mentioned, viz. water washing and acid washing are necessary, resulting in higher costs.

On the other hand, a method of forming a vaporised aluminium film directly on the surface of a bottle of refreshing beverage is possible by placing the bottle directly under vacuum conditions, but the method of placing the bottle under vacuum conditions in this way is not suitable for mass production and is unprofitable.

For this reason, it is the actual situation in the case of such bottles that vaporised aluminium film is built up on the surface of the bottle by uniting the bottle surface with a plastic film on which a vaporised aluminium film has been formed separately.

One expedient form of this invention proposes a method of forming a vaporised aluminium or other metal film on the surface of a transparent plastic film as well as providing a stamping region on part of this vaporised metal surface at a low cost.

Another expedient form of this invention proposes the build up of a vaporised metal film directly on the surface of paper.

A further expedient form of this invention proposes to form a vaporised metal film on a surface of a glass bottle, plastic container or metallic vessel at a low cost.

One possibility afforded by this invention is where a printing is made on one surface of a transparent plastic film using ink, then a transparent or coloured bonding agent is applied to the said printed face while matching the pattern, for uniting it with the plastic film on which aluminium or other metal has been vaporised, and the pattern area of the vaporised metal surface is shifted to the bonding agent side for formation of vaporised metal film and further for performing a stamping region on part of it by separating both of them from each other when the bonding agent is hardened or cured.

Another possibility afforded by this invention involves forming a vaporised metal face on the surface of paper by stamping a letter and/or pattern on the surface of paper or coating the bonding agent in the form of a letter and/or pattern, by uniting this paper with the vaporised metal face adherent to a plastic film and by shifting to the bonding agent side the region of letter and/or pattern out of the vaporised metal face or an area other than the letter and/or pattern being stamped by peeling them off from each other when the bonding agent is hardened or cured.

A further possibility afforded by this invention entails the building up of a vaporised metal face onto the surface of a glass container or the like by uniting a film X on which the vaporised metal film has been formed up with a bonding agent-coated film Y after stamping the area corresponding to a letter and/or pattern, where the area corrsponding to the letter and/or pattern out of the vaporised metal face is left remaining on the film X and the other area is shifted to the film Y side by peeling the films X and Y off from each other when the bonding agent is hardened or cured, then the vaporised metal face of film X is joined up with a surface-treated glass container for shifting the vaporised metal face of the film X to the surface of a glass container or the the like.

According to this invention there is provided a method for forming a design or representation by removing a predetermined portion or portions of a metallic film, the method comprising applying a vaporised metallic film which is adherent to a first substrate to a second substrate bearing a design or representation selectively coated with a hardenable or curable bonding agent in such a manner that the metal film contacts the coated design or representation, allowing the bonding agent to harden or cure and thereafter stripping the metallic film together with the first substrate from the coated second substrate whereby the said design or representation is stamped out of the metallic film, the stamped out portion or portions of the metallic film remaining adherent to the coated design or representation.

Preferably the first substrate comprises synthetic polymeric material. According to requirements a synthetic polymeric material, preferably one which is transparent, may be used for the second substrate. Alternatively paper may be used as the second substrate.

The design or representation may constitute a printed image. Preferably the vaporised metal film comprises vaporised aluminium or zinc. The bonding agent which may be colourless or coloured may comprise a urethane based resin.

In a further development of the invention the said design or representation stamped out of the metallic film adherent to the first substrate is subsequently selectively coated with a hardenable or curable bonding agent and the coated metallic film is applied to a third substrate, the bonding agent is then allowed to harden or cure and thereafter the said design or representation remains adherent to the third substrate upon stripping the first substrate with the remaining metallic film adherent thereto from the third substrate.

The third substrate which may be glass or synthetic polymeric material may constitute the wall of a container such as a bottle.

By way of example, preferred methods embodying the invention will now be described with reference to Figures 1 to 10 of the accompanying drawings, wherein:

Figure 1 is an explanatory diagrammatic - scheme illustrating an overall procedure embodying the invention,

Figures 2 and 3 are sectional elevations to demonstrate steps in a process embodying the invention,

Figures 4 and 5 are analogous to Figures 2 and 3 respectively and illustrate preferred steps in a process embodying the invention,

Figures 6, 7 and 8 are sectional elevations to demonstrate steps in another process embodying the invention,

Figure 9 is a perspective view showing a film wound round a bottle as a development of the steps shown in Figures 6 to 8, and

Figure 10 shows a perspective view of the bottle shown in Figure 9 with the film broken away from the bottle.

In Figure 1 the example is shown for not only forming a vaporised metallic film, e.g. aluminium, that has been built up on the surface of transparent plastic film but also for stamping a part of this vaporised metallic film.

While a transparent plastic film 1 is unrolled from an unwinder 2, and passes through first and second printing sections 7 and 8 respectively consisting of an ink pan 4, printing plate 5 and pressing plate 6 via a tension control group 3, a printing a is made on the film 1.

The plastic film 1 thus printed is then coated with bonding agent b while the pattern is being matched to the printed face when it passes through bonding agent coating section 11 consisting of a transparent bonding agent pan or urethane resin 9, and press-fitting rolls 10 and 10'. The bonding agent employable may be tinted.

A plastics substrate 12 with adherent vaporised metallic film is coated with the aforesaid bonding agent face by dint of rolls 13 and 13', reaches a rewinder 14, is wound up by it into the shape of a roll and left until the curing or hardending of bonding agent b is completed.

Figure 2 shows the sectional area of the coated film 1.

Next, when the hardending or curing of bonding agent b is completed the film c is broken away as illustrated in Figure 3. When this break-away is achieved, the vaporised metallic film c adheres only to the area of bonding agent b and the vaporised metallic film c fails to adhere to the region where the bonding agent b has not been applied.

As a result, the area where the bonding agent b is applied can be seen prominently in this plastic film 1 while the other area becomes background. In this way, an optional pattern and/or letter region can be stamped.

Furthermore, through the aforesaid example has directed its attention to a stamping process region d, if attention is directed to the vaporised metallic film c, the residual vaporised metal film c on substrate 12 represents the a pattern and/or letter region on this side, so this side can be utilized as a label or packing material.

The vaporised metallic film c that has been stamped in such a manner though useable as such, can be coated with a sealant film such as polyethylene if it is to be used, for example, as a packing material.

As the plastic film 1 in the example, films such as polyester, polyacetate, hard quality polyvinyl chloride film, "Cellophane" (Trade Mark) or heat shrinkable plastic film with good transparency and lustre properties may be used. Also, as substrate 12, a polypropylene film may be utilized, as this is especially suitable for vaporising a film of aluminium thereon.

In the case of paper or in the case of plastic film unsuitable for aluminium or other metal to be vaporised thereon, a vaporised metal face may be built up by uniting a vaporised metal film to a sheet, but it is possible to form a vaporised metal film directly onto a sheet in one form of this invention, by replacing the plastic film with paper or a plastic film unsuitable for vaporisation of metal thereon.

As mentioned above, according to one form of this invention, the stamping process can be made uniting a vaporised metal with a plastic film of paper on which a bonding agent has been coated, contacting the printed pattern and/or letter and subsequently by peeling them off from each other when the bonding agent is hardened or cured. As a result, the effects as follows are available.

(i) The process can be simplified because the printed and bonding agent-applied film may be produced by a technique of gravure printing to which the vaporised metal film is joined, then peeled off after the bonding agent is cured or hardened, which therefore eliminates the conventional need for the transport and washing processes of film in the stamping process, and serves to reduce the cost that is required for these processes.

(ii) Since the stamping process can be made only be breaking away the sheets that have once been united with each other, the joining together and peeling-off processes can be done automatically by known means, thus conspicuously speeding up the stamping process,

(iii) As the stamping process can be achieved by a printing technique, the contours of pattern and/or letter look more satisfactory and make available a stamping process employing extremely small letter and line that are mostly impossible in conventional washing methods because of the breaks of line, or the formation of vaporised metal letter and/or pattern.

Figures 4 and 5 show an example of forming a film of vaporised aluminium or other metal onto the surface of paper in place of transparent plastic film (Figures 2 and 3). Figure 1 is modified in that paper 15 is used instead of plastic film 1, the paper 15, being unrolled from the unwinder 2, being given a printing thereon while it passes through the tension control group 3 and further through first and second printing sections 7 and 8 consisting of the ink pan 4, the printing plate 5 and the pressing plate 6.

The paper 15 that has thus been printed is coated with a letter and/or pattern arrangement (bonding agent b) when it passes through the bonding agent coating section 11 that is comprised of the transparent bonding agent pan 9 of urethane based resin, the press-fitting rolls 10 and 10'.

Film 16 on which a film c of vaporised aluminium or other metal has been formed is joined up to the aforesaid bonding agent face b by the rolls 13 and 13', reaches the rewind 14 and is wound up by it into a roll shape, thus being left until the curing or hardening of the bonding agent b is completed.

Figure 4 shows the sectional area of film that has been joined up in this manner.

Next, when the hardening or curing of the bonding agent b is completed, the film 16 is broken away as shown in Figure 5. When the film 16 is peeled off, the face c sticks only to the region of bonding agent b, and the face c fails to adhere to the region where the bonding agent b has not been applied.

As a result, the region of the paper 15 where the bonding agent b has not been coated corresponds to the region of letter and/or pattern intended. If the bonding agent b is not applied to the region of letter and/or pattern but is applied to another region, then the letter and/or pattern will be stamped.

The aforesaid example has concentrated attention to the paper, but if attention is directed to the film 16, the letter and/or pattern are stamped in the residual vaporised metal face. For this reason, film 16 can also be utilized as label or packing material.

The paper 15 where the face c has directly been built up in this way, though useable as such, can be coated with a sealant film such as polyethylene film, for example as the packing material.

Polypropylene film may also be used in this embodiment as film 16.

As mentioned above, this example has the effect of providing that the vaporised metal face contacts directly the surface of paper at a low cost by uniting the vaporised metal film with the paper where the bonding agent has been applied, contacting the letter and/or pattern and by breaking both the sheets away from each other when the bonding agent is hardened or cured.

Also, since the application of bonding agent is available by using a printing technique, an extremely small letter, line and/or pattern can be optionally printed, and their finish is of a very high standard.

Figures 6, 7, 8, 9 and 10 show the examples of forming a vaporised metal film onto the surface of a bottle.

As illustrated in Figure 6, this example builds up a vaporised aluminium or other metallic film c by means of a conventional technique, on to the surface of an acceptable plastic film X, for instance polypropylene film 17, and applies a urethane based resin bonding agent b onto the surface of another plastic film Y, for example polypropylene film 18, thus leaving the non-applied area in the form of capital letter "A" in the objective location.

Then, the plastic film Y18 is united with the aforesaid plastic film X17 as shown in Figure 7, and left until the bonding agent b is hardened or cured.

When the bonding agent b is hardened or cured, the plastic film X17 is peeled off from the plastic film Y18 as shown in Figure 8.

If these films are broken away from each other in this way, the face c corresponding to the region 20 wherein bonding agent has not been applied is left on the side of plastic film X17, while the other region shifts to the side of plastic film Y18 because of the adhesive force of the bonding agent b.

In this way, the plastic film X17 where the vaporised metal face X in the form of capital letter "A" has been formed is directed with its X side of vaporised face on the inside as indicated in Figure 9, and joined up to a glass bottle 19 whose surface is coated with the bonding agent b, then the plastic film X17 is peeled off as shown in Figure 10 after the bonding agent b is hardened or cured. Further, this film need not be broken away, but can be left as it is to be peeled off when desired.

If the plastic film X17 is peeled off in such a way, the vaporised face X in the form of "A" is left on the surface of the glass bottle 19, and becomes the label.

A suitable plastic film can be adhered to the surface of the letter "A" in order to prevent the face X being damaged.

Next, in the case of the aforesaid example, a urethane based resin bonding agent has previously been applied to the surface of glass bottle 19, but in place of this sort of bonding agent, it is also acceptable to coat or apply a resin that softens at low temperature, for instance, a urethane based resin previously on to the surface of glass bottle 19, to join up the plastic film X17 after heating and softening it, then to peel off the plastic film X17 for shifting it to the face X after the resin is hardened or cured.

Although the aforesaid example demonstrates the formation of a vaporised metal face, if the letter and/or patern are to be expressed by performing the stamping process on to the vaporised metal face, the plastic film Y18 side may be united in a similar way while the vaporised metal face is shifted to the side of glass bottle 19.

Claims

1. A method for forming a design or representation by removing a predetermined portion or portions of a metallic film, the method comprising applying a vaporised metallic film which is adherent to a first substrate to a second substrate bearing a design or representation selectively coated with a hardenable or curable bonding agent in such a manner that the metal film contacts the coated design or representation, allowing the bonding agent to harden or cure and thereafter stripping the metallic film together with the first substrate from the coated second substrate whereby the said design or representation is stamped out of the metallic film, the stamped out portion or portions of the metallic film remaining adherent to the coated design or representation.

2. A method according to Claim 1, wherein the first substrate comprises synthetic polymeric material.

3. A method according to Claim 1 or Claim 2, wherein the second substrate comprises synthetic polymeric material.

4. A method according to Claim 1 or Claim 2, wherein the second substrate comprises paper.

5. A method according to any preceding claim, wherein the design or representation constitutes a printed image.

6. A method according to any preceding claim, wherein the vaporised metal film comprises vaporised aluminium or zinc.

7. A method according to any preceding claim, wherein the bonding agent is colourless or coloured.

8. A method according to any preceding claim, wherein the said design or representation stamped out of the metallic film adherent to the first substrate is subsequently selectively coated with a hardenable or curable bonding agent and the coated metallic film is applied to a third substrate, the bonding agent is then allowed to harden or cure and thereafter the said design or representation remains adherent to the third substrate upon stripping the first substrate with the remaining metallic film adherent thereto from the third substrate.

9. A method according to Claim 8, wherein the third substrate is glass or synthetic polymeric material.

10. A method according to Claim 8 or Claim 9, wherein the third substrate constitutes a wall of a container.

FIG. 1

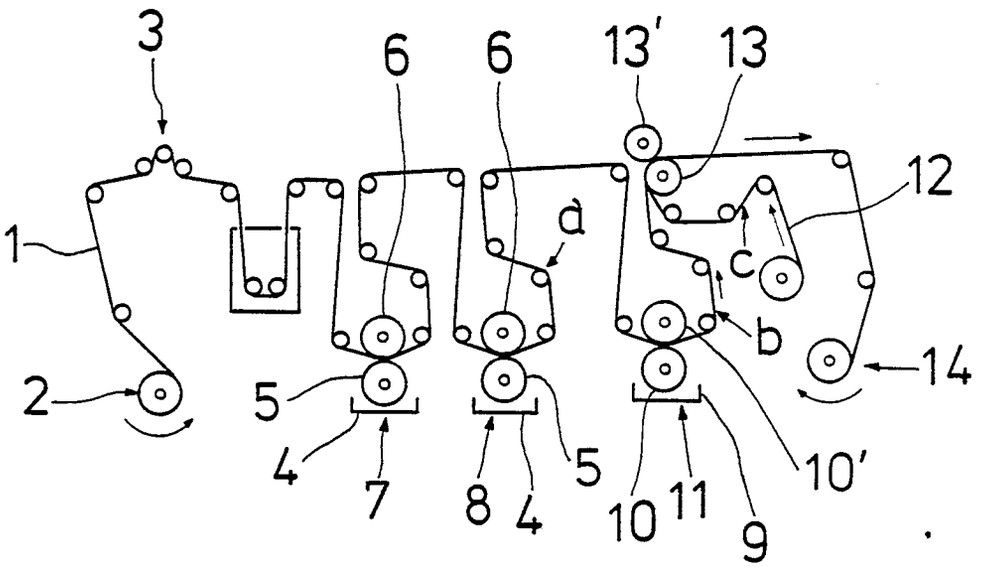


FIG. 2

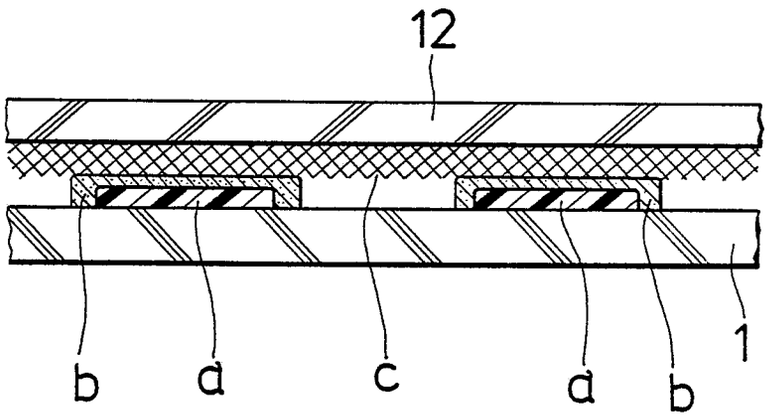


FIG. 3

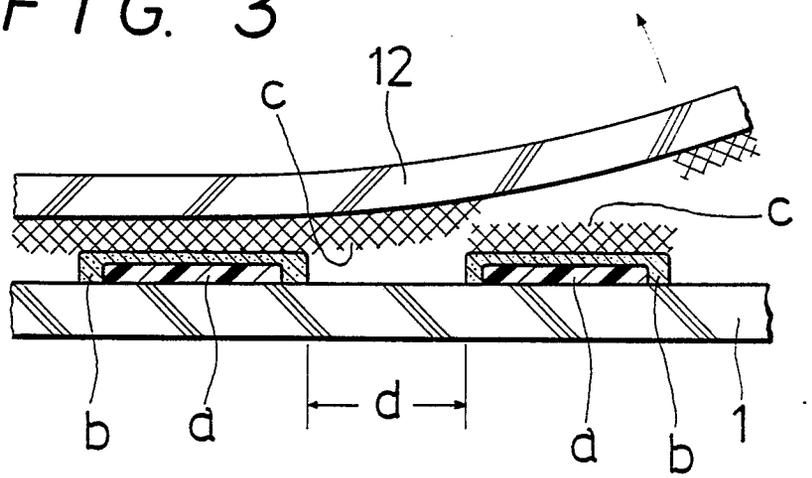


FIG. 4

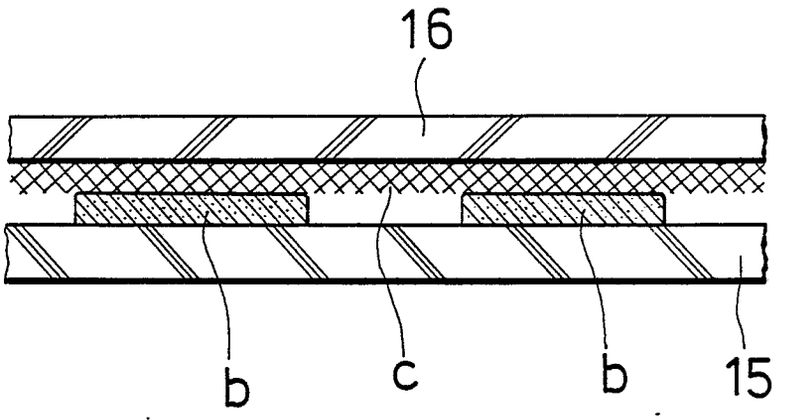


FIG. 5

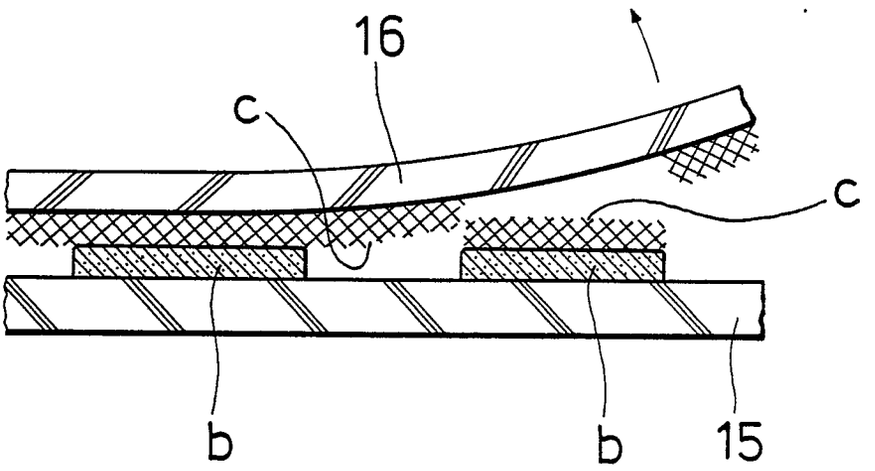


FIG. 8

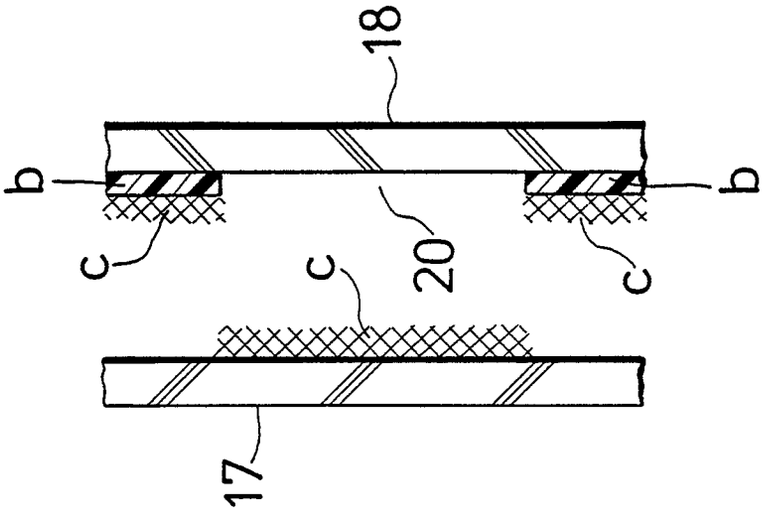


FIG. 7

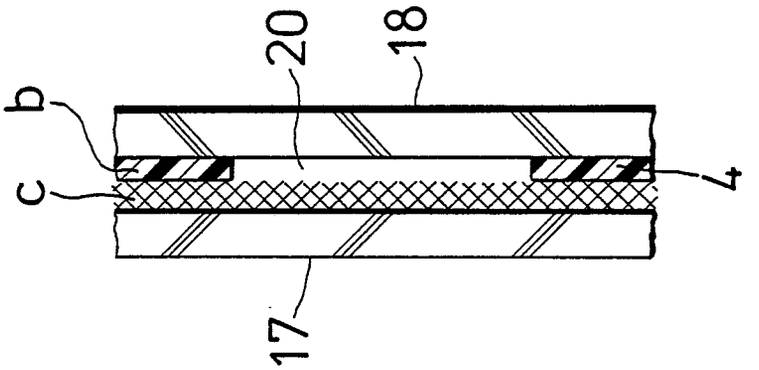


FIG. 6

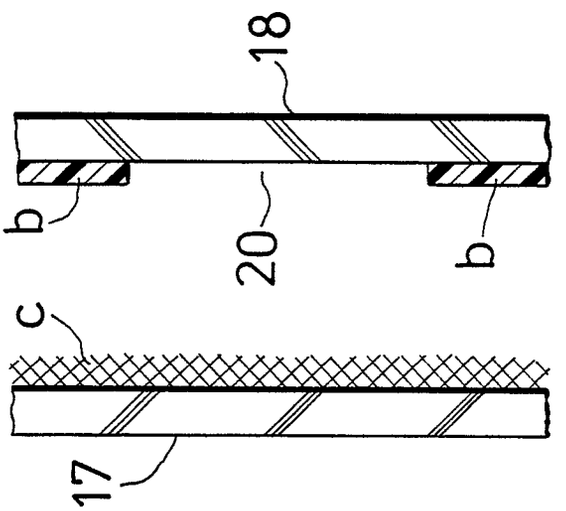


FIG. 10

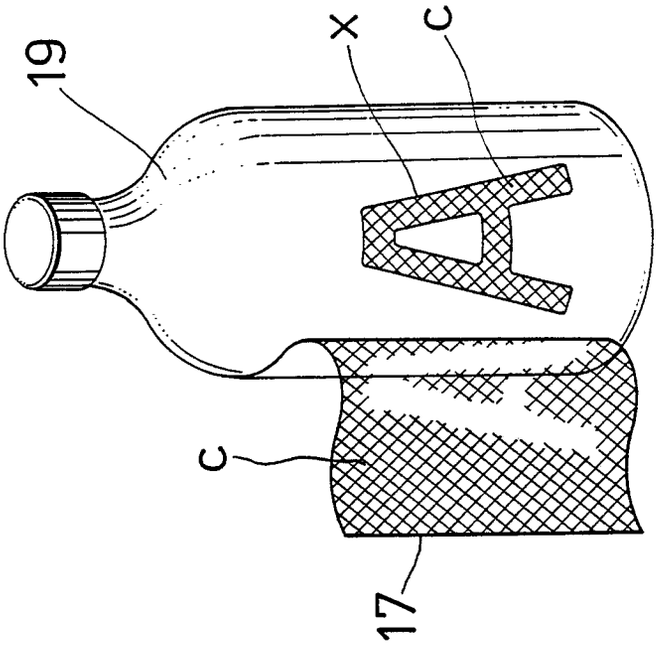


FIG. 9

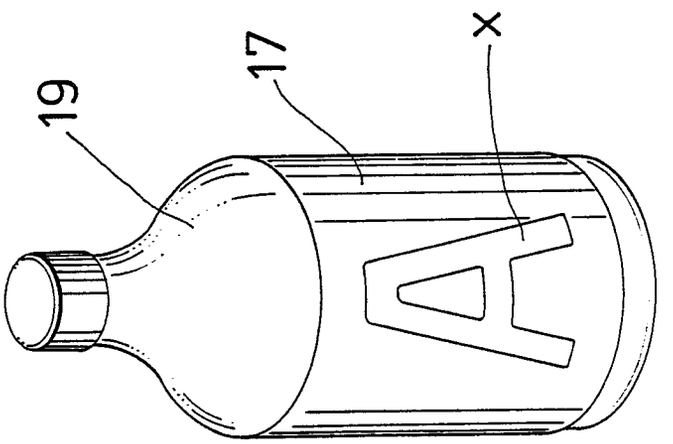


FIG. 11

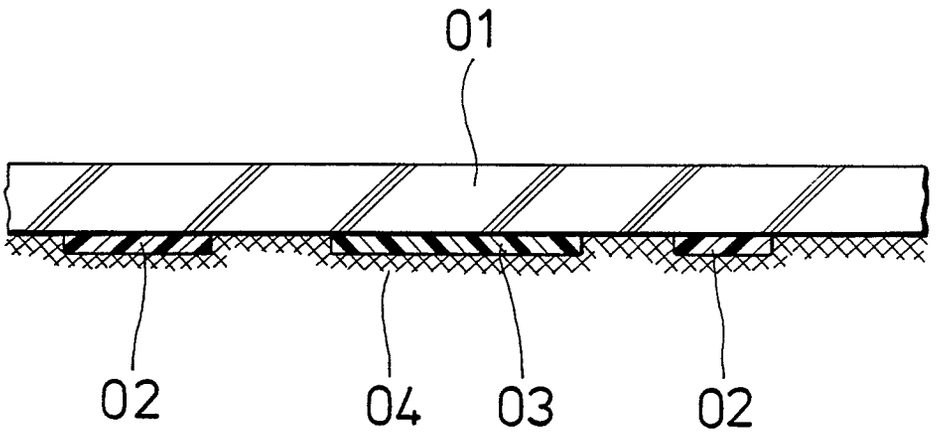


FIG. 12

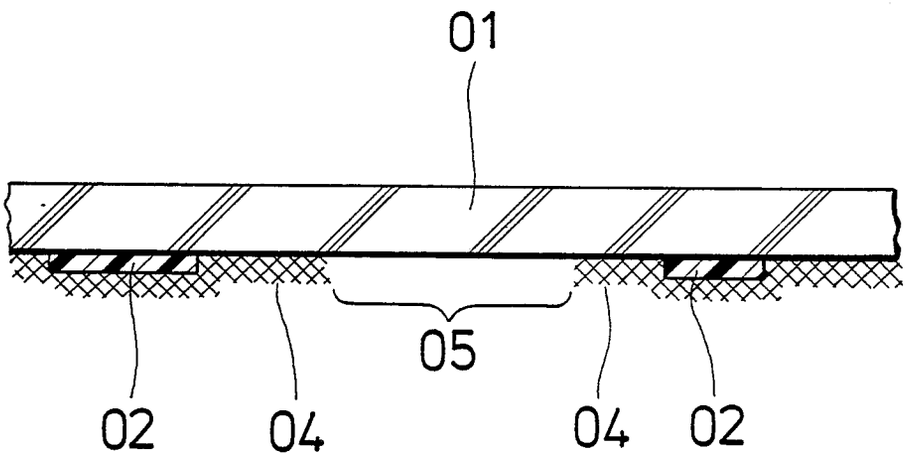


FIG. 13

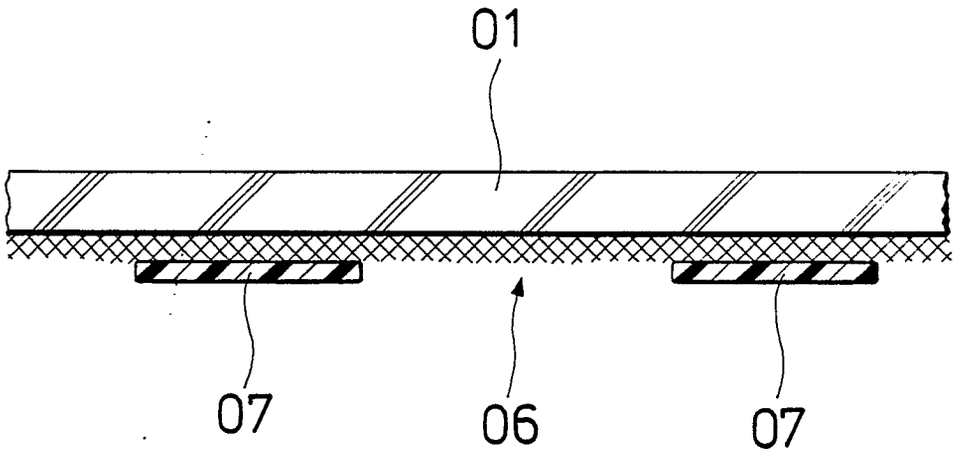
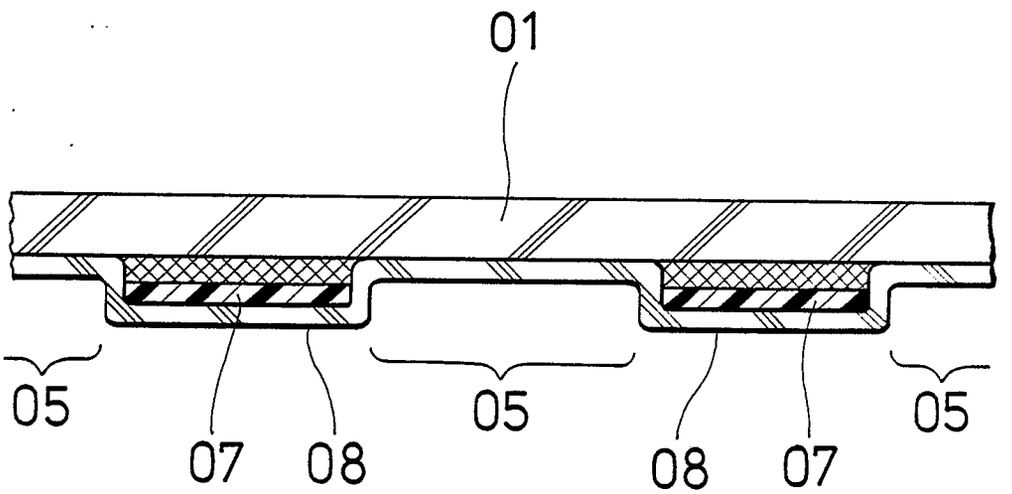


FIG. 14



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EUROPEAN SEARCH REPORT

Application number

EP 86 30 2868

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.4)
Y	EP-A-0 108 320 (THATCHER PLASTIC PACKAGING) * Page 1, lines 1-6; page 5, lines 18-27; page 6, lines 7-22; page 8, lines 17-27 *	1-6	B 44 C 1/14
A		8,9	
Y	DE-C-3 430 111 (L. KURZ) * Column 3, lines 50-62; column 5, line 41 - column 6, line 44 *	1-6	
A	GB-A-2 152 433 (OIKE INDUSTRIAL) * Page 1, line 113 - page 2, line 11 *	1	
A	US-A-4 242 378 (YOSHIAKI ARAI) * Page 2, lines 33-51 *	1	TECHNICAL FIELDS SEARCHED (Int. Cl.4) B 44 C
A	EP-A-0 043 989 (INTERLETTER) * Page 2, line 35 - page 3, line 18 *	1	
A	GB-A-2 107 361 (SONY) * Page 1, line 128 - page 2, line 29 *	1	

-/-

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	17-12-1986	FRIDEN N.

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
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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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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.4)
A	US-A-4 012 552 (T.J. WATTS) * Column 4, lines 1-41 * -----	1,2,4,6	

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

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