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54 Titre: Method for applying a removable printed marking to a container.

57 Abrégé:

For the application of a removable printing to a container, such as a plastic crate, a layer of ink, which forms the printing and is provided on one side with a bonding agent for bonding the layer of ink to the container, is transferred to the container from a carrier film to which the layer of ink has been applied to the side not provided with bonding agent. The bonding agent has such properties that in normal conditions of use of the container the layer of ink adheres firmly to the container and in predetermined conditions which differ from the conditions of use the bonding agent and the layer of ink are easy to remove from the container. This produces a container with a high-quality printing, which printing is easy to replace with another printing.

## METHOD FOR APPLYING A REMOVABLE PRINTED MARKING TO A CONTAINER

The invention relates to a method for applying a removable printing to a container.

Applying a printing to a container, for example a bottle crate, is generally known. The printing can be applied to the container by flexographic printing or screen printing techniques. However, such a printing is of a permanent character and cannot be removed from the container, or can be removed only by very special measures.

In practice, there is a need for applying a different printing to a certain type of container (for example, if a different product is to be packed therein, or in the case of advertising promotions). For this purpose, the printing on the container must be relatively easy to remove from it without the container being damaged. On the other hand, the printing must be durable and of good optical quality, in order to ensure that a container can be used for a specific brand of product for quite a long period of time.

Labels which can be affixed to containers and removed from them again are known. Such labels contain a paper, aluminium or plastic film which is provided with a special layer of bonding agent. However, a container provided with such a label does not have a perfect appearance. Moreover, the thickness of such labels invites undesirable removal. During the industrial removal of labels from a large number of containers a relatively large quantity of material comes off and requires further processing.

The object of the invention is to provide a method which makes it possible to apply an optically pleasing printing to a container, which printing is difficult for the user to remove from the container, but is easy to remove from the container industrially, the container being clean again after the printing has been removed, so that a new printing can be applied.

This object is achieved according to the invention by a method for applying a removable printing to a container, in which a layer of ink, which forms the printing and is provided on one side with a bonding agent for bonding the layer of ink to the container, is transferred to the container from a carrier film to which the layer of ink has been applied at the side not provided with bonding agent, the bonding agent having such properties that in normal conditions of use of the container the layer of ink adheres firmly to the container and in predetermined conditions which differ from the conditions of use the bonding agent and the layer of ink are easy to remove from the container.

Use of the method according to the invention produces a container with a high-quality printing which is relatively easy to replace by another printing.

The invention also relates to a plastic container provided with a removable printing comprising a layer of ink which forms the printing, which layer of ink is applied to the container by means of a bonding agent, the bonding agent having such properties that in normal conditions of use of the container the printing adheres firmly to the container and in predetermined conditions which differ from the conditions of use the bonding agent and the layer of ink are easy to remove from the container.

The invention also relates to a film to which a layer of ink which forms the printing is applied to one side, which layer of ink on the side facing away from the film is provided with a bonding agent for bonding the layer of ink to a substrate.

Preferred embodiments of the method, the plastic container and the film according to the invention are defined in the subclaims.

The invention will be explained in greater detail with reference to the exemplary embodiment below.

The exemplary embodiment relates to the application of a removable printing to a plastic bottle crate which is preferably made of a polyalkene, such as polyethylene or polypropylene, and in which the printing is applied to the

outside wall of the crate. However, the method according to the invention can also be used for other types of containers, such as plastic boxes and glass or plastic bottles.

5           When the method according to the invention is applied to a clean crate, a layer of ink, which forms the printing and is provided on one side with a bonding agent for bonding the layer of ink to the crate, is transferred from a carrier film to the crate. The layer of ink is  
10 applied to a carrier film at the side not provided with a bonding agent. The carrier film is preferably a calendered PET, polypropylene or polyethylene film with a thickness of 40 - 50  $\mu\text{m}$ .

15           If the printing is being applied on an industrial scale, the printing will generally come from a carrier film web to which several layers of ink which form the printing have been applied. If the carrier film web has been placed on a roll, the side not provided with the printing will preferably be provided with an anti-bonding layer, for  
20 example a silicone layer. The printing will preferably be applied mechanically to the crates.

          In order to be able to guarantee a perfect appearance and good protection of the printing, the layer of ink can be provided with a layer of lacquer on the side  
25 not provided with a bonding agent. Consequently, when the layer of ink has been applied to the carrier film, the layer of lacquer will be situated between the layer of ink and the carrier film. In order to guarantee optimum protection of the printing on a crate, the layer of lacquer  
30 projects beyond the contours of the layer of ink and is likewise provided with a bonding agent in that region, preferably the same bonding agent as that also applied to the layer of ink. Once the printing has been applied to the crate, the layer of ink is completely enclosed between the  
35 wall of the crate and the layer of lacquer.

          In order to be able to remove the printing from the crate again relatively easily, the bonding agent has such properties that in normal conditions of use of the crate the layer of ink and the layer of lacquer adhere firmly to

the crate and in predetermined conditions which differ from the conditions of use the bonding agent, the layer of ink and the layer of lacquer are easy to remove from the crate. An example is a bonding agent which loses its adhesion to  
5 the crate at a temperature which is higher than the temperature at which crates are usually cleaned. Crates are generally cleaned with water at a temperature of approximately 40°C. By using a bonding agent which becomes  
10 ineffective at a temperature of approximately 60°C and higher, it is possible to allow crates from which the printing is to be removed to soak for some time in water at 60°C and higher (to which an agent for reducing the surface tension has been added if necessary) and then to remove the printing using a high-pressure water jet (for example 15  
15 bar).

In order to accelerate the soaking process, a slightly porous layer of ink and layer of lacquer, if present, can be used, so that water can penetrate rapidly to the bonding agent.

20 It is also possible to use a bonding agent which becomes ineffective under the influence of UV rays. In that case also, the printing can be removed using a high-pressure water jet.

The printing can be applied to the carrier film by  
25 means of conventional printing techniques, such as flexographic printing or screen printing techniques. This also applies to the layer of lacquer. In practice, a layer of lacquer will first be applied to the carrier film, with such dimensions that said layer of lacquer projects  
30 slightly beyond the layer of ink to be applied subsequently. The layer of ink will then be applied to the layer of lacquer and, finally, a bonding agent will be applied to the layer of ink and the part of the layer of lacquer projecting beyond the layer of ink, likewise using  
35 printing techniques.

The bonding between the layer of ink or layer of lacquer and the carrier film must, of course, be weaker than the bonding which the bonding agent produces between the layer of ink and layer of lacquer and the crate. This

means that the layer of ink is easy to transfer from the carrier film to the crate without the layer of ink or the layer of lacquer being damaged. The bonding between the layer of ink or the layer of lacquer and the carrier film  
5 is the result of adhesion between the layer of ink or layer of lacquer and the carrier film.

As already mentioned, the layer of ink will generally be transferred mechanically from the carrier film to the crate. It must be ensured in this case that the  
10 layer of ink is pressed down well on the substrate, and that no air inclusions arise between the layer of ink and the crate wall.

The result of the application of the method according to the invention is a crate with a printing of  
15 very high quality, but which can easily be removed again, in such a way that after the removal of the printing the surface of the crate is undamaged, and a new printing can be applied to the crate.

Good results are obtained in practice with a  
20 dispersion glue manufactured by KIWO, known by the name of D 3206 VP, as the bonding agent. Of course, the invention is not limited to this bonding agent.

Claims

1. Method for applying a removable printing to a container, in which a layer of ink, which forms the printing, is transferred from a carrier film, to which the layer of ink has been applied by means of conventional printing techniques, to the container, the layer of ink being provided on the side contacting the container with an adhesive for bonding the layer of ink to the container, the adhesive having such properties that in normal conditions of use of the container the layer of ink adheres firmly to the container and in predetermined conditions which differ from the normal conditions of use the adhesive and the layer of ink are easy to remove from the container.
2. Method according to claim 1, in which the adhesive and the layer of ink can be removed together from the container.
3. Method according to claim 1 or 2, in which the layer of ink is provided with a layer of lacquer on the side not provided with adhesive, the layer of lacquer being situated between the layer of ink and the carrier film when the layer of ink has been applied to the carrier film.
4. Method according to anyone of claims 1 to 3, in which the layer of lacquer projects beyond the contours of the layer of ink, and the part of the layer of lacquer projecting beyond the layer of ink is provided with adhesive for bonding the corresponding part of the layer of lacquer to the container, this adhesive preferably being the same as the bonding agent on the layer of ink.
5. Method according to anyone of claims 1 to 4, in which the bonding between the layer of ink or the layer of lacquer and the carrier film is weaker than the bonding which the adhesive produces between the layer of ink and

any part of the layer of lacquer which may project beyond the layer of ink and the container.

6. Method according to anyone of claims 1 to 5, in which the bonding between the adhesive and the container  
5 substantially disappears at a temperature which is higher than the temperature at which containers are normally cleaned.

7. Method according to claim 6, in which the bonding between the adhesive and the container disappears at a  
10 temperature of approximately 60°C.

8. Method according to anyone of claims 1 to 5, in which the bonding between the adhesive and the container substantially disappears under the influence of UV rays.

9. Method according to anyone of claims 1 to 8, in  
15 which the carrier film is a carrier film web to which several layers of ink which form the printing have been applied.

10. Method according to anyone of claims 1 to 9, in which the layer of ink is transferred mechanically from the  
20 carrier film to the container.

11. Method according to anyone of claims 1 to 10, in which the printing is applied to a container made of plastic material, preferably of a polyalkene, such as polyethylene or polypropylene.

25 12. Method according to anyone of claims 1 to 11, in which the container is a plastic crate or box and the printing is applied to the outside wall of the crate or the tray.

13. Plastic container provided with a removable  
30 printing comprising a layer of ink which forms the printing and which is applied directly to the container by means of

an adhesive, the adhesive having such properties that in normal conditions of use of the container the printing adheres firmly to the container and in predetermined conditions which differ from the normal conditions of use the layer of ink and the adhesive are easy to remove from the container.

14. Plastic container according to claim 13, in which a layer of lacquer is applied over the layer of ink and a region immediately next to the layer of ink.

10 15. Plastic container according to claim 13 or 14, in which the bonding between the adhesive and the container substantially disappears at a temperature which is higher than the temperature at which containers are usually cleaned.

15 16. Plastic container according to claim 15, in which the bonding between the adhesive and the container disappears at a temperature of approximately 60°C.

17. Plastic container according to claim 16, in which the container is a crate or box which is preferably made of a polyalkene, such as polyethylene or polypropylene, and the printing is applied to the outside wall of the crate or the box.

18. Film to which a layer of ink which forms the printing is applied to one side by means of conventional printing techniques, which layer of ink on the side facing away from the film is provided with an adhesive for bonding the layer of ink to a substrate.

19. Film according to claim 18, in which a layer of lacquer connected to the layer of ink is present between the layer of ink and the film.

20. Film according to claim 18 or 19, in which the film is in the form of a film web to which several layers of ink

which form the printing have been applied.

21. Film according to claim 20, in which on the side not provided with a layer of ink the film is provided with an anti-bonding layer, for example a silicone layer.