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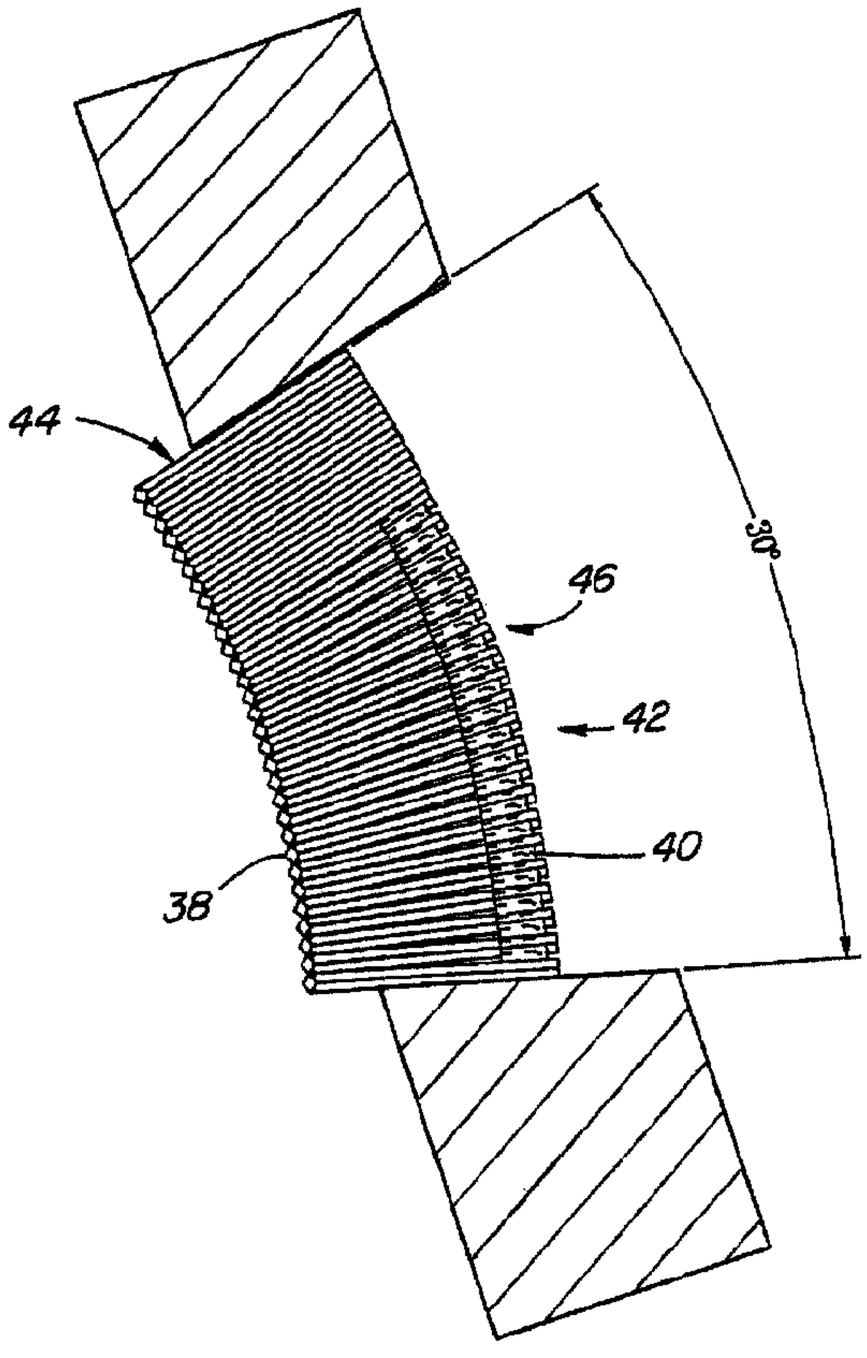
(54) Titre : BROCHE POUR MOULE ET MOYENS D'ESPACEMENT INTEGRES
(54) Title: MOLD MATRIX PIN WITH INTEGRAL SPACING MEANS



(57) Abrégé/Abstract:
Mold pins for use in a mold matrix, as used in the production of electroforms, are provided with means to alter the longitudinal axis of the pins relative to that of adjacent pins so that the longitudinal axis of the pins are tapered with respect to one another towards the operative ends of the pins. In one embodiment of the invention a dowel is inserted into a sidewall of the pin and extends normal thereto to space the pin from an adjacent one. In another embodiment, a spacing member of a desired thickness is applied to the shank of the pin at a location remote from the operative end thereof.

ABSTRACT OF THE DISCLOSURE

Mold pins for use in a mold matrix, as used in the production of electroforms, are provided with means to alter the longitudinal axis of the pins relative to that of adjacent pins so that the longitudinal axis of the pins are tapered with respect to one another towards the operative ends of the pins. In one embodiment of the invention a dowel is inserted into a sidewall of the pin and extends normal thereto to space the pin from an adjacent one. In another embodiment, a spacing member of a desired thickness is applied to the shank of the pin at a location remote from the operative end thereof.

MOLD MATRIX PIN WITH INTEGRAL SPACING MEANS

FIELD OF THE INVENTION

This invention relates to mold pins and in particular to optic or reflex pins having means thereon to space them from adjacent pins when a plurality of the pins are grouped in an pin master or mold matrix.

While the invention is applicable to either optic pins or reflex pins used in a mold matrix, a reflex pin or pins are used as examples only and the specification is not limited only to that form of pin.

BACKGROUND OF THE INVENTION

A pin master or matrix comprises a plurality of mold pins, for example reflex pins or a combination of optic pins and reflex pins, which are assembled into a specific configuration. The matrix (as it will be referred to hereinafter) is used to produce an electroform, by electrodeposition, or other suitable means, and the electroform so produced is then used to manufacture a mold which receives suitable mold material, such as thermoplastic, under pressure for making lens and/or reflective devices such as automobile lamp assemblies.

The outer lens portion of automotive lamp assemblies include sections made up of reflex elements, the purpose of which is to reflect light from an exterior light source

directed at the lamp assembly. The reflex portion of a lamp assembly provides the reflective brilliance to a light source directed at the assembly i.e. from the headlights of a vehicle which are being directed at a rear lamp assembly incorporating the reflex elements. The brilliance of the reflective elements must meet standards set by various countries.

Lamp assemblies and their lenses for automotive vehicles are relatively simple to manufacture when the areas of the vehicles on which they are mounted are relatively flat. However, bodies of automotive vehicles are now smoothly contoured both on rear surfaces as well as front surfaces thereof in order to reduce the coefficient of drag and it has become more difficult to manufacture suitable lenses that will blend into these contours and which will still provide the required amount of reflectivity and brilliance required by law.

There is also a requirement for single, unitary lenses to meet the above mentioned needs for vehicles having smoother, rounded styling but which can also be tailored to the specific functions of the lamp assembly for a particular vehicle. For example, to meet safety requirements of certain countries, lamp assemblies must have lenses that extend into portions of the side surfaces of the vehicle as well as surfaces to the front and rear thereof. There are often compound curvatures to the surfaces to which the lenses must match.

One example of an automotive vehicle lens using reflex elements is shown in Canadian Patent 2,060,703 issued 17 October 1995 to DBM Reflex Enterprises Inc. This patent illustrates a lens which has a combination of optical elements and reflex elements.

Conventionally, reflex elements, sometimes in combination with optical elements, are manufactured by assembling a large plurality of mold pins (reflex and if necessary optical pins) into a matrix and an electroform is then made by electro-depositing metal on the shaped ends of the mold pins in the matrix and then using the resulting electroform in a mold where plastic material is injected to form the reflected surfaces.

It is important in the preparation of a matrix to have the pins oriented properly to provide the directional brilliance and reflectivity in the finished product and it is therefore necessary, in the manufacturer of a reflective matrix, to ensure that the required reflectivity in the finished product is not lost in the curved portion thereof while matching the contour of a vehicle body.

There are several examples of arranging reflex pins in a bundle or matrix so that they provide the reflective brilliance in the resulting lenses, taking into account the above mentioned body contours of vehicles to which the lenses are attached.

One example of an attempt to meeting the requirements is shown in U.S. Patent 4,733,946 of March 29, 1988 to

Cossetti. In this publication, reflex pins are machined such that their side surfaces are tapered towards the face of the matrix so that when the elements are grouped in a matrix, the tapered pins will provide the necessary curvature. However, while this may be effective, it is a very time consuming and very expensive manner in dealing with the problem.

In U.S. Patent 5,565,221 of October 15, 1996 assigned to DBM Reflex Enterprises Inc., the problem referred to above is addressed by providing spacers or wedges for use in combination with mold elements such as optic or reflex pins, in the pin master or matrix assembly. The spacers or wedges are selectively located between rows or banks of mold elements in the matrix to provide the required orientation to the optic and/or reflex pins. Thus the necessary reflective surfaces from the prisms will return the requirement amount of reflected light toward a source even when the surface of the product is on a contoured portion of a lamp assembly on a vehicle. The spacer consists of an elongated body having flat parallel side edges and converging faces which taper towards one another from a major edge to a minor edge. One of the faces has a surface profile to fit the profile of juxtaposed elements in the matrix assembly. These spacers or wedges do function well but problems have been encountered in bundling them in the matrix and maintaining the bundles with the elements in proper orientation.

Another example of the prior art is shown in the patent to Hedgewick U.S. 3,258,840 of 5 July 1966.

SUMMARY OF THE INVENTION

The present invention addresses the problems referred to above by providing spacing means for use in combination with mold elements such as optic or reflex reflector pins, in the pin block or matrix assembly. The spacing means can be selectively located in producing a continuously variable pin axis electroform so as to alter the longitudinal axis of the pins relative to that of adjacent pins whereby the longitudinal axis of the pins are tapered with respect to one another towards the reflex ends of the pins.

In accordance with one broad aspect, the invention relates to a mold pin for use in a mold matrix, said pin having means thereon to effectively alter an angle of a longitudinal axis of said pin relative to longitudinal axes of adjacent pins in said matrix, whereby said longitudinal axes of said pins are tapered with respect to one another towards operative ends of the pins.

According to a still further aspect, the invention relates to a method of providing a mold pin with means for varying a longitudinal axis of said pin relative to adjacent pins in a mold matrix, said method comprising the steps of:

a) selecting a location on a sidewall of said mold pin;

b) drilling a socket in said sidewall normal to the longitudinal axis of said pin; and

c) inserting and securing a dowel in said socket, whereby said dowel extends normal to the longitudinal axis of said pin, and whereby a length of protrusion of said dowel sets a degree of taper of said pin relative to an adjacent pin in said matrix.

According to yet another aspect, the invention relates to a method of altering an angle of a longitudinal axis of a mold pin relative to adjacent pins when used in a mold matrix, comprising the steps of:

a) providing a shank of said pin with a section of reduced diameter, said section being adjacent an end of the pin remote from an operative end of the pin; and

b) positioning and anchoring a collar on said shank in said section of reduced diameter, a longitudinal axis of said collar being offset and tapered with respect to the longitudinal axis of the pin.

DESCRIPTION OF THE DRAWINGS

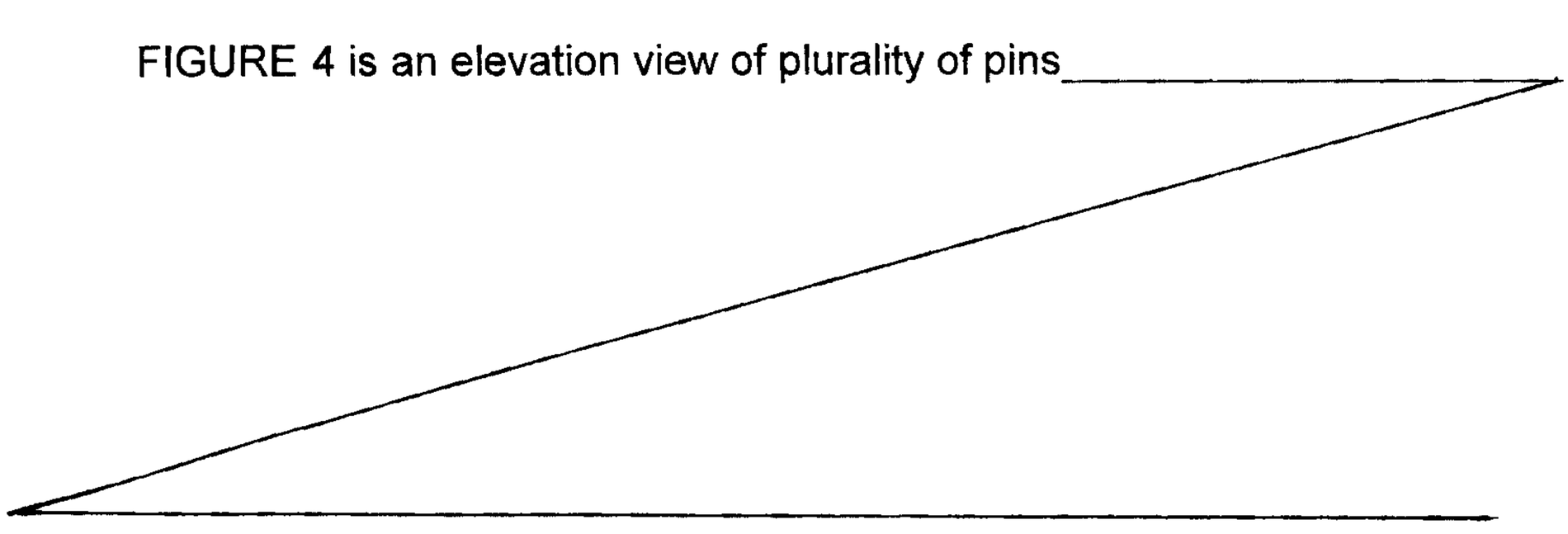
The invention is illustrated by way of example in the accompanying drawings in which:

FIGURE 1 is a schematic plan view of part of an electroform showing mold pins with their longitudinal angles set for a desired curvature in a matrix assembly;

FIGURE 2 is an elevation view of a reflex pin having tapering means thereon according to one embodiment of the present invention;

FIGURE 3 is an end view of the mold pin shown in Figure 2;

FIGURE 4 is an elevation view of plurality of pins



having tapering means thereon according to one embodiment of the invention and arranged in a group simulating a portion of a matrix assembly;

FIGURE 5 is an elevation view of a mold pin according to a further embodiment of the invention;

FIGURE 6 is an elevation view similar to Figure 5 showing tapering means applied thereto;

FIGURE 7 is an end view of the pin shown in Figure 6;

FIGURE 8 is a plan view of a matrix assembly of a plurality of pins clamped together for making an electroform; and

FIGURE 9 is a sectional view taken along the line 9-9 of Figure 8.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to Figure 1, a matrix **10** includes a plurality of mold pins such as reflex pins **12** bundled together for the application of electroform material **14** over the heads **16** of the pins as illustrated. Selected ones of the pins **12** have their longitudinal axis varied relative to adjacent pins in the matrix so that those longitudinal axes are tapered with respect to one another towards the operative or reflex end **16** of the pins.

Figures 2 and 3 show one example of spacing means according to the invention. Pin **12** is provided with a dowel **18** in the sidewall thereof. A location on the side-wall of the pin is selected and a socket **20** is drilled in

the sidewall **22** normal to the longitudinal axis of the pin. The dowel is then inserted in the socket **20** so that the dowel **18** extends normal to the longitudinal axis of the pin. The length of protrusion of the dowel sets the degree of taper of the pin relative to adjacent pins in the matrix. The length of protrusion can be adjusted in various ways such as by grinding or the like.

Figure 4 illustrates an example of a plurality of pins **12**, **13** and **15** having dowels **18** projecting therefrom and serving to space the upper ends of the pins from one another to the extent of a desired angle.

A further embodiment of the invention is illustrated in Figures 5, 6 and 7. A reflex pin has a portion of its upper end formed, for example by machining, to provide a reduced portion **26** leaving a head **28**. Pin **24** is then placed in a mold **30** having a sidewall **32** tapered to a degree which, if extended, as illustrated by the dashed line **34**, would meet the side of the pin adjacent the junction **36** with the head **38** of the pin. A collar **40** is then molded on to the upper end of the pin around the reduced portion as shown in Figure 6 and, when cooled and removed from the mold, provides the collar **40** which constitutes the means for spacing that pin from adjacent ones in a matrix.

The central longitudinal axis of the collar **40** is offset from and is tapered with respect to the central longitudinal axis of the pin **24**. It will be noted that the

configuration of the offset collar **40** corresponds to that of the pin **24** from which it is offset.

It will be appreciated that the length of the collar and the width thereof (the amount offset from the pin) can be selected to meet the requirements of the spacing between the adjacent pins in the matrix.

Figures 8 and 9 show a pin bundle **42** in a matrix consisting of a combination of a first group of pins **44** having their longitudinal axis parallel to one another and a second group of pins **46** having spacing means in the form of a collar **40** on each of the pins so that the longitudinal axis of the pins in group **46** have been altered with respect to adjacent pins in that group. As shown in Figure 8, this has the result of orienting the longitudinal axis of the pins in group **46** so that the operative or reflex ends **38** of the pins are directed as desired.

The material for the spacing collar **40** should be a suitable high impact material such as polycarbonate, one that is resistant to acids and solvents and that adheres well to the pins.

While the invention has been described in connection with a specific embodiment thereof and in a specific use, various modifications thereof will occur to those skilled in the art without departing from the spirit and scope of the invention as set forth in the appended claims.

The terms and expressions which have been employed in this specification are used as terms of description and not

of limitations, and there is no intention in the use of such terms and expressions to exclude any equivalents of the features shown and described or portions thereof, but it is recognized that various modifications are possible within the scope of the invention claims.

CLAIMS:

1. A mold pin for use in a mold matrix, said pin having means thereon to effectively alter an angle of a longitudinal axis of said pin relative to longitudinal axes of adjacent pins in said matrix, whereby said longitudinal axes of said pins are tapered with respect to one another towards operative ends of the pins.

2. The mold pin according to claim 1, wherein said means comprises a dowel located in a sidewall of said mold pin and extending normal thereto, said dowel being located toward an end of the pin remote from an operative end of the pin.

3. The mold pin according to claim 1, wherein said means comprises a spacing member mounted on, and offset from, said pin at a location remote from an operative end of the pin to space said location of said pin from the adjacent pins in said matrix.

4. The mold pin according to claim 3, wherein said means comprises a collar member molded onto, and offset from, said pin and located remote from the operative end of the pin.

5. The mold pin according to any one of claims 1 to 4, wherein said mold pin is a reflex pin.

6. The mold pin according to claim 3, wherein said spacing member comprises a collar molded onto said pin and said collar has a longitudinal axis offset from and tapered with respect to the longitudinal axis of the pin.

7. The mold pin according to claim 6, wherein said means is positioned on a shank of said pin adjacent the end of the pin remote from the operative end, and said collar is offset from a central longitudinal axis of said pin.

8. The mold pin according to claim 7, wherein the shank of said pin has a portion of reduced diameter and said collar is anchored therein.

9. The mold pin according to any one of claims 6 to 8, wherein said mold pin is a reflex pin and said mold matrix is for use in a manufacture of a variable pin axis electroform.

10. The mold pin according to any one of claims 5 to 8, wherein a configuration of said collar corresponds to a configuration of the pin from which the collar is offset.

11. A method of providing a mold pin with means for varying a longitudinal axis of said pin relative to adjacent pins in a mold matrix, said method comprising the steps of:

a) selecting a location on a sidewall of said mold pin;

b) drilling a socket in said sidewall normal to the longitudinal axis of said pin; and

c) inserting and securing a dowel in said socket, whereby said dowel extends normal to the longitudinal axis of said pin, and whereby a length of protrusion of said dowel sets a degree of taper of said pin relative to an adjacent pin in said matrix.

12. The method according to claim 11, comprising the step of machining an outer end of said dowel to provide for a desired length of the dowel outwardly of said pin.

13. The method according to claim 11 or claim 12, wherein the mold pin is a reflex pin.

14. A method of altering an angle of a longitudinal axis of a mold pin relative to adjacent pins when used in a mold matrix, comprising the steps of:

a) providing a shank of said pin with a section of reduced diameter, said

section being adjacent an end of the pin remote from an operative end of the pin; and

b) positioning and anchoring a collar on said shank in said section of reduced diameter, a longitudinal axis of said collar being offset and tapered with respect to the longitudinal axis of the pin.

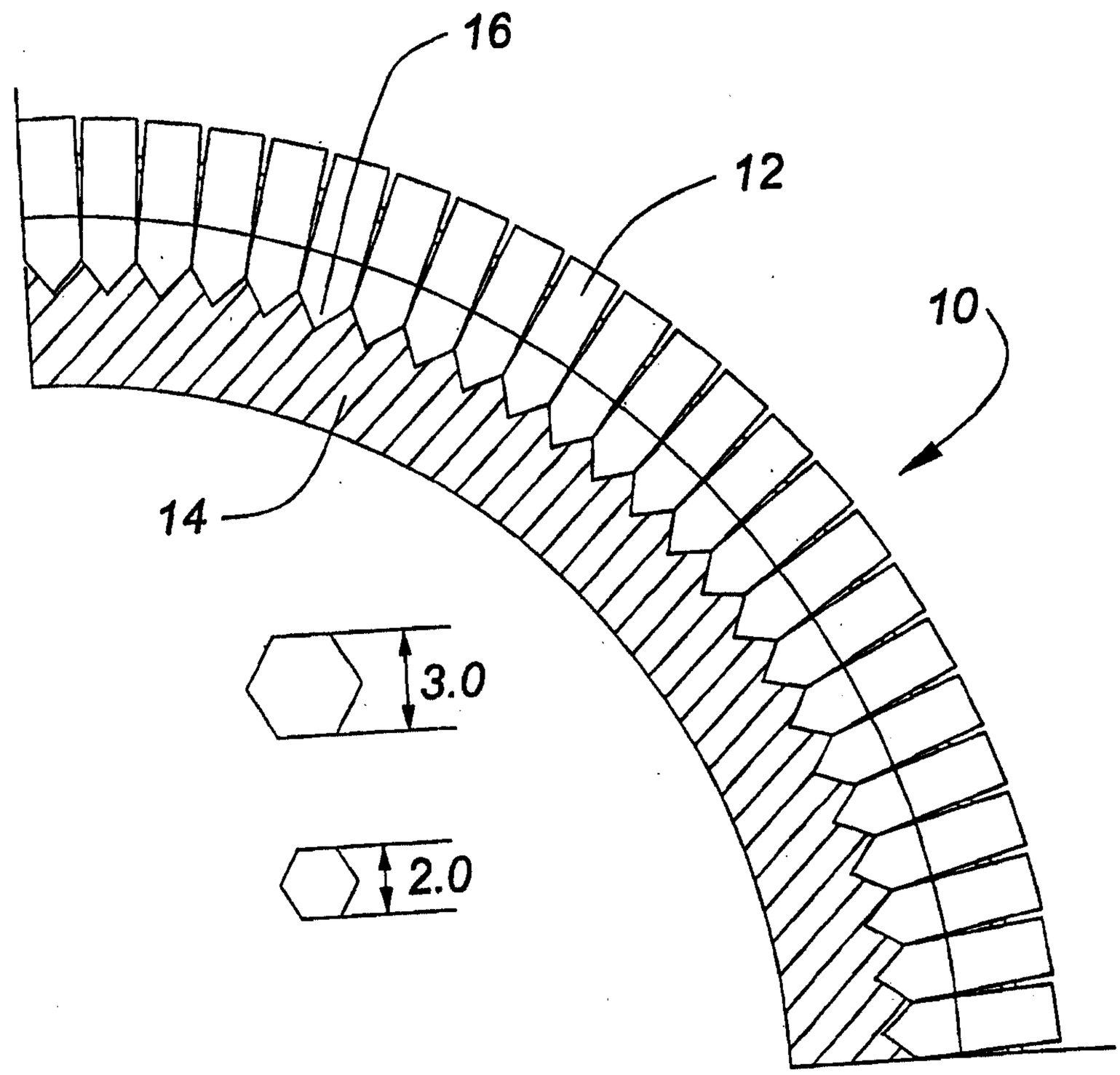


FIG. 1

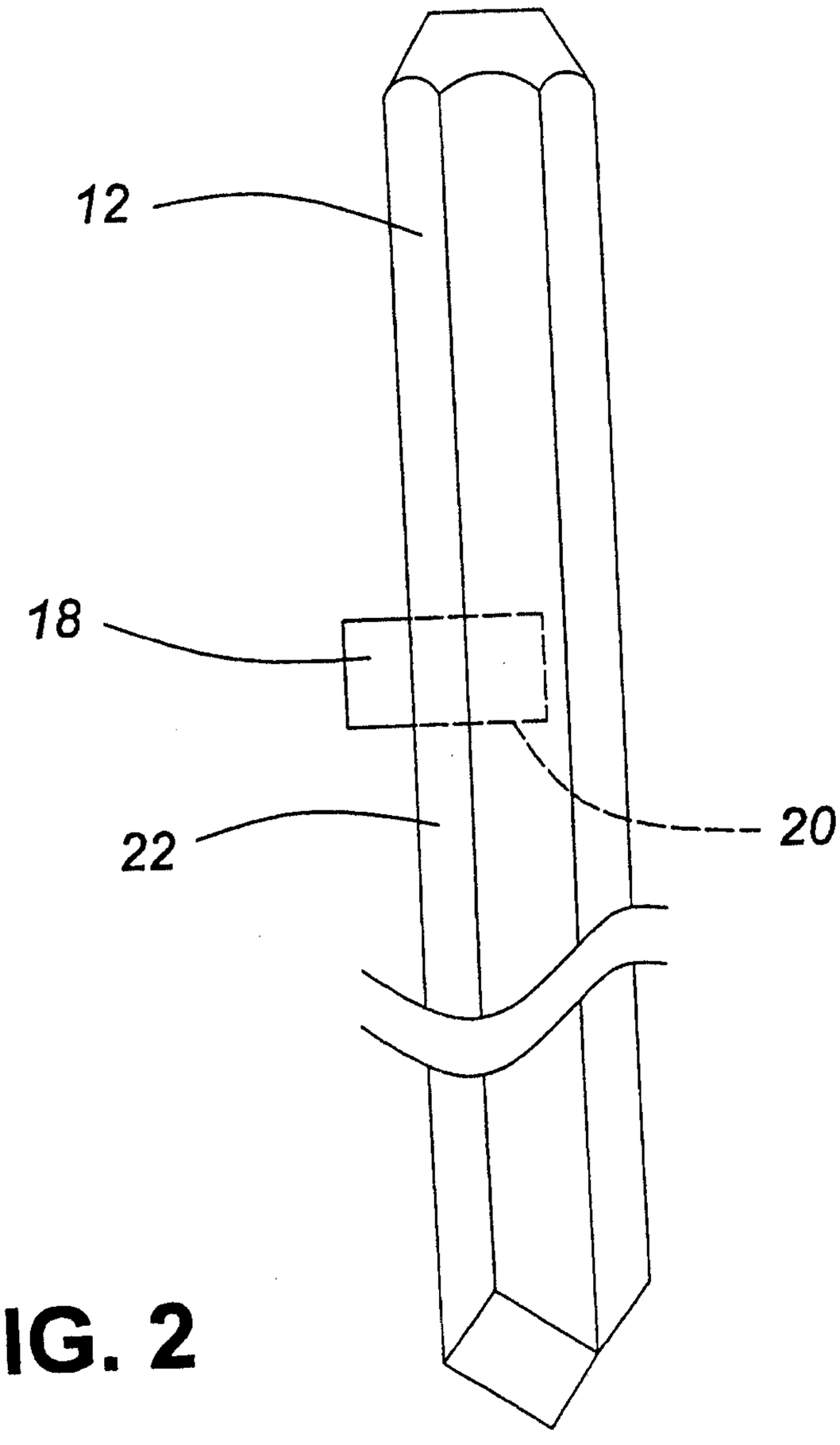
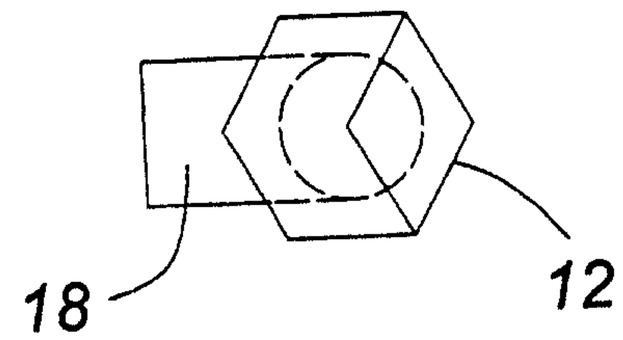


FIG. 2

FIG. 3



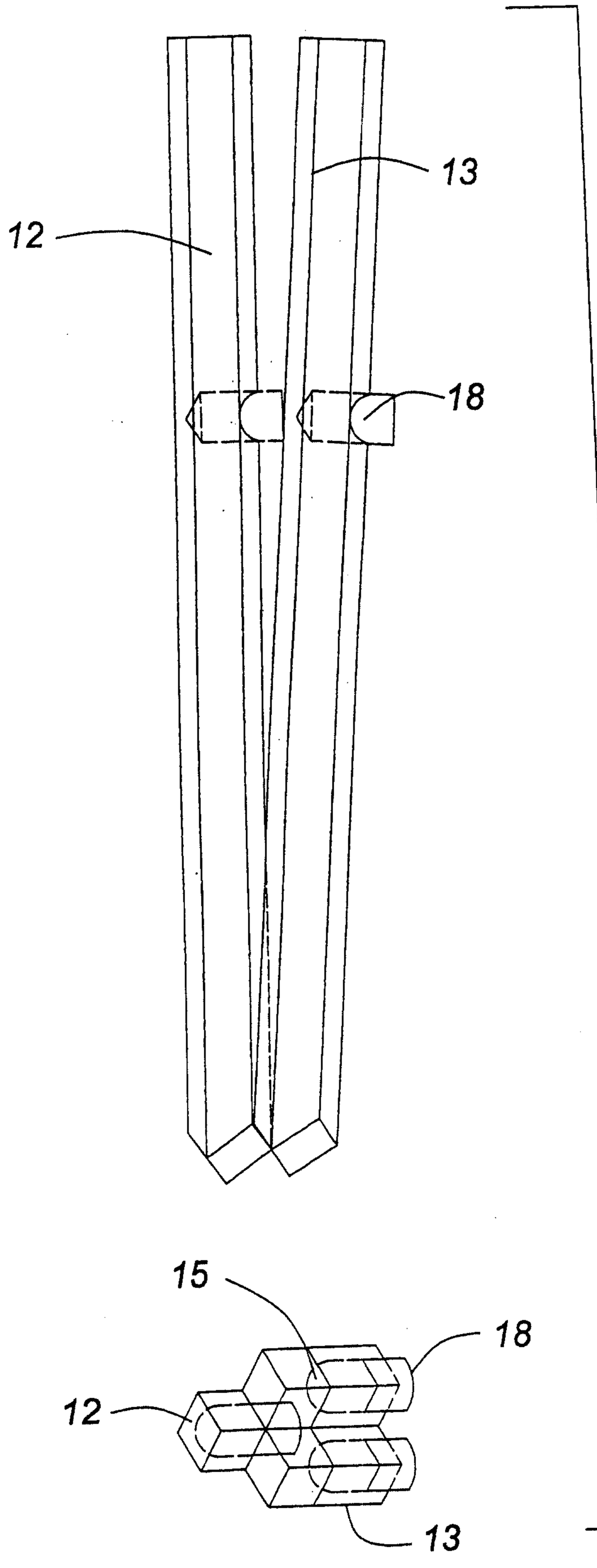


FIG. 4

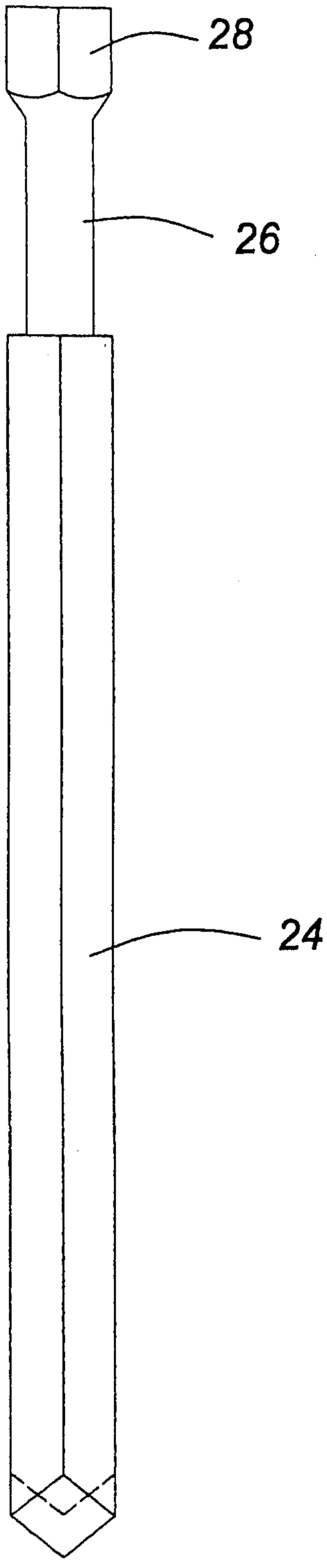


FIG. 5

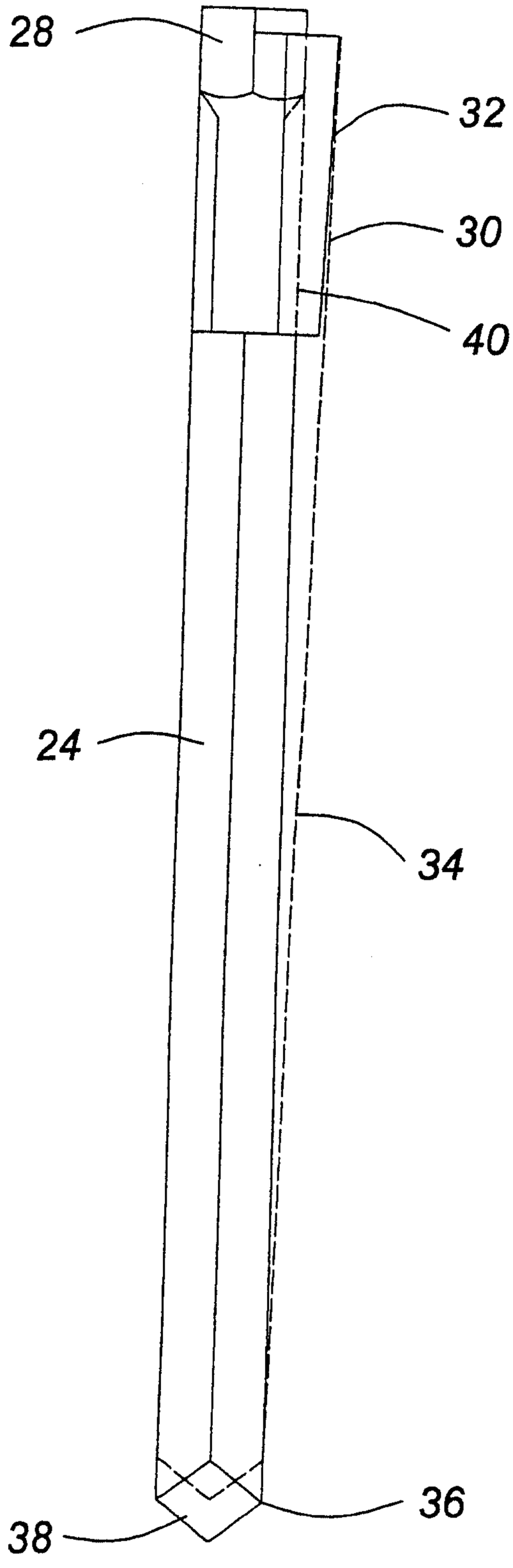


FIG. 6

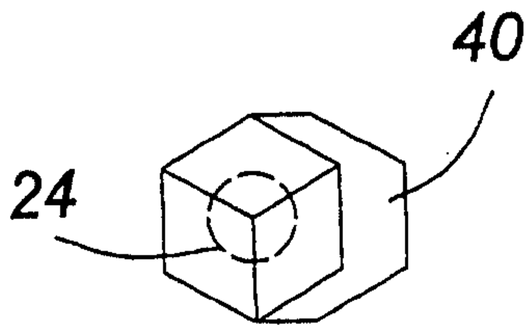


FIG. 7

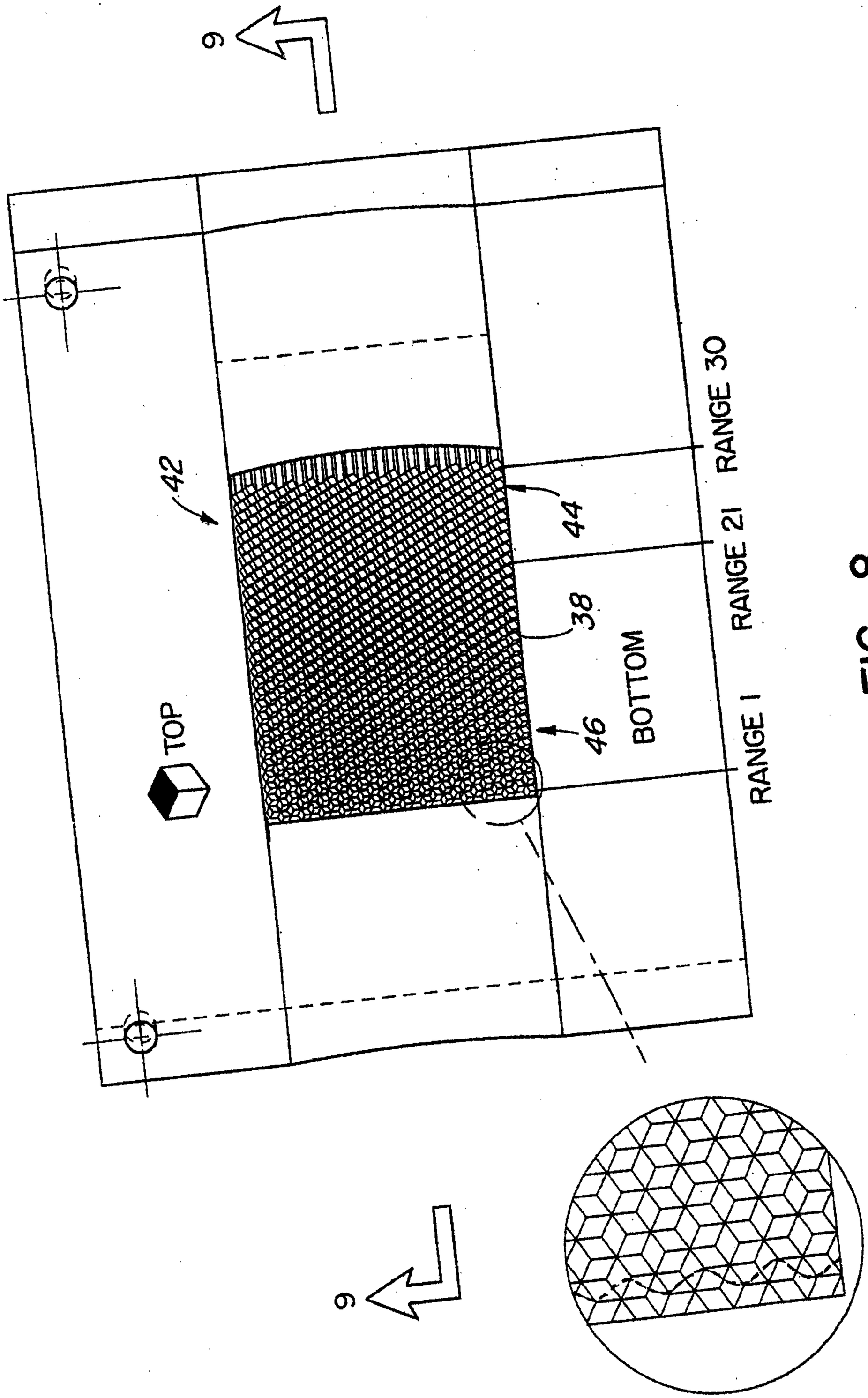


FIG. 8

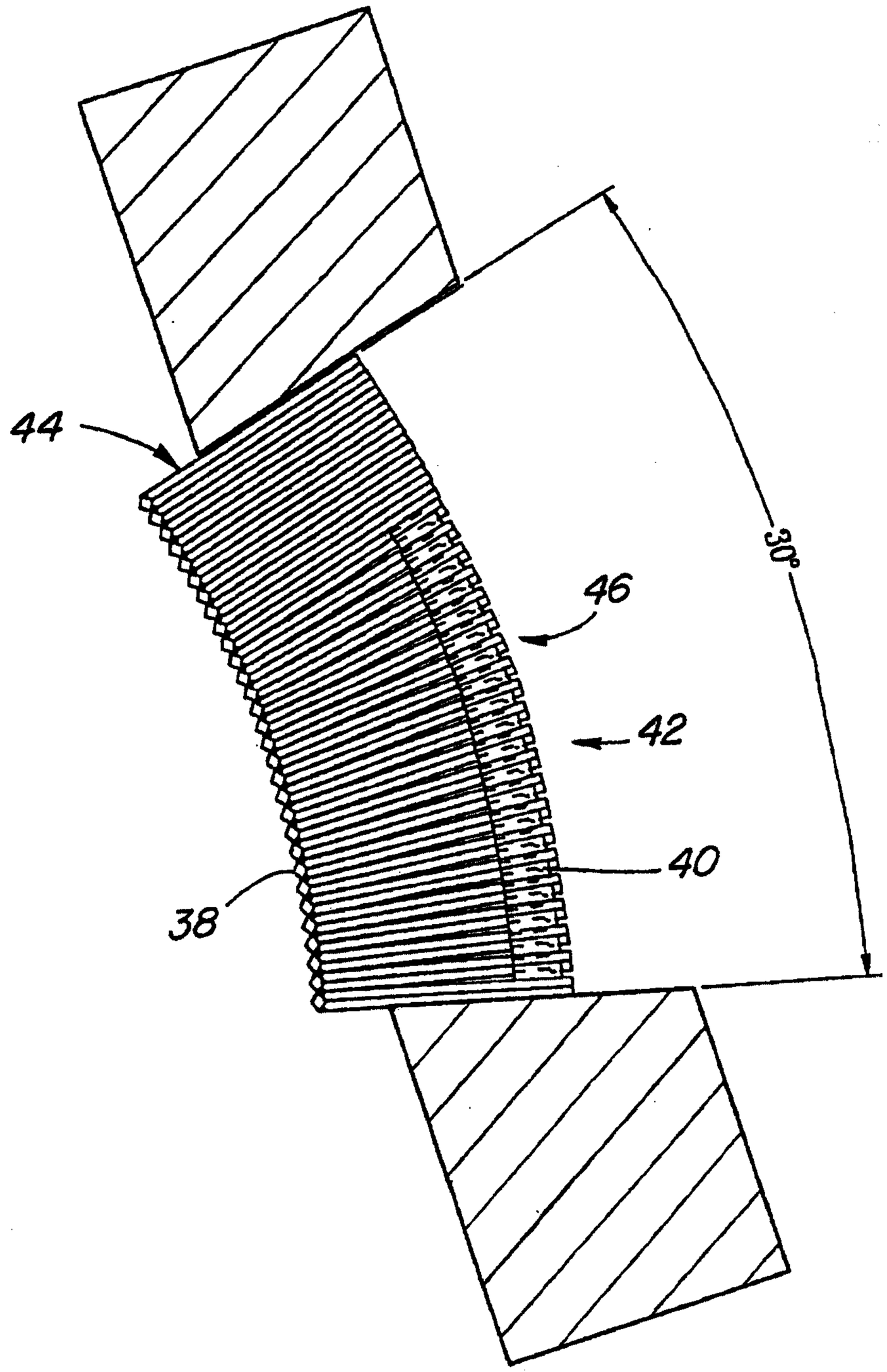
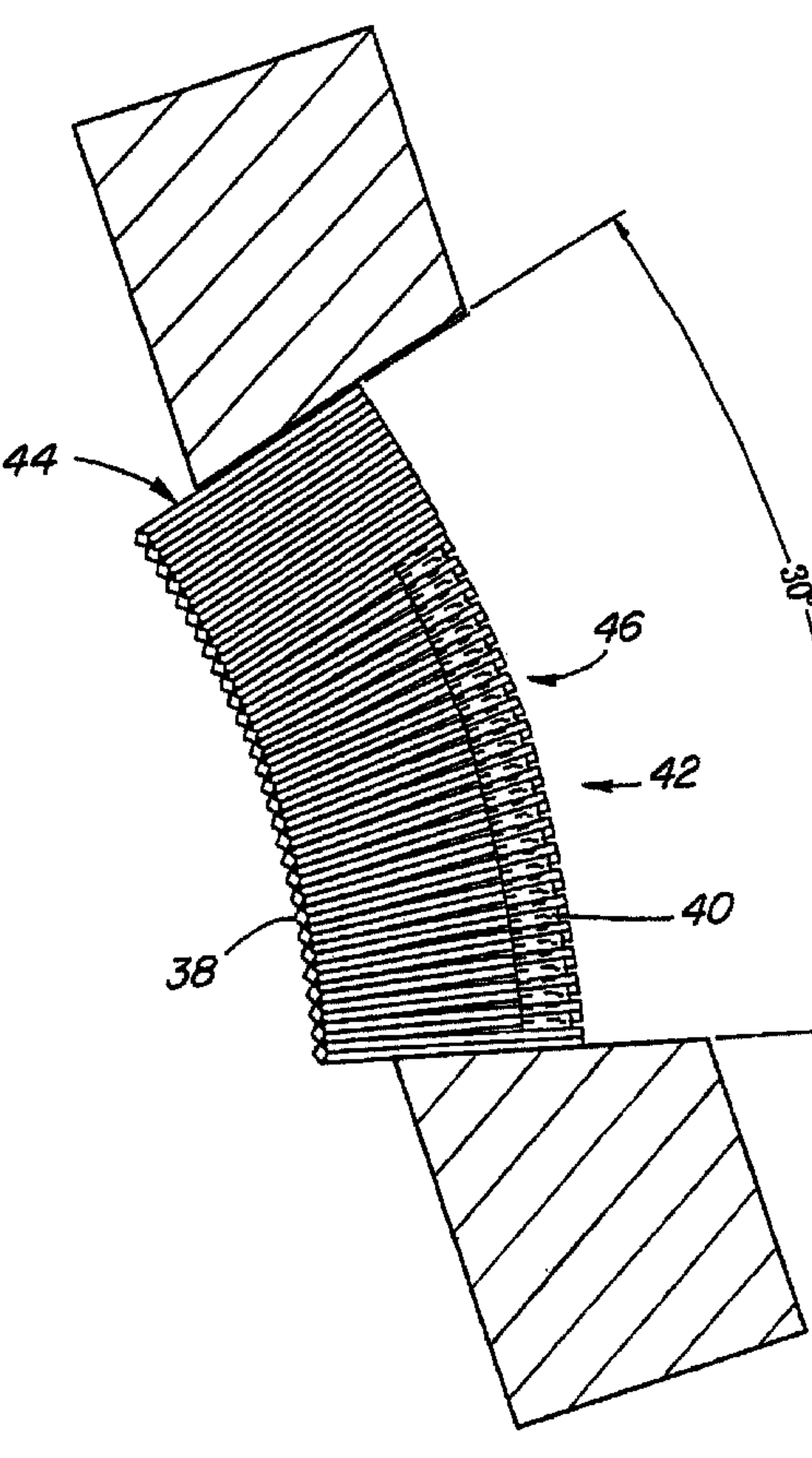


FIG. 9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