March 16, 1971 E. C. WALKER 3,570,156

DISPLAY DEVICE

Filed Nov. 13, 1968

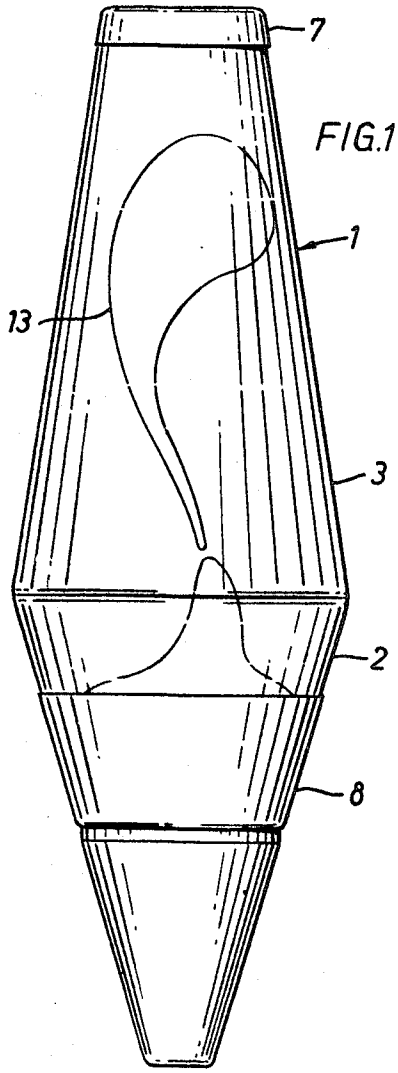

FIG.1

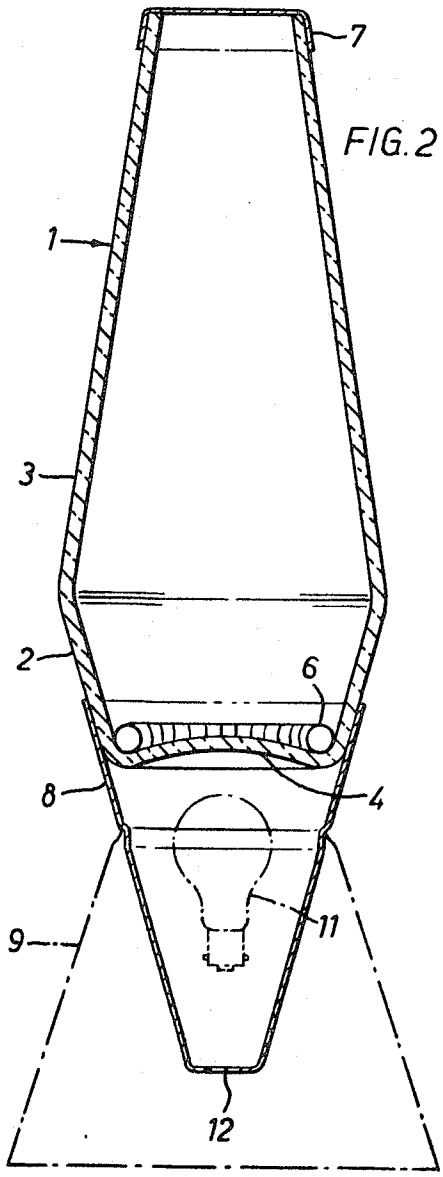

FIG.2

United States Patent Office 3,570,156
Patented Mar. 16, 1971

3,570,156

DISPLAY DEVICE

Edward C. Walker, Woodspeen, Forest Corner, Ringwood, Hampshire, England

Filed Nov. 13, 1968, Ser. No. 775,401
Claims priority, application Great Britain, Nov. 14, 1967, 51,814/67
Int. Cl. G09f *13/24*
U.S. Cl. 40—106.21 4 Claims

ABSTRACT OF THE DISCLOSURE

A display lamp in which the light bulb illuminates and heats components contained in a glass vessel, one of the components being a mineral oil and the other water containing an additive effective to raise the coefficient of expansion of the water.

The invention relates to a display device comprising a transparent or translucent container for two components which, upon the application of heat, give rise to display properties. During operation, the two components are in a liquid state, a first component being at least one globule which is suspended in the second component that is immiscible therewith. The said display properties consist of the first liquid component ascending under the influence of the heat and circulating in the second liquid component to produce shapes and/or patterns which are fascinating and relaxing to observe, especially if at least one of the components is coloured and the container is illuminated by the heat source which may be an electric light bulb located under the container base.

The first component is preferably a solid at room temperature and becomes fluent at about 45° to 50° C. It may comprise a mineral oil such as Ondina 17 (R.T.M.) with a light paraffin, carbon tetrachloride and a dye and paraffin wax, the second component being water with or without a differently coloured dye. The initially solid first component is heavier at room temperature and is therefore located at the bottom of the container and receives heat from the light bulb before the second component. It firstly becomes fluent and, upon continued heating, its specific gravity, eventually decreases relatively to that of the second component, whereupon it rises in the second component, drops again to receive more heat that was lost to the second component, and so on to give the desired display properties.

It has been found that some viewers may becomes impatient during the preliminary heating up period. It has also been found that there is a danger of the globule or globules of the first component breaking up into unattractive tiny droplets if the device is overheated, i.e. operated for excessively long periods. Further, difficulty has been experienced with the second component in cold climates and during transport where there is a danger that it will freeze and cause the container to break. Still further, it has been found that the display properties are unfavourably influenced by changes in the ambient temperature or by draughts and the device must therefore be carefully positioned.

According to the invention, the water or second component contains an additive of a substance which has the effect of raising the coefficient of cubic thermal expansion of the water alone. Surprisingly, all four of the above-mentioned disadvantages can be overcome by this simple expedient, especially if the additive has a relatively high coefficient of expansion, for example, polyhydroxy organic liquids such as glycerol ethylene glycol, polyethylene glycol or propylene glycol, preferably the latter.

The amount of additive in the second component can be about 30% by volume.

In one form of the invention, the oil or first component has a coefficient of expansion of about 0.00068 and the second component is given a coefficient of expansion of about 0.00057 by mixing the water (coefficient of expansion=0.0004) with propylene glycol or polyethylene glycol (coefficient of expansion=0.00074), these coefficients of expansion being referred to the operative temperature of the device when the display properties are attained by heating with a light bulb.

An example of the invention is illustrated in the accompanying drawing in which:

FIG. 1 is a side elevation of a display device, and

FIG. 2 is a sectional side elevation thereof but omitting the liquid contents.

The display device comprises a glass vessel, generally indicated at **1**, of circular cross-section. The side walls of the vessel are divergent from a base **4** of the vessel for about ⅓ of the height of the vessel, as shown at **2**, and then convergent to the top, as shown at **3**. The base **4** is upwardly convex and at its periphery supports a surface tension breaker **6** in the form of a helically coiled wire ring. The top of the vessel is hermetically sealed by a metallic cap **7** whilst its divergent portion **2** rests in a hollow conical metallic seating **8** which, in turn, may be supported in any suitable stand, such as the frustoconical hollow metallic stand diagrammatically indicated in chain-dotted lines at **9** in FIG. 2.

The vessel contains two liquids, namely a first liquid (which is invisible in FIG. 1) comprising water with an additive of propylene glycol which is effective to raise the coefficient of cubic thermal expansion of the water alone, and at least one globule **13** of a second liquid which is suspended in the first liquid and comprises mineral oil, paraffin, carbon tetrachloride, a dye and paraffin wax.

The seating **8** accommodates and may act as a reflector for an electric light bulb **11** of suitable wattage for the capacity of the vessel and it is provided with an aperture **12** for the passage of an electric lead and/or the attachment of an electric socket fitting. The bulk not only illuminates the vessel from underneath but also causes heat to be applied slowly so as to avoid excessive convection currents in the liquid contents.

At room temperature, the component that forms the globule **13** is solid and forms a block at the base **4** of the vessel around the surface tension breaker **6**. When the light bulb **11** is energised, it first causes the block to liquefy and then heat up. Eventually, the oily liquid will be sufficiently hot to ascend as at least one globule in the water and circulate therethrough to produce shapes and/or patterns which are fascinating and relaxing to observe. The additive of propylene glycol to the water has the effect of reducing the initial heating up period before the display properties are attained. As the globule reaches the top of the vessel, it will have given most of its heat to the surrounding water and therefore descend again to be reheated by the bulb **11**. The surface tension breaker **6** counteracts any tendency of the oily liquid to rise in the form of unattractive small bubbles rather than columnar or mushroom-like larger shapes by causing any descending small bubbles to re-unite each time they reach the base of the vessel. However, the additive to the water helps to counteract such tendency of the oily liquid to break up, especially when the device has been in operation for long periods.

I claim:

1. A display device comprising a transparent or translucent container holding two immiscible components, and heating means mounted outside the container, wherein

one of the said components comprises a mineral oil and paraffin wax and is solid at room temperature but adapted to form at least one liquid globule on the application of heat to said container by said heating means and the other component comprises water in which said one component is adapted to circulate when liquefied, said water containing an additive of a water-miscible polyhydroxy organic liquid effective to raise the coefficient of cubic thermal expansion of the water.

2. The device of claim 5 wherein the said one component comprises a mineral oil with a light paraffin, carbon tetrachloride, a dye and paraffin wax.

3. The device of claim 1 wherein said polyhydroxy organic liquid is selected from the group comprising

glycerol, ethylene glycol, polyethylene glycol and propylene glycol.

4. The device of claim 1 wherein the amount of additive is 30% of the water.

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ROBERT W. MICHELL, Primary Examiner

R. CARTER, Assistant Examiner