May 15, 1945. C. A. BAUER 2,376,305

MOLDED ARTICLE

Filed April 3, 1939

Fig. 1.

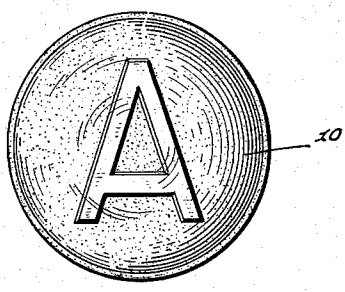


Fig. 2.

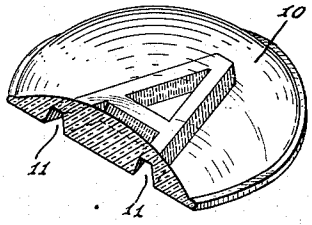


Fig. 4.

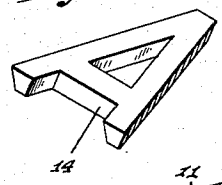


Fig. 3.

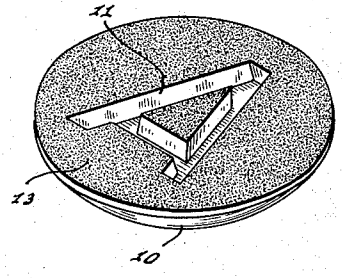


Fig. 8.

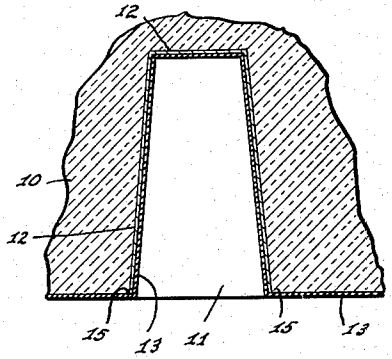


Fig. 5.

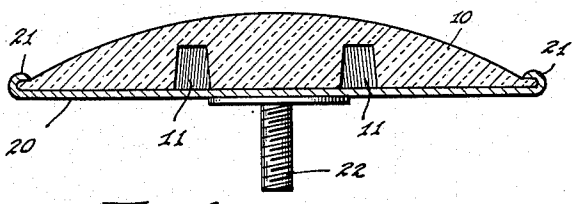


Fig. 6.

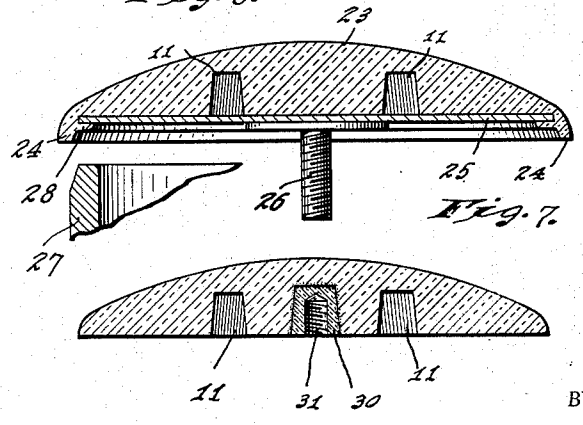
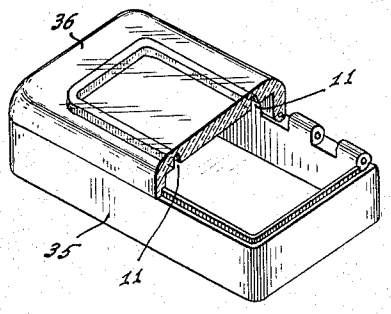


Fig. 7.

Fig. 9.



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Patented May 15, 1945 2,376,305

UNITED STATES PATENT OFFICE

2,376,305

MOLDED ARTICLE

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Application April 3, 1939, Serial No. 265,746

1 Claim. (Cl. 41—22)

My invention relates to articles formed of transparent material and has for its primary object the creation of an illusion whereby the article will bear a design which appears to be formed of a different material embedded within it. Such articles may be used for purely decorative purposes, for name plates, for push-buttons such as the push-buttons for automobile horns, for containers or container-covers, or for countless other purposes.

In carrying out my invention, I make the article of transparent material with the design recessed into its rear face, and then I render the recess walls opaque, as by applying thereto an opaque coating material. Preferably, the unrecessed portions of the rear face of the article are also rendered opaque, again as by application of an opaque coating material which may be of a color contrasting with that employed on the recess walls. Desirably the article is formed of transparent plastic material, the design being created by the mold in which the article is molded.

The accompanying drawing illustrates my invention: Fig. 1 is a plan view showing a simple lens-like article embodying my invention; Fig. 2 is an isometric view, in partial section, of the article shown in Fig. 1; Fig. 3 is an isometric view of the rear face of the article shown in Fig. 1; Fig. 4 is an isometric view of a mask which may be used in coloring the back of the article illustrated in Figs. 1 to 3; Fig. 5 is an enlarged section in a plane normal to the rear face of an article embodying my invention; Figs. 6, 7, and 8 are sectional views illustrating suitable mountings for articles, such as name plates, embodying my invention; and Fig. 9 is an isometric view of a box the cover of which embodies my invention.

The article illustrated in Figs. 1 to 3 inclusive consists of a simple lens-shaped body 10 such as might be used to display a name, a monogram, or any other desired design. The article is shown as circular and as possessing a plane rear face and a convex front face; but it is to be understood that this particular shape, as well as the particular design shown, are to be taken as merely illustrative.

The design, whatever its shape, is formed by recessing the rear face of the body 10, as indicated at 11, such recesses being formed either during the operation of molding the article or by cutting after the article is molded. After the design is formed, the recess-walls, and desirably also the rear face of the article, are rendered opaque, as by the application thereto of opaque coating material. Preferably, the recess-walls and rear face of the article are coated with opaque materials of contrasting colors. When such an article is then viewed from the front, the design will have the appearance of being formed of a material different from that of the body of the article and as embedded from the rear in the material of which the article is formed. In some cases, the design appears as if cut out of solid material, secured to a suitable base, and covered with a dished cover of thin transparent material.

Several methods may be employed for applying contrasting colors to the recess walls and to the rear face of the article. For example, suitable colored coating material may be applied, as by spraying, simultaneously to the recess walls and to the rear face of the article, and then wiped or otherwise removed from the rear face of the article to leave coating material, as indicated at 12 in Fig. 8, only on the recess-walls. After the coating material on the recess-walls has dried, a second coating material 13 of contrasting color may be sprayed on the rear face of the article. Because the coating materials used are opaque, the second coat will not be visible through the first coat on the recess walls; and as a result, when the article is viewed from in front, the recess walls and the rear face will possess contrasting colors. If this method of applying the contrasting colors is employed, it is of advantage to have the rear face of the article plane in order to facilitate removal therefrom of the coating material first applied.

In another method of applying coating materials of contrasting color, I employ a mask which protects either the recess walls or the unrecessed portions of the rear face of the article when the first coat is applied and which may then be removed when the second coat is applied. If this method is used I prefer to employ a mask which protects the recess-walls and to apply first a coating material of the color which is to appear as background when the article is viewed from in front. Such a mask may take the form of a casting, such as is indicated at 14 in Fig. 3, which fits into the recess or recesses forming the design.

I find that the illusion of solidity of the coated recess walls is enhanced if those walls extend approximately normally—say within 10°, and preferably within 5°, of a right-angle—to the rear face of the article, as is clear from Fig. 5. The illusion is also more striking if the depth of each recess is made greater than its width. The recess walls, for the creation of the best effect, should meet the rear face of the article in a fairly well defined edge, as indicated at 15 in Fig. 8. This well defined edge 15 not only aids in the

creation of the illusion but also facilitates the maintenance of a sharp line of demarcation between coating materials of contrasting colors.

I am aware that it has heretofore been proposed to form glass articles with designs created by recesses in their rear faces, and also old to render the recess-surfaces opaque by paint or otherwise. It is a practical impossibility, however, to mold glass with the well defined edges indicated at 15 in Fig. 5 and also a practical impossibility to mold a glass article with a recess having a depth greater than its width and having side walls which are approximately parallel to each other and normal to the rear face of the glass. Clear synthetic "plastics" are free from the objections which, as just noted, are possessed by glass; and in forming articles in accordance with my invention, I therefore prefer to use such materials.

The plastic used should be clear, so that the coated recess-walls are clearly visible through it. Desirably, the material is colorless, although that is not essential. Cellulose acetate and polystyrene, as well as acrylic resins and cellulose aceto-butyrate, are examples of plastics which I have found to be satisfactory.

Since the interfaces between the body of the article and the colored coatings applied to the rear face thereof and to the recess walls are visible through the article, it is essential for the best effects that each be uniform in appearance throughout its extent. I have found that best results in this respect are obtained if the coating material contains a solvent for the plastic of which the article is formed. For example, a suitable coating material which I have successfully employed with articles made of cellulose acetate consists of about 25% flake cellulose acetate, 10% color pigment, and 65% methyl acetone. This composition may also contain a small proportion (say about 2%) of any of the common plasticizers for cellulose acetate. As another example, I have used successfully on articles made of polystyrene a coating material consisting of about 10% nitro-cellulose, 10% alcohol-soluble ester gums, 10% color pigment, 35% butyl acetate, and 35% iso-propyl alcohol.

When coating materials such as those described are used, the solvent in the coating material tends to penetrate and soften the surfaces to which the coating material is applied, with the result that a permanent and uniform bond between the body of the article and the coating material is obtained. For best results, the solvent used should be one whose volatility is so co-ordinated with its rate of attack on the plastic that the desired bonding effect is obtained before the solvent penetrates too deeply into the body of the article; for if the solvent penetrates too deeply the appearance of the coated surfaces, when viewed through the article, will be adversely affected, and if the attack of the solvent on the plastic is insufficient an inadequate bond is obtained. The volatility of the methyl acetone used in the composition mentioned above as a coating material for application to articles made of cellulose acetate may, in some cases, be so great that the solvent will evaporate before the desired bond is obtained; in which event small proportions of di-acetone alcohol may be added to the coating material. The attack on the plastic of the other coating material disclosed above may be controlled by varying the relative proportions of the butyl acetate and iso-propyl alcohol, an increase in the proportion of butyl acetate increasing the rate of attack, and vice versa. The most desirable solvent-composition is that which will most quickly produce a permanent and uniform bond.

Because of the transparent nature of an article embodying my invention, certain restrictions are placed upon the manner in which it is attached to any support or base upon which it is to appear, as many otherwise suitable attaching means would be visible through the transparent body of the article. In Figs. 6, 7, and 8 I have illustrated three different arrangements by which an article embodying my invention can be mounted without interfering with its appearance.

In the arrangement illustrated in Fig. 5, the lens-shaped article 10 shown is mounted in a shallow sheet-metal cup 20 of corresponding shape, the peripheral edge of the cup 20 being turned over the circumferential edge of the article 10 as indicated at 21. The cup 20 may have secured to it, as by welding or soldering, a mounting screw 22 by means of which the article may be mounted upon any desired base or support.

In the arrangement illustrated in Fig. 6, the rear face of the article 23 shown is recessed over an area somewhat greater than that occupied by the design formed by the groove 11 to leave a peripheral flange 24. A plate 25, desirably of metal, to which a mounting screw 26 is secured, is disposed against the rear face of the article within the flange 24 and the inner edge of that flange then distorted over the periphery of the plate 25. This form of mounting is especially convenient when the article 23 is of thermoplastic material, as the desired distortion of the inner edge of the flange 24 may be secured through the use of an annular heated member 27 having an external diameter slightly less than that of the article 23. When such a member is forced against the rear face of the article, the material is softened and forced radially inwardly over the edge of the plate 25, as indicated at 28. If this operation unduly disturbs the appearance at the periphery of the opaque coating material as viewed through the article, additional coating material may be applied.

Where the design of the article permits, I may employ the mounting means illustrated in Fig. 7. In that arrangement, after the recess-walls have been coated there is mounted in one or more of the recessed portions of the article a plug 30 which may be provided with any desired means for attachment to a base or support. As shown, this means takes the form of a plug 30 having a screw-threaded hole 31 adapted for the reception of the screw by which the article embodying my invention may be secured to the desired support. Conveniently, the plug 30 is of the same material as the article and, before being inserted into the recess, is coated with a suitable solvent which will soften the outer surface of the plug and the coating material and firmly bond them together. The opaque coating material with which the recess walls are covered before the plug 30 is inserted prevents the plug itself or any mounting screw in the hole 31 from being visible through the article.

Instead of being embodied in an article intended for attachment to a suitable base or support, my invention may also be embodied in articles which need no mounting. Thus, I have illustrated in Fig. 9 a box 35 having a cover 36 which bears a design formed, in accordance with my invention, by grooves in the inner face of the box-cover, the walls of such grooves, and preferably also the ungrooved portions of the inner

surface of the cover, being covered with opaque coating material.

My invention has a wide field of application. It has been used in the manufacture of small decorative panels of various kinds, name plates, automobile horn-buttons, coasters, control knobs, and in small boxes such as cosmetic compacts; and many other uses will be obvious. Where the article is backed, as by the use of the cup **20** of Fig. 5 or the plate **25** of Fig. 6, the background color may be applied to the backing; but I prefer, where a colored background is employed, to apply it directly to the article in the manner indicated above.

I claim as my invention:

An article of the class described, comprising a body of transparent plastic having recesses in its rear face, the walls of said recesses being provided with a coating of opaque material, and a member adapted for co-operation with article-mounting means, said member being received in one of said recesses with the opaque coating intervening between it and the walls of the associated recesses whereby the member will not be visible from the front of the article.

CHARLES A. BAUER.