May 15, 1962 C. B. SPASE 3,034,207

METHOD OF MAKING A THERMAL UNIT

Original Filed May 13, 1958

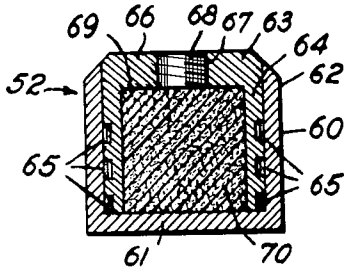


FIG. 1.

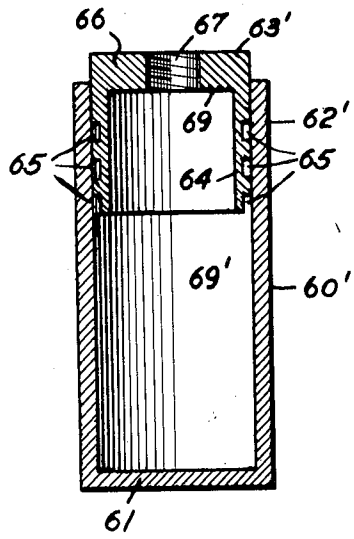


FIG. 2.

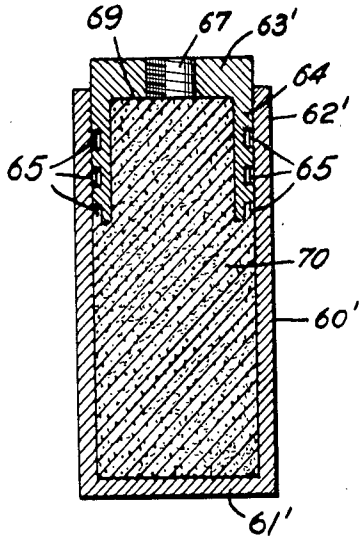


FIG. 3.

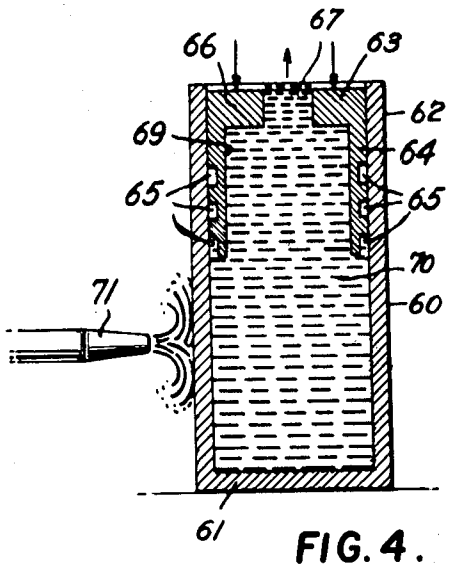


FIG. 4.

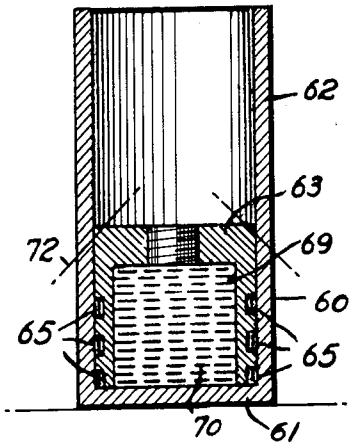


FIG. 5.

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METHOD OF MAKING A THERMAL UNIT

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Original application May 13, 1958, Ser. No. 734,944, now Patent No. 2,924,083, dated Feb. 9, 1960. Divided and this application Aug. 21, 1959, Ser. No. 837,316
4 Claims. (Cl. 29—405)

This application is a division of S.N. 734,944, filed May 13, 1958, now Patent No. 2,924,083, granted February 9, 1960.

The present invention relates to a method of making a thermally expansible unit that excludes air and other foreign matter from the space occupied by the thermally expansible material in the thermally responsive unit.

Prior art processes of making thermally expansive units have required in general expensive molds thus making the units unduly costly, and necessitating large investments for equipment.

Further, known methods have not invariably provided for the exclusion of foreign matter from the expansible material chamber, with consequent adverse effect on the performance of the unit.

It is an object of the present invention provide a process for making a thermally expansible device that is relatively simple.

Another object of the present invention is the provision of a process for making a thermally expansible device that does not require the manufacture of molds or the use of equipment that is capable of exerting high pressures.

A further object of the present invention is to provide a method of making a thermally expansible device that will positively exclude the introduction of air or other foreign matter into the chamber that contains the thermally expansible material during the manufacture of the device.

Other objects and the nature and advantages of the instant invention will be apparent from the following description taken in conjunction with the accompanying drawings, wherein:

FIG. 1 is a longitudinal cross-sectional view of a thermally responsive device made in accordance with the process of the present invention.

FIG. 2 is a longitudinal cross-sectional view showing a first step in the process of making the device of FIG. 1.

FIGS. 3, 4 and 5 illustrate successive steps in the manufacture of the device of FIG. 1.

Referring now to the drawings wherein like reference characters are used to designate like or corresponding parts throughout the several views, there is shown in FIG. 1 a thermal unit 52 which consists of an outer capsule member 60 that is cup-shaped and has end wall 61 and an open-ended skirt 62 extending therefrom. Telescopically received within the skirt 62 of the capsule member 60 is a plug member 63 having a skirt 64, the skirt 64 having a plurality of circumferentially extending grooves 65 on the exterior periphery thereof. Plug member 63, which is also cup-shaped, has an end wall 66 having a threaded hole 67 therein, and a plug 68 in said hole 67.

The end wall 66 of plug member 63, the end wall 61 of capsule 60, and the interior of the skirt 64 of plug member 63 form a chamber 69 in which there is positioned the thermally expansible material 70. This material is preferably solid at ordinary temperatures, or room temperatures but becomes liquid at approximately 300° F., and upon further heating of the material 70 above 300° F., the material 70 will expand. Such materials are

well known in the art, and the specific material used forms no part of the present invention.

The method of manufacture is as follows: Referring to FIG. 2, there may be seen a pair of cup-like members 60′ and the cup-like member 63′ having the grooves 65 on the periphery of the skirt 64 thereof. Member 63′ has an end wall 66 that is oppositely disposed to an end wall 61 of the member 60′. The skirt 64 of member 63′ is telescoped within and is relatively shorter than the skirt 62′ of the member 60′. The end wall 66 has a threaded hole 67 therein. As may be seen, a relatively large chamber 69′ is formed between the end walls and the skirts of the members 60′ and 63′.

Having thus assembled the above described parts, the material 70 is poured into the chamber 69′ through the hole 67, this operation taking place with both the cup-shaped member 60′ and the cup-shaped member 63′ and the material 70 at approximately 70° F. It will be recalled that at this temperature the material 70 is a solid, preferably a crystal granulate, the thus filled device being shown in FIG. 3.

The parts as thus assembled, and with the chamber 69′ filled with the material 70, are then heated by any convenient means, a burner 71 being shown for this purpose in FIG. 4. This serves to liquefy the material 70 as shown in FIG. 4. Note that the hole 67 is uppermost during this heating operation.

Thereafter, the cup-shaped member 63′ is telescoped within the skirt 62′ of the cup-shaped member 60′ until the skirt 64 thereof bottoms on the end wall 61 of the cup-shaped member 60′; this action extrudes the liquid material 70 upwardly through the hole 67 in the end wall 66 of cup-shaped member 63′.

While at the elevated temperature, a flush screw or plug 68 is placed in the hole 67, and it may thus be seen that the unit has been sealed without any air in the unit and without any foreign material getting into the chamber that is occupied by the material 70; the unit is then cooled.

The members 60′ and 63′ are then cut along the plane 72 shown in FIG. 5, this of course removing that part of the skirt 62′ of cup-shaped member 60′ that extends beyond the end wall 66 of the member 63′. This cutting action also places a champered edge on the member 63′ so that it is in fact now the member 63 of the completed unit.

It will be understood that the cup-shaped members are cylindrical, and preferably that they are of a circular cylindrical form, although other shapes are possible.

There has also been provided a simple and efficient method of manufacturing a thermal unit that can be accomplished with a minimum of equipment and which method requires no forms nor high capacity presses.

It will be obvious to those skilled in the art that various changes may be made without departing from the spirit of the invention and therefore the invention is not limited to what is shown in the drawings and described in the specification but only as indicated in the appended claims.

What is claimed is:

1. The method of making a thermally expansible device comprising telescopically assembling in relative reciprocable, sealed relation a pair of cup-like members, each having an end wall and a skirt in telescopic relationship with the skirt of the inner member being shorter than the skirt of the outer member and with said end walls oppositely disposed, whereby to form a chamber between said end walls and the skirts of said members, introducing through a hole in the end wall of said inner member and into said chamber at ordinary room temperature a material that is in the solid state at ordinary room tempertures and liquefies into an expansible liquid at elevated

temperatures, heating said assembled parts with said hole uppermost to at least the liquefaction temperature of said material, further telescoping said members until the skirt of the inner member bottoms on the end wall of the outer member and thereby extruding liquid material upwardly through said hole, plugging said hole, cooling said assembly to ordinary room temperature, and then removing that part of the skirt of the outer member that extends beyond the end wall of the inner member.

2. The method of making a thermally expansible device comprising telescopically assembling in relative reciprocable, sealed relation a pair of cup-like members, each having an end wall and a skirt in telescopic relationship with the skirt of the inner member being shorter than the skirt of the outer member and with said end walls oppositely disposed, whereby to form a chamber between said end walls and the skirts of said members, introducing through an orifice in one of said members and into said chamber at ordinary room temperature a material that is in the solid state at ordinary room temperatures and liquefies into an expansible liquid at elevated temperatures, heating said assembled parts with said orifice uppermost to at least the liquefaction temperature of said material, further telescoping said members until the skirt of the inner member bottoms on the end wall of the outer member and thereby extruding liquid material upwardly through said orifice, closing said orifice, cooling said assembly to ordinary room temperature, and then removing that part of the skirt of the outer member that extends beyond the end wall of the inner member.

3. The method of making a thermally expansible device comprising telescopically assembling in relative reciprocable, sealed relation a pair of cup-like members, each having an end wall and a skirt in telescopic relationship with the skirt of the inner member being shorter than the skirt of the outer member and with said end walls oppositely disposed, whereby to form a chamber between said end walls and the skirts of said members, introducing through an orifice in one of said members and into

said chamber at ordinary room temperature a material that is in the solid state at ordinary room temperatures and liquefies into an expansible liquid at elevated temperatures, heating said assembled parts to at least the liquefaction temperature of said material, further telescoping said members until the skirt of the inner member bottoms on the end wall of the outer member and thereby extruding liquid material through said orifice, closing said orifice, cooling said assembly to ordinary room temperature, and then removing that part of the skirt of the outer member that extends beyond the end wall of the inner member.

4. The method of making a thermally expansible device comprising telescopically assembling in relative reciprocable, sealed relation a pair of cup-like members, each having an end wall and a skirt in telescopic relationship with the skirt of the inner member being shorter than the skirt of the outer member and with said end walls oppositely disposed, whereby to form a chamber between said end walls and the skirts of said members, introducing through an orifice in one of said members and into said chamber at ordinary room temperature a material that is in the solid state at ordinary room temperatures and liquefies into an expansible liquid at elevated temperatures, heating said assembled parts to at least the liquefaction temperature of said material, further telescoping said members until the skirt of the inner member bottoms on the end wall of the outer member and thereby extruding liquid material through said orifice, closing said orifice, and cooling said assembly to ordinary room temperature.

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