(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 268 473**
A2

(12) # EUROPEAN PATENT APPLICATION

(21) Application number: **87310189.3**

(22) Date of filing: **18.11.87**

(51) Int. Cl.[4]: **F 21 S 13/00**
F 21 V 23/00

(30) Priority: **18.11.86 US 931834**

(43) Date of publication of application:
25.05.88 Bulletin 88/21

(84) Designated Contracting States: **DE FR GB NL**

(71) Applicant: **Kwok, Wai-Shi**
Metropole Building Block C 25th Floor, Room 26 7 King's Road
North Point (HK)

(72) Inventor: **Kwok, Wai-Shi**
Metropole Building Block C 25th Floor, Room 26 7 King's Road
North Point (HK)

(74) Representative: **Higgins, Michael Roger et al**
MARKS & CLERK 57/60 Lincoln's Inn Fields
London WC2A 3LS (GB)

(54) **A candle device.**

(57) A candle device comprises a wax body 3 which is urged upwardly by a spring 6 against a thermally insulating cover 5. A wick 4 projects through an aperture 19 in the cover, and wires 20 conduct heat from the candle flame 8 to melt wax beneath the cover. A music generator 15 in the form of an integrated circuit and a speaker is trigger by a sensor 13 to play music while the candle is burning. The sensor 13 may take the form of a temperature sensitive resistor, a photocell, a bimetallic contact. Other forms utilise a conducting wire to conduct heat from the candle flame to expand air in a container to operate a mechanical switch.

Also disclosed is a time delay switch in the form of a tube 40 of porous material 41. Water is absorbed along the tube and changes the capacitance between pairs of plates 43, each pair activating the IC to play a different tune.

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Description

A CANDLE DEVICE

The present invention relates to a candle device incorporating a music generator.

A first aspect of the invention provides a candle housed in a container, a cover comprising a thermally insulating plate located on top of the container and covering an upper surface of the candle, the plate having an aperture or slot through which a wick of the candle projects, means for urging the candle upwardly in the container and means for conducting heat from the region of the candle wick to beneath the cover, characterised in that there is provided a music generator and switching means for switching on said music generator to play music.

A second aspect of the invention provides a candle and a music generator, the candle comprising a wick extending through the body of the candle and switching means comprising a thermally conducting member extending along the wick, the member being aranged to melt under the heat of the candle flame, and means responsive to heat conducting along said element from the vicinity of the candle flame to activate said music generator.

A third aspect of the invention provides a candle device comprising a candle, a music generator and switching means for activating the music generator, the switching means comprising an elongate tube having porous material therein arranged to absorb liquid along the tube from a reservoir, and a plurality of detectors arranged in the tube to detect the arrival of the liquid and activiate the music generator.

Preferred features and advantages of the invention will be apparent from the following description and the accompanying claims.

The invention will be more particularly described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a cross-sectional view thorugh a first embodiment of the invention,

Figure 2 is a systems diagram for a music generator for use in a candle device according to the invention;

Figure 3 illustrates a first embodiment of a switch of a switching means,

Figure 4 illustrates a second embodiment of a switch for a switching means,

Figure 5 illustrates a third embodiment of a switch for a switching means;

Figure 6 illustrates a fourth embodiment for a switch for a switching means;

Figure 7 is a cross-section through a figure 6, and

Figure 8 shows another embodiment of a candle device according to the invention.

Referring firstly to Figures 1 and 2 of the drawings, the candle device shown therein comprises a tubular outer casing 1 and an inner lining 2 of thermally-insulating material, a candle having a wax body 3 with an embedded wick 4, an apertured thermally-insulating cover 5 extending across the upper end of the casing 1 and a compression spring 6 within the casing 1 below the wax body 3. The casing 1 can be formed of any appropriate material such as porcelain, plastics, metal, or wax, and can be provided with a plain or decorative external surface. The lining 2 fits snugly in the casing 1. The wax body 3 has a rigid base plate 12 attached to its bottom end. The wick 4 whilst being embedded in the wax body 3 is attached to the centre of the plate 12 by means of a clip on an apertured aluminium disc 11 to prevent sideways movement of the lower end of the wick when burning of the wax body 3 is nearly complete. A stiff support member 10, for example of bamboo fibre, is provided within the wick 4 to keep the latter upright.

The wax body 3 and the base plate 12 are contained within the lining 2 below the cover 5 in an open-topped thin flexible casing 14 and is subjected to an upward force exerted by the compression spring 6. The casing 14 is preferably formed of cellulose or polyethylene film although it may, for instance, be of aluminium foil. The casing 14 is trapped between the cover 5 and the lining 2 and retains the molten wax at the final burning stage of the wax body 3. It also serves to prevent sticking of the wax body 3 to the lining 2.

The cover 5, which is made of thermally insulating material such as a hard, high melting point thermoset resin material, comprises a flat member and a cylindical, longitudinally extending rim integral with the flat member. The rim has an external screw thread 17 which is screw threadably engageable with an internal thread 18 on the lining 2 to clamp the upper end of the thin casing 14. The cover 5 has a central aperture 19 through which the wick 4 extends and a plurality of other openings 22 through which molten wax can flow from beneath the cover 5 to the surface. The number of the openings 22 depends on the type of wax used for the wax body 3 and the diameter of the wax body 3. Thermally conducting metal wires 20 extend from the aperture 19 to conduct heat from the region of the wick 4 to the periphery of the candle below the cover 5, to melt the wax across the full diameter of the candle.

The cover 5 comprises an upper par 5a of flame resistant material, such as metal or procelain, and a lower part 5b of thermally insulating material, such as plastics, wood or multi-ply paper, the two parts 5a, 5b being glued together.

In use, the candle burns, molten wax 9 is formed above the solid wax body 3. There is of course also a transistion zone between the solid and molten wax where the wax is soft but not molten. The molten wax 9 flows into and retained by the upper part 5a of the cover 5 through the openings 19, 22. As the wax burns the spring 6 relaxes and pushed the body 3 upwards in such a manner that the surface level of the molten wax 9 is maintained substantially constant and without overflowing the cover 5.

The casing 1 of the candle device maintains its external appearance throughout the burning of the candle, and can be used with replaceable wax bodies 3.

A compartment 7 is formed at the bottom of the casing 1 for accommodating a music generator 15, the compartment is closed from below by a lid 7'. The music generator operates to play music in response to the burning of the candle.

As best shown in Figure 2, the music generator 15 comprises an integrated circuit IC, a d.c. battery V, a piezo-electric crystal loudspeaker SP, and switching means 13.

The integrated circuit IC has a memory storing one or more musical tunes. It is electrically connected to a loudspeaker SP, a battery V, and switching means 13. When an appropriate signal to is applied the integrated circuit IC from switching means 13, the integrated circuit IC is triggered to provide an electical output signal corresponding to one of the stored musical tunes to drive the speaker SP.

The switching means 13 is arranged to trigger the integrated circuit IC in response to the presence of a candle flame 8 at the wick 4 when the candle is burning. The switching means 13 may comprise a photo-sensitive resistor R which detects the presence of the candle flame 9 by means of an elongate fibre optic 19 extending from the region of the upper end of the candle wick 4. The fibre optic 19 may extend between the casing 1 and the lining 2, as shown in Figure 1, or extend along side candle wick 4, both being embedded in the wax body 3.

Alternatively, the photo-sensitive resistor R may be mounted at the top of the casing 1 so that light from the candle flame 8 will fall directly on the resistor R.

A second type of the switching means 13 may include a thermo-senstivie resistor R' which detects the presence of the candle flame 8 by means of a thermally conducting wire 19' which extends along a similar path to the fibre optic 19, the resistor R' may be placed in the vicinity of the candle flame. When the thermally conducting wire 19' is used, it is preferably heat insulated along its length so as not to damage or melt other parts of the candle device.

In place of the thermo-sensitive resistor, infra-red sensitive diode may detect infra-red radiation given off by the heated wire.

Figure 3 shows a third type of the switching means 13 which includes a pressure sensitive switch 21. A sealed container 23 is closed at one end 23a by a flexible or elastic membrane 24, and contains thermally expansible material 25, for example air. A thermally conducting wire 26 extends from the region of the candle flame 8 into the other end 23b of the container 23 where the wire 26 is laid as a flat spiral 26b on a thermally insulating plate 27. Head from the candle flame passes along the wire 26, to heat the material (air) 25 which thus expands and bows the membrane 24 outwards.

The pressure sensitive switch 21 comprises movable and stationary contacts 28a and 28b. The movable contact 28a is located on the membrane 24, and is arranged to contact the stationary contact 28b when the membrane 24 is sufficiently bowed. The pressure sensitive switch 21, when closed, will trigger the integrated circuit IC to play a tune.

Figure 4 shows a second embodiment of a switch mechanism, similar to that of figure 3. In place of the membrane 24, a piston 30 and cylinder 23' arrangement is provided. As the air 25 in the cylinder 23' expands, the piston 30 is urged along the cylinder 23 against the biassing force of spring 31, the end 23a of the cylinder having aperture 31. Piston 30 carries a first switch contact 28a' and a second switch contact 28b' is mounted at the cylinder end 23a. When the wire 26 heats the air 25 to a sufficient extent the piston is pushed to the end of the cylinder against the force of spring 31, closing the switch contacts 28a', 28b' together.

Figure 5 shows a modification of the embodiment of figure 4 in which several switch contacts 28b' are arranged along the cylinder 23. As the temperature of the air 25 increases the piston is pushed further along the cylinder and contact 28a' makes contact with each contact 28b' in turn. Each contact 28b' forms an input to the IC, and the IC is arranged to play a number of different tunes. As contact is made between contact 28a' and each contact 28b' in turn a different tune is played by the IC.

Figure 6 shows a switch mechanism which operates independently of the candle. An elongate glass tube 40 is formed into the shape of a word. The tupe 40 is packed with a mix 41 of porous material and copper (11) sulphate crystals. To start the switch mechanism, water is poured into a reservoir 42 at one end of the tube 40. The water is slowly absorbed along the tube by the porous material. As the water moves along the tube it dissolves the copper (11) sulphate crystals contacts 43 are fixed in the tube at intervals along its length. The opposed contacts form plates of a capacitor. As the water reaches the contacts, the capacitance between them changes, and this can be detected by the IC, to trigger the IC to play a tune. Each contact is preferably arranged to trigger the playing of a different tune, or the same tune may be repeated. Apertures 44 in the top of the tube allow for the water to evaporate after use, so that the switch reusable. A heating wire 45 can be provided in the tube to dry out the mix 41.

Figure 8 shows a candle 50 of traditional form comprising a wax body 51 having an embedded wick 52. A thermally conducting wire 53 extends through the body 51 adjacent the wick 52. The wire may extend through the centre of the wick 52. The wire is of low melting point so that it melts and/or burns way as the candle burns. Heat is conducted by the wire 53 to a sensor or switch 54 which may takes for example, the form of the switch mechanism of Figure 3, 4 or 5, a temperature sensitive resistor, or an infra red sensitive diode which reacts to infra-red light given off by the heated wire 54. The sensor 54 is turn triggers the IC to play a tune (Figure 2).

A plurality of sensors may be arranged around the candle flame, they may be fixed at different distances from the flame and/or embedded at different heights in the candle wax body. Each sensor may provide a signal for the IC, being coupled directly to the IC or activating a switch as in the embodiment of figures 3, 4 and 5.

A manually operated on-off switch may be provided in serles with the battery V to disable the music generator.

Various modifications may be made to the described embodiments and it is desired to include all such modifications as fall within the scope of the accompanying claims.

Claims

1. A candle device comprising a candle housed in a container, a cover comprising a thermally insulating plate located on top of the container and covering an upper surface of the candle, the plate having an aperture or slot through which a wick of the candle projects, means for urging the candle upwardly in the container and means for conducting heat from the region of the candle wick to beneath the cover, characterised in that there is provided a music generator and switching means for switching on said music generator to play music.

2. A candle device as claimed in claim 1, characterised in that the switching means is activated by heat or light from a flame of the candle.

3. A candle device as claimed in claim 2, characterised in that said switching means comprises a thermally conducting member for conducting heat from the region of said flames.

4. A candle device comprising a candle and a music generator, the candle comprising a wick extending through the body of the candle and switching means comprising a thermally conducting member extending along the wick, the element being arranged to melt under the heat of the candle flame, and means responsive to heat conducted along said element from the vicinity of the candle flame to activate said music generator.

5. A candle device as claimed in claim 4, wherein the conducting element is coated in a low melting point thermal insulator.

6. A candle device as claimed in anyone of claims 2 to 5 characterised in that said switching means comprises bimetallic switch.

7. A candle device as claimed in any one of claims 2 to 5, characterised in that said switching means comprises a sealed container having a wall comprising at least in part a flexible membrane, said thermally conducting member being in thermal contact with contents of the container to heat the contents, whereby the contents of the container expand and cause said membrane to flex outwardly, a pressure operated switch being located in the path of said membrane and activated by the membrane to turn on the music generator.

8. A candle device as claimed in any one of claims 2 to 5, characterised in that said switching means comprises a piston and cylinder, said thermally conducting member being in thermal contact with contents contained between the piston and cylinder to heat said contents and move the piston along the cylinder, said piston being arranged to operate a switch when it moves along the cylinder.

9. A candle device as claimed in claim 8, wherein said piston operates in turn in plurality of switches as it moves along the cylinder and said music generator is arranged to play a plurality of tunes, a respective tube being played as each switch is activated.

10. A candle device as claimed in claim 2, wherein said switching means comprises a plurality of heat sensing elements, arranged at different distances from said flame and/or different positions in the body of the candle, each element being arranged to activate a switch and said music generator being arranged to play a different tune on activation of each switch.

11. A candle device as claimed in claim 2, characterised in that said switching means comprises a photoelectric cell.

12. A candle device as claimed in claim 11, wherein a fibre optic is provided to conduct light from the candle flame to the cell.

13. A candle device as claimed in claim 1, wherein the switching means is a manually operated switch.

14. A candle device as claimed in claim 1, characterised in that the switching means comprises an elongate tube filled with porous material and having a pairs of electrical contacts in said tube, a reservoir for liquid located at one end of tube, the arrangement being such that liquid is absorbed along said tube by said porous material, the presence of liquid between a pair of contacts serving to activate the switch.

15. A candle device as claimed in claim 14, characterised in that a plurality of pairs of contacts are provided spaced apart along the tube, and said music generator is arranged to play a plurality of tunes, the arrangement being such that as the liquid reaches a pair of contacts a respective tune is played.

16. A candle device comprising a candle, a music generator and switching means for activating the music generator, the switching means comprising an elongate tube having porous material therein arranged to absorb liquid along the tube from a reservoir, a plurality of detectors arranged in the tube to detect the arrival of the liquid and activate the music generator.

17. A candle device as claimed in claim 16, wherein the liquid changes colour when it is absorbed along the tube.

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FIG. 1

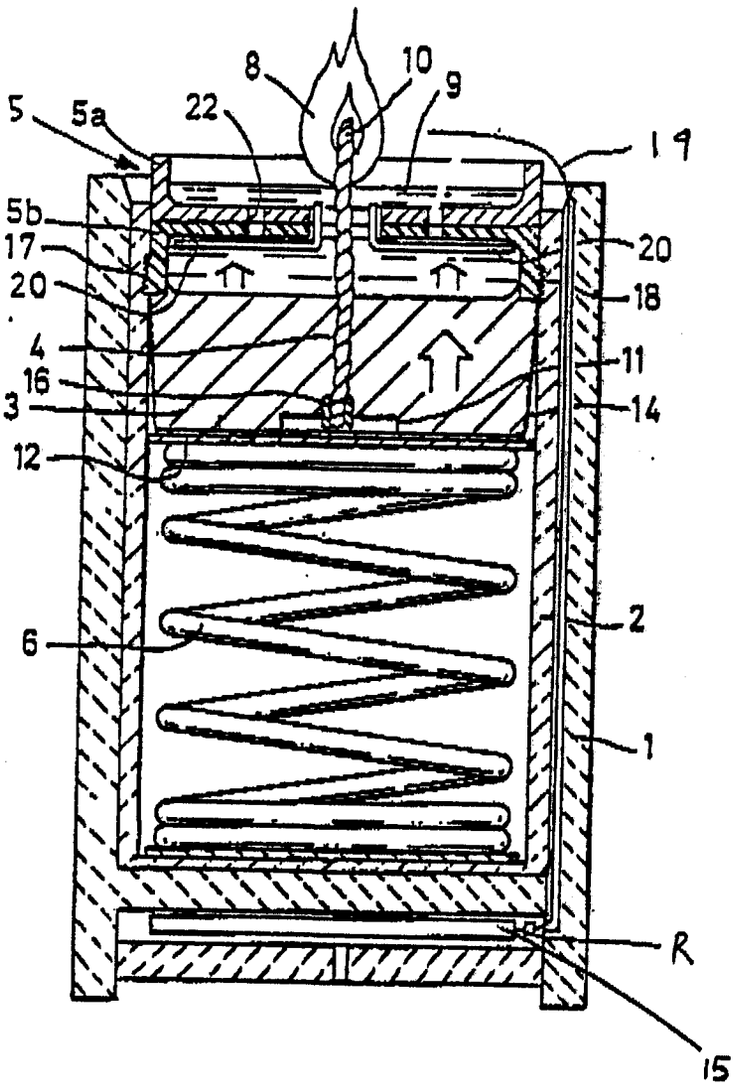
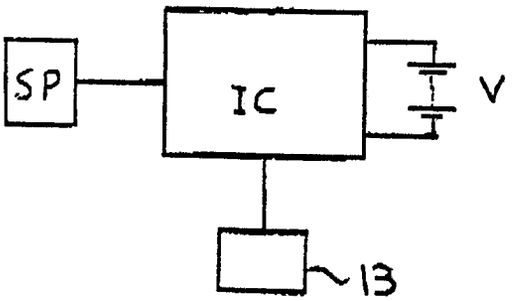


FIG. 2



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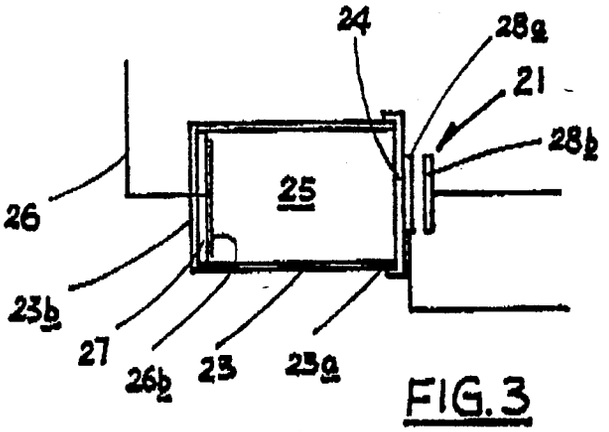


FIG. 3

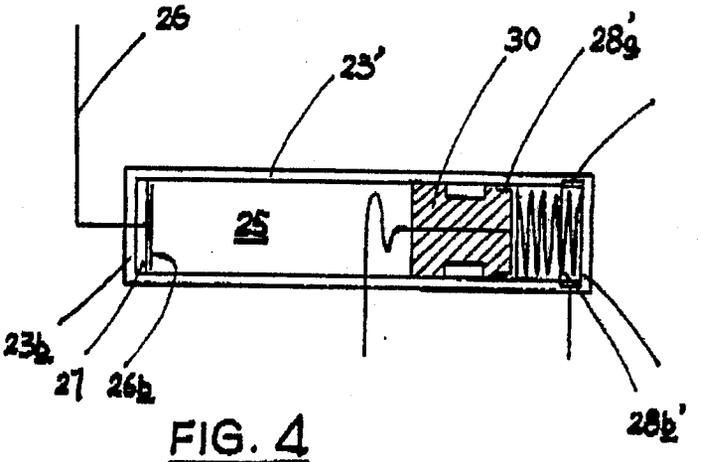


FIG. 4

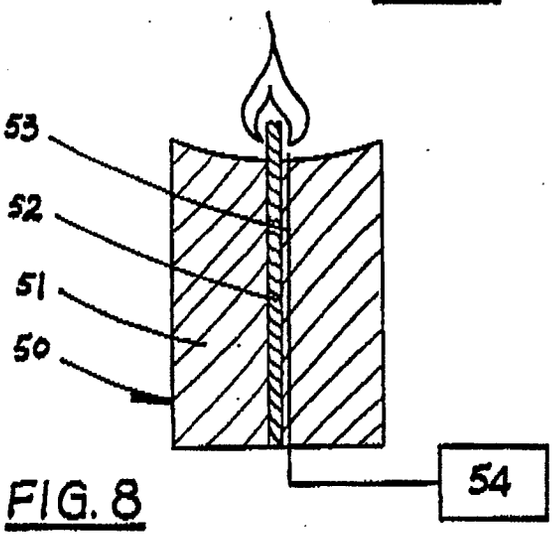


FIG. 8

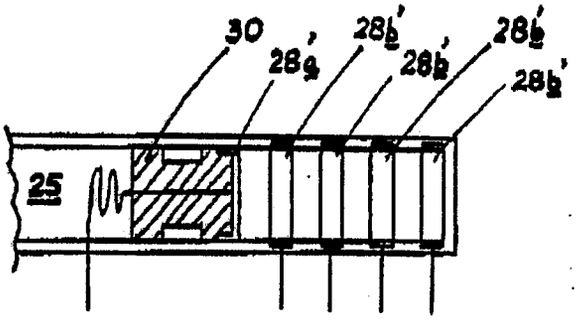


FIG. 5

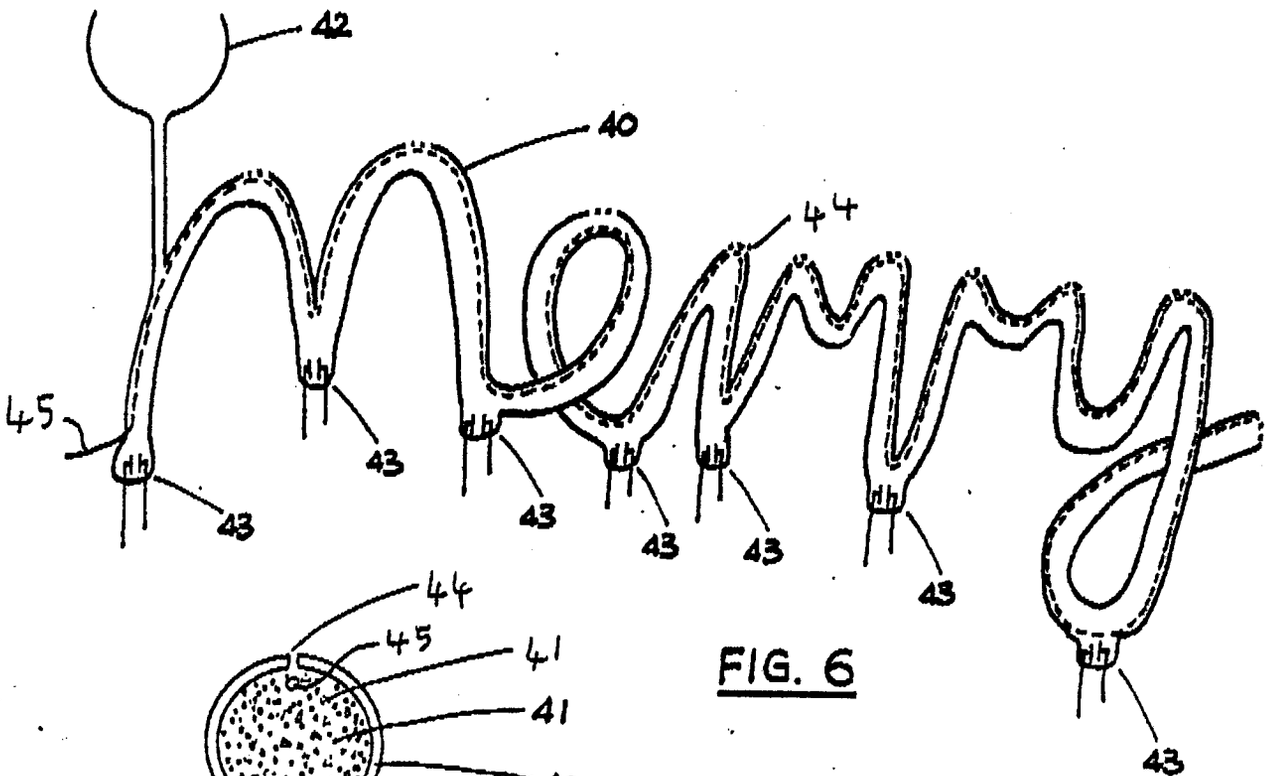


FIG. 6

FIG. 7