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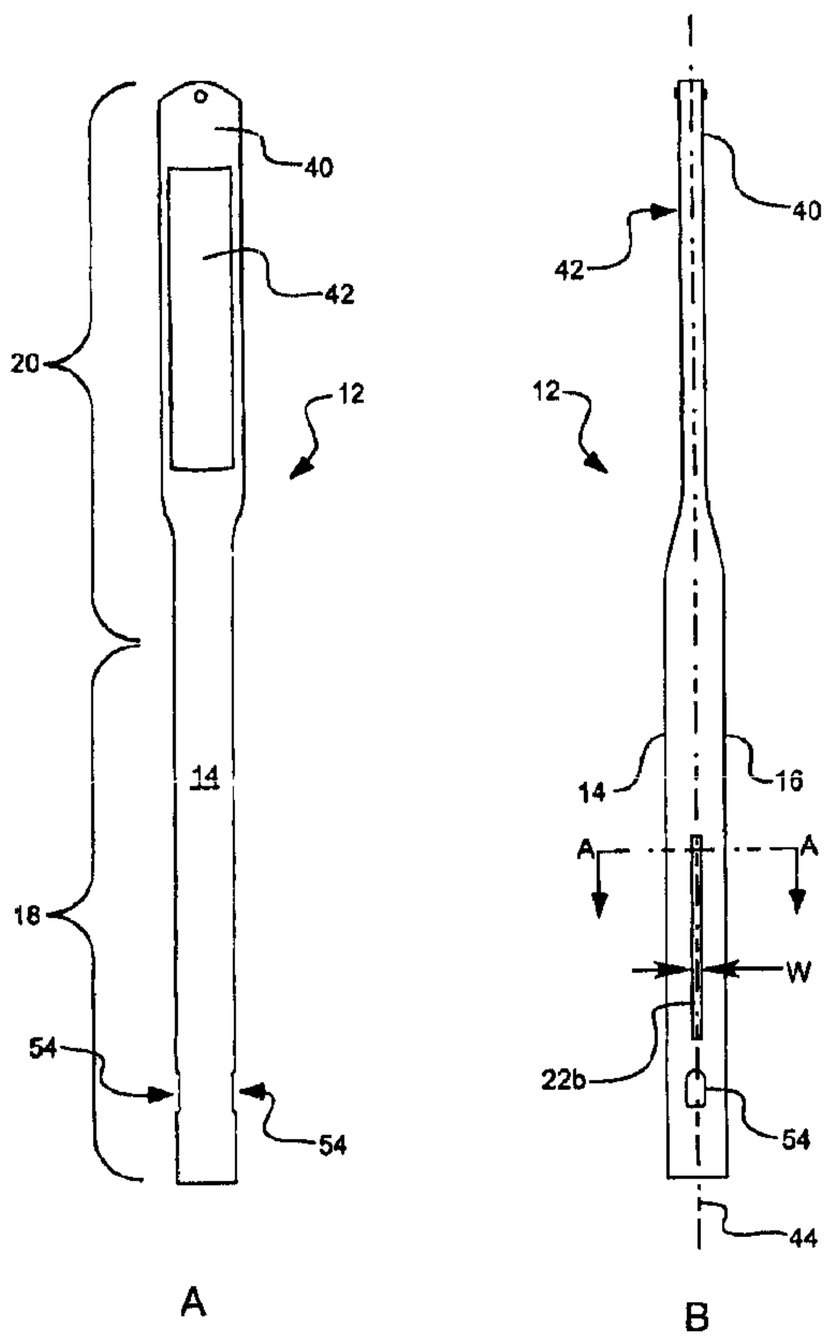
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(54) Titre : DELINEATEUR DE CHAUSSEE
(54) Title: ROADWAY DELINEATOR



(57) Abrégé/Abstract:
A directional roadway delineator includes an elongate, tubular body having a frontal impact face and a rearward face. The tubular body has a lower section disposable at least partially below a surface of the roadway to secure the delineator below the roadway surface. The tubular body includes an upper section, extending upwardly from the lower section to provide a marker above the roadway surface. A pair of longitudinal slits are formed through opposite sides of tile tubular body between the frontal face and rearward face in the lower section of the body to allow the delineator to: elastically flex rearwardly in response to a force applied to the frontal impact face; and return to a substantially vertical orientation upon removal of the applied force.

ABSTRACT OF THE DISCLOSURE

A directional roadway delineator includes an elongate, tubular body having a frontal impact face and a rearward face. The tubular body has a lower section disposable at least partially below a surface of the roadway to secure the delineator below the roadway surface. The tubular body includes an upper section, extending upwardly from the lower section to provide a marker above the roadway surface. A pair of longitudinal slits are formed through opposite sides of the tubular body between the frontal face and rearward face in the lower section of the body to allow the delineator to: elastically flex rearwardly in response to a force applied to the frontal impact face; and return to a substantially vertical orientation upon removal of the applied force.

ROADWAY DELINEATOR

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates generally to roadway delineators. More particularly, the present invention relates to self-erecting roadway delineators capable of independently returning to an operable position after being deflected by a force.

Related Art

Upright roadway delineators have been used for some time to delineate sections of concern in vehicle traffic flow areas. Upright delineators typically extend above a ground surface and include a reflective marker to increase visibility of the delineator. Roadway delineators are often installed at the edges of highways to delineate the outer edge of the highway, or are installed between lanes of the highway to indicate division between the lanes. Delineators are also installed in parking areas and other general traffic areas to delineate areas in which vehicle traffic is to be restricted, i.e., to direct vehicles away from parking-restricted areas, or to separate incoming traffic from outgoing traffic. Restricting vehicle traffic to a particular area may be done for a number of other reasons, including restricting vehicles from construction areas or from pedestrian-only areas.

As such, roadway delineators are often placed immediately adjacent to areas in which vehicles are operated, and the delineators are often subject to contact by or collision with the vehicles. Consequently, it is often desired to form the delineators from a suitable material, and/or in a suitable configuration, such that damage to vehicles resulting from inadvertent

collision with the delineators is minimized. This is desirable for a number of reasons, including safety considerations, as damaged vehicles may become more difficult to operate safely. Also, of course, damaged vehicles must generally be repaired at often considerable expense. In addition to reducing damage to vehicles colliding with the delineators, it is often desirable to limited resultant damage to the delineators themselves, as a damaged delineator may be ineffective at marking a desired location and must generally be replaced in order to maintain the efficacy of the delineation system as a whole.

For at least these reasons, it has been desired to produce delineators that self-erect into operable position after being struck by a vehicle, and which inflict relatively little damage to the vehicle striking the delineators. Due to these considerations, many contractors and municipalities will only allow installation of roadway delineators that are capable of returning to an operable condition after multiple vehicle collisions. A variety of designs have been developed in an attempt to address these issues. Examples of such designs include complex spring assemblies that serve to flex rearwardly and rebound upwardly in response to a vehicle collision. Other examples include elaborate delineator body configurations which attempt to provide the same effect with fewer moving components.

Despite these attempts, however, conventional self-erecting delineators remain problematic in that the delineators can be overly expensive to produce and can be sufficiently difficult to install and maintain as to greatly add to the costs of using the delineators.

SUMMARY OF THE INVENTION

It has been recognized that it would be advantageous to develop a roadway delineator that can self-erect after multiple vehicle collisions; can be manufactured at limited cost; and can be installed and removed with minimal effort and cost.

In accordance with one aspect of the invention, a directional roadway delineator is provided that can include an elongate, tubular body having a frontal impact face and a rearward face. The tubular body can have a lower section disposable at least partially below a surface of the roadway to secure the delineator below the roadway surface. The tubular body can also have an upper section, extending upwardly from the lower section to provide a marker above the roadway surface. A pair of longitudinal slits can be formed through opposite sides of the tubular body between the frontal face and rearward face in the lower section of the body to allow the delineator to: elastically flex rearwardly in response to a force applied to the frontal impact face; and return to a substantially vertical orientation upon removal of the applied force.

In accordance with a more detailed aspect of the present invention, a roadway delineator is provided that can include an elongate body having a frontal impact face and a rearward face. The elongate body can have a lower section, disposable at least partially below a surface of the roadway to secure the delineator below the roadway surface. The elongate body can also have an upper section, extending upwardly from the lower section to provide a marker above the roadway surface. A pair of longitudinal slits can be formed through opposite sides of the elongate body between the frontal face and rearward face in the lower section of the elongate body. The delineator can have a first, upright configuration in which the lower section includes a substantially tubular cross section, and a second, flexed configuration in which an inside surface

of the frontal impact face of the body at least partially contacts an inside surface of the rearward face of the body.

In accordance with another aspect of the invention, a method of delineating a roadway is provided which can include the step of obtaining an elongate, tubular delineator. The delineator can include: a lower section, including a pair of longitudinal slits formed through sides of the tubular delineator; and an upper section, extending upwardly from the lower section to provide a marker above the roadway. The method can include the further step of disposing at least a portion of the lower section of the delineator into the roadway such that each of the pair of longitudinal slits formed in the sides of the delineator are at least partially disposed beneath the roadway.

Additional features and advantages of the invention will be apparent from the detailed description which follows, taken in conjunction with the accompanying drawings, which together illustrate, by way of example, features of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1A is a front view of a delineator in accordance with an embodiment of the present invention;

FIG. 1B is a side view of the delineator of FIG. 1A;

FIG. 2 is another side view of the delineator of FIG. 1A, as installed in a roadway;

FIG. 3 is another side view of the delineator of FIG. 1A in a flexed configuration;

FIG. 4A is a cross-sectional view of the delineator of FIG. 1B, taken along section A-A;

FIG. 4B is a cross-sectional view of the delineator of FIG. 3, taken along section B-B;

FIG. 5 is a side view of the delineator of FIG. 1A showing the delineator prior to one exemplary installation configuration;

FIG. 6A is a front view of an anchor in accordance with one aspect of the invention; and

FIG. 6B is a side view of the anchor of FIG. 6A.

DETAILED DESCRIPTION

Reference will now be made to the exemplary embodiments illustrated in the drawings, and specific language will be used herein to describe the same. It will nevertheless be understood that no limitation of the scope of the invention is thereby intended. Alterations and further modifications of the inventive features illustrated herein, and additional applications of the principles of the inventions as illustrated herein, which would occur to one skilled in the relevant art and having possession of this disclosure, are to be considered within the scope of the invention.

Illustrated in FIGs. 1A and 1B is a roadway delineator in accordance with one aspect of the present invention. The roadway delineator can include an elongate, tubular body 12 having a frontal impact face 14 and a rearward face 16. A lower section 18 can be disposable at least partially below a surface of a roadway (25 in FIG. 2) to secure the delineator below the roadway surface. An upper section 20 can extend upwardly from the lower section and can be configured to provide a marker 42 above the roadway surface. A pair of longitudinal slits 22a, 22b can be formed through opposite sides of the tubular body between the frontal face and rearward face in the lower section of the body. It will be appreciated that, as FIGs. 1B, 2, 3 and 5 are side views of the delineator, only slit 22b is shown in these views. Both slits 22a and 22b are shown in sectional view in FIGs. 4A and 4B.

As shown in FIG. 3, the longitudinal slits 22a, 22b can be configured to allow the delineator to elastically flex, bend or deflect rearwardly in response to a force F applied to the frontal impact face 14 of the delineator body 12. Upon removal of the force, the longitudinal slits allow the body to flex upwardly and return to an operable, generally vertical orientation (as shown, for example in FIG. 1B). While the longitudinal slits can be formed within the body in a variety of positions and orientations, in one aspect of the invention, the slits are formed in the body in a manner such that the delineator is directional. As used herein, the term "directional" is to be understood to mean that the delineator is configured to perform best when impacted by a force directed in a particular orientation relative to the delineator. Thus, in the aspect shown in FIG. 3, the slits 22a, 22b are formed in opposite sides of the body to allow the body to flex or bend rearwardly and forwardly about the slits.

To simplify the discussion herein, the aspects of the delineator will be discussed in relation to a frontward and rearward direction, with the frontward side or face of the delineator generally referenced as exposed to the left of the pages of the figures (in those views illustrating the delineator from the side). It is to be understood that such convention is only for purposes of simplification and not limitation of the invention disclosed herein.

In addition, the term "tubular," while generally used in the discussion relating to delineators with a body having a cylindrical cross sectional shape, is not limited to cylindrical cross section but can include a variety of cross sectional shapes, as would occur to one skilled in the art. Examples of tubular cross sectional shapes can include, without limitation, oval cross sectional shapes, rectangular cross sectional shapes, combinations of cross sectional shapes having curved and straight portions, etc.

Also, the term "roadway," as used herein, is to be understood to refer to a variety of surfaces which may support traffic flow, or which may lie adjacent to traffic flow surfaces. For example, the term "roadway" can refer to roads, streets, highways or freeways, any of which may be formed of concrete, asphalt, aggregate, or other similar material. Also, the term "roadway" can refer to ground lying adjacent to a road, street or highway, the adjacent ground being formed of a variety of materials including sand, dirt, soil, aggregate, concrete, asphalt, etc.

Returning to FIG. 3, and with further regard to FIG. 4B, it can be seen that when the body 12 of the delineator is impacted by a force F, the slits 22a, 22b allow the body to elastically flex or fold upon itself. While a conventional, closed tubular body may fold or flex in reaction to such a force, a conventional, closed body would be subjected to very high stress concentrations in the area of the body located at the edges of the fold, i.e., very sharp "pinch" points at corners of the fold. In contrast, the slits 22a, 22b formed in the present delineator serve as stress relief sections, providing areas in which the body can flex or fold without incurring substantial permanent material deformation.

The slits 22a, 22b thus aid in reducing areas of stress which have conventionally resulted in delineators exhibiting limited service life. It has been found that the delineators of the present invention can sustain repeated cycles of alternating between a substantially vertical orientation to a folded, rearwardly flexed orientation. Delineators in accordance with the present invention have exhibited cycle lives of greater than ten (10) impacts by a vehicle traveling over fifty (50) miles per hour. In these tests, the delineator subjected to impact by the vehicle consistently returned to a vertical position of at least twenty (20) degrees within true vertical (that is, within 20 degrees of the original vertical orientation of the delineator).

It will be appreciated that the embodiment illustrated in FIG. 3 can be directional in at least two opposite directions. As the delineator is generally symmetrical about an axis (44 in FIG. 1B) defined by the slits 22a, 22b, the delineator can perform equally well when impacted by a force from either the front direction shown, or from a force applied from the rearward direction. Thus, the delineator can be effectively used in areas where traffic near the delineator may be anticipated to be traveling in two directions, as may be the case for example when the delineator is used to delineate opposing lanes of traffic.

While the delineator can be formed from a variety of materials, in one aspect of the invention the delineator is formed of a polymeric material such as non-reactive, impact modified thermoplastics. It has been found that such a material, in combination with the vertical slits 22a, 22b, can provide a delineator that exhibits superior resistance to permanent deformation due to vehicle collisions while also limiting damage caused to vehicles as a result of the collisions. Similarly, the delineator can be formed in a variety of sizes and slit configurations. In one aspect of the invention, the lower section 18 of the tubular body 12 can have an outer diameter from about 2 inches to about 2 1/2 inches. In another aspect, the lower section of the tubular body can have an outer diameter on the order of about 2 1/4 inches and can have an outer wall thickness (36 in FIG. 4A) of about 1/8 of an inch.

The slits 22a, 22b can similarly be formed in a variety of configurations. In one aspect, the slits can each have a width of about 1/8 of an inch to about 3/8 of an inch. In another aspect, the slits can each have a width of about 1/4 of an inch. In addition, as shown in FIG. 1B, the longitudinal slits 22 of the elongate body can have a substantially constant width W along the longitudinal axis 44. The slits can have a longitudinal length from about 7 inches to about 10 inches, and in one aspect the slits have a longitudinal length of about 7 1/2 inches.

As represented by arrow 30 in FIG. 4A, in one embodiment of the invention, the frontal impact face 14 of the tubular body 12 can extend substantially uninterrupted around the body from one 22a of the longitudinal slits to another 22b of the longitudinal slits. Similarly, the rearward impact face 16 can extend substantially uninterrupted around the tubular body from one of the longitudinal slits to another of the longitudinal slits (as represented by arrow 32). By extending the frontal and/or rearward faces in a substantially interrupted manner from one slit to another, the tubular body 12 allows stress due to vehicle impact to "flow" through the frontal and rearward faces to the relief section provided by the slits. In this manner, high stress concentrations in the material of the body are avoided, increasing useable life of the delineator.

To further aid in distributing stress levels through the material of the body 12, the tubular body can include an outer wall 37 which can define an internal hollow cavity 38. The internal hollow cavity 38 can extend substantially uninterrupted throughout the lower section. In this manner, little or no material is present within the tubular body to impede the tube from flexing or folding about the slits 22a, 22b. This feature further aids in providing a delineator which can repeatedly flex or fold in a non-deformable, or elastic, manner about the longitudinal slits.

In accordance with another aspect of the invention, the elongate body 12 can have a first, upright configuration (shown by example in FIGs. 1A, 1B and 2) in which the lower section 18 includes a substantially tubular cross section (shown by example in FIG. 4A). The body 12 can have a second, flexed configuration (shown by example in FIG. 3) in which an inside surface 14a of the frontal impact face 14 of the body at least partially contacts an inside surface 16a of the rearward face 16 of the body (shown by example in FIG. 4B).

In this aspect of the invention, the frontal face 14 and rearward face 16 of the delineator cooperate about the slits 22 to allow the delineator to flex or bend in response to an applied force

F. As the force initially causes the body to begin bending rearwardly (i.e., to the right of FIG. 3), the rearward face 16 between the slits 22a, 22b will begin to flatten, as will the frontal impact face 14. In one aspect of the invention, when the body reaches a critical stage of bending, the inside surface 14a of the frontal face and the inside surface 16a of the rearward face contact each other and cooperatively flatten into substantially planar surfaces at the point of bending. The degree of bend or flex of the tube can alter the extent of contact of the inside surfaces, with a severe degree of bend resulting in the inside surfaces contacting each other across a majority of the point of bending.

As best shown in FIGs. 1A and 1B, the upper section 20 of the tube 12 can include a flattened section 40 that can be configured to receive a reflector or marker 42 thereon. The reflector can be of a variety of those known in the art, and can be adhered to the flattened section or formed as an integral part thereof. As shown in FIG. 1B, the flattened section can be flattened in a plane common to a vertical axis 44 formed by the longitudinal slits 22a, 22b. In this manner, the plane of the reflector can be substantially parallel to an axis through which the body 12 will flex about the slits. In the embodiment illustrated in the figures, the flattened section of the delineator includes a rivet or other securing device 41 which aids in maintaining the top of the delineator in a closed position. In addition to a securing device, the top of the delineator may be sealed, for example, by plastically welding the top portions to one another.

In one aspect of the invention, the delineator can be configured to cooperate with an anchor 50 that can be disposable beneath the surface 25 of the roadway, as shown at 50 in FIGs. 2, 3, 5, 6A and 6B. The anchor can be of a variety of those known in the art and can be formed of a substantially rigid material such as galvanized steel. As shown in side view in FIG. 6B, the anchor can include a pair of indentations 52 that can correspond to a pair of voids 54 formed in

the tubular body 12. As the tubular body is lowered into the socket, the indentations of the socket engage the voids of the body, thus securing the body within the anchor. As shown in FIG. 2, in one aspect of the invention, the anchor can receive at least a portion of the longitudinal slits and secure the at least a portion of the slits below the surface of the roadway.

In addition to the anchor 50 shown in the various figures, the delineator of the present invention can be used with a variety of other anchor configurations known in the art. The delineator can also be utilized in installation procedures that involve no anchor, that is, the delineator can be installed as a stand-alone unit.

In accordance with another aspect of the present invention, a method of delineating a roadway is provided and can include the steps of: a) obtaining an elongate, tubular delineator, the delineator including: i) a lower section, including a pair of longitudinal slits formed through sides of the tubular delineator; and ii) an upper section, extending upwardly from the lower section and being configured to provide a marker above the roadway. The method can include the further step of disposing at least a portion of the lower section of the delineator into the roadway such that each of the pair of longitudinal slits formed in the sides of the delineator is at least partially disposed beneath the roadway.

This method can be appreciated from the arrangement of FIG. 5, where anchor 50 is shown already anchored or buried beneath surface 25 of the roadway. The tubular body 12 can be disposed above the anchor and then lowered into the anchor 50 until voids 54 engage depressions 52 to secure the body to the anchor. By disposing the anchor a depth D beneath the surface 25, the tubular body will bend or flex primarily about a point P on the surface of the roadway (in the case where a force is applied to frontal face 14). In this manner, rather than bending the body 12 about an inside edge of the anchor, which may be very rigid and possibly

sharp, the tube is bent or flexed against the roadway, which may be softer and less likely to initiate shear of the tube. In one aspect of the invention, the step of installing the anchor in the roadway includes the step of installing the anchor at least about 1/2 inch below the surface of the roadway. In another aspect, the anchor can be installed about 1 inch below the surface of the roadway.

In the embodiment illustrated in FIG. 5, the flattened section 40 is aligned in a plane which is orthogonal to a direction of anticipated traffic flow. Thus, the delineator can be effectively used to delineate in an area adjacent to traffic anticipated to flow from the left-to-right or right-to-left of the page of FIG. 5.

It is to be understood that the above-referenced arrangements are illustrative of the application for the principles of the present invention. Numerous modifications and alternative arrangements can be devised without departing from the spirit and scope of the present invention while the present invention has been shown in the drawings and described above in connection with the exemplary embodiments(s) of the invention. It will be apparent to those of ordinary skill in the art that numerous modifications can be made without departing from the principles and concepts of the invention as set forth in the claims.

CLAIMS

What is claimed is:

1. A directional roadway delineator, comprising:

an elongate, tubular body having a frontal impact face and a rearward face:

a lower section, disposable at least partially below a surface of the roadway to secure the delineator below the roadway surface;

an upper section, extending upwardly from the lower section and being configured to provide a marker above the roadway surface; and

a pair of longitudinal slits formed through opposite sides of the tubular body between the frontal impact face and rearward face in the lower section of the body, the longitudinal slits being configured to allow the delineator to:

elastically flex rearwardly in response to a force applied to the frontal impact face; and

return to a substantially vertical orientation upon removal of the applied force.

2. The delineator of claim 1, wherein the frontal impact face extends substantially uninterrupted around the tubular body from one of the longitudinal slits to another of the longitudinal slits.

3. The delineator of claim 2, wherein the rearward impact face extends substantially uninterrupted around the tubular body from one of the longitudinal slits to another of the longitudinal slits.

4. The delineator of claim 1, wherein each of the longitudinal slits has a substantially constant width along a longitudinal axis.

5. The delineator of claim 1, wherein the tubular body includes an outer wall defining an internal hollow cavity extending substantially uninterrupted throughout the lower section, the hollow cavity being configured to allow the tubular body to elastically flex at the longitudinal slits.

6. The delineator of claim 1, wherein the lower section of the tubular body has an outer diameter from about 2 inches to about 2 1/2 inches, and wherein the slits each have a width of about 1/8 of an inch to about 3/8 of an inch.

7. The delineator of claim 6, wherein each of the slits has a width of about 1/4 of an inch.

8. The delineator of claim 1, wherein the lower section of the tubular body has an outer diameter of about 2 1/4 inches.

9. The delineator of claim 1, wherein each of the slits has a longitudinal length from about 7 inches to about 10 inches.

10. The delineator of claim 9, wherein each of the slits has a longitudinal length of about 8 1/2 inches.

11. The delineator of claim 10, wherein the lower section of the tubular body has an outer wall thickness of about 1/8 inch.

12. The delineator of claim 1, wherein the upper section includes a flattened section being configured to receive a reflector thereon, the flattened section being flattened in a plane common to the pair of longitudinal slits.

13. The delineator of claim 1, further comprising means for securing at least a portion of the longitudinal slits below the roadway surface.

14. The delineator of claim 1, further comprising an anchor, disposable below the surface of the roadway, the anchor receiving at least a portion of the longitudinal slits and securing the at least a portion below the surface of the roadway.

15. A roadway delineator, comprising an elongate body having a frontal impact face and a rearward face, the elongate body having:

a lower section, disposable at least partially below a surface of the roadway to secure the delineator below the roadway surface;

an upper section, extending upwardly from the lower section and being configured to provide a marker above the roadway surface;

a pair of longitudinal slits formed through opposite sides of the elongate body between the frontal face and rearward face in the lower section of the elongate body;

a first, upright configuration in which the lower section includes a substantially tubular cross section; and

a second, flexed configuration in which an inside surface of the frontal impact face of the body at least partially contacts an inside surface of the rearward face of the body.

16. The delineator of claim 15, wherein the frontal impact face extends substantially uninterrupted around the tubular body from one of the longitudinal slits to another of the longitudinal slits.

17. The delineator of claim 15, wherein the rearward impact face extends substantially uninterrupted around the tubular body from one of the longitudinal slits to another of the longitudinal slits.

18. The delineator of claim 15, wherein each of the longitudinal slits has a substantially constant width along a longitudinal axis.

19. The delineator of claim 15, wherein the tubular body includes an outer wall defining an internal hollow cavity extending substantially uninterrupted throughout the lower section, the

hollow cavity being configured to allow the tubular body to elastically flex at the longitudinal slits.

20. The delineator of claim 15, wherein the lower section of the tubular body has an outer diameter from about 2 inches to about 2 1/2 inches when in the first, upright configuration, and wherein the slits each have a width of about 1/8 of an inch to 3/8 of an inch when in the first, upright configuration.

21. The delineator of claim 20, wherein the slits have a width of about 1/4 of an inch when in the first, upright position.

22. The delineator of claim 20, wherein the lower section of the tubular body has an outer diameter of about 2 1/4 inches when in the first, upright configuration.

23. The delineator of claim 15, wherein each of the slits has a longitudinal length from about 7 inches to about 10 inches.

24. The delineator of claim 23, wherein each of the slits has a longitudinal length of about 8 1/2 inches.

25. The delineator of claim 15, wherein the lower section of the tubular body has an outer wall thickness of about 1/8 inch.

26. The delineator of claim 15, wherein the upper section includes a flattened section being configured to receive a reflector thereon, the flattened section being flattened in a plane common to the pair of longitudinal slits.

27. A method of delineating a roadway, comprising the steps of:

obtaining an elongate, tubular delineator, the delineator including:

a lower section, including a pair of longitudinal slits formed through sides of the tubular delineator; and

an upper section, extending upwardly from the lower section and being configured to provide a marker above the roadway; and

disposing at least a portion of the lower section of the delineator into the roadway such that each of the pair of longitudinal slits formed in the sides of the delineator is at least partially disposed beneath the roadway.

28. The method of claim 27, comprising the further steps of installing an anchor in the roadway and attaching the delineator within the anchor.

29. The method of claim 28, wherein the step of installing an anchor in the roadway includes the step of installing the anchor at least about 1/2 inch below the surface of the roadway.

30. The method of claim 29, wherein the step of installing the anchor in the roadway includes the step of installing the anchor about 1 inch below the surface of the roadway.

31. The method of claim 27, wherein the upper section of the delineator includes a flattened section being configured to receive a reflector thereon, and comprising the further step of aligning the flattened section in a plane substantially orthogonal to a direction of anticipated traffic flow.

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Patent Agents

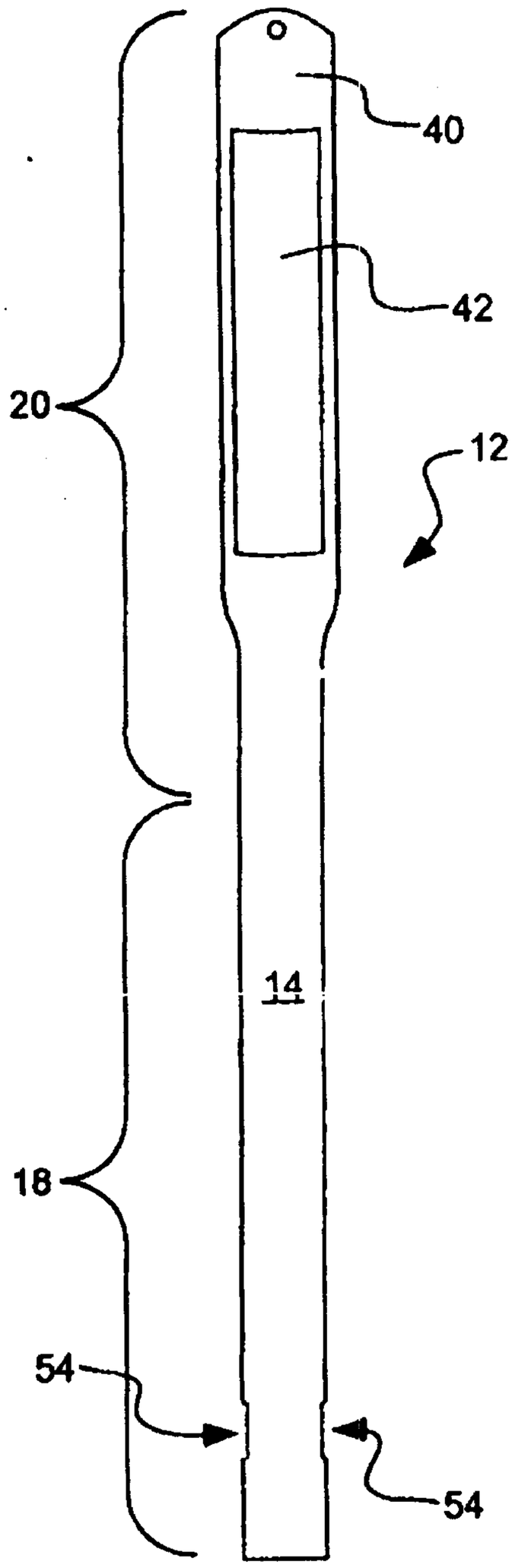


FIG. 1A

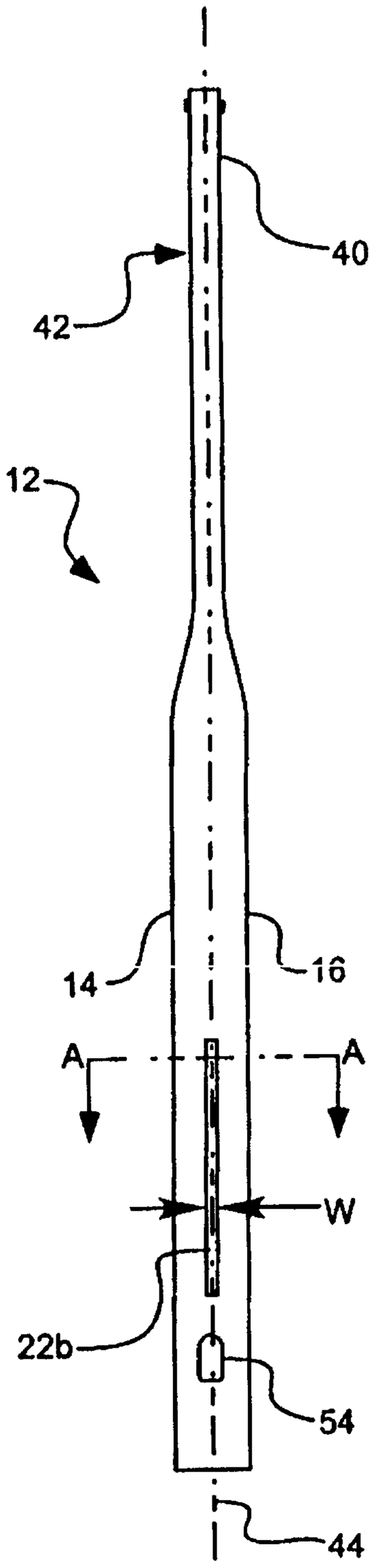


FIG. 1B

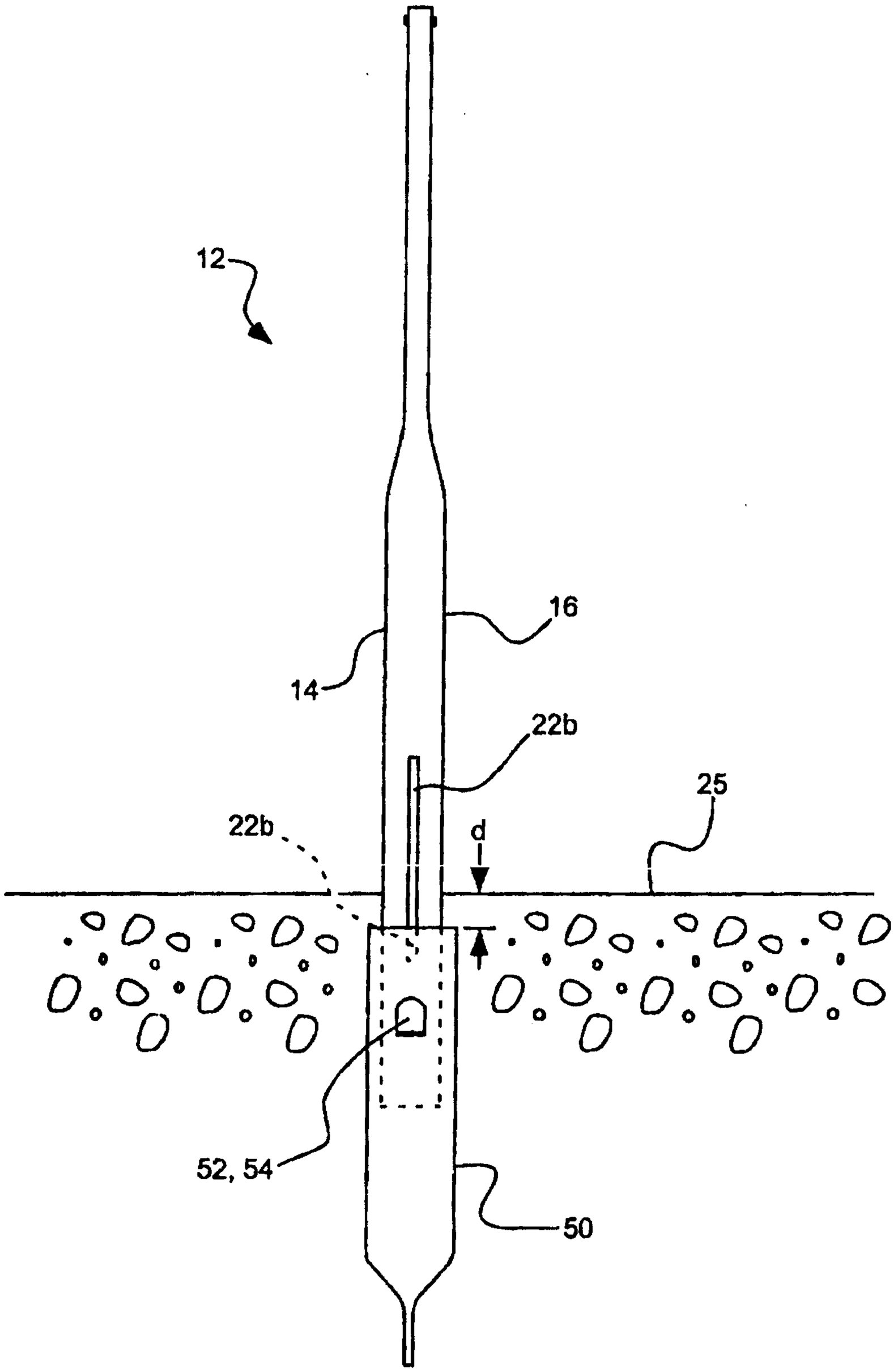


FIG. 2

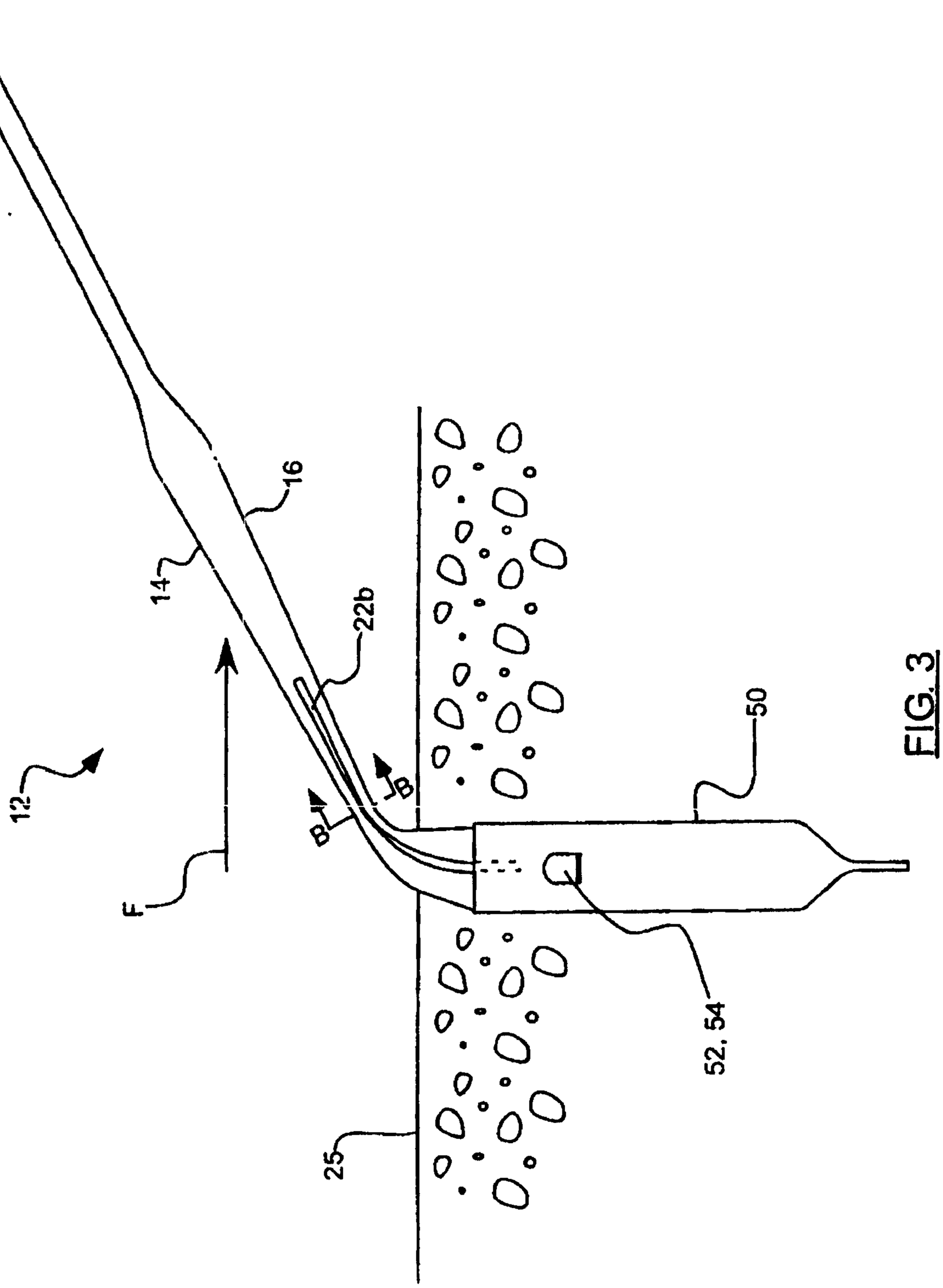


FIG. 3

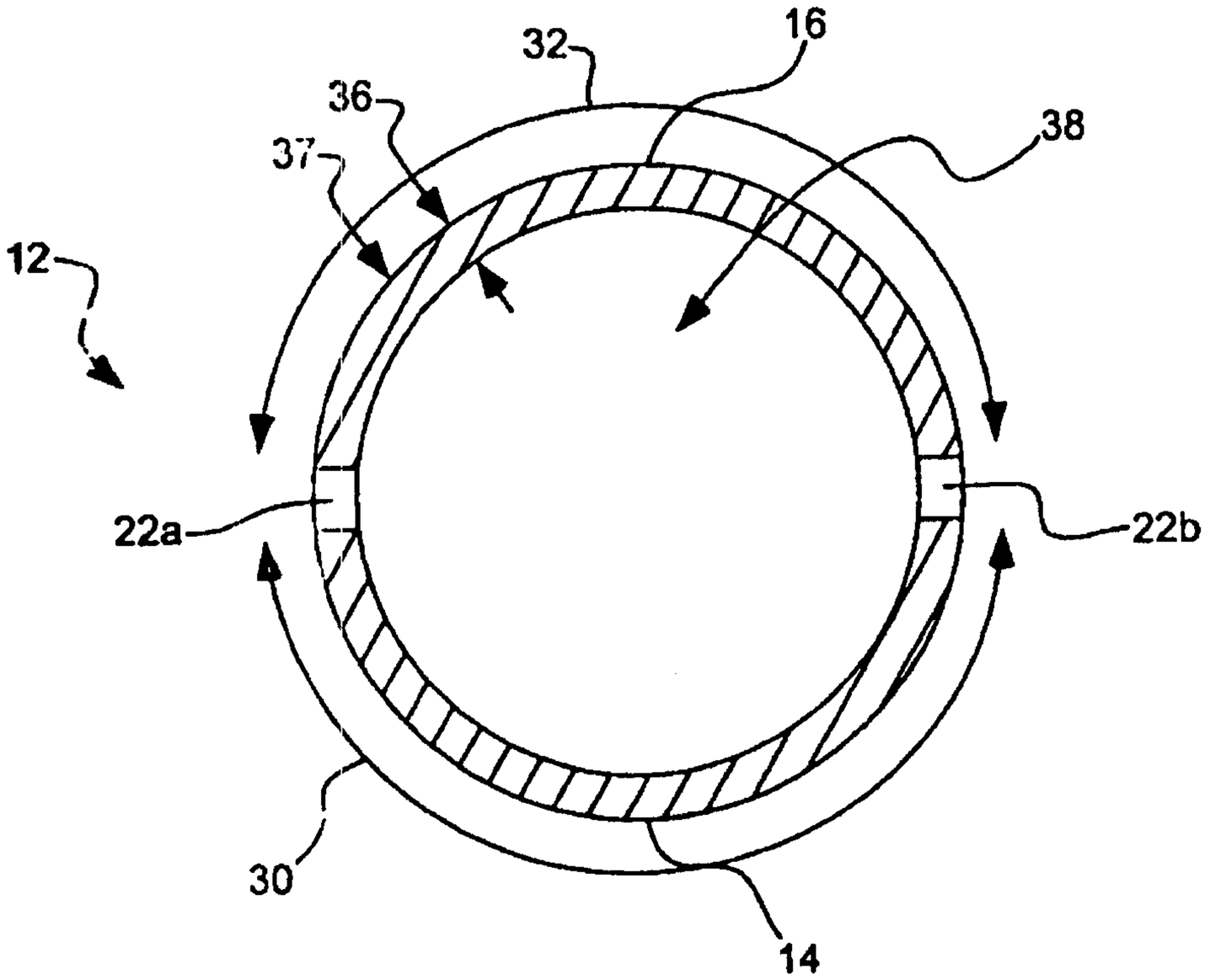


FIG. 4A

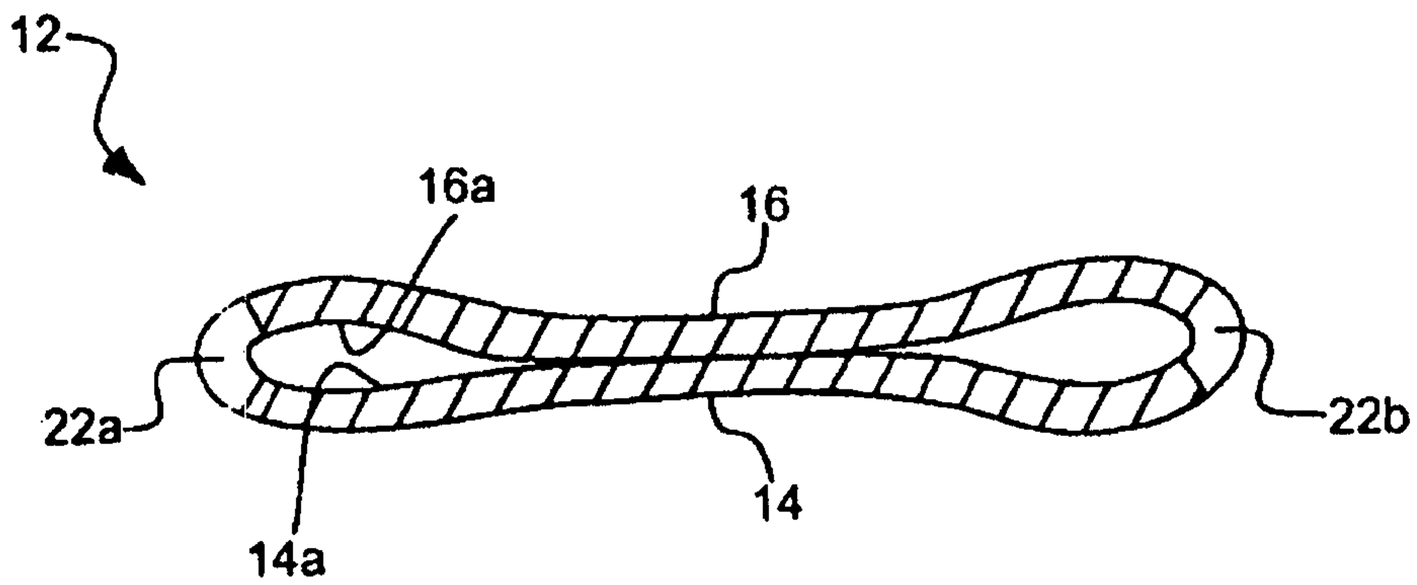


FIG. 4B

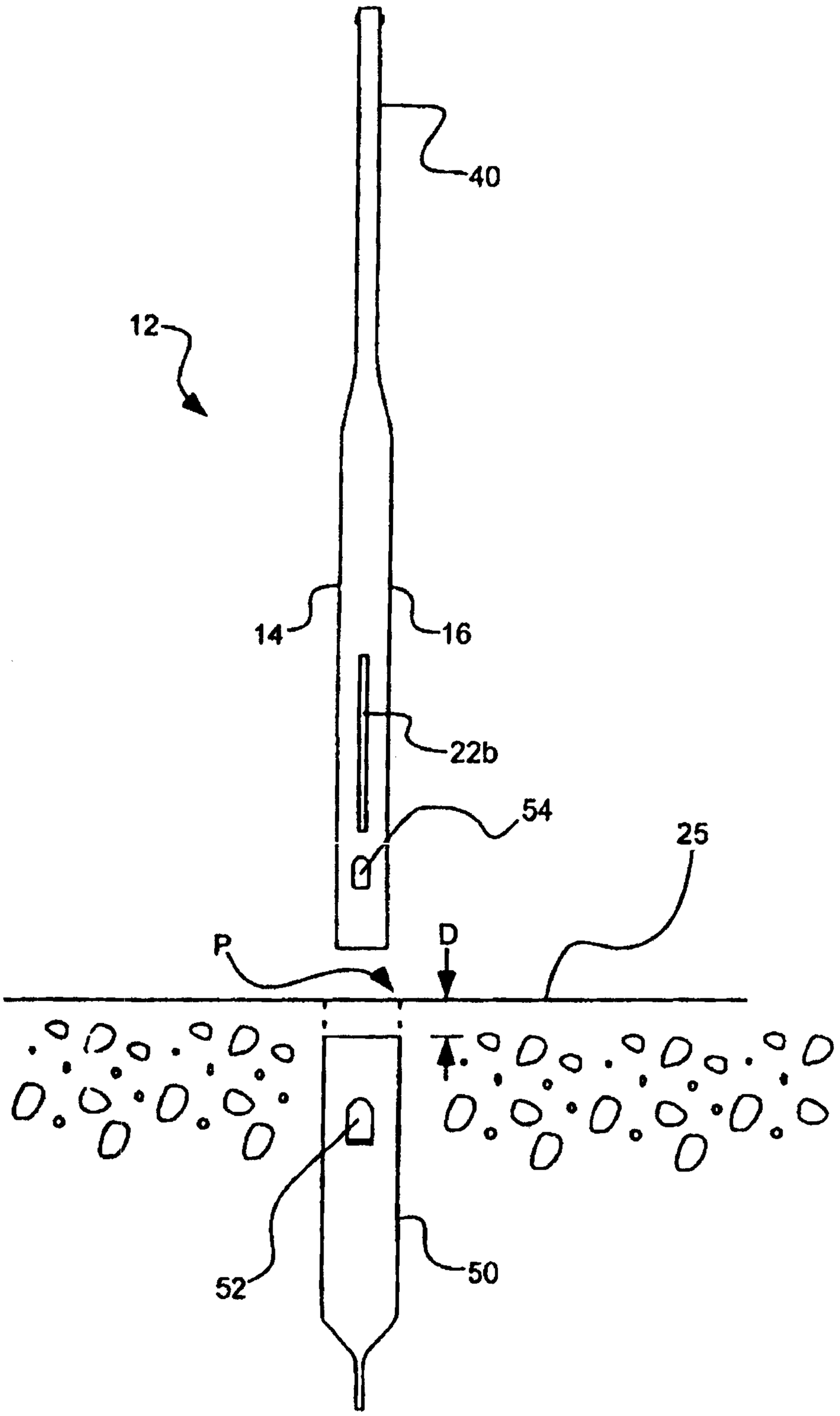


FIG. 5

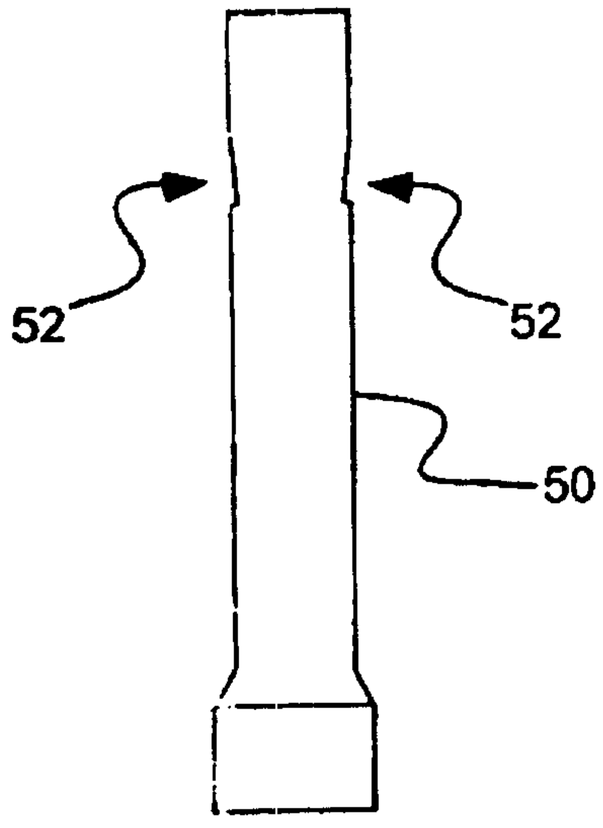


FIG. 6A

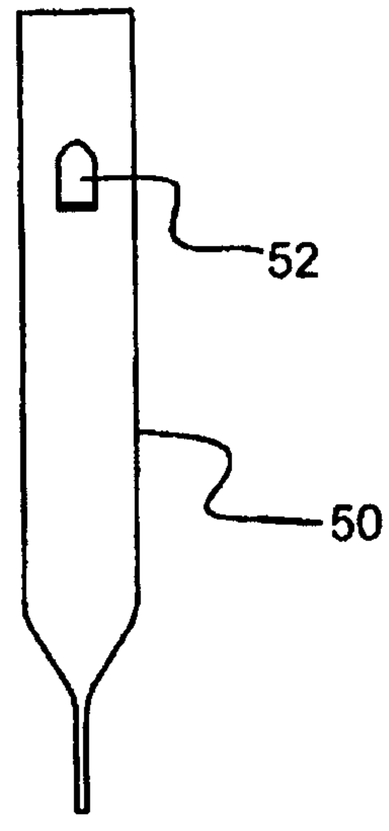
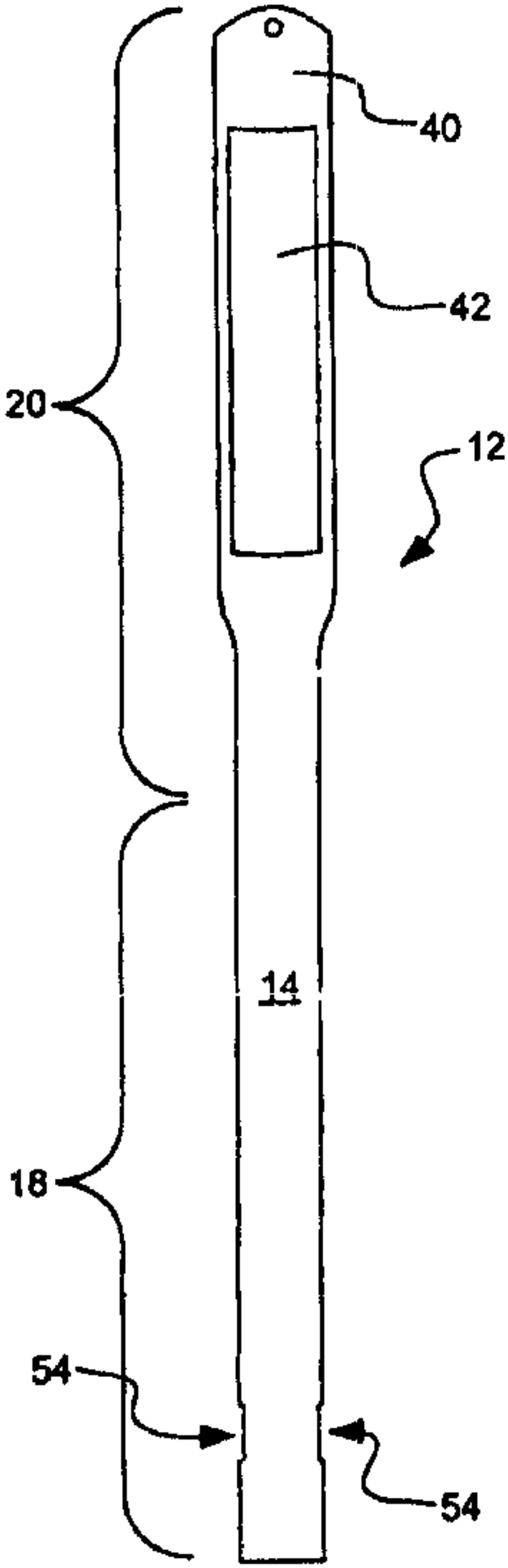
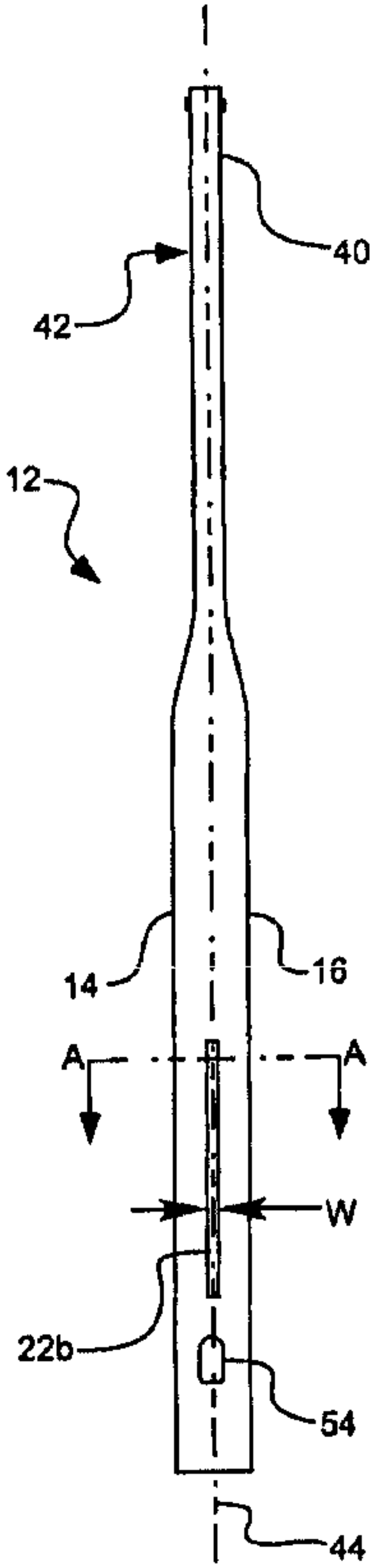


FIG. 6B



A



B