July 13, 1965 W. S. GORMAN, JR 3,194,031

TRANSPARENT CANDLE

Filed Aug. 26, 1963

Fig. 1.

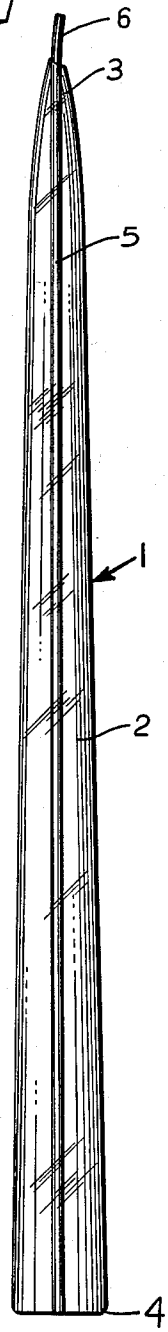


Fig. 2.

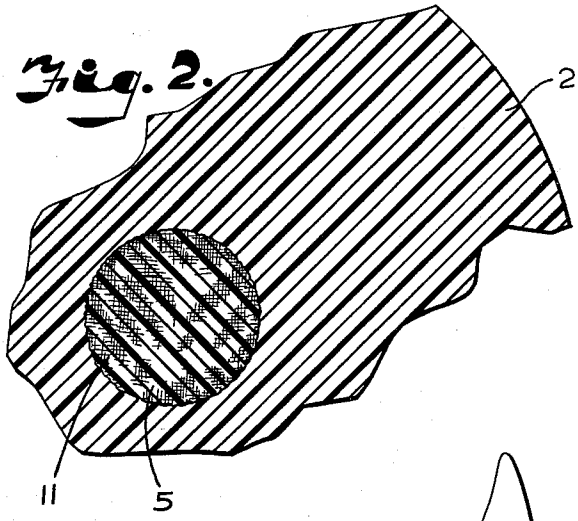
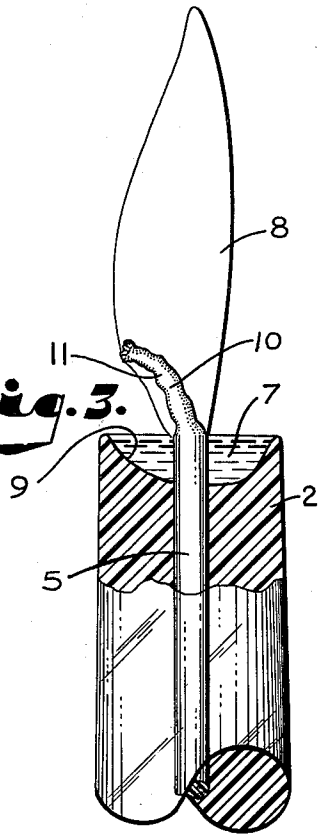


Fig. 3.



INVENTOR.
WILLIAM S. GORMAN JR.

BY
Fishburn & Gold,
ATTORNEYS

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TRANSPARENT CANDLE

William S. Gorman, Jr., Kansas City, Mo., assignor to Hallmark Cards, Incorporated, Kansas City, Mo., a corporation of Missouri

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This invention relates to novel decorative articles of manufacture, and more particularly to burnable transparent candles.

In recent years, the old art of candle making has been expanded to encompass the production of candles and pseudo-candles having a great variety of shapes, sizes and colors for use primarily as ornamental decorations. Some are burned for light, as at formal dinner parties, and others are intended to be purely decorative for adding to the furnishings of a room. In the latter class are included ornaments shaped as conventional candles but constructed of materials which are non-combustible, for example metal, wood or glass. Glass candles, or more accurately pseudo-candles, are in demand for their light refractive properties which produce highly attractive and unusual effects in this configuration. Glass candles, however, are obviously non-burnable and are, therefore, unsuitable in applications which also require candlelight.

The principal objecst of the present invention are: to provide a burnable candle which is transparent; to provide such an article which burns through the action of a centrally located wick in the same manner as the well known paraffin candle; to provide such a transparent candle which does not smoke excessively nor tend to burn in absence of a wick; to provide such an article which may be manufactured by processes similar to those used in conventional paraffin candle manufacture; to provide such a candle which displays unique and attractive ornamental effects when burning; and to provide such an article which is relatively inexpensive to produce.

Other objects and advantages of this invention will become apparent from the following description taken in connection with the accompanying drawings wherein are set forth by way of illustration and example certain embodiments of this invention.

FIG. 1 is a side elevation of a transparent burnable candle embodying this invention.

FIG. 2 is a fragmentary cross-sectional view through the candle of FIG. 1 on a greatly enlarged scale particularly showing the wick in relation to the body portion.

FIG. 3 is a fragmentary side elevation of a burning candle embodying this invention particularly showing the body material in a molten state adjacent the flame and contained in a bowl-shaped body depression for wicking up in the manner of a conventional paraffin wax candle.

Referring to the drawings in more detail:

The reference numeral **1** generally indicates a transparent, burnable candle embodying this invention. The candle **1** comprises a transparent body **2**, in the illustrated example having an elongated tapered shape which is narrower at the upper end **3** thereof than at the lower end **4**. A wick **5** extends longitudinally centrally within the body **2** and projects above the upper end at **6** for ignition.

The transparent body **2** is composed of a hydrocarbon resin which must have the following properties: (1) substantially transparent or crystal clear rather than the translucent character of paraffin wax or polyethylene; (2) thermoplastic to the extent that it will easily melt under the temperature conditions created adjacent a small flame; (3) low cohesive energy density for proper wicking-up to the combustion area; (4) low crystalline structure to provide uninterrupted light transmission and the consequent "lens" effect sought; and (5) not produce an unpleasant odor or excessive smoke (soot) when burned by wicking-up.

With respect to requirement (5), it has been determined that the tendency of hydrocarbon resins to smoke under these conditions is particularly associated with the chemical structure thereof. Research has indicated that resins which are substantially free of unsaturated aromatic rings and also substantially free of double-bonded carbon smoke the least but still smoke excessively for consumer acceptance.

The most satisfactory body resins found have included a carbonyl bonded oxygen or ester. Resins best meeting the requirements set forth for individual use as body resins were found to be hydrogenated polycycloalkanes (commercially marketed as "Nevillite," Neville Chemical Company, Pittsburgh, Pennsylvania), sucrose acetate isobutyrate, hydrogenated abietic acid, and polyvinyl acetate. It was determined that the inclusion of a suitable catalyst material in the body resin would, to a satisfactory degree, eliminate the smoking problem; however, the catalysts which provided effective results invariably were found to be highly colored metal-containing compositions which adversely influenced the transparent properties of the body resin. It was then discovered that the catalyst could be included in the wick prior to fabricating the candle and thereby produce the desired smoke inhibition without affecting the transparent properties of the body. Catalyst materials which have been found satisfactory for individual use for this purpose include: dicyclopentadienyl iron (ferrocene), cobalt naphthanate, lead naphthanate, and ferric acetyl acetonate. These catalysts are apparently active in promoting the oxidation of carbon in an open flame.

The wick **5** is of commercially available absorbent cotton sold for use as paraffin candle wicking material and comprising cotton braid which is suitably treated so as to be self-snuffing, that is, prevent an excessively long ash at the burning tip. The catalyst may be included in the wick by any suitable method, a preferred method being the formation of a mixture or suspension of the catalyst in high concentration with the liquefied resin making up the body **2** and dipping the wick thereinto whereupon the material is absorbed and intimately associated with the wick. The treated wick is then withdrawn and used in a conventional manner in manufacturing the candle, primarily by dipping or casting.

When the improved candle is burned, as illustrated in FIG. 3, the thermoplastic body material melts as at **7** adjacent the flame **8** but is generally maintained within a bowl-shaped depression **9** formed by the adjacent solid body resin **2**. The liquid body material **7**, due to the low cohesive energy density, is easily wicked up by the wick **5** and burns in the ash portion **10** of the wick in the presence of the catalyst **11** which aids in preventing the formation of a substantial quantity of smoke or soot. The transparency of the body **2** in the presence of the flame **8** produces a very attractive and unusual decorative effect.

It is to be understood that while one form of this invention has been illustrated and described, it is not to be limited to the specific form or arrangement of parts herein described and shown except insofar as such limitations are included in the claims.

What I claim and desire to secure by Letters Patent is:

1. A transparent burnable smoke formation resisting candle comprising, a body having an upper end and a wick extending longitudinally within said body and projecting above said upper end, said body being composed essentially of a hydrocarbon resin characterized as substantially transparent thermoplastic low crystalline low cohesive energy density materials substantially free of unsaturated aromatic rings and double-bonded carbon, said

wick being of absorbent material treated by inclusion therewith of a catalyst material characterized as active in promoting the oxidation of carbon in an open flame.

2. The candle as set forth in claim 1 wherein said resin is selected from the group consisting of hydrogenated polycycloalkanes, sucrose acetate isobutyrate, hydrogenated abietic acid, and polyvinyl acetate.

3. The candle as set forth in claim 1 wherein said catalyst material is selected from the group consisting of dicyclopentadienyl iron (ferrocene), cobalt naphthanate, lead naphthanate, and ferric acetyl acetonate.

4. A transparent burnable smoke formation resisting candle comprising, an elongated body having an upper end and a wick extending longitudinally centrally within said body and projecting above said upper end, said body consisting of a hydrocarbon resin selected from the group consisting of hydrogenated polycycloalkanes, sucrose acetate isobutyrate, hydrogenated abietic acid, and polyvinyl acetate, the members of said resin group being further characterized as substantially transparent thermoplastic low crystalline low cohesive energy density materials substantially free of unsaturated aromatic rings and double-bonded carbon, said wick being of self-snuffing absorbent cotton braid treated by inclusion therewith of a catalyst material selected from the group consisting of dicyclopentadienyl iron (ferrocene), cobalt naphthanate, lead naphthanate, and ferric acetyl acetonate.

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FREDERICK L. MATTESON, JR., *Primary Examiner.*

EDWARD J. MICHAEL, *Examiner.*