

METHOD FOR PRODUCING PAPER OR PLASTIC CONTAINER OF HEAT INSULATION, HEAT PRESERVATION AND SCALD PREVENTION AND THE SAME CONTAINER OBTAINED THEREBY

BACKGROUND OF THE INVENTION

(a) Field of the Invention

The present invention is related to a manufacturing process of a container and its finished product, and more particularly, to one for producing a container with an insulation surface and its finished product.

(b) Description of the Prior Art:

For cost and popular application concerns, general containers are usually made of paper or plastic material. For example, paper or plastic cup, bowl, plate or paper or plastic made container for packaging, refractory container, and lunchbox. These containers have their inherited flaws:

1. Each is related to a single-layer construction failing to provide refractory and insulation effects; if for achieving refractory and insulation effects, the container is made of two-layer construction or a segregation is provided, the higher production cost fails to be justified by the disposable nature of the container.

2. For aesthetic purpose, the surface layer of the container at its best is printed a pattern thereon and it is impossible to present 3D pattern effects.

3. To prevent its holder to get burned, a plastic plate is usually supplied with a paper cup generally available in the market to support the cup. This becomes not very convenient and after the paper cup is disposed of, the plastic plate must be separately stored.

SUMMARY OF THE INVENTION

The primary purpose of the present invention is to provide a process for manufacturing a container with insulation surface and its finished product.

To achieve the purpose of eliminating the flaws found with the prior art, the present invention discloses a method for manufacturing a container with an insulation surface by having first a compound coating prepared and then having the mixture coated on the surface of the container. The compound coating is prepared by mixing liquid adhesive and heat-resistant foaming powder particles. The compound coating is applied on a semi-finished product of the container, e.g., a continuously running paper

or plastic web or on the surface of a container already molded in shape, e.g., the surface of a paper or plastic container. There is no specific demand on the thickness of the compound coating; and a thin layer is sufficient by following the principle of producing a proper thickness of foaming to provide expected insulation with minimum amount of the coating. The coated paper or plastic web or the container then heated for the surface to initiate foaming process by means of those foaming powder particles while causing the liquid adhesive to attach to the surface to create a foamed layer. Finally, the paper or plastic web is cut to be molded into a container that is capable of delivering insulation effects for its holder will not risk of getting burned when the container is filled up with hot drink. Accordingly, the container manufactured using the process of the present invention delivers in general refractory, insulation, and burn-prevention effects.

The liquid adhesive is related to a water-based EVA or PE/EVA resin, or oil-based acrylic adhesive and they are readily available in the market. The foaming powder particle is related to a thermoplastic polymer containing low-boiling point solvent, and is also readily available from the market.

The adhesive and the foaming particle is mixed at a ratio of 5%~20% of the adhesive and 95%~80% by weight with a foaming extent reaching 20~50 times greater of the volume.

Specifically, the process of the present invention for manufacturing a container provided with an insulation surface is comprised of the following steps:

- a. The liquid adhesive and the heat-resistant foaming powder particles are mixed to produce a compound coating;
- b. The compound coating is applied on the outer surface of paper or plastic container, or its semi-finished product;
- c. The container applied with the compound coating is heated by a heating device;
- d. The compound coating on the surface of the container initiates the foaming process to produce a foamed layer thereon; and
- e. The foamed layer by taking advantage of condensation provided by the liquid adhesive to become integrated with the surface of the container.

Color pigment may be added into the coating and spray with a spraying gun or printed with a rotary printing press to form a color 3D pattern on the surface of the

container when the coating is heated and foamed, or the color printing is provided after the formation of the pattern so to deliver diversified and attractive visual effect. Meanwhile, the protruded 3D pattern forthwith provides insulation function for the user to hold in achieving the same multiple benefits of refractory, insulation, and burn-proof in an attractive appearance.

The compound coating may be applied only to where allows to be held without coating on the entire surface of the container; and may be applied to a recessed area of the surface of the container when the container is molded.

The present invention is applicable to the surface of any paper or plastic container for the pattern model to from patterns of different interests for presenting attractive appearance and providing practical burn-proof effects when the container is filled with hot drink.

The heating device used in the present invention is related to any heating device generally operating in the trade.

The thickness of the 3D pattern protruding from the surface of the container as desired is achieved depending on that of the compound coating applied and by controlling the heating temperature. Whereas there is no strict restriction on the thickness, the heating temperature is generally controlled within the range of 80~150℃. For those who are familiar with the art of the present invention may control the thickness of the 3D pattern protruding from the surface of the container as desired according to the present invention and their best judgment to determine proper coating thickness and proper heating temperature.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block chart showing a process flow path of the present invention.

Fig. 2 is a schematic view showing a layout of a rolling system in the present invention.

Fig. 2A is schematic view showing a semi-product completed with a coating process of the present invention.

Fig. 2B is a schematic view showing a finished product before and after the coating process of the present invention.

Fig. 2C is a preferred embodiment showing a container printed with a pattern on its surface of the present invention.

Fig. 3A is a schematic view showing that partial areas of the surface of the

container are foamed in the present invention.

Fig. 3B is a schematic view showing another preferred embodiment of the present invention with multiple foamed patterns on a surface of a container.

Fig. 3C is a schematic view showing that partial areas of the surface of the container are foamed in another preferred embodiment of yet the present invention.

Fig. 4A is a schematic view showing that the surface of a container is entirely foamed in the present invention.

Fig. 4B is a schematic view showing that the surface of a container is partially foamed in the present invention.

Fig. 4C is a schematic view showing that a concave area of a surface of a container is filled with a foamed layer.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to Fig. 1, a manufacturing process of the present invention involves addition of a liquid adhesive 1 into multiple thermal resisting foaming powder particles 2; both of adhesive 1 and particles 2 are mixed 3 to form a compound coating 4; the compound coating 4 is applied on a surface of an semi-finished product 6 (as illustrated in fig. 2A) or a container 7, 7' (as illustrated in Figs. 2B, 2C, 3A, 3B, and 3C) by a spraying 5, a rotary printing press 5', or a color printing 5'' method; the container 7, 7' is then heated through a heating device 8 for those powder particles 2 on the surface to start foaming while attaching the liquid adhesive 1 to the surface of the container 7, 7'; and finally the surface is formed with a foamed layer 9 to provide reinforcement, insulation, and refractory effects to the container 7, 7'.

The liquid adhesive 1 is related to oil or water base to deliver the same solidification and adhesion results in the process of heating and foaming.

As illustrated in Figs. 1 and 2, a pattern model is directly disposed on a roller 51' of the rotary printing press 5' to continuously print the pattern on a paper web P while applying the compound coating 4 on the paper web P, and the printed paper web P is cut into the semi-finished 6 for a preset scope that is necessary to make the container 7, 7' as illustrated in Fig. 2A. The container 7, 7' is then molded (with molding process not falling within the scope of claims to be claimed in the present invention, thus will not be elaborated here) and heated to form the foamed layer 9 on the surface of the container 7, 7'.

Now referring to Figs. 1, 2, 4A, 4B, and 4C, the compound coating is

applied to the surface of the paper container 7 or the surface of the injection molded plastic container 7' to provide the container 7, 7' insulation effect so that its holder will not feel too hot to hold when the container 7, 7' contains hot drink while keeping warm of the hot drink for a longer time. As illustrated in Figs. 3A, 3B, and 3C, the pattern model is sprayed or printed on the surface of the container 7, 7' during the coating process as illustrated in Figs. 1 and 2, the pattern coated compound coating is then heated and foamed to provide protruded 3D pattern 9 for the container when containing hot drink will not get too hot to hold while achieving multiple benefits of attractive appearance, refractory, insulation, and burn-proof..

Application of the compound coating 4 may be confined to the location and range on the surface of the container 7 (7') at where the container is to be held by its user without coating the entire area of the surface of the container as illustrated in Figs. 1, 2A, 2B, 2C, 3A, 3B, 3C, 4A, 4B, and 4C. If a recessed area 71(71') is disposed on the container when molded into shape as illustrated in Fig. 4C, the recessed area 71 (71') is filled up with the compound coating 4 for the recessed area 71 (71') of the container 7(7') to remain in flushed condition to provide the burn-proof effects when held for cost reduction purpose.

As illustrated in Figs. 1, 3A, 3B, 3C, 4A, and 4C, a color pigment 11 is added into the compound coating 4 to create colorful pattern at where the foaming process takes place. The color printing process is performed at where the formed layer 9 is located after the compound coating 4 is incorporated with the foamed layer on the surface of the container 7 (7') as illustrated in Fig. 4B and 4C) or performed on the entire foamed layer 9 to present the color pattern as illustrated in Fig. 4A.

A proper thickness of the compound coating protruding from the surface of the container upon completing the foaming process is controlled by regulating the heating temperature. The higher (lower) heating temperature means sufficient (less sufficient) foaming, and thus resulting in thicker (thinner) protrusion of the foamed compound coating. Furthermore, excessively higher heating temperature will cause the plastic material to get melted; therefore, the heating temperature is preferred to be controlled with a range of 80~160℃.

The present invention has a wide application range including all kinds of paper or plastic containers, e.g., cup, bowl, plate, lunchbox and other containers for packaging purpose for them to deliver refractory, insulation, burn-proof, and structural

reinforcement results.

CLAIMS

I Claim,

1. A process for manufacturing a container with an insulation surface comprising the following steps:
 - 5 a. The liquid adhesive and the heat-resistant foaming powder particles are mixed to produce a compound coating;
 - b. The compound coating is applied on the outer surface of paper or plastic container, or its semi-finished product;
 - c. The container applied with the compound coating is heated by a heating device;
 - 10 d. The compound coating on the surface of the container initiates the foaming process to produce a foamed layer thereon; and
 - e. The foamed layer by taking advantage of condensation provided by the liquid adhesive to become integrated with the surface of the container.
- 15 2. The process for manufacturing a container with an insulation surface as claimed in Claim 1, wherein a pattern model is disposed on the surface of the container; the compound coating is applied and attached to pattern model; the coating is applied on the pattern model by spray with a spray gun or by printing using a rotary printing press; the coated area is then heated to initiate the foaming process; and a protruding 3D pattern is formed on the surface of the container.
- 20 3. The process for manufacturing a container with an insulation surface as claimed in Claim 1, wherein the liquid adhesive in the compound coating is related to an oil-based or a water-based adhesive.
- 25 4. The process for manufacturing a container with an insulation surface as claimed in Claim 1, wherein the compound coating is directly applied on a continuously running paper or plastic web, the coated web is then cut into multiple pieces with each in a given size for the manufacturing of the container; the container when molded in shape is then heated to create on its surface a foamed layer.
- 30 5. The process for manufacturing a container with an insulation surface as claimed in Claim 1, wherein a recessed area in proper depth and range

disposed on the container where it is to be held is applied with the compound coating, heated and foamed for the recessed area to stay flushed with other areas on the surface of the container.

6. The process for manufacturing a container with an insulation surface as claimed in Claim 1, wherein the heating temperatures is controlled with a range of 80~160° to achieve the protruding thickness of the pattern as desired after completing the foaming process.

7. The process for manufacturing a container with an insulation surface as claimed in Claim 2, wherein a color pigment is added into the compound coating to create a color pattern at where the foaming process takes place.

8. The process for manufacturing a container with an insulation surface as claimed in Claim 2, wherein after the compound coating is foamed on the surface of the container, a color printing method is applied to print color patterns on the foamed pattern model or at where the foaming process takes place.