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(54) **Packaging material and containers and their method of manufacture.**

(57) A packaging material which can be formed into or form part of a packaging container or outer cover and a method of manufacturing a packaging container or cover is disclosed.

In accordance with the invention, a sheet of transparent polymeric material has identifying means printed onto its rear face by a reverse printing process and the sheet is then either formed into the container or is bonded or otherwise secured to an outer face of the container with the result that the material protects the identifying means printed thereon. In order to make the polymeric material receptive to the identifying means, the sheet material has a dimpled finish on the face to receive the identifying means and this face is subjected to corona treatment prior to the printing step. If the sheet material is to be bonded or otherwise secured to the surface of the container it is formed of a relatively thin flexible film but if the sheet material is to be formed into the container itself, it is formed of a relatively stiff and thick material which is largely self-supporting.

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PACKAGING MATERIAL AND CONTAINERS AND THEIR METHOD OF MANUFACTURE

This invention relates to packaging material and containers and their method of manufacture.

The invention is particularly suited to boxes for audio and video cassettes, and containers for records and compact discs, but could have many other uses, such as magazine and book cases.

Nowadays, there is a thriving market in counterfeit, i.e. pirate products, such as audio and video cassettes. To sell such products, the supplier of the counterfeit products must not only produce e.g. counterfeit tape recordings on the cassettes, but he must also produce copies of the covers or containers in which the genuine product would be sold, otherwise the counterfeit product would instantly be recognised as such.

At the moment, video and audio cassette tapes are normally sold in boxes having some form of plastic jacket onto the outer face of which identifying means giving details of the material on the cassette are printed directly. This is simple for counterfeiters to copy but anyhow results in a somewhat inferior product which can easily be scratched and disfigured. The alternative to printing directly on the jacket is to provide a pocket between the jacket and box and slip a pre-printed card into the pocket. Again, it is very simple for counterfeiters to produce such cards. Similar containers or covers are also used for records, compact discs, books and even magazines.

The present invention seeks to provide a new construction of packaging material which can be used for containers for video and audio cassettes, which is difficult to manufacture and is therefore expensive to manufacture, and which is too expensive for counterfeiters to copy. In this respect, such copies would be prohibitively expensive to produce, unless they were produced in the sort of numbers in which the containers for the genuine product are produced. The invention is, however, applicable to containers and covers for many other types of product, and will result in a container or cover which appeals to the end user, because of its quality and durability.

According to the broadest aspect of the present invention, we provide a packaging material which can be formed into, or form part of, a packaging container or outer cover to protect a product or article, said material having identifying means thereon for identifying the product or article, said material comprising a sheet of transparent polymeric material having said identifying means reverse printed onto its inner face, which in use of the material will be the face adjacent to the product or article to be protected.

Also according to the present invention, we

provide a packaging container having identifying means thereon for identifying the contents of the container, wherein at least part of the outer surface of the container has a sheet of transparent polymeric sheet material bonded or otherwise securely attached thereto, and wherein the identifying means is reverse printed onto the inner face of the sheet material prior to attachment of said material to the container.

Also according to the present invention, we provide a packaging container or cover for an article or product, said container or cover being formed of a relatively stiff sheet of transparent polymeric material having identifying means for the article or product printed onto at least one of its internal faces.

The container may comprise a box for a tape cassette, or a sleeve for a record or compact disc, which may be made of a synthetic resinous or a fibrous sheet material, to some or all of the outer faces thereof either reverse printed sheet material is attached by heat sealing, ultrasonic welding or by any other known technique, or onto which the identifying means is directly printed by a reverse printing process.

Also according to the present invention, we provide a method of manufacturing a packaging container or cover, comprising the steps of making the container or cover of the desired construction, taking a film of transparent polymeric sheet material and reverse printing identifying means onto one face thereof, and when said printed identifying means is dry, bonding or otherwise securely attaching said sheet material onto an outer face of said container or cover with the identifying means on the inside face of said sheet.

Also according to the present invention, we provide a method of manufacturing a packaging cover or container comprising the steps of taking a film of relatively stiff transparent polymeric sheet material, reverse printing identifying means onto one face thereof, and when said identifying means is dry, forming at least part of said sheet into the cover or container with the identifying means on an inside face of the cover or container.

Preferably, the sheet material has a dimpled finish on said one face so that it resembles the peel of an orange to make it more receptive to printing inks. Preferably also, prior to the printing operation, said one face of the sheet material is subjected to corona treatment by passing the sheet material through apparatus which alters the surface micro structure of the material by discharging high voltage and high frequency energy into the surface of the material, which increases its wettability and

adhesive strength, and thus improves the adhesion qualities of the said one face, making it readily accept printing inks. Suitable corona treatment machines are those manufactured by K.R.Oberflächen-technik, of Bury, Lancashire.

Preferably, the sheet material is polypropylene film or sheet.

Preferably, the identifying means is printed onto the corona treated sheet material within 12 hours of the corona treatment. Care should be taken not to handle the said one face after said corona treatment, otherwise the charge in the face will be discharged.

It is preferred that the printing operation is carried out on a printing machine incorporating an ink drying facility, a suitable machine being a Heidelberg SPEEDMASTER® which incorporates UV drying.

The ink used for printing the identifying means must be suitable for the polymeric sheet material. It is possible to use either solvent based or water based inks.

From the ink makers' point of view, the surface conditions of the sheet or film are critical for good performance. Like other saturated hydrocarbon surfaces, polypropylene has very low polarity and reactivity. The surface energy of the pure material is around 29 dynes per cm. This inertness and low energy makes ink adhesion difficult at best. Typically the surface, if uncoated, is treated with a corona, high voltage discharge or flame to raise the surface energy by adding polar sites and "burning off" surface contaminants. The technique used and the energy applied to the surface are critical factors in the successful printing of polypropylene. Typically a surface treatment equivalent of 2.5 to three watt-minutes of corona discharge per square foot of surface area will increase the surface energy of oriented polypropylene film from 29 to about 40 dynes per cm. This is a good level for proper ink adhesion and good surface wetting. Higher surface energy treatments can lead to poorer ink adhesion rather than better properties. Sometimes film to film blocking can occur if the treatment is carried to extremes.

Oriented polypropylene films or sheets usually contain some small amounts of slip additives and anti-blocking agents. Since these additives will tend to migrate to the sheet or film surface, they will mask the effect of the sheet or film treatment. Since solvent based inks will dissolve these materials to bite into the true sheet or film surface below, good ink adhesion can often be found even when a low surface energy is measured. However, this is not the case with water based inks since these film additives typically form a hydrophobic layer which prevents wetting.

Other variations in the surface composition of

polypropylene film or sheet include co-extruded or coated layers of ethylene-propylene copolymers, acrylic polymers, PVDC and aluminium. Each of these materials bring with it particular surface characteristics. Polyolefin copolymers are generally similar to oriented polypropylene film characteristics and therefore so is the printing. Coatings such as acrylic polymers are generally of a higher surface energy and therefore provide better ink adhesion. At the same time solvent retention can be a significant problem without carefully formulated inks and extra care in drying on the press.

In one construction, a printed film is adhered to the container or cover surface using a known technique, e.g. using ultrasonic welding, an adhesive or a laminating process. Alternatively, if a relatively stiff sheet of polypropylene is used, which has a thickness of the same order as traditional sheet material used for packaging purposes, e.g. fibrous sheet material used for "cardboard" boxes, cartons and the like, the reverse printed sheet can itself be formed directly into the packaging container or cover. For example, it can be formed into a traditional cassette box, or one with ordinary fold-in end flaps, or one with a flip-top type end, or it can be formed into a sleeve for a record or a compact disc, largely in known manner, or used as a book or magazine cover. Also, it could be used for other purposes. In all cases, the reverse printed surface would be on the inside of the container or cover.

Because the printed identifying means is on the rear or back face of the cover or container, i.e. the inner face of the polypropylene sheet or film, a smooth glossy outer finish is provided from which it is impossible to remove the identifying means. This can only be achieved either by destroying the container or cover or by peeling off the polymeric sheet material from the cover or container. This means that the covers or containers can only be used for the purpose for which their manufacturer intended them to be used. Furthermore, because the equipment required for manufacturing the sheet material for the containers or covers is expensive, it is difficult for counterfeiters and those wanting to reproduce pirate copies of the containers or covers to do so, since they cannot match the quality of the product without incurring substantial expense. This means that the containers or covers of this invention are of particular value to the music and video industries for use as cassette boxes, and for the packaging of records, compact discs and the like.

It will of course be understood that the present invention has been described above purely by way of example, and modifications of detail can be made within the scope of the invention. For example, the sheet material need not be a polypropylene film. Other materials which are transparent and durable and which will accept printing, and

which can be bonded to a surface of, or formed into, the container, could also be used.

Claims

1. Packaging material which can be formed into, or form part of, a packaging container or outer cover to protect a product or article, said material having identifying means thereon for identifying the product or article, said material comprising a sheet of transparent polymeric material having said identifying means reverse printed onto its inner face, which in use of the material will be the face adjacent to the product or article to be protected.

2. A packaging container having identifying means thereon for identifying the contents of the container, wherein at least part of the outer surface of the container has a sheet of transparent polymeric sheet material bonded or otherwise securely attached thereto, and wherein the identifying means is reverse printed onto the inner face of the sheet material prior to attachment of said material to the container.

3. A packaging container or cover for an article or product, said container or cover being formed of a relatively stiff sheet of transparent polymeric material having identifying means for the article or product printed onto at least one of its internal faces.

4. A container according to claim 2 which comprises a box for a tape cassette, or a sleeve for a record or compact disc, which is made of a synthetic resinous or a fibrous sheet material, to at least one of the outer faces of which the reverse printed transparent sheet material is attached by heat sealing, ultrasonic welding or by any other technique.

5. A container or cover according to claim 3 which is formed into a box or sleeve for a tape cassette, compact disc or record, and is formed of a relatively thick, foldable transparent polypropylene onto at least one internal face of which the identifying means is directly printed by the reverse printing process.

6. A method of manufacturing a packaging container or cover, comprising the steps of forming the container or cover into the desired construction, taking a film of transparent polymeric sheet material and reverse printing identifying means onto one face thereof, and when said printed identifying means is dry, bonding or otherwise securely attaching said sheet material onto an outer face of said container or cover with the identifying means on the inside face of said sheet.

7. A method of manufacturing a packaging cover or container comprising the steps of taking a film of relatively stiff transparent polymeric sheet

material, reverse printing identifying means onto one face thereof, and when said identifying means is dry, forming at least part of said sheet into the cover or container with the identifying means on an inside face of the cover or container.

8. A method according to claim 6 or 7 wherein the sheet material has a dimpled finish formed on said one face so that it resembles the peel of an orange to make it more receptive to printing inks.

9. A method according to claim 6 or 7 wherein prior to the printing operation, said one face of the sheet material is subjected to corona treatment by passing the sheet material through apparatus when alters the surface micro structure of the material by discharging high voltage and high frequency energy into the surface of the material, to increase its wettability and adhesive strength, and thus improves the adhesion qualities of the said one face, making it readily accept printing inks.

10. The invention as claimed in any one of claims 1-4 wherein the sheet material is polypropylene film or sheet.

11. A method according to claim 9 wherein the identifying means is printed onto the corona treated sheet material within 12 hours of the corona treatment.

12. A method according to claim 6, 7, 8 or 9 wherein the polymeric material is polypropylene.