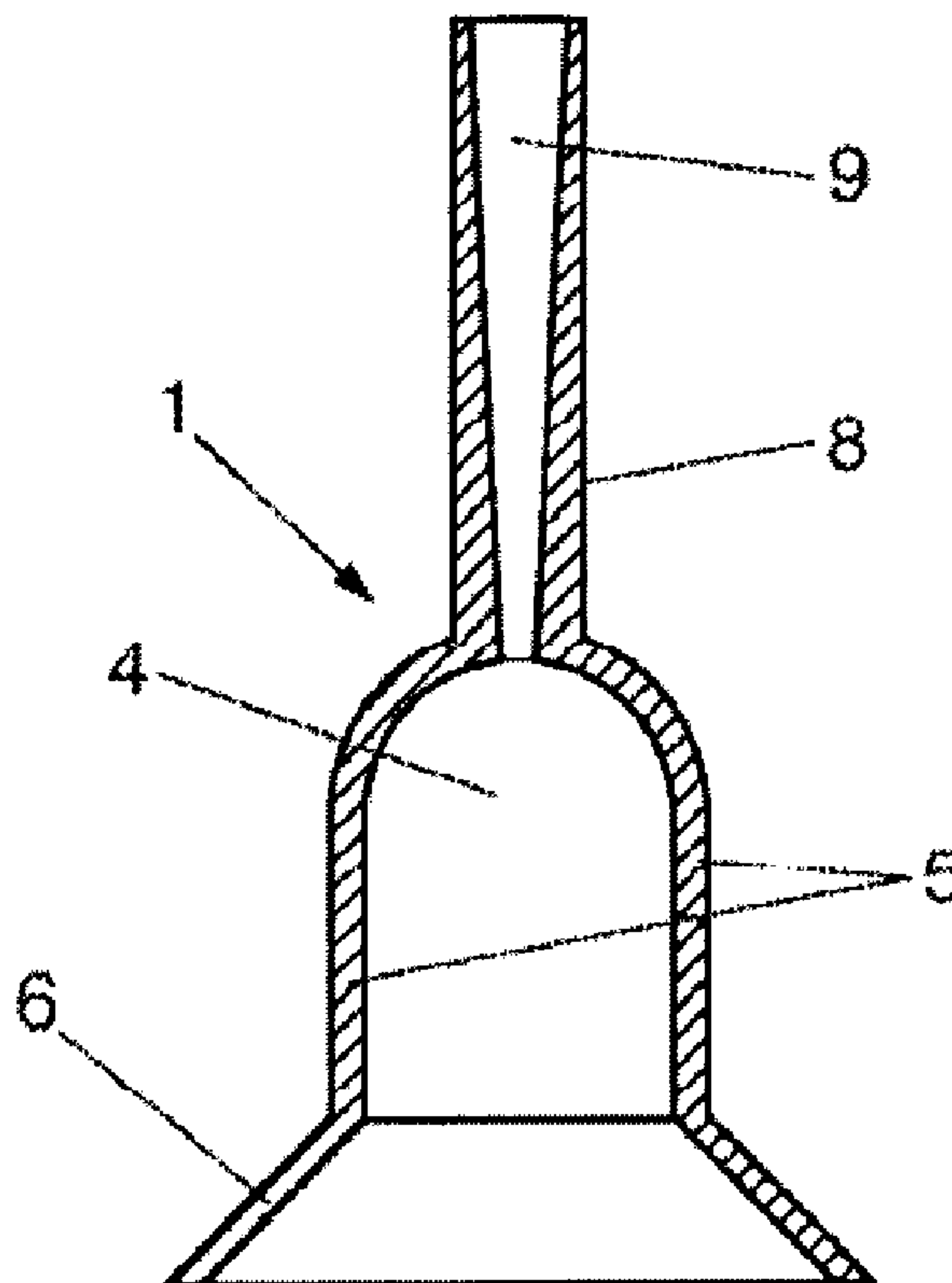




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(54) **Titre : MOULE DE TYPE CLOCHETTE POUR ENCAPSULES A MATERIAU D'ETANCHEITE MOULABLE**
(54) **Title: BELL-SHAPE MOULD FOR ENCAPSULATED ARTICLES WITH MOULDABLE SEAL**



(57) **Abrégé/Abstract:**

Bell-shaped mould for encapsulated articles with mouldable seal, formed by a piece comprising a nozzle (4) with vertical walls (5) and lampshade-shaped part (6) with a planar edge (7) and, opposite, a rod (8) with a through-hole (9) for inserting a guide (10)

(57) Abrégé(suite)/Abstract(continued):

with slits (13) for the exit of the air from the seal (2). The guide (10) is a body in the form of a sword with a grip (11) for handling and with a rounded tip (12). The slits (13) are the cruciform-section configuration of the sword-like body of the guide. The mould is arranged in such a manner as to be grouped in a grid (15) of multiple units connected by connection segments (16) and provided with support feet (17). The mould is made from phosphorescent PP or PE plastic material.

BELL-SHAPE MOULD FOR ENCAPSULATED ARTICLES WITH MOULDABLE SEAL

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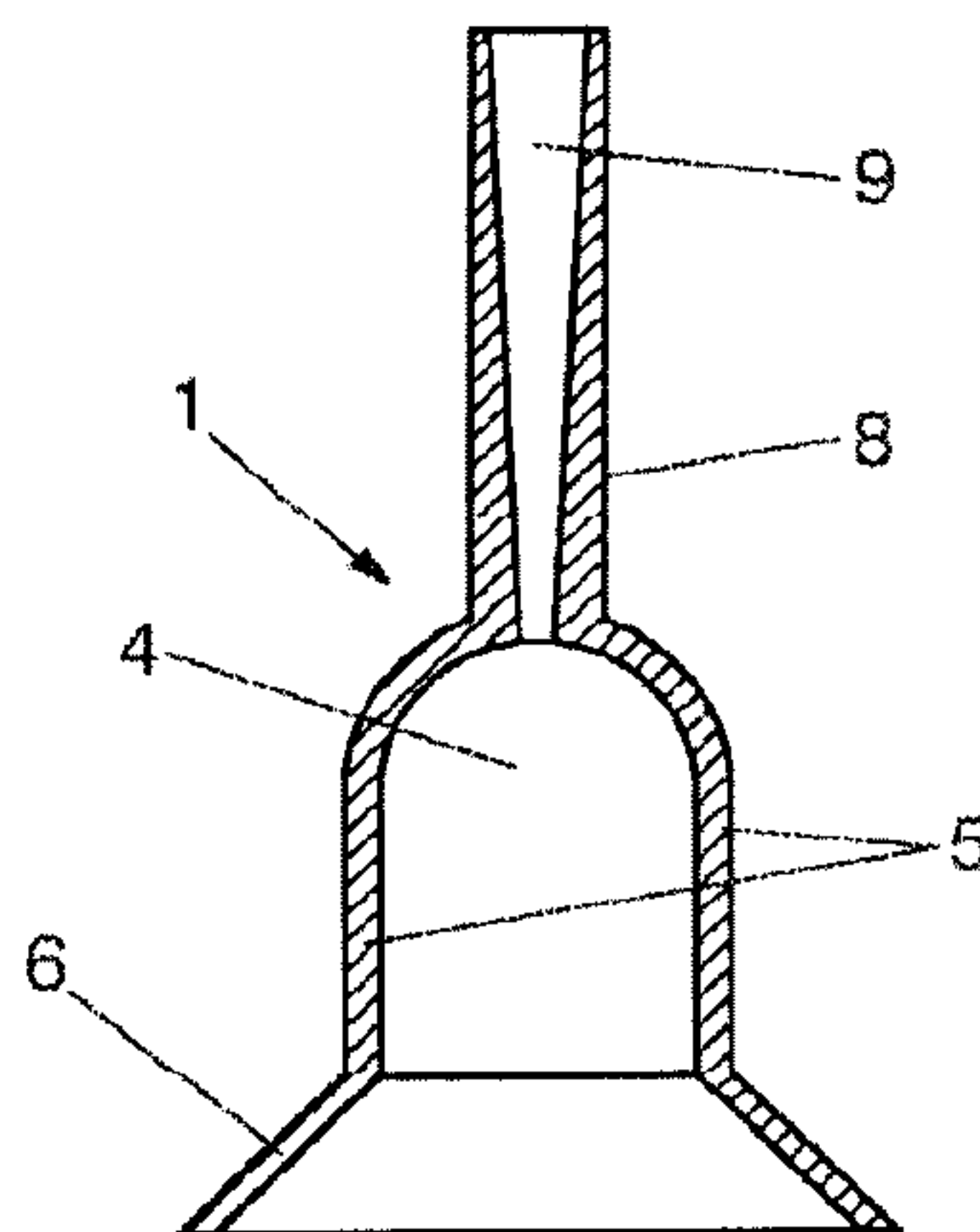


FIG. 1

**BELL-SHAPE MOULD FOR ENCAPSULATED ARTICLES WITH MOULDABLE
SEAL**

OBJECT OF THE INVENTION

The invention, as expressed in the heading of this specification, relates to a
5 bell-shaped mould for encapsulated articles with mouldable seal, which contributes to
the function destined to have several advantages and characteristics of novelty, which
shall be described in detail below and which involve a remarkable improvement over
the systems currently known for the same purpose.

More in particular, the object of the invention focuses on a bell-shaped mould
10 and that, being of the so-called of two pieces, is aimed at encapsulation of rivets or
screws with viscous materials as sealants and silicones of one or two components that,
once cured, provide a solid tight sealing coverage protecting against humidity and
corrosion, with the particularity of having an innovative structural design that, amongst
other advantages, on the one hand, enhances the robotic application of the
15 components of sealing material, allowing a strict, precise control of the product
amounts to be applied and, on the other hand, establishes a safe coverage with a
completely smooth surface, without pores, which prevents the creation of fungi and
bacteria that can cause corrosion.

FIELD OF APPLICATION OF THE INVENTION

20 The field of application of this invention is framed within the technical industrial sector,
covering in general any industry dealing with the manufacture of machines or
apparatus with screws and rivets requiring encapsulation for sealing, such as the
aeronautic, railroad, shipyard industries, etc., focusing in particular on the scope of
encapsulated articles by mouldable sealant.

25 **BACKGROUND OF THE INVENTION**

As a reference to the current state of the art, it must be noted that the technique of
sealing screws and rivets by adding to them a sealing material coverage made by
inserting the material in a mould that, before it forges, is placed over the rivet or screw
and, once cured, is removed.

30 However, the applicant does not know the existence of any other bell mould or
similar invention that shows technical, structural and constitutive characteristics similar
to those herein discussed, and the details characterising it are duly collected in the final
claims enclosed to this specification thereof.

EXPLANATION OF THE INVENTION

35 Specifically, the invention proposes, as pointed out above, a bell-shaped mould for

rivets and screws.

According to a first characteristic of the invention, the mould discussed is arranged grouped forming a nozzle grid cluster with the shape of inverted bells, with the planned existence of support legs in the edges and in the middle part of this grid to enhance levelling on a bench and thus enable an automatic filling machine with a filler to fill them, one by one or in rows, with the scheduled amount of material so that all bells have exactly the same amount and thus all encapsulated articles will have the same amount of sealant and are identical, firm and uniform.

Logically, the nozzles or bells can be also filled with a manual extrusion gun, which is the conventional method.

According to another particularity of the invention, the bell mould or grid is preferably made of plastic, PE (polyethylene) or PP (polypropylene) material, of phosphorescent colour, so that it can be seen in the dark. This is because, thanks to this material, once lightening is removed, phosphorescence is activated and reflected in the dark and thus, as it is lightening in the dark, it can be easily and quickly detected if any mould to be removed of the screws or rivets is forgotten, once the material is cured, for instance inside a plane fuel tank.

In addition, the proposed mould has the advantage over other types of existing encapsulation systems, that its application is direct and that, once the components have been mixed, the material starts its polymerisation or drying, so there is no need for ultra-freezing as with other systems where handling and distribution is very difficult, as the sealant to be used for encapsulation, first are moulded in special moulds for distribution to the companies that will use them and they must be stored in special chambers and special transport, since, once the two components have been mixed, it must be applied immediately or frozen to stop the polymerisation or curing process, which makes the process more expensive and in many cases makes it unfeasible.

Another advantage of the mould of the invention is that, once it has been placed and while the sealing material forges, the work to assemble the machine or apparatus where it is applied can be continued, such as drilling, deburring, etc. as the bell mould protects the sealing encapsulation from shavings, dust or other contaminants that can fall over the sealant.

Furthermore, it must be also highlighted that the proposed mould can be recovered and, therefore, reused, as when the bell is unmoulded it is seen to be clean, leaving, on the other hand, a fully smooth sealing moulding, which enables a finish of encapsulation of rivets and screws without pores or rough forms that give an

antiaesthetic appearance to it.

Specifically dealing with the particular configuration of the bell mould, it must be noted that, in addition to a nozzle or nozzle ending in a tapered skirt giving it a bell shape, it has been designed to place in the edge thereof a flat rim to achieve full support and make it safer. At the opposite side, the mould has a stem joined to the nozzle which makes handling easier, which has a venting hole crossing it.

This hole is used for air release and to insert a sword-shaped guide into it. This sword is fitted with a tip that, before placing the mould on the screw or rivet, is fitted over it for centring it.

Furthermore, this sword is fitted with holes to make air release easier, that can be found in the sealant when the bell is filled. Giving minor turns to the right and left while pressing to reach the base of the rivet or bolt with the flat side of the bell mouth, once the mould is placed, the sword of the rod is removed, leaving the mould placed until the sealing material is forged.

It must be also stressed that the rod in the mould nozzle is preferably round, though it can have different shapes, for instance, star, hexagonal, etc., and it's used for handling it and for making unmoulding easier.

Therefore, the invention of the bell mould is aimed at getting the encapsulated articles to be perfect, fully homogeneous and uniform and also achieving precision measures which are reduced to millimetre tens, as with conventional systems the working tolerances are of up to 5 m/m, while with the mould discussed herein the tolerances are of millimetre tens. This makes it be configured as an engineering part and optimum method to make a sealant that in addition to precise and fully tight, ensuring full tightness, allows weight to be saved, which, for instance, in the case of aviation is very important, as many grams of many encapsulated articles can involve an extra ballast.

The main difference from other techniques known in the state of the art to perform encapsulated articles is the application of the sealant that can be done automatically or manually, with a sealant filling gun or with a syringe.

The process consists of inserting the necessary material of sealant inside the nozzle of the bell, which will have a different size depending on the dimensions of the rivet or bolt. The amount of sealant necessary for encapsulation to be performed is applied. The capsule is placed in front of the rivet first pointing with the sword-shaped guide in the screw or rivet hole and then fitting the bell on the screw or rivet leaving it sunk in sealant and ensuring that the flat edge thereof is adjusted over the surface of

the part around the screw or rivet. Giving small turns to the right and left of the bell, while pressing, it allows the air that may be contained in the sealing material to leave through the through-hole of the rod where the guide has been inserted and through the slits thereof. Once the base thereof has been reached, we remove the guide and
5 leave the mould until the sealant is forged. After drying or curing the sealant, after a few hours, we unmould the bell separating it from the sealant that is solidified, with a perfect finished, without pores, with shine and giving a spectacular aesthetic appearance, in particular in visible areas. And most importantly, protecting against corrosion, which is the big enemy of aviation, automotion, ships and railroads.

10 In addition, this system, as it can be mechanised, enables us to calculate the exact amount of sealant applied to each rivet and know at each time the amount of sealant that is used in the whole apparatus or machine where it is applied.

According to one aspect of the present invention, there is provided a bell mould for encapsulated materials with mouldable sealant, comprising a plastic
15 material body applicable for encapsulation of screws or rivets with a viscous sealing material or silicone that, once cured, forms a protecting coverage, characterized by comprising two parts: a first part formed by a rod-shaped guide with longitudinal slits ; and a second part formed by a bell-shaped nozzle having vertical walls with a lower end tapered skirt and an upper end column having a through-bore configured for
20 receiving the rod-shaped guide, such that centering of the nozzle on the screw or rivet is carried out by insertion of the guide through the bore until a tip of said guide contacts a head of the screw or rivet, while the longitudinal slits of the guide allow for air occluded in the sealant filling the bell-shaped nozzle to escape.

Based on the above, it is verified that the above-described bell mould
25 for encapsulated articles with mouldable sealant means an innovation of unknown characteristics to date for that purpose, reasons which, together with its practical value, give it sufficient grounds to obtain the privilege of exclusivity requested.

DESCRIPTION OF THE DRAWINGS

To complement the description made of the invention and to help for a better understanding of the characteristics distinguishing it, this specification encloses, as an integral part thereof, a set of plans, where, by way of illustration and
5 without limitation, the following is represented:

Figure number 1.- It shows a sectioned elevation view of an example of an embodiment of bell mould for encapsulated articles with mouldable sealant object of the invention, noticing in it the configuration thereof and parts it comprises.

Figure number 2.- It shows a plan view of the mould, according to the
10 invention, shown in the above figure.

Figure number 3.- It shows a perspective view of the mould of the invention, represented in this case with the centering sword fitted in it.

Figure number 4.- It shows an elevation view of the centering sword, noticing the grip thereof and the slits that provide air release.

15 Figure number 5.- It shows a sectional view of the sword, according to the section A-A noted in figure 4.

Figure number 6.- It shows a sectional view of a part with rivets to which encapsulations have been performed with the mould of the invention, noticing in it how

this mould is applied over the rivets to achieve said encapsulated articles.

Figure number 7.- It shows a perspective view of the bell mould for encapsulated articles with mouldable sealant object of the invention, grouped in the grid with support legs enabling mechanisation.

5 Figure number 8 and 9.- They show a sectional and plan view, respectively, of the mould grid, according to the invention shown in Figure 7.

PREFERRED EMBODIMENT OF THE INVENTION

10 In view of the abovementioned figures, and according to the numbering adopted, it can be noticed in them an example of preferred embodiment of the invention, which comprises the parts and elements described in detail below.

15 Furthermore, as shown in these figures, the mould (1) involved is configured from a solid part of plastic material, preferably of plastic phosphorescent PE or PP material, of bell-shaped configuration applicable for including mouldable sealing material (2) for encapsulating screws or rivets (2), which is configured from a nozzle (4) of vertical walls (5) that are extended and open in a perimeteral visor (6) in the edge of which a flat rim (7) has been planned, that provides full support of the mould over the part surface where the screw or rivet emerges (3) over which the encapsulation is implemented.

20 On the opposite side to that described in the visor (6), the mould has a stem (8), that can be of round section or of any other configuration, to which a through-bore (9) has been performed that preferably is of conical configuration, and slightly wider in the distal part of the stem than in the part joining it to the nozzle (4).

25 This through-bore (9) is for allowing the insertion in it of a centering guide (10), which consists, as shown in Figures 4 and 5, of a sword-shaped elongated body fitted in its edge with a handling knob (11) to make it easier to insert the drill, and, in particular, to make extraction easier, having in the opposite side a rounded tip (12) that, for achieving centering of the mould, is inserted over a hollow planned in the head of the screw or rivet (3).

30 This guide (10) also has a number of slits (13) which allow for an air outlet, that may contain the sealing material (2), which is achieved moving it slightly once entered into the through-bore (9) of the rod (8) and when the mould is already placed with the tip of the guide fixed over the screw or rivet.

35 These slits (13) of the guide (10), as shown in Figures 4 and 5, consist preferably of a cross-sectional configuration of the sword-shaped body of the guide,

which covers most of it, except for the handling knob (11) and the end (14) prior to the tip (12) which is solid.

According to Figures 7, 8 and 9, it is seen how mould (1) is arranged grouped forming a grid (15) or a cluster of multiple moulds (1) joined by joining segments (16) and located with the nozzle (4) of the bell upside down, i.e., with the opening of the visor (6) oriented upwards to make automatic filling thereof easier, previously planning the existence of some support legs (17), located in the edges and in the central part of said grid (15), which allows to level the set of moulds over a bench.

After sufficiently describing the nature of this invention and how to implement it, it is not considered necessary to provide a longer explanation for any expert in the art to understand its scope and the advantages resulting from it, noting that, in its essence, it may be implemented in other embodiments differing in detail from that shown by way of illustration, and which shall be also covered by the protection achieved provided its fundamental principle is not affected, changed or modified.

CLAIMS:

1. Bell mould for encapsulated materials with mouldable sealant, comprising a plastic material body applicable for encapsulation of screws or rivets with a viscous sealing material or silicone that, once cured, forms a protecting coverage, characterized by comprising two parts:

a first part formed by a rod-shaped guide with longitudinal slits ; and

a second part formed by a bell-shaped nozzle having vertical walls with a lower end tapered skirt and an upper end column having a through-bore configured for receiving the rod-shaped guide,

such that centering of the nozzle on the screw or rivet is carried out by insertion of the guide through the bore until a tip of said guide contacts a head of the screw or rivet, while the longitudinal slits of the guide allow for air occluded in the sealant filling the bell-shaped nozzle to escape.

2. Bell mould for encapsulated materials with mouldable sealant according to claim 1, where the guide consists of a rod-shaped elongated body having a handle at a back end and the rounded tip at a front end configured for insertion through the bore until contacting a head of the screw or rivet.

3. Bell mould for encapsulated materials with mouldable sealant according to any one of claims 1 or 2, where the bore of the column has a conic configuration, said bore being wider at a distal end of the column than at a proximal end of the column where said column is joined to the nozzle.

4. Bell mould for encapsulated materials with mouldable sealant according to any one of claims 1 or 2, where the longitudinal slits of the guide extend along the guide except for the handle at the back end and for a solid front end portion adjacent the tip.

5. Bell mould for encapsulated materials with mouldable sealant according to any one of claims 1-4, made of plastic phosphorescent PE or PP material.

6. Bell mould grouping, comprising a plurality of mould units according to any of claims 1-5 arranged in a grid joined by joining segments, fitted with support legs located at the edges and central part of the grid for leveling the grouping such that the bell-shaped nozzles of the respective mould units open upwards.

10

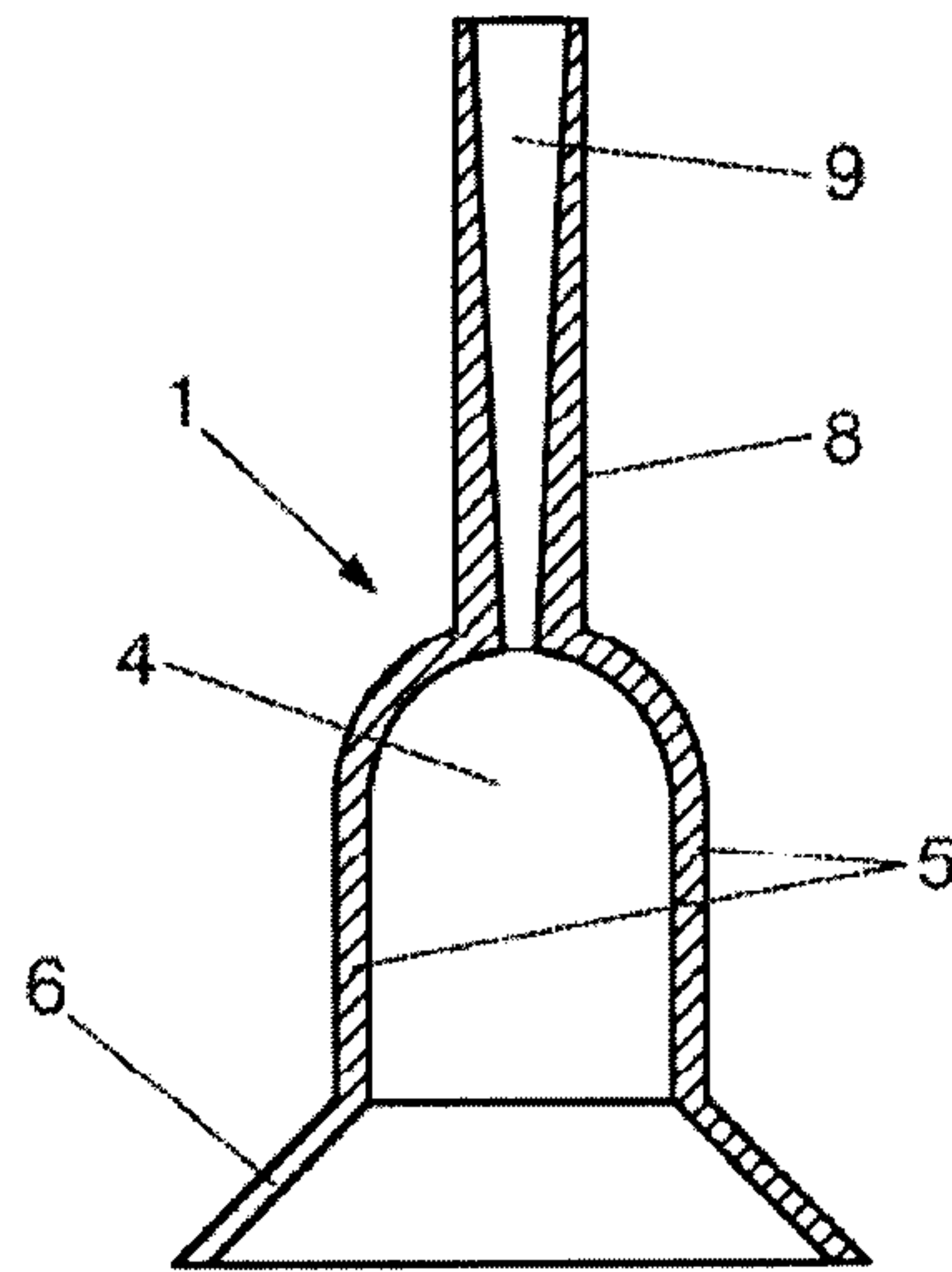


FIG. 1

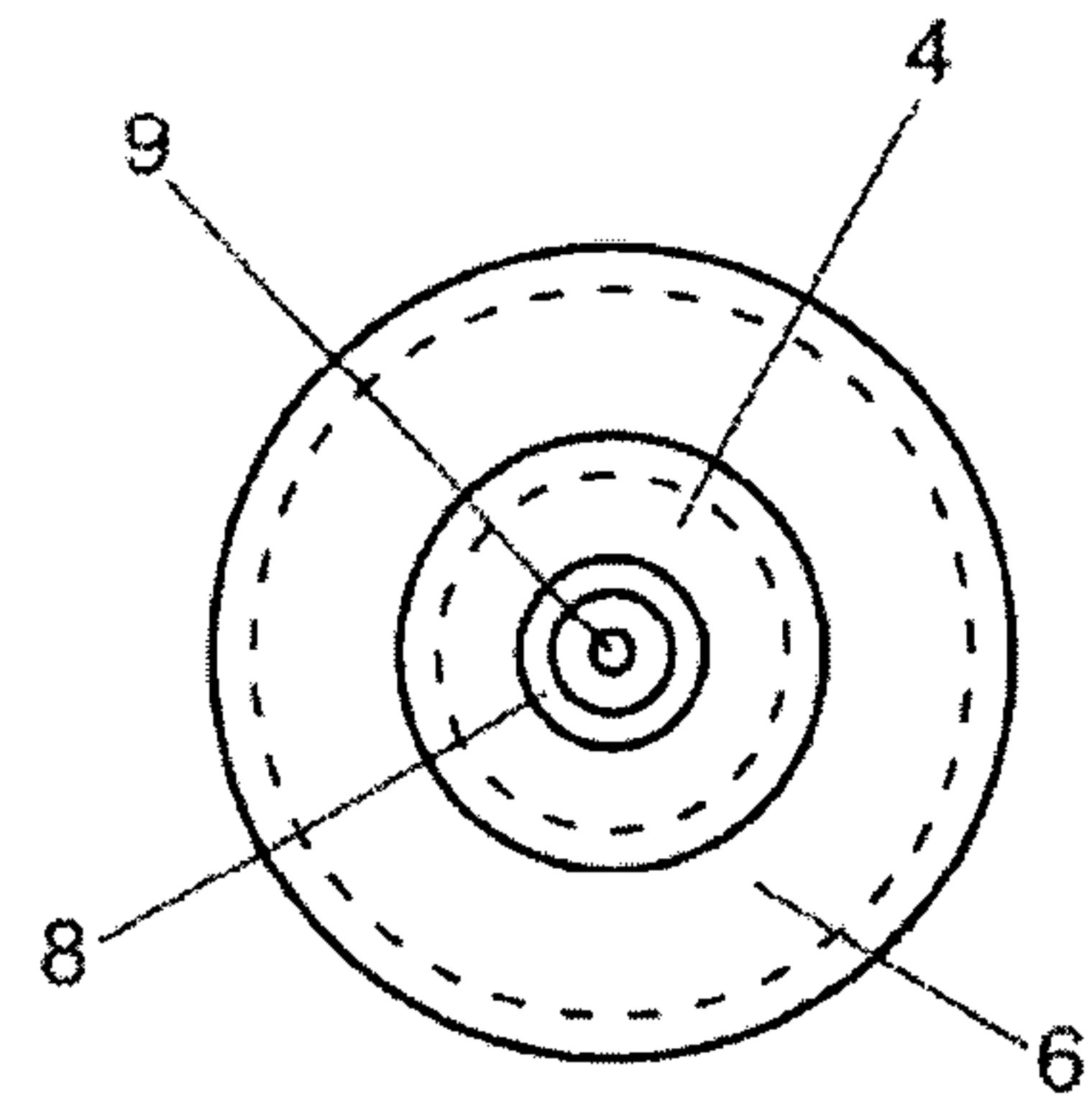


FIG. 2

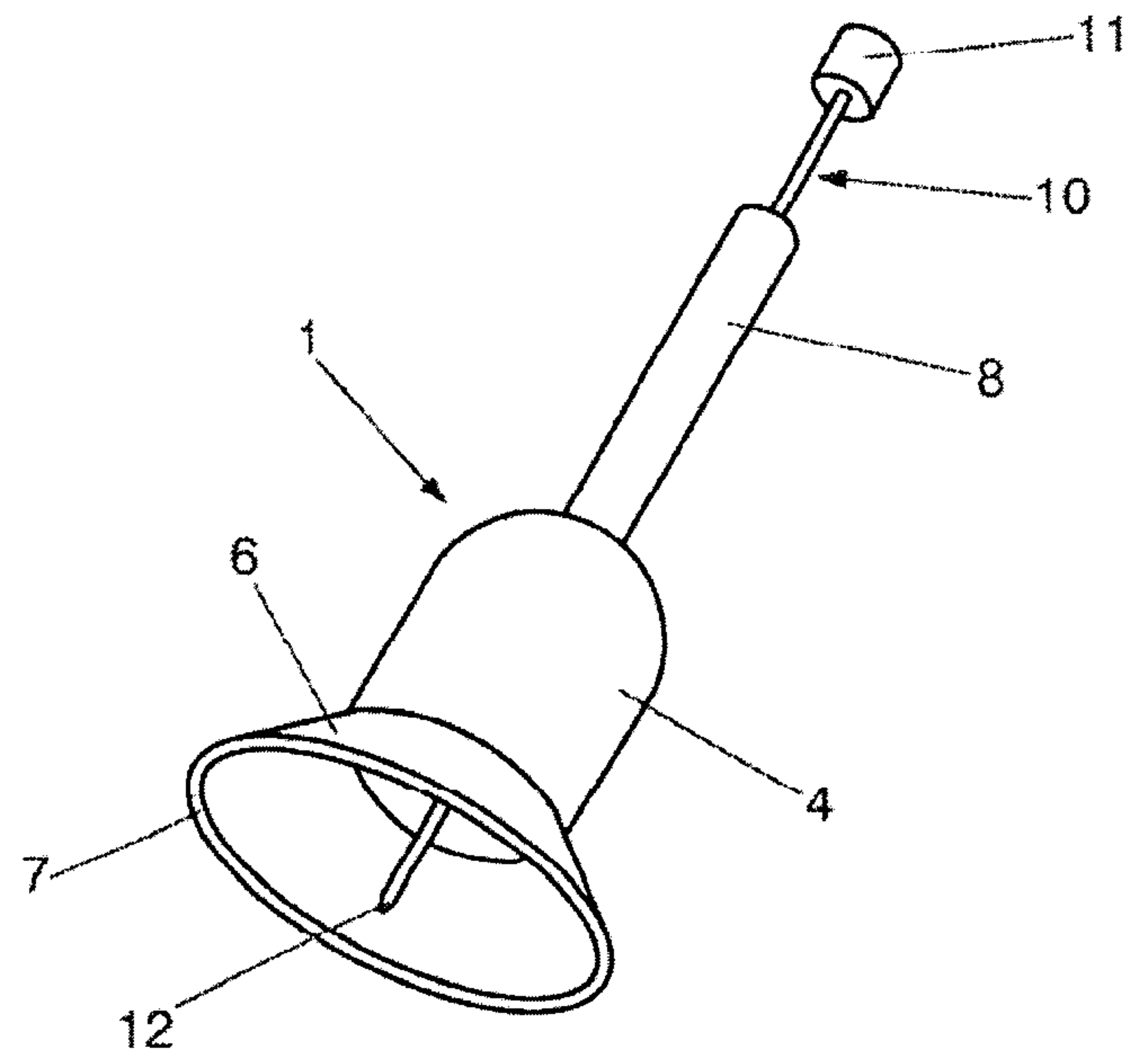


FIG. 3

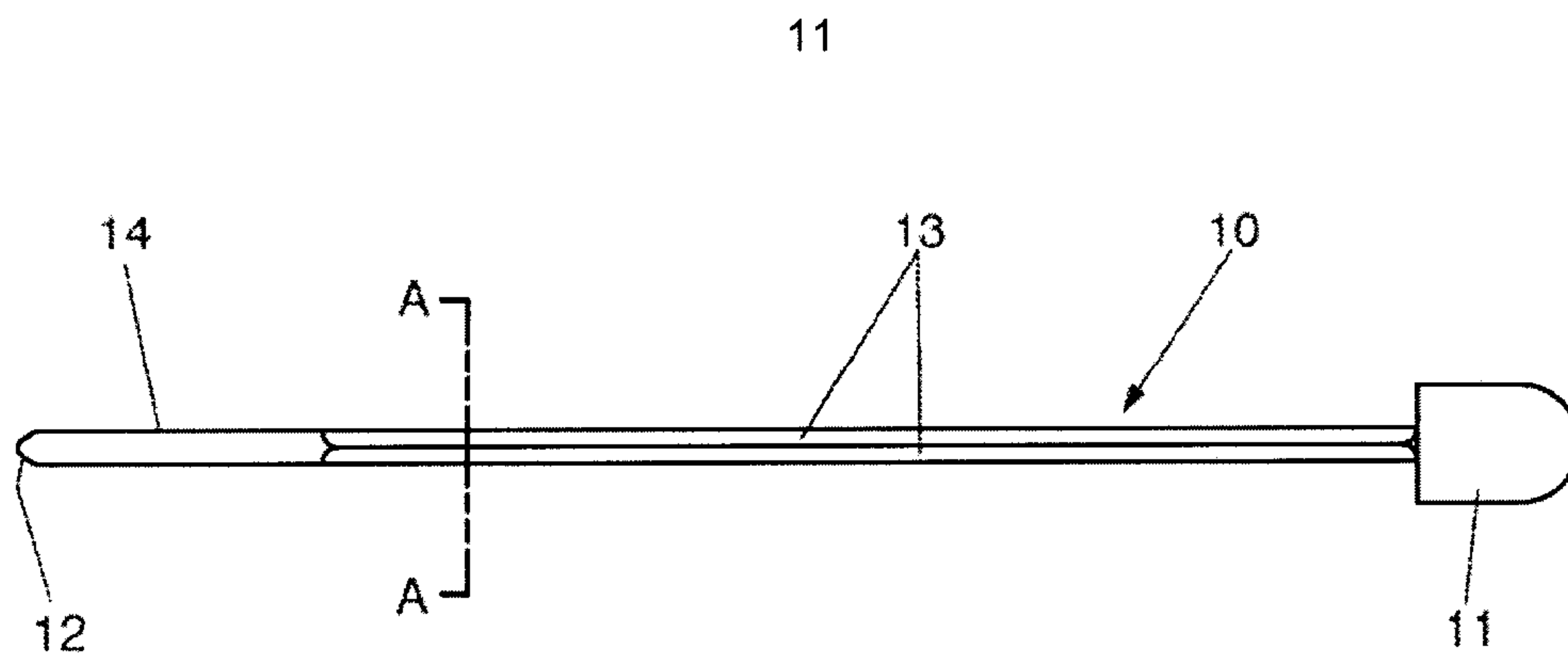


FIG. 4

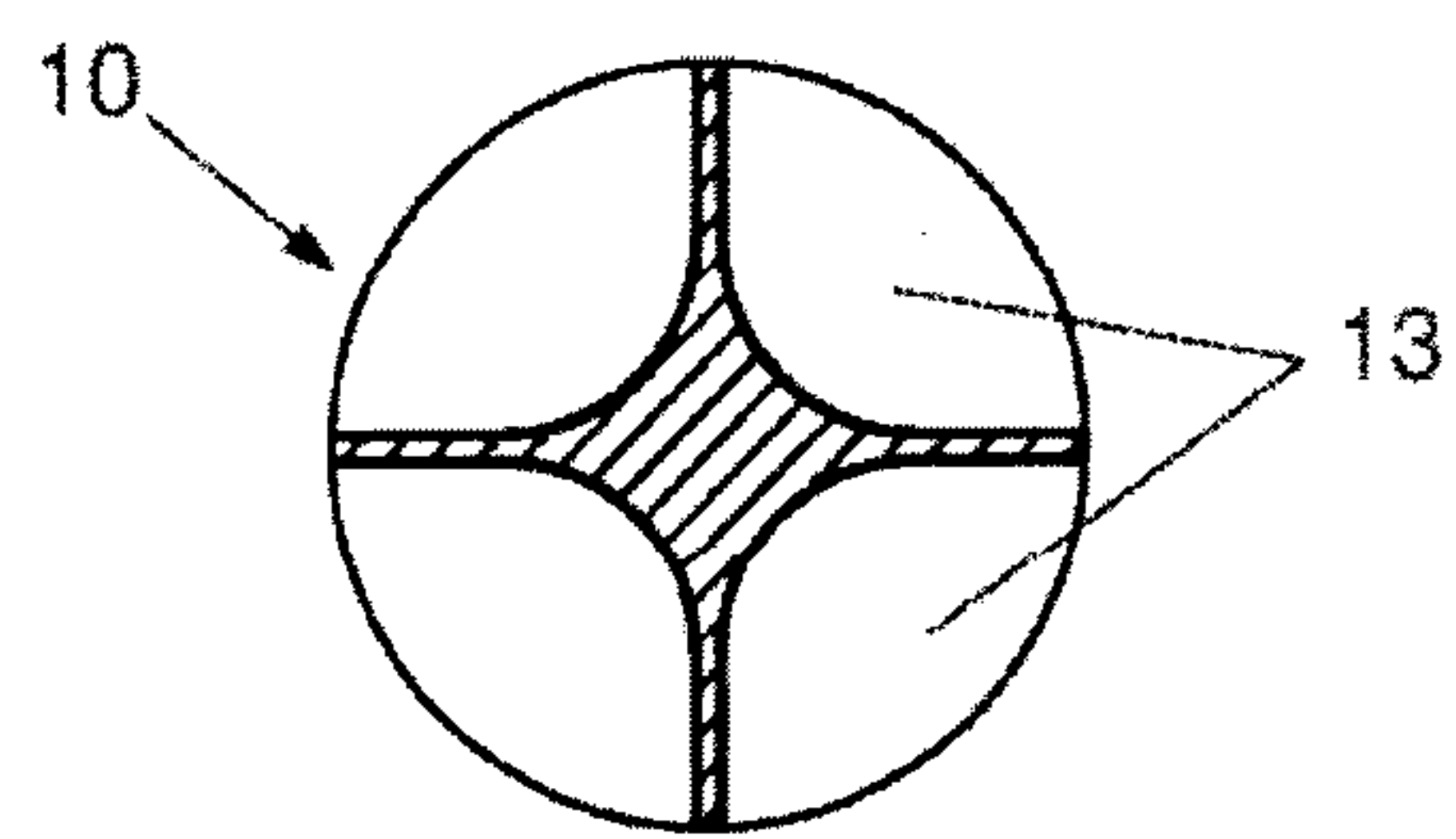
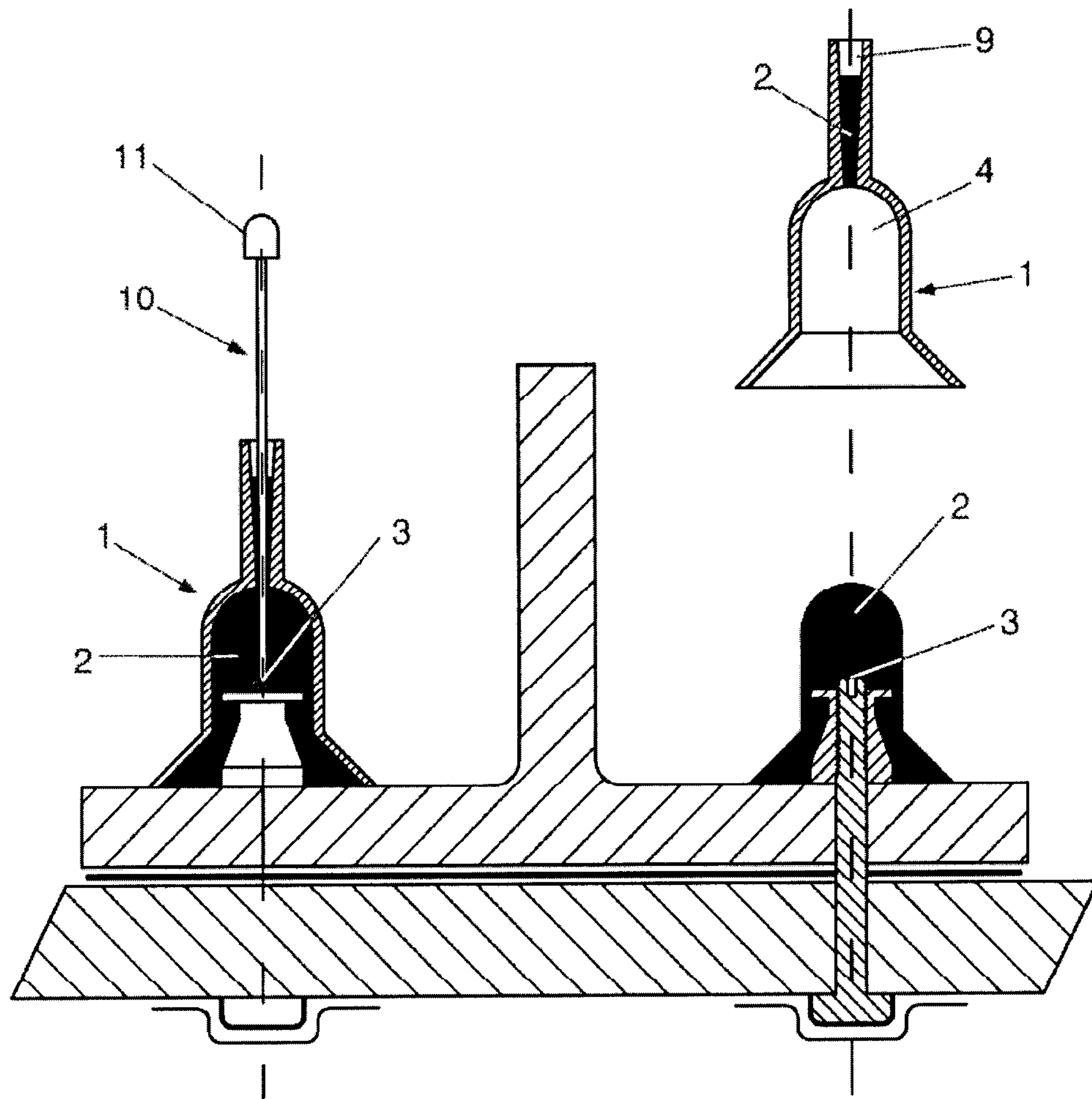


FIG. 5

A-A

**FIG. 6**

13

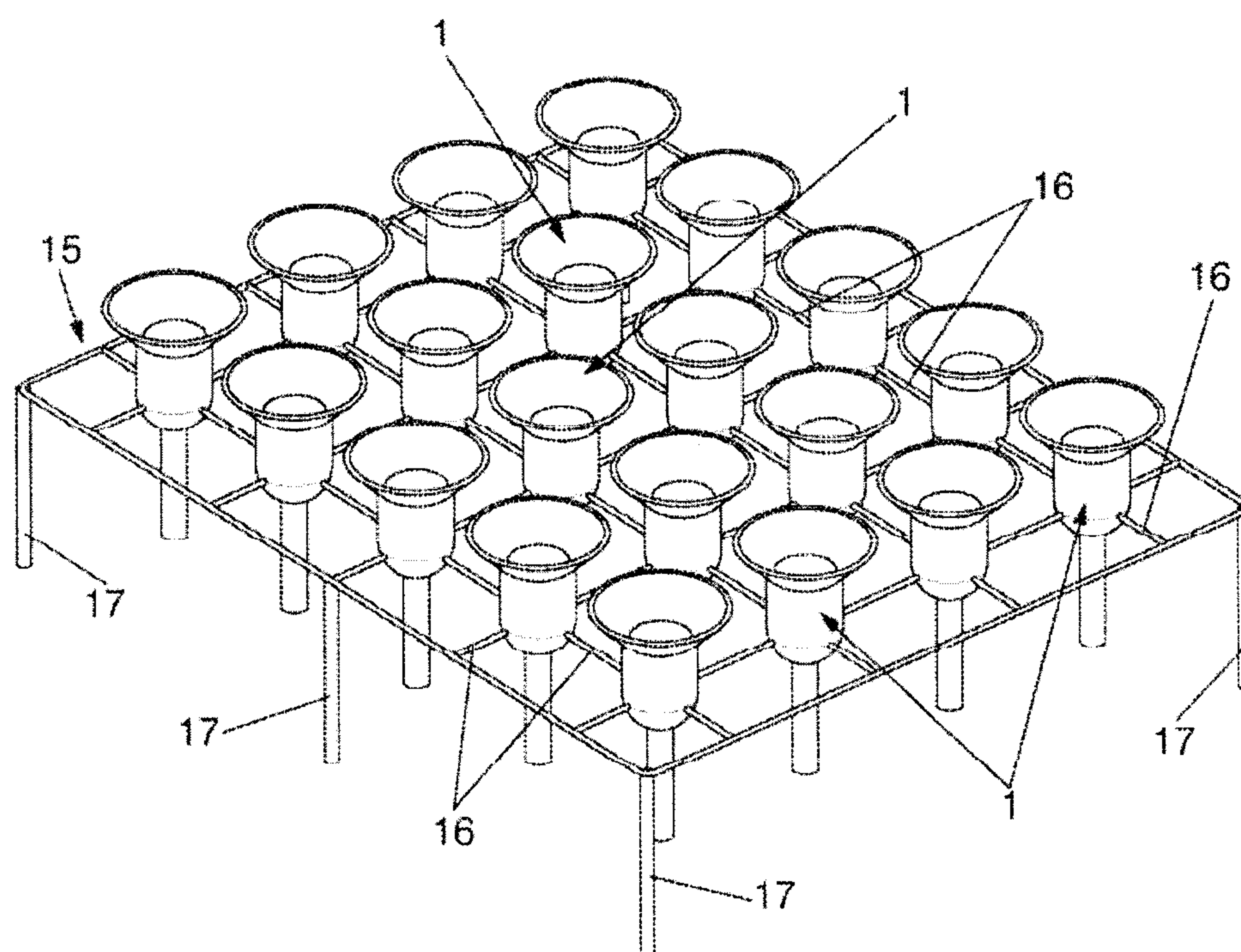


FIG. 7

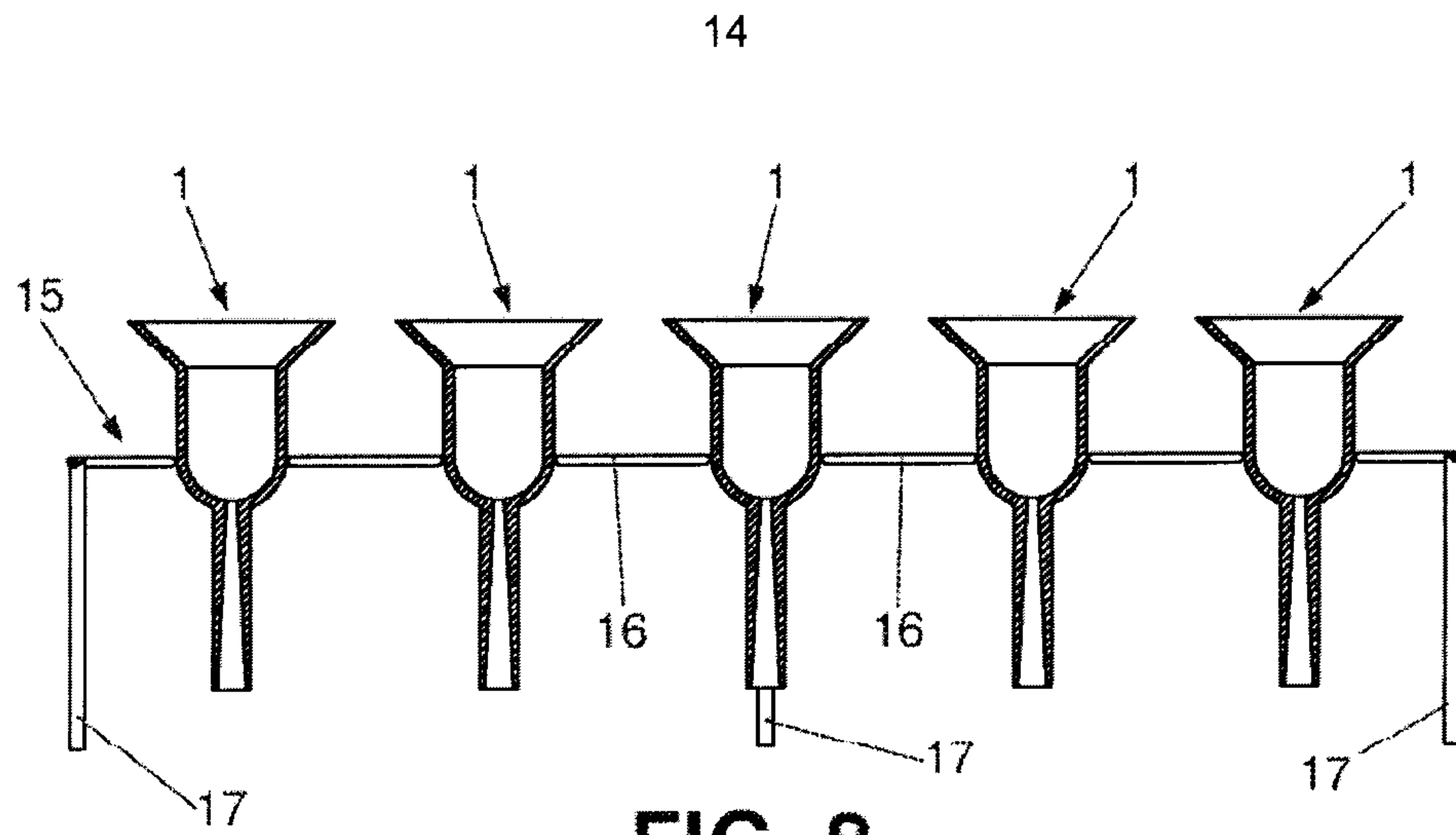


FIG. 8

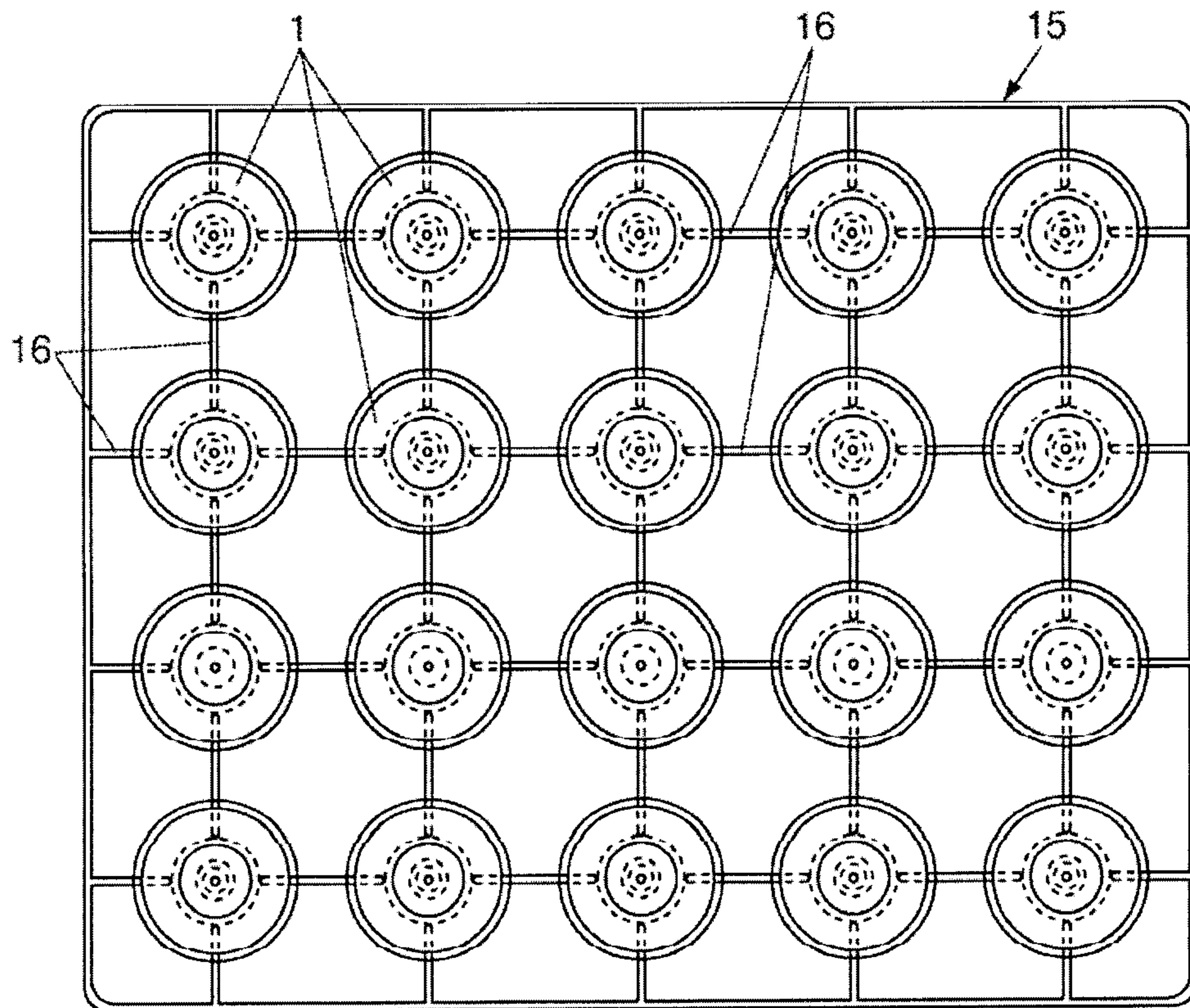


FIG. 9

