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(54) **Method for forming three-dimensional containers of extensible paper material.**

(57) A method for forming three-dimensional containers of extensible paper material, characterised by:
- forming a tubular element (2) from extensible paper material,
- associating the tubular element obtained in this manner

with a mould (4) negatively reproducing at least the side wall of the container to be obtained,
- causing the tubular element (2) to adhere to the mould walls by utilizing the extensibility characteristics of the paper material,
- closing said tubular element at at least one end.

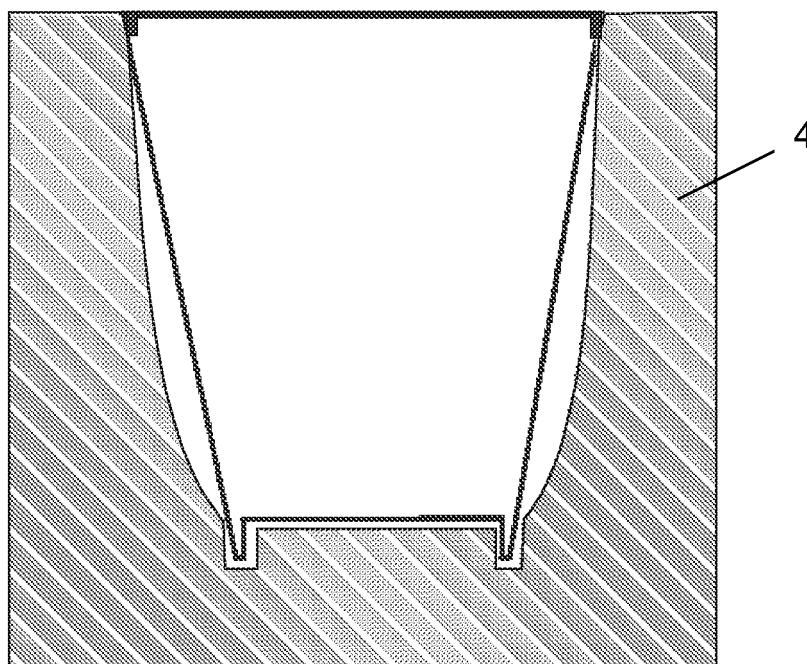


FIG. 2

Description

[0001] The present invention relates to a method for forming three-dimensional containers of extensible paper material.

[0002] Methods for forming three-dimensional containers of paper material are known.

[0003] One of these methods consists of wrapping about a tube a paper sheet with its surface corresponding to the lateral surface of the container, joining the superposed edges together and inserting a base to obtain for example an ice cream tub.

[0004] A drawback of this system is the fact that the container presents a flat surface which to be decorated must be subjected to a printing process.

[0005] Another method consists of applying a sheet of plastic material over the cavity of a mould the inner surface of which is provided with a three-dimensional design, then making the sheet adhere to the mould walls to obtain for example a plastic cup.

[0006] The drawback of this method is the fact that it can be used only to form plastic containers which are not of ecological materials and which also require costly and sophisticated processes for their formation.

[0007] Another method consists of forming the container by injection moulding.

[0008] This method presents the drawback that printing can be carried only after the container has been formed, by special methods which hence require a very costly process.

[0009] Methods are also known for forming filled and closed three-dimensional containers of substantially parallelepiped shape formed from coupled cardboard, they being produced starting from a tube of a web of material subjected to successive folding and welding for the side regions, and then closed to obtain for example a traditional milk container.

[0010] A drawback of these known methods is that the container obtained is linked to a geometry determined by folding, and in no way resembles a cup or tub in the traditional sense.

[0011] An object of the invention is to eliminate these drawbacks by providing a method which enables three-dimensional containers to be obtained the walls of which can be shaped to achieve a better ornamental appearance, improved product-customer communication facilities and an increased volume.

[0012] This and other objects which will be apparent from the ensuing description are attained according to the invention by a method for forming three-dimensional containers of extensible paper material as described in claim 1.

[0013] Some preferred embodiments of the present invention are further clarified hereinafter with reference to the accompanying drawings, in which:

Figures 1-4 represent schematically a method for forming containers without undercuts,

Figures 5-8 represent schematically a method for forming containers with undercuts,
Figures 9-12 represent a method for forming containers the lateral surface of which comprises reliefs,
Figures 13-16 represent a method for forming containers provided with closure flaps,
Figures 17-20 represent a method for forming an ice cream tub, and
Figures 21-24 represent a method for forming an ice cream tub.

[0014] As can be seen from the figures, the method of the invention in the embodiment illustrated in Figures 1-4 consists of subjecting a substantially conical tubular element 2 of one, two or multi-layer extensible paper material with its longitudinal edges glued together, to the interior of a mould 4 of size greater than the cone and free of undercuts.

[0015] The tubular element is secured at its open ends and a single punch 6 of the same size as the mould is inserted into the mould. In this manner the tubular element is made to adhere to the mould walls.

[0016] The punch is then removed and the deformed cone can be extracted and fed to further processing.

[0017] In the embodiment shown in Figures 5-8, a substantially conical tubular element 8 of extensible paper material coupled to a weldable polymer film, the longitudinal edges of which are joined together by thermowelding, is preheated and then inserted into a mould 10, comprising two openable half-moulds 12, 12', which is of greater width than the cone and comprises two undercuts 14.

[0018] The cone is secured at its open ends and is hermetically sealed. An air flow is then fed through an aperture 16 provided in a closure cap 18 so that the cone 8 is deformed by the air and adheres to the mould walls.

[0019] When the cone has adhered to the walls of the cooled mould the two half-moulds 12, 12' are spaced apart so that the mould can be opened to extract the container in order to feed it to subsequent processing steps.

[0020] In the embodiment shown in Figures 9-12, a flat frustoconical element of extensible paper material associated with a layer of aluminium is subjected to localized limited-area deformation, for example small projecting points 22. The sheet is wrapped to form a tubular element with its longitudinal edges joined together by thermowelding and a base 24 is applied to one end. The tubular element is mounted about a core 26 of dimensions less than those of the tubular element. The cone is then made to adhere to the core by material stretching such as to cause it to adhere to cavities 28 present in the circumferential surface of the core.

[0021] In the embodiment shown in Figures 13-16 a web of extensible paper material, coupled to polymer layers with fluid barrier characteristics and able to be welded, is processed to form a cylindrical tube 30.

[0022] The tube is cut to form a portion 32 which is inserted into a conical mould of greater volume, leaving bands 36 free at its ends.

[0023] An inflatable balloon 38 is inserted into the portion and is connected to a compressed air source to inflate the balloon. As a result of this inflation the balloon surface urges the portion to widen and adhere to the walls of the mould 34. The mould is opened longitudinally and the shaped tube is extracted from it. The free flaps at the end are bent over and welded to form firstly a flat base and then, after inserting the product into the container, a flat top.

[0024] In the embodiment shown in Figures 17-20 the tubular element consists of a small-height conical element made of extensible paper material in the configuration of an undulated three-layer carton, associated with a layer of polymer film, and closed at one end by a traditional closure system for ice cream tubs.

[0025] Said element is inserted into a larger volume mould 38 which covers both the base and the side band of the container. The container mouth is secured about the mould aperture, a balloon 40 is inserted into the container and the mould is then closed. Air is fed into the balloon, causing the entire surface of the tubular element to adhere against the mould wall. The cap is removed and the container is extracted.

[0026] In the embodiment shown in Figures 21-24 the procedure commences with a tub 42 as described in Figure 17, which is inserted into a mould 44 having the same shape as the tub. The mould is made of yieldable material contained in a rigid box 46. After securing the tub edge about the mould aperture a profiled punch 48 is inserted into the tub to cause the material to extend and deform, to give it the appearance of the punch.

Claims

1. A method for forming three-dimensional containers of extensible paper material, **characterised by**:
 - forming a tubular element from extensible paper material,
 - associating the tubular element obtained in this manner with a mould negatively reproducing at least the side wall of the container to be obtained,
 - causing the tubular element to adhere to the mould walls by utilizing the extensibility characteristics of the paper material,
 - closing said tubular element at at least one end.
2. A method as claimed in claim 1, **characterised in that** to form the tubular element, a flat shape corresponding to approximately the plan development of the container to be obtained is formed from a sheet of extensible paper material, said flat shape being rolled up to obtain said tubular element.
3. A method as claimed in claim 1, **characterised in that** to obtain said tubular element a continuous tubular element is cut to size.
4. A method as claimed in claim 2, **characterised in that** said tubular element is obtained by rolling said flat shape about itself.
5. A method as claimed in claim 2, **characterised in that** to obtain said tubular element said flat shape is wrapped about a core.
6. A method as claimed in claim 2, **characterised by** subjecting said flat shape to localized deformation in a step which precedes its complete rolling up to obtain the tubular element.
7. A method as claimed in claim 1, **characterised by** closing said tubular element by applying a base before its deformation by adhesion to the mould wall.
8. A method as claimed in claim 7, **characterised by** also subjecting said base applied to said tubular element to deformation.
9. A method as claimed in claim 1, **characterised in that** said paper material consists of a sheet of extensible paper.
10. A method as claimed in claim 1, **characterised in that** said paper material consists of a sheet of extensible paper coupled to a film of waterproofing material.
11. A method as claimed in claim 1, **characterised in that** said paper material consists of a sheet of extensible paper with added waterproofing material.
12. A method as claimed in claim 1, **characterised in that** said paper material consists of a multi-layer paper sheet.
13. A method as claimed in claim 1, **characterised in that** said paper material consists of an undulated cardboard sheet.
14. A method as claimed in claim 13, **characterised in that** said undulated cardboard sheet is in two layers.
15. A method as claimed in claim 13, **characterised in that** said undulated cardboard sheet is in three layers.
16. A method as claimed in claim 13, **characterised in that** said undulated cardboard sheet is associated with at least one waterproofing layer.
17. A method as claimed in claim 1, **characterised by**

closing said tubular element at at least one end by bringing together and then welding the flats of said tubular element.

18. A method as claimed in claim 16, **characterised in that** after bringing together the flaps of the tubular element at the end to be closed and before welding them, said brought-together flats are folded.

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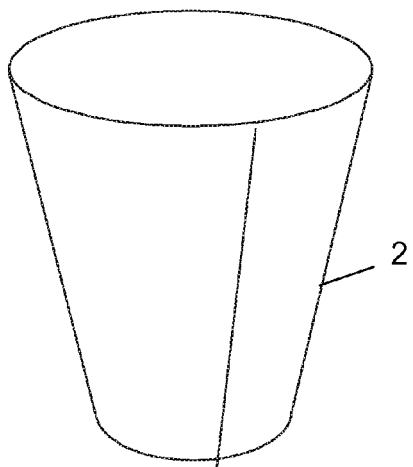


FIG. 1

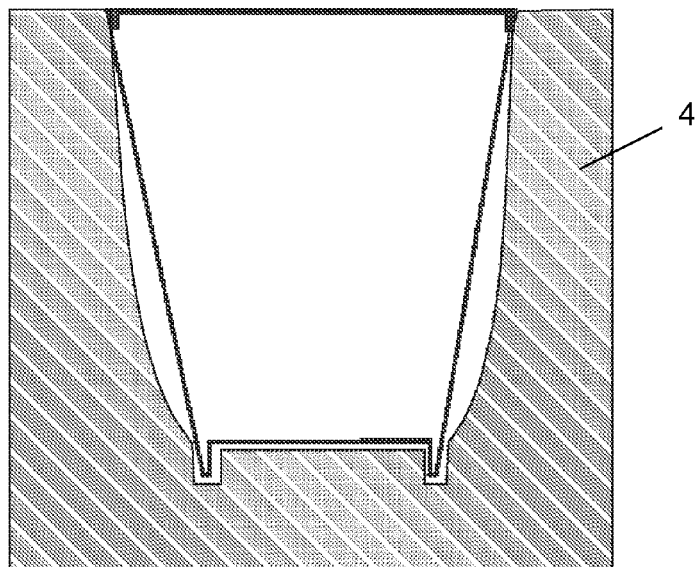


FIG. 2

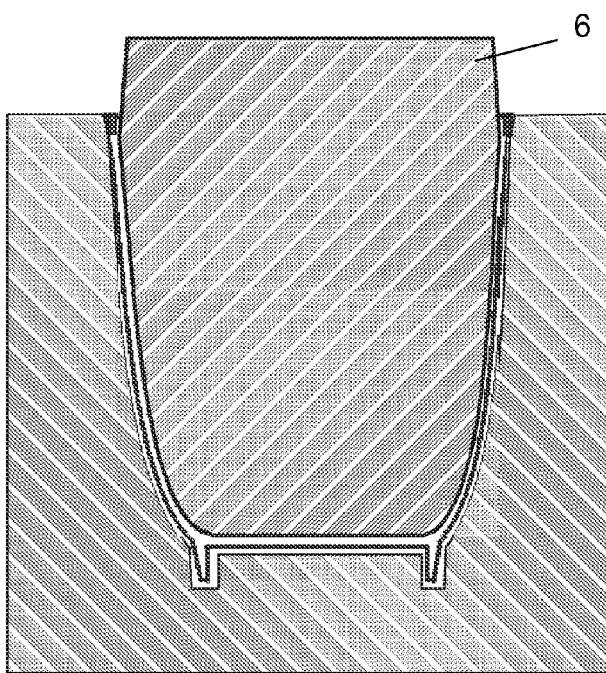


FIG. 3

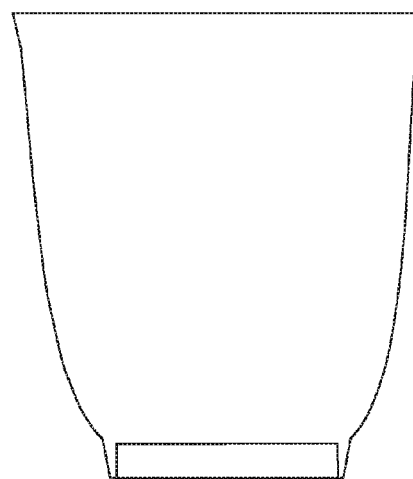


FIG. 4

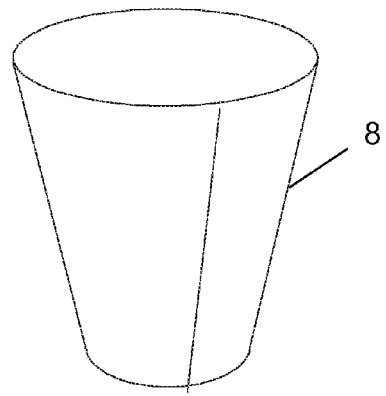


FIG. 5

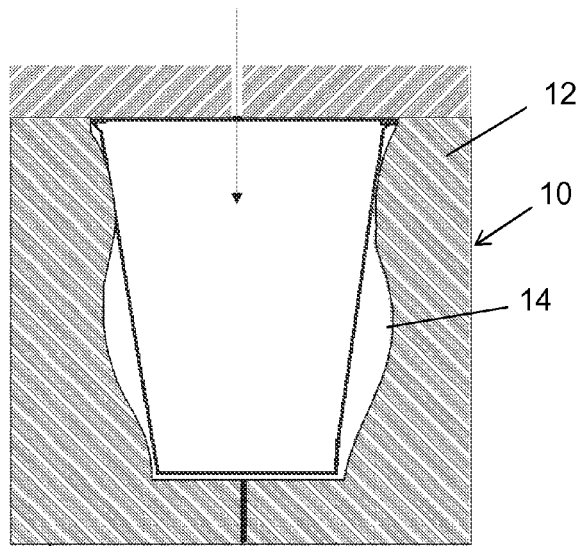


FIG. 6

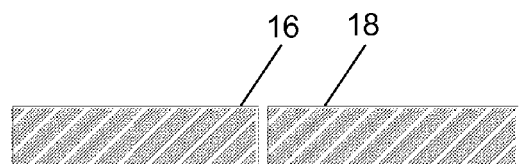


FIG. 7

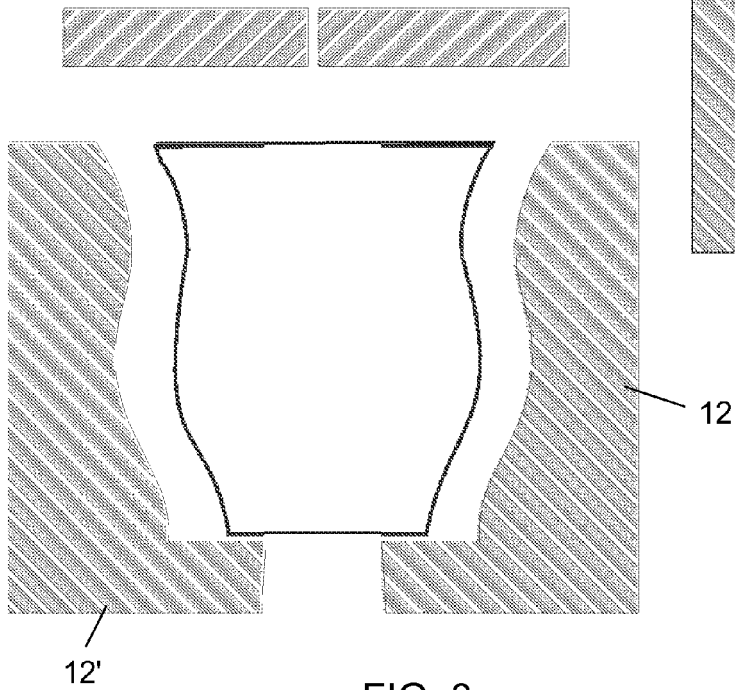


FIG. 8

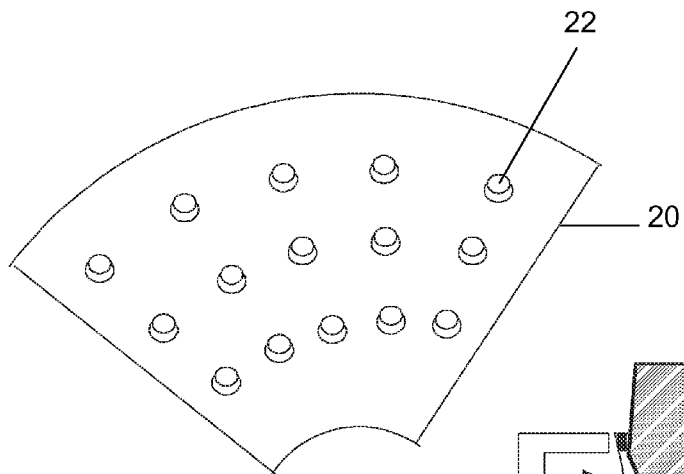


FIG. 9

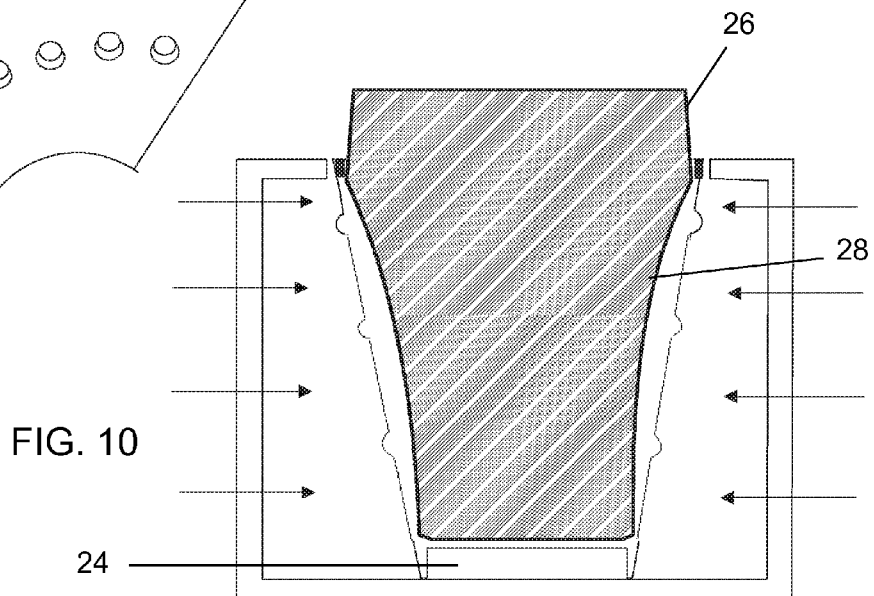


FIG. 10

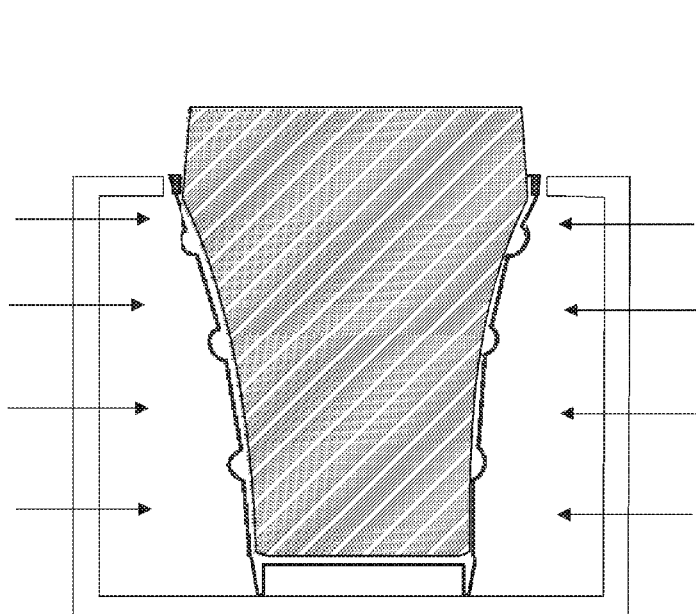


FIG. 11

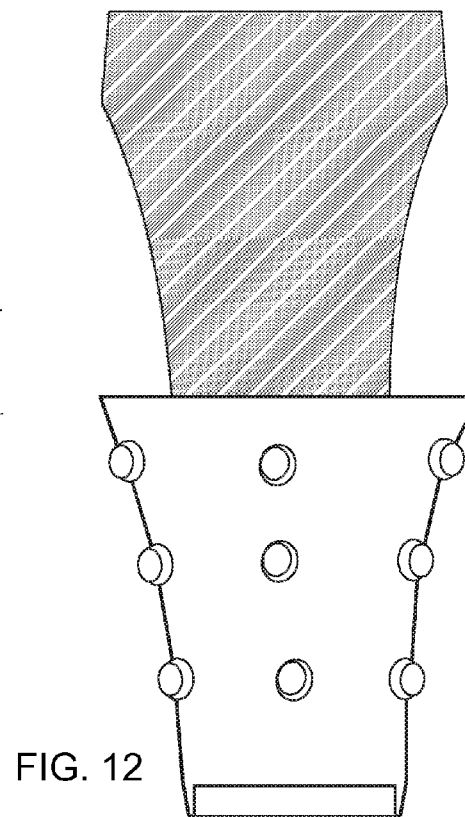


FIG. 12

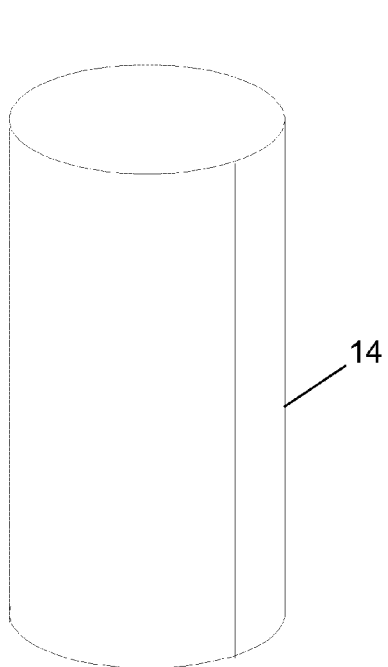


FIG. 13

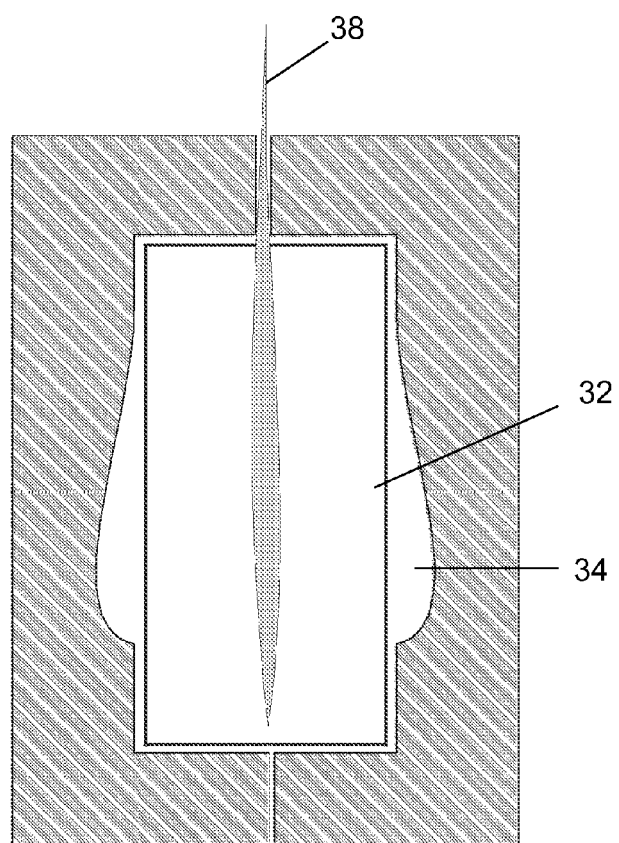


FIG. 14

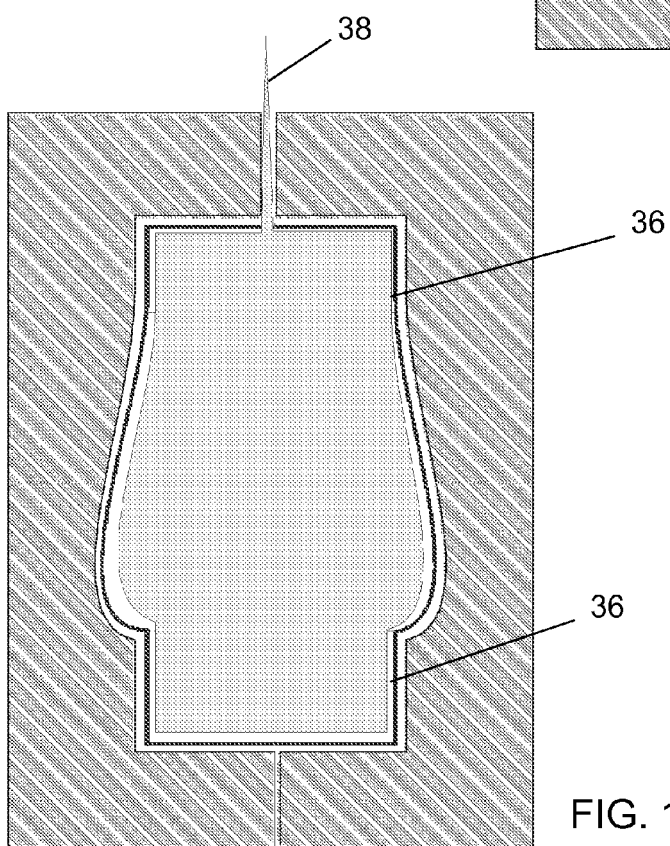


FIG. 15

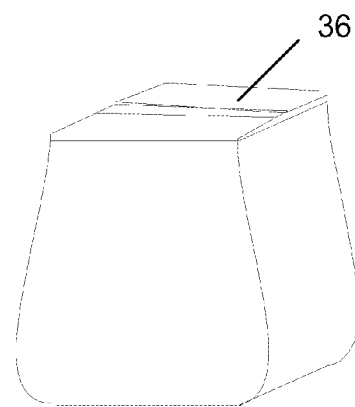


FIG. 16

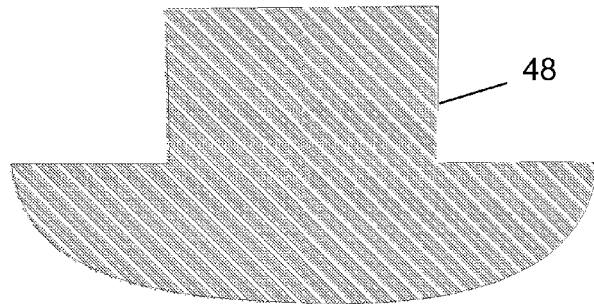
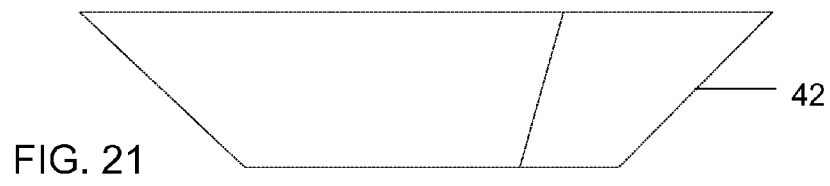


FIG. 22

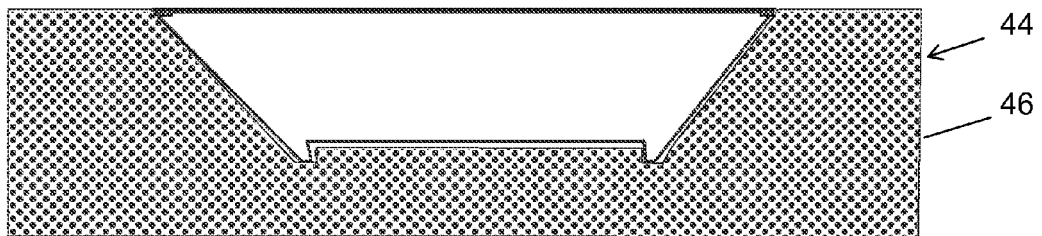


FIG. 23

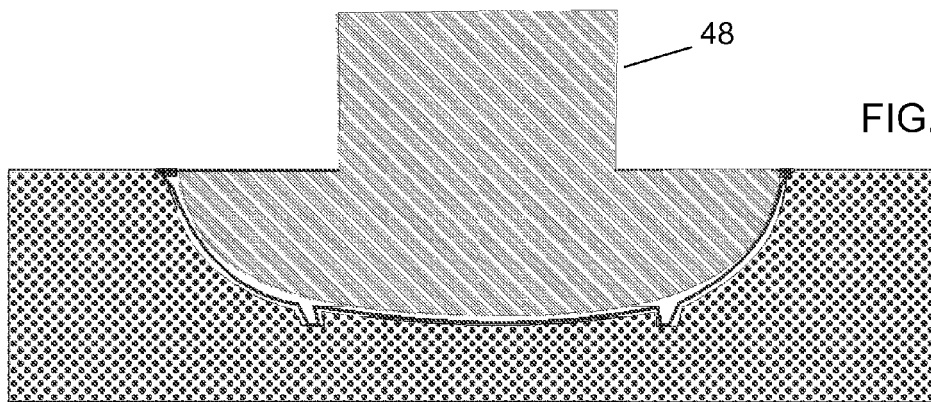


FIG. 24

FIG. 17

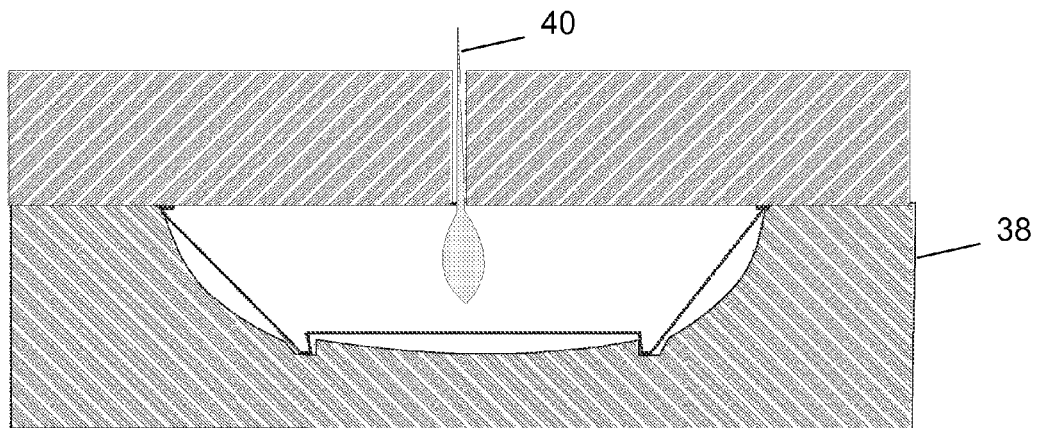
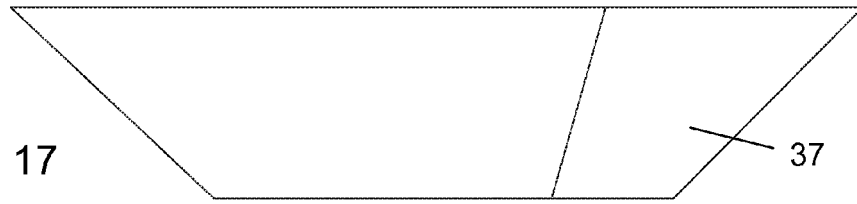


FIG. 18

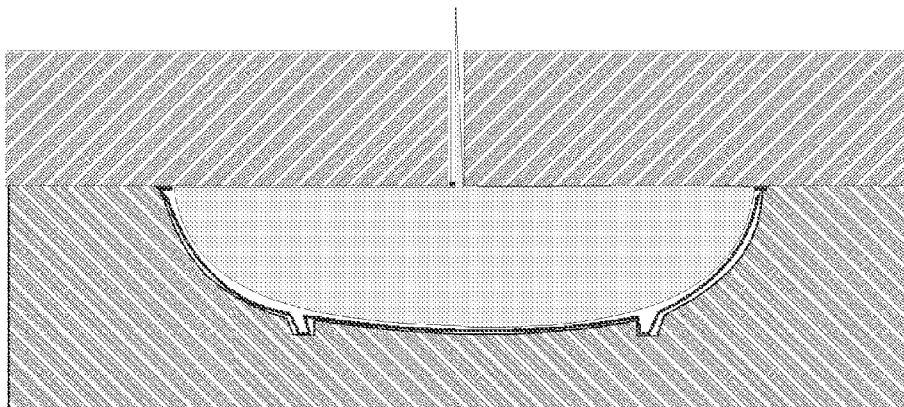


FIG. 19

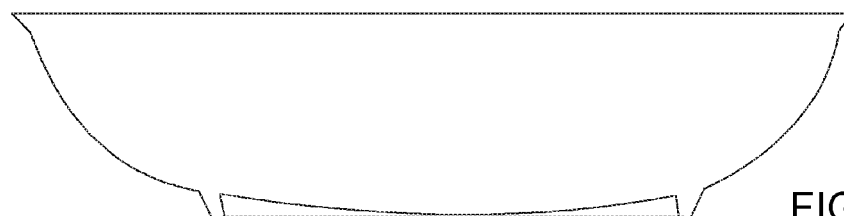


FIG. 20