Oct. 9, 1956 J. P. GITS ET AL 2,765,555

MOLDED ARTICLE AND METHOD OF MAKING SAME

Filed May 9, 1952 2 Sheets-Sheet 1

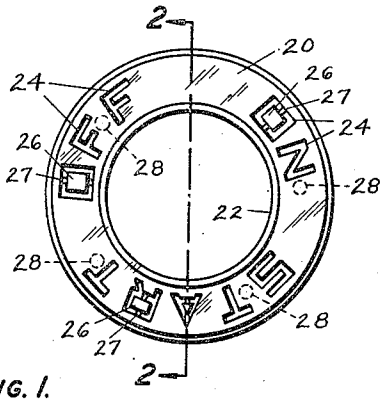

FIG. 1.

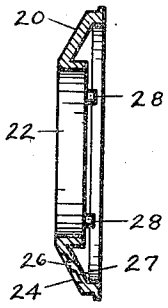

FIG. 2.

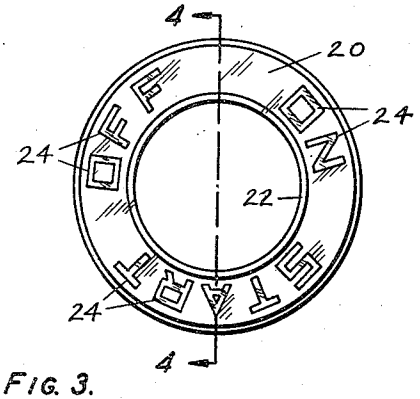

FIG. 3.

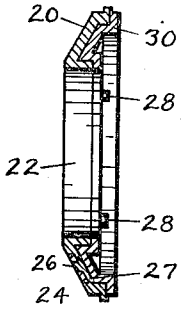

FIG. 4.

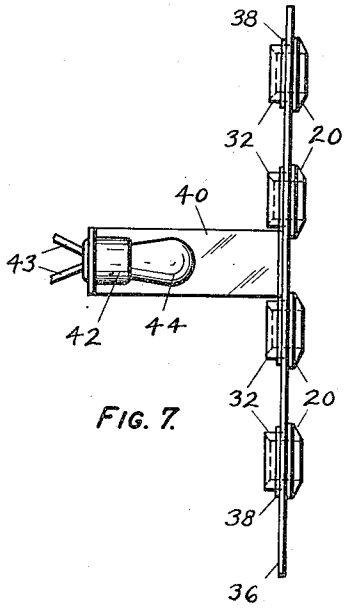

FIG. 7.

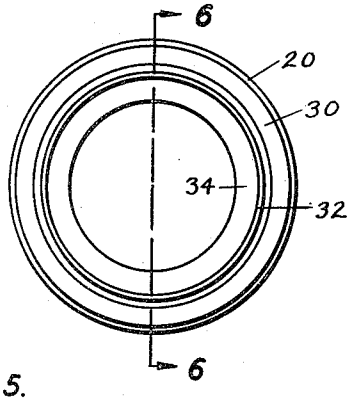

FIG. 5.

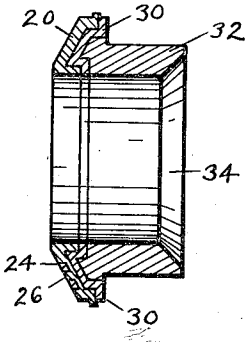

FIG. 6.

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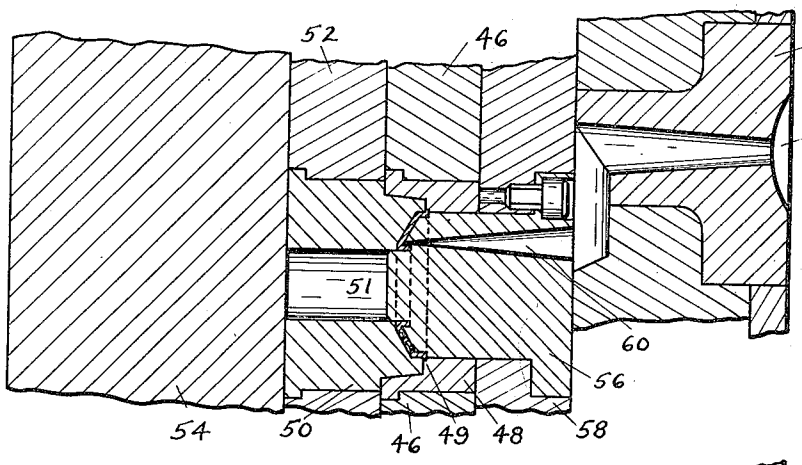

FIG. 8.

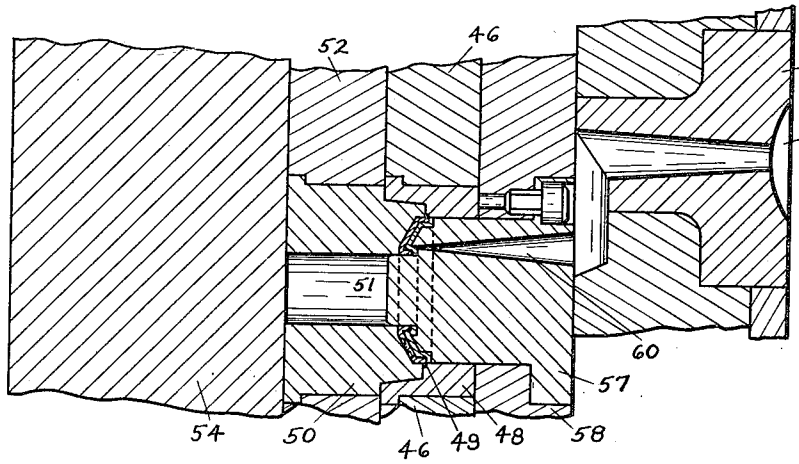

FIG. 9.

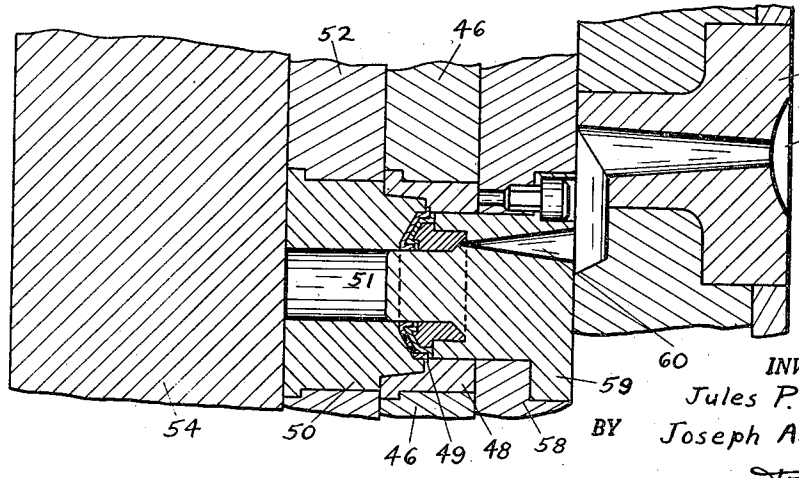

FIG. 10.

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MOLDED ARTICLE AND METHOD OF MAKING SAME

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3 Claims. (Cl. 40—130)

This invention relates to improvements in molded articles and in methods of making same. More particularly this invention relates to improvements in molded, indicia-bearing articles and in methods of making same.

It is therefore an object of the present invention to provide an improved molded indicia-bearing article and to an improved method of making same.

The molded article provided by the present invention has a portion of low light transmissibility which defines openings in the form of indicia, has another portion of higher light transmissibility which underlies those openings, and has a portion of high light conductivity. The portion of low light transmissibility and the portion of high light transmissibility coact to define indicia which can readily be seen when front-lighted, because of the contrast between the appearance of the portion of high light transmissibility and the portion of low light transmissibility. The indicia defined by those portions can also be seen when the two portions of different light transmissibilities are illuminated from the rear, as by having a source of light behind them. In that case, the light from the source will pass more readily through the portion of high light transmissibility than it will through the portion of low light transmissibility, and a contrasting appearance will result. In these two ways, the portions of high light transmissibility and low light transmissibility fully define the indicia. It is therefore an object of the present invention to provide a molded article which has an indicia-defining portion of low light transmissibility and which has a portion of high light transmissibility underlying the indicia defined by the portion of low light transmissibility.

To be fully efficient, the molded article provided by the present invention should afford full and even illumination of the indicia defined thereby. This is difficult without attaining full and even illumination of all portions of the rear face of the molded article. To provide such illumination of the rear face of the molded article by using a plurality of lamps would be unduly expensive. The present invention obviates any need of using a plurality of lamps to illuminate the rear of the molded article by providing a portion of high light conductivity in intimate engagement with the portion of high light transmissibility. The portion of high light conductivity will conduct light to the portion of high light transmissibility and will distribute that light evenly over the surface of the portion of high light transmissibility. It is therefore an object of the present invention to provide a molded article which has a portion of high light transmissibility and has a portion of high light conductivity which conducts light evenly to the surface of the portion of high light transmissibility.

The portion of high light conductivity provided by the present invention is made tubular in form and has an inclined surface at the rear edge thereof. The tubular configuration of the portion of high light conductivity, and the inclined face at the rear edge of that portion, coact to enable that portion to capture light from many

directions. The portion of light conductivity is thus enabled to capture light and distribute it evenly to the portion of high light transmissibility.

Other and further objects and advantages of the present invention should become apparent from an examination of the drawing and accompanying description.

In the drawing and accompanying description a preferred embodiment of the present invention is shown and described but it is to be understood that the drawing and accompanying description are for the purpose of illustration only and do not limit the invention and that the invention will be defined by the appended claims.

In the drawing, Fig. 1 is a front elevational view of a molded bezel portion of low light transmissibility,

Fig. 2 is a cross sectional view of the portion of Fig. 1, and it is taken along the plane defined by the line 2—2,

Fig. 3 is a front elevational view of the portion of Fig. 1 after the said portion has had a portion of high light transmissibility molded in intimate engagement therewith,

Fig. 4 is a cross sectional view of the "two shot" article of Fig. 3 and it is taken along the plane defined by the line 4—4,

Fig. 5 is a rear elevational view of the "two shot" article of Figs. 3 and 4 after a tubular portion of high light conductivity has been molded to the portion of high light transmissibility,

Fig. 6 is a cross sectional view of the "three shot" molded article of Fig. 5, and it is taken along the plane 6—6 of Fig. 5,

Fig. 7 is a plan view of a panel board on which are mounted a number of the "three shot" molded objects shown in Figs. 5 and 6,

Fig. 8 is a cross sectional view through a mold and it shows the formation of the portion of Figs. 1 and 2,

Fig. 9 is a cross sectional view of the mold wherein the "two shot" article of Figs. 3 and 4 is formed, and

Fig. 10 is a cross sectional view of the mold wherein the "three shot" article of Figs. 5 and 6 is formed.

Referring to the drawing in detail, the numeral 20 denotes a molded annulus of an opaque, low light transmissibility material. Preferably, that material will be quite dark and can be black. The material will be a plastic material which can be formed by injection molding. The annulus 20 has an opening 22 at the center thereof and it has a plurality of indicia-defining openings 24 therein. Those openings can define letters or numbers or other indicia. In the particular construction shown by the drawing, the indicia are "on," "off" and "start." Where the openings 24 have an indicia-defining island 26, as is the case of the openings of the "O," "R," and "A," webs extend to and support those islands. The webs are not as thick as the molded annulus 20 and have their outer surfaces spaced rearwardly of the front surface of the annulus 20. This enables the front surfaces of those webs to be covered by the plastic material of the "second shot."

The openings 24 and the webs 27 perform a dual function in that they serve as interlocking surfaces which can hold and lock the plastic material of the "second shot." In this way, the annulus 20 can be intimately and securely held in intimate engagement with the plastic material of the "second shot."

A plurality of rearwardly extending, axially directed pins 28 are formed on the rear surface of the annulus 20. These pins are displaced to one side of the openings 24 which define the indicia. In this way, the pins 28 do not interfere with full transmission of light to the indicia-defining openings 24.

The numeral 30 denotes a molded portion of higher transmissibility material. This material will be translucent and preferably will be a milky white. Such a ma-

terial will provide a readily observable contrast to the opaque, low light transmissibility material of the annulus 20. This will enable the "two shot" article to emphasize the indicia when front-lighted. The high transmissibility, translucent material will also facilitate determination of the indicia by trans-illumination because light will be able to pass through the portion 30 and through the openings 24 in the annulus 20. The openings 24 in the annulus 20 will be filled with the molded material 30 and that material will flow around and overlie the front of the webs 27. The molded material 30 will distribute the light throughout its volume, and light passing alongside of the webs 27 will flow into and illuminate the portion of the molded material 30 which overlies the front of the webs 27. The molded material 30 will surround the base of the pins 22 but will not completely envelop those pins.

The numeral 32 denotes a transparent tube of high light conductivity plastic such as Lucite. This transparent tube envelops the rear portions of the pins 28 and is tightly secured to those pins. The pins 28 thus constitute interlocking surfaces which hold all three portions of the "three shot" molded articles in intimate and locking relation. The portions of the molded material 30 which enter the indicia-defining openings 24 and which flow in front of the front surfaces of the webs 27 also constitute interlocking surfaces. Similarly, the portions of the transparent tube 32 which surround the pins 28 constitute interlocking surfaces. Thus there is a succession of interlocking surfaces on each of the three portions of the "three shot" molded article to assure full and positive interlocking of those three portions.

The transparent tube 32 has an inwardly inclined face 34. This inwardly inclined face will coact with the tubular character of the portion 32 to enable that portion to catch light transmitted from any different directions. That light will then be directed along the length of the tube and transmitted to the molded material 30. This material will then transmit the light while also diffusing it. The overall result is that light can be caught readily and fully by the transparent tube 32 and can be transmitted by the molded material 30 which receives it from the tube 32 and then diffuses that light and emits it through the openings 24 in the annulus 20.

The numeral 36 denotes a panel board which has four openings therethrough. Positioned in each one of said openings is a "three shot" molded article of the type shown in Figs. 5 and 6. An annular retainer 38 is provided on the transparent tube 32 of each of those "three shot" articles and the retainers 38 will coact with the radially extending front portions of those articles to hold those articles in position relative to the panel board 36. The panel board 36 supports a rearwardly extending bracket 40, and that bracket supports a lamp socket 42. Wires 43 extend rearwardly from that socket and can be attached to a suitable source of electric power. A lamp 44 mounted in the socket 42 will receive that electric power and will become illuminated. Light from the lamp will radiate outwardly in all directions, and sufficient light will be captured by the inclined face of the transparent tube 32 of each of the "three shot" molded articles to assure full illumination of the indicia defined thereby. Even the "three shot" articles which are most distant from the lamp 44 will receive sufficient light to fully illumine the indicia which they define. In this way, it is possible to attain full lighting of the indicia on a panel board with a minimum number of lamps. Not only can the "three shot" molded articles be spaced horizontally from the lamp 44 but they can also be spaced vertically from that lamp and still receive full illumination from that lamp.

In Figs. 8–10, the numeral 46 denotes a transfer plate of a mold. This transfer plate has a replaceable center portion which has an annular undercut 49. The replaceable center portion 48 of the transfer plate 46 has a

generally recessed left hand face, and the projecting right hand face of a female mold portion 50 interfits snugly within that generally recessed end. The female mold portion is carried by a supporting plate 52 which abuts the left hand face of the transfer plate 46. The female mold portion 50 has a cylindrical opening 51 therethrough at the geometric center thereof. The female mold portion 50 and the supporting plate 52 are reinforced by a backing plate 54.

A male mold portion 56 is provided which has a projecting cylinder at the left hand face thereof which extends snugly within the cylindrical opening 51 through the female portion 50. The male mold portion 56 is carried by a supporting plate 58, and the length of the male mold portion 56 is such that a space is defined between the male and female portions 56 and 50. A sprue 60 is provided in the male mold portion 56, and that sprue is connected to a passage in the backing plate 62 which leads to the gate 64 of the mold. With this construction, plastic material in the fluidized state can be forced through the gate 64, through the passage to the sprue 60 and then through the sprue 60 to the cavity defined by the male and female portions 56 and 50 of the mold. This plastic material will then define the annulus 20 shown in Figs. 1 and 2. The passage in the backing plate 62 will also communicate with other sprues 60 in other male mold portions 56 so more than one annulus 20 can be formed during one "shot."

At the conclusion of the first "shot" the male portion 56 is withdrawn with its backing plate 58 and a generally similar male mold portion 57 with its backing plate 58 is placed in proximity to the right hand face of the newly molded annulus 20. The male mold portion 57 differs from the male mold portion 56 in being somewhat shorter and in having a longer cylindrical projection extending from the left hand end thereof. The shorter length of the male mold portion 57 facilitates the provision of a cavity between the right hand face of the annulus 20 and the left hand face of the male mold portion 57. When a plastic material in the fluidized state is then injected through the gate 64, through the passage in the backing plate 62 and through the sprue 60, that plastic material will intimately adhere to the right hand surface of the annulus 20. In addition, that material will flow into and fill the indicia-defining openings 24 in that annulus and will also flow in front of webs 27 of that annulus. The material will thus interlock with the material of the first "shot."

After the second "shot" has been formed, the male mold portion 57 will be replaced by the male mold portion 59. This portion has an annular recess formed in the left hand end thereof and it has a long cylindrical projection which snugly fits the cylindrical opening 51 through the female mold portion 50. When a transparent material is injected through the gate 64 of the backing plate 62, it will flow through the passage of the backing plate and through the sprue 60 of the male mold portion 59 and form the tubular portion 32 of the "three shot" molded article.

For simplicity, the molding operation has been described as contemplating the removal of the male molding portions; but in practice, the transfer plate and the supporting plate 52 will be successively set in three molds in proximity with three different male molding portions. However, the molding action will be the same in either situation.

The "three shot" article of the present invention can also be made by forming the portion of high light transmissibility first. In such a case, the portion of high light transmissibility is molded with indicia that project forwardly from the front surface thereof and with slots that extend through that portion; a slot being provided adjacent each indicia which has an island therein so fluidized material can fill that island as well as the space around the indicia; the slots extending from a point out-

side the indicia, under the indicia, and into the island. The portion of high light transmissibility is then placed in a mold and fluidized material of lower light transmissibility is applied to the front surface of that portion; that material filling the spaces around the indicia and also passing through the slots to fill the islands in the indicia on the portion of high light transmissibility. The fluidized material will fill the slots and thus fill the islands of the indicia. The rear surface of the portion of high light transmissibility will be pressed tightly against the inner surface of the mold and will not be overlain by the fluidized material; hence the "two shot" article will have a rear surface that can receive, diffuse and transmit light. A transparent tube, similar to tube 32 of Figs. 5 and 6, can readily be formed in engagement with said rear surface.

Whereas a preferred embodiment of the present invention has been shown and described, it should be apparent to those skilled in the art that various changes may be made in the form of the invention without affecting the scope thereof.

What we claim is:

1. A molded product which can be mounted in an opening in a panelboard and which has a front portion of material having low light transmissibility, an intermediate portion of material having higher light transmissibility, and a rear portion of material having high light transmissibility, said rear portion being elongated to telescope through and project rearwardly from said opening in said panelboard, said intermediate portion and said front portion being directed laterally of said rear portion and projecting outwardly beyond the sides of said rear portion to overlie those portions of the panelboard that define said opening, said front portion having indicia-defining openings therethrough, said intermediate portion underlying and filling said openings in said front portion, said front portion and said intermediate portion being bonded to each other, said rear portion and said intermediate portion being bonded to each other in void-free intermolecular face-to-face relation, said rear portion having an inwardly and forwardly inclined face that receives light rays directed into said inclined face for conduction to said intermediate portion, said rays passing into said intermediate portion through said void-free intermolecular face-to-face bond and being conducted forwardly and outwardly by said intermediate portion to said openings in said front portion, whereby all areas of said openings including those areas overlying said opening-defining portions of said panelboard are illuminated.

2. A molded product which can be mounted in an opening in a panelboard and which has a front portion of material having low light transmissibility, an intermediate portion of material having higher light transmissibility, and a rear portion of material having high light transmissibility, said rear portion being elongated to telescope through and project rearwardly from said opening in said panelboard, said intermediate portion and said front portion being directed laterally of said rear portion and projecting outwardly beyond the sides of said rear portion to overlie those portions of the panelboard that define said opening, said front portion having indicia-defining openings therethrough, said intermediate portion underlying and filling said openings in said front portion, said front portion and said intermediate portion being bonded to each other, said rear portion and said intermediate portion being bonded to each other in void-free intermolecular face-to-face relation, said rear portion having an inwardly and forwardly inclined face that receives light rays directed into said inclined face for conduction to said intermediate portion, said rays passing into said intermediate portion through said void-free intermolecular face-to-face bond and being conducted forwardly and outwardly by said intermediate portion to said openings in said front portion, whereby all areas of said openings including those areas overlying said opening-defining portions of said panelboard are illuminated, said rear portion being annular, whereby the said inclined surface thereon can catch light from all directions, said rear portion being transparent.

3. A molded product as defined in claim 2 wherein said front portion is opaque, said intermediate portion is translucent, and said rear portion is transparent.

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