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(56) Documents Cited
JP 590146827 A JP 020118591 A
US 5712731 A US 4892336 A
JP2002090919 A (KYOWA)
**JP2000258634 A (TSUCHIYA) see abstract; an article
with a printed film on one side and a transparent
viewing layer laminated therewith and formed by
injection moulding**

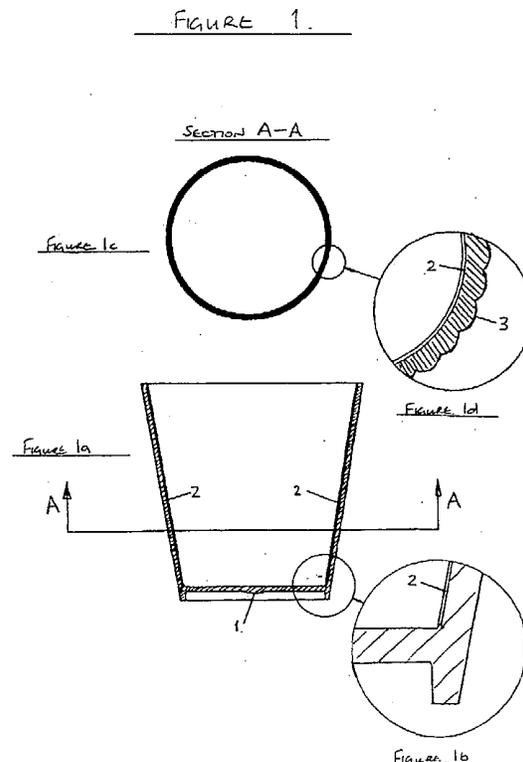
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(54) Abstract Title
Moulded lenticulated articles

(57) A lenticulated article is produced by positioning a printed film inside a mould, which includes a lenticular lens defining surface opposite the surface positioning the film, and injecting transparent plastics material into the mould to produce an article having a film on one surface and a lenticular lens on the opposite transparent surface.

The article may be a container having a lenticulated convex exterior surface 3.

On the opposite surface of the moulding is an 'in-mould label' (printed film) 2 which comprises two or more images of animation, as stripes. By moving the container, or by moving past the container, the eyes observe the instant changes in the image and hence animation or other special effects are achieved.



GB 2377 201 A

The claims were filed later than the filing date but within the period prescribed by Rule 25(1) of the Patents Rules 1995.

At least one of these pages has been prepared from an original which was unsuitable for direct photoreproduction.

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FIGURE 1.

SECTION A-A

FIGURE 1c

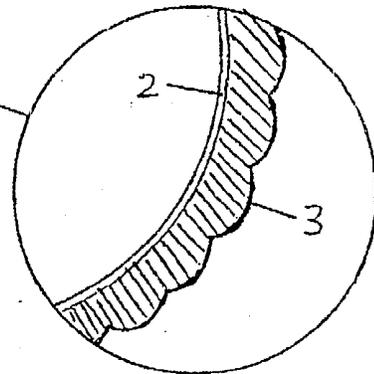
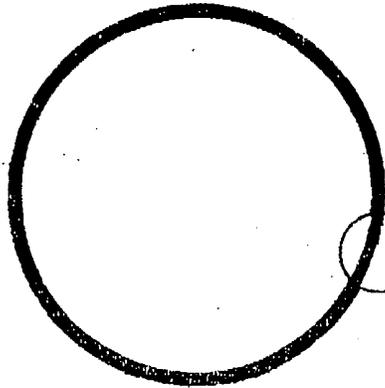


FIGURE 1d

FIGURE 1a

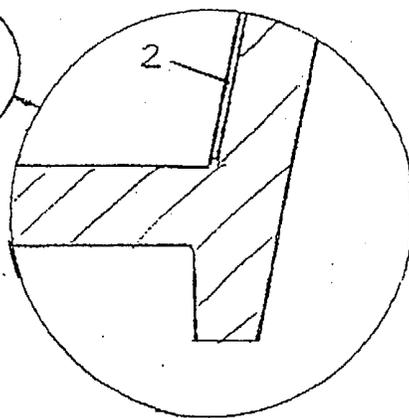
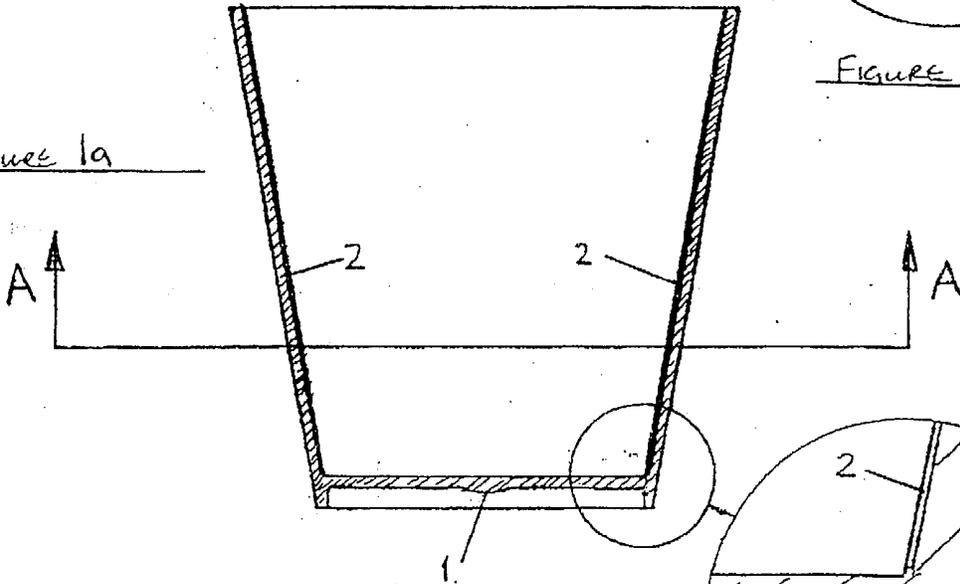
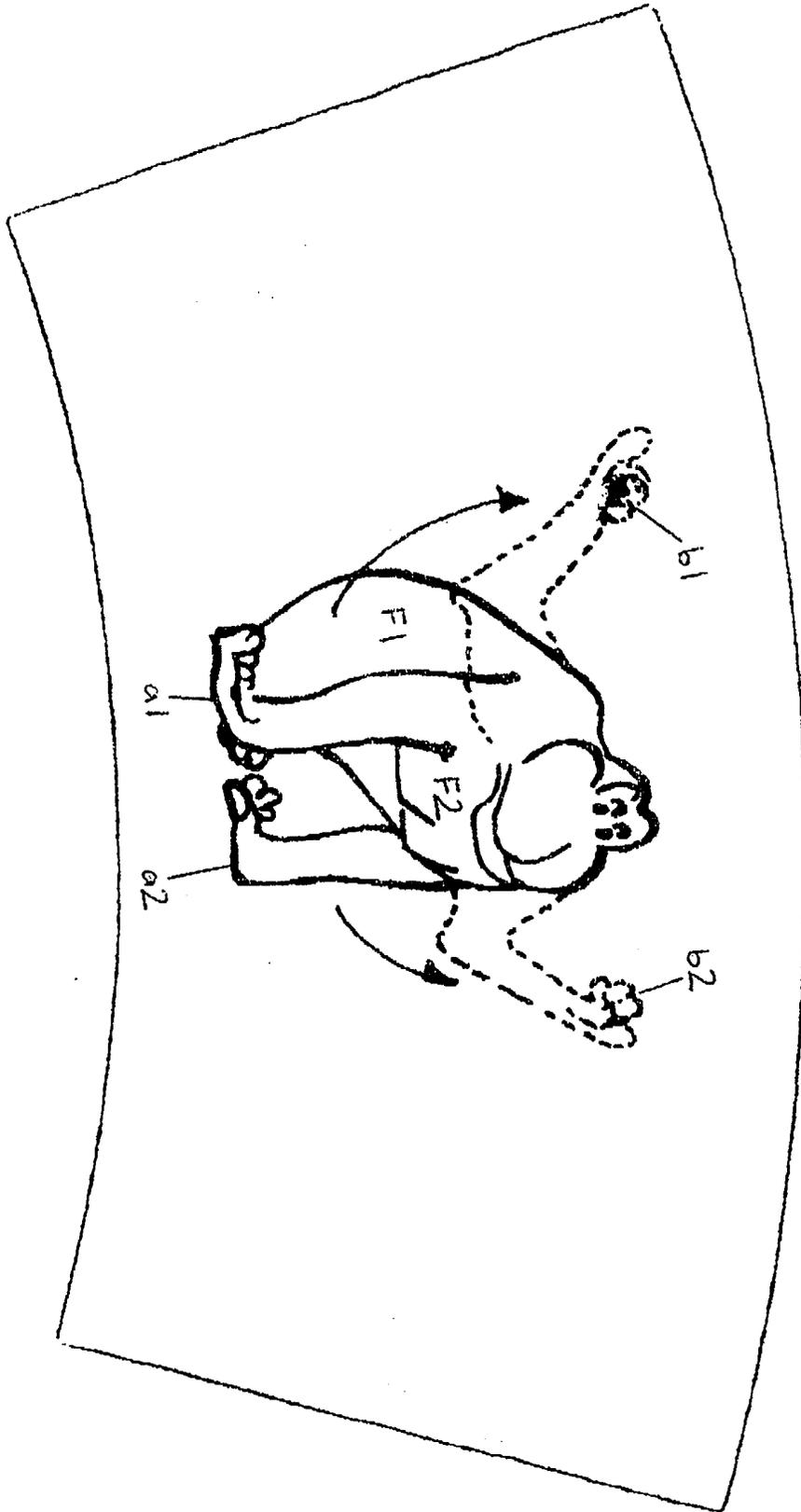


FIGURE 1b

FIGURE 2.



Patent Application for lenticulated containers and surfaces having In-Mould Labelling

This invention relates to moulded plastic products which display animation or other visually interactive effects.

Drinking cups for example have a large surface area. This has the advantage of making them ideal for displaying artwork, but the disadvantage of high expense if one covers them with a special expensive material that can create visually interactive effects. There is also the additional cost and the practical problem of adhering the special material which is normally of a thickness between 0.5 and 1.5mm to the outer surface of the drinking cup in a clean and presentable manner.

According to the present invention, there is provided a transparent moulding which has one surface moulded to create a special lens, and which is then laminated or 'in-moulded' to the opposite surface with a printed film so as to give animation effects when the observer moves the moulding or moves past it whilst viewing the moulding through the lens surface. This solution provides a far more cost effective technique than traditional methods, as the printing is carried out on a thinner inexpensive material and the finished product is produced in a single automated operation.

A specific embodiment of the present invention will now be described by way of example with reference to the accompanying drawings in which:-

Figure 1 shows a section through a moulded container, of typical thickness 0.4 to 3.0mm, having a convex lenticulated structure on its outer surface. Figure 1a shows a side section through the moulded cup. Figure 1b shows an enlarged view of the bottom corner of the cup in Figure 1a. Figure 1c shows a planar section taken through Figure 1a at the line A-A and Figure 1d shows an enlarged view of the part of the cup wall taken from Figure 1c.

Figure 2 shows the internally located printed film, of typical thickness between 30 and 200 microns, prior to it being introduced into the moulding showing a character waving its arms, with arms initially in position a1 and a2, and then in position b1 and b2. Certain areas F1 and F2 of the character remain in the same position.

In Figure 1 the moulded cup is formed by injecting molten plastic, typically clear polypropylene, into a tool made up of a male and female halves with the plastic being injected at 1 through the female half of the tool. Prior to injection taking place and while the two halves of the tool are open, the printed film shown in Figure 2 is wrapped around the male side of the tool being accurately positioned at 2, normally by robotic handling and held in place either by vacuum or by static electricity. The mould is then closed and the molten plastic is injected at 1 with the melt flow passing over the surface of the film up the sides of the container until the mould is full, the heat and pressure of the process causes the film to be perfectly laminated to the inside of the container walls. The printed film, being also made of polypropylene, would normally be white on the inside with the print effectively coming in direct contact with the molten plastic as it is injected. It has been shown that the printing inks will withstand the temperature of the molten plastic and that an excellent chemical bond will be achieved between the molten plastic and the unprinted areas of the film being that they are similar materials. Alternatively where the application demands a 'fully printed' film area, the printed side of the film can be laminated after printing with a thin layer of clear polypropylene film, typically 30 microns in thickness, so that again a chemical bond of the film is achieved to the moulded container during the moulding process, hence the term 'in-mould labelling'.

The female side of the moulding tool has the concave lenticular structure formed in it to produce a convex lenticular structure on the sides of the finished moulded container as can be seen at point 3 in Figure 1d. The printed image on the film is actually made up of a number of thin stripes, typically xxx microns wide, which alternately contain the two images of the characters arms in different positions. Therefore, as the cup is viewed by a moving observer from the outside looking through the convex lenticular structure of the moulded container, the observer's eyes are focused onto different lines of print and the arms of the character 'appear' to move up and down.

Claims:

1. A method of manufacturing a lenticulated product by the stages of introducing a printed filmic material into a mould which is made up of a smooth flat surface on one face and a female lenticular lens on the opposite face which is parallel to the first, injecting transparent material into the mould so that the filmic material is forced onto the smooth flat side of the mould and becomes bonded to the transparent material which fills the mould forming the finished component. The printed filmic material is then viewed through the moulded transparent lens to produce the lenticular effect.
2. A method as described in claim 1 where the printed filmic material contains a series of lines or images so that when viewed through the lens the finished product provides one or several diffraction patterns.
3. A method as described in claim 1 where the printed filmic material contains a number of printed images so that when viewed through the lens the finished product provides a view of one of the printed images at a particular viewing angle whilst the other printed images are revealed by changing the viewing angle slightly.
4. A method as described in claim 1 where the printed filmic material contains a number of printed images so that when viewed through the lens the finished product provides a three dimensional illusion by the combination of the printed images being viewed simultaneously by stereo vision.
5. A method of manufacturing a lenticulated product by the stages of introducing a printed filmic material into a mould which is made up of a smooth curved surface on one face and a female lenticular lens on the opposite face which is parallel to the first, injecting transparent material into the mould so that the filmic material is forced onto the smooth curved side of the mould and becomes bonded to the transparent material which fills the mould forming the finished component. The printed filmic material is then viewed through the moulded transparent lens to produce the lenticular effect.
6. A method as described in claim 5 where the printed filmic material contains a series of lines or images so that when viewed through the lens the finished product provides one or several diffraction patterns.
7. A method as described in claim 5 where the printed filmic material contains a number of printed images so that when viewed through the lens the finished product provides a view of one of the printed images at a particular viewing angle whilst the other printed images are revealed by changing the viewing angle slightly.
8. A method as described in claim 5 where the printed filmic material contains a number of printed images so that when viewed through the lens the finished product provides a three dimensional illusion by the combination of the printed images being viewed simultaneously by stereo vision.
9. A method according to any of the preceding claims 1 to 8 where the printed filmic material consists of just one layer of film or paper which is printed with printing inks, the moulded material bonds to either the printing inks or the unprinted areas of the film or paper.

10. A method according to any of the preceding claims 1 to 8 where the printed filmic material consists of just one layer of film or paper which is printed with printing inks and then coated with a varnish, laquer or adhesive layer, this outer layer is chosen to chemically bond to the transparent moulded material during the injection process.
11. A method according to any of the preceding claims 1 to 8 where the printed filmic material consists of more than one layer of film or paper with the printing inks being sandwiched between the layers, the layer that will come in contact with the transparent moulding material is also transparent and is chosen to adhere to the transparent moulding material. This transparent film is, prior to moulding, laminated to the base film using either adhesive or thermal lamination techniques. The transparent film is either 'reverse' printed or the base film is printed in normal reading mode to achieve the finished effect of reading the film correctly when viewed through the transparent filmic side.



INVESTOR IN PEOPLE

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 Claims searched: Claim 1 without the added Date of search: 30 October 2002
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Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:
 UK Cl (Ed.T): B5A (AA1, AB14, AB19, AD20, AF30E, ANA, AT14P, AT16P, AT16Q)
 Int Cl (Ed.7): B29C 33/42 39/10 39/12 45/14 45/16; B29D 11/00
 Other: Online: WPI EPODOC JAPIO

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	US 5712731 (THOMAS DE LA RUE) printed microimages viewed through a lenticular surface	
Y	US 4892336 (GAO...) printed film viewed from an opposite side through a lenticular surface	1 at least
Y	JP 020118591 A (ICHIKO) see abstract; moulding printed film layer with an injected transparent resin layer (lens)	1 at least
Y	JP 590146827 A (SONY) see abstract; injection moulding a transparent layer onto a printed film layer	1 at least
A	JP 2002090919 A (KYOWA)	
Y	JP 2000258634 A (TSUCHIYA) see abstract; an article with a printed film on one side and a transparent viewing layer laminated therewith and formed by injection moulding	1 at least

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.