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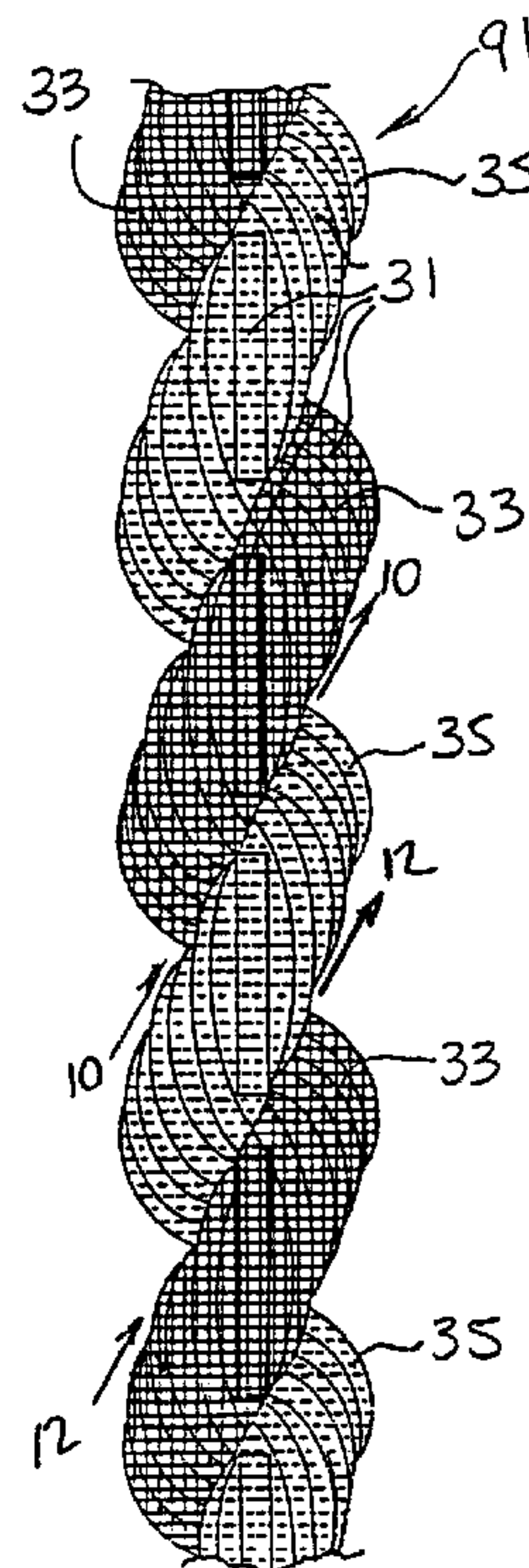
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(57) **Abrégé/Abstract:**

A decorative rope chain and a manufacturing process to produce a rope chain in which each link used as a basic building element exhibits a unique visual property, such as surface texture, coloration, attribute, feature, characteristic, shape or other physical, appearance. Such unique visual property traits for the succession of links results in a more attractive, fanciful, more delicate and interesting fashion item. In one aspect of the invention, each of the interconnected links has a first side surface exhibiting a first visual property and an opposite second side surface exhibiting a second, perceptively different, visual property. In other aspects of the invention, the side surfaces of the links may have differently colored, textured, or patterned surface portions. In yet another aspect of the invention, each link may have differently shaped portions.

ABSTRACT

A decorative rope chain and a manufacturing process to produce a rope chain in which each link used as a basic building element exhibits a unique visual property, such as surface texture, coloration, attribute, feature, characteristic, shape or other physical appearance. Such unique visual property traits for the succession of links results in a more attractive, fanciful, more delicate and interesting fashion item. In one aspect of the invention, each of the interconnected links has a first side surface exhibiting a first visual property and an opposite second side surface exhibiting a second, perceptively different, visual property. In other aspects of the invention, the side surfaces of the links may have differently colored, textured, or patterned surface portions. In yet another aspect of the invention, each link may have differently shaped portions.

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JEWELRY CHAIN

BACKGROUND OF THE INVENTION

Field of the Invention

20 This invention relates to the field of decorative jewelry items, and more particularly to a jewelry rope chain exhibiting unusual visual properties. This invention also relates to the basic structural link element of a jewelry rope chain exhibiting unusual visual properties. Furthermore, this invention relates to the basic structural link element of a jewelry rope chain exhibiting attractive, decorative, and ornamental visual properties. In addition, this
25 invention relates to an attractive jewelry rope chain exhibiting unusual visual properties.

Brief Description of the Art

Rope chains are a popular type of jewelry made from linking a number of regular annular links together in a repetitive manner and usually soldering or welding every two links

together. The result is a chain that is flexible and pleasing to the eye. The annular links are often formed of gold or other precious metal and are circular in form with flat sides. The circle is not complete as there must be a gap to permit the linking of the links with each other.

- 5 Rope chains are a popular type of jewelry made from linking a number of standard sized annular link elements together in a repetitive manner and usually soldering, welding, or otherwise bonding every two link elements together. The result is a chain that is flexible and pleasing to the eye. The annular link elements are typically formed of gold, silver, or other precious metal and may be round in cross section or may be rectangular in cross
- 10 section with flat major side surfaces, depending on the method of manufacture. The overall generally circular configuration of the annular link elements is not complete as there must be a gap provided to permit interlinking, i.e. interconnecting, of the link elements with each other. The result is a link element having a generally C-shaped configuration.
- 15 The generally C-shaped link elements are fastened together in a particular way, such that tightly interlinking annular link elements give the appearance of a pair of intertwining helical rope strands. A number of annular link elements are connected and intertwined together in a systematic and repetitive pattern of orientation, resulting in an eye-pleasing, flexible, and delicate-appearing chain that looks and feels like a finely braided double
- 20 helix.

Jewelry rope chain has been made for many years. Although rope chains can be made by machine, the better quality rope chains are usually manufactured by hand. While a rope chain has the feel and look of a rope, it is actually made up of a series of individual C-shaped flat links made from a precious metal such as silver or gold. Gold is available in at

25 least four colors: white, yellow, rose (pink), and green. The C-shaped links are gapped and fastened together in a particular way, such that tightly interlinking annular links give the appearance of intertwining helical rope strands. The links of hand-made rope chains are made with a tighter fit and are more visually appealing than are machine-made rope chains. A number of annular links are connected and intertwined together in a systematic

and repetitive pattern of orientation, resulting in an eye-pleasing, flexible, and delicate-appearing chain that looks and feels like a finely braided helix.

In a conventional rope chain, the orientation pattern of individual links producing the rope chain is repeated every several links, for example every four links, and as such is referred to as a four-link rope chain. In an improvement to the conventional basic rope chain, it is taught in U.S. Patent No. 4,651,517 that the links can be constructed in different and narrower dimensions so that the pattern is repeated every six links or even every eight links. In U.S. Patent No. 5,301,498, to Chia et al., it is suggested that, by narrowing the cross-section of the link, the six-link rope chain's connected segments appear finer than those of the four-link version and consequently provides a more delicate and refined presentation than that obtainable with a four-link rope chain arrangement. While the '517 patent uses a six-link rope chain as a preferred embodiment, that patent teaches the formulas for creating rope chains consisting of a repeated series of six, eight, or more links.

The assembly method for interconnecting a series of link elements can be found by reference to U.S. Patent No. 4,651,517 to Benhamou et al. and 5,301,498 to Chia et al.

Some manufacturers of jewelry use different colored gold and silver elements to enhance the beauty of the jewelry article. Examples are: rope chains in which sets of links of one color alternate with sets of links of another color; and bracelets or necklaces constructed of interconnected twisted loops exhibiting alternating colors along their lengths.

However, in typical prior art construction techniques for producing rope chain jewelry, each link is of a single solid color, texture, and pattern, e.g., each link may be stamped from a solid thin sheet of precious metal, such as gold. Thus, for example, while an all yellow gold rope chain or an all white gold rope chain is attractive, it is otherwise uninteresting due to the monotonic nature of its unvarying coloration and/or texture along the links of the chain. Those prior art rope chains that do exhibit variations of colors along their lengths nevertheless are constructed of individual links each of which is of a single

solid color, texture, and/or pattern. Other jewelry articles exhibit variations of colors along their lengths using interconnected twisted chain loops, but they are not regarded as rope chains as defined herein.

Moreover, prior art link elements are generally C-shaped with a constant, typically
5 rectangular cross section. As a result, a predictable visual effect is realized when the C-shaped link elements are assembled to simulate intertwined rope helixes. Additionally, after all of the link elements have been assembled into a finished rope chain jewelry item, a large percentage of the total volume of precious metal in each link element is forever hidden from view. That is, for the structural integrity of the rope chain, certain
10 dimensional parameters have to be maintained, and there have been few attempts in the prior art of manufacturing rope chains to reduce the amount of precious metals being used, for fear of lessening or destroying the structural integrity of the finished product.

One example of prior attempts to reduce the amount of precious metal in a rope chain link element can be found in U.S. Patent No. 5,185,995 to Dal Monte. In this patent, it is
15 taught to modify the conventional cross sectional shape of a link element by maintaining a large mass of material at the exterior edge periphery and forming a narrow or pointed interior edge periphery. However, since the cross section for a particular link element is constant throughout the extent of the link element, this severely limits the flexibility of design. For example, manufacturing a link element having different link thicknesses, or
20 different link widths, or different link cross sectional patterns along the extent of the link is not suggested in the '995 patent, and may not be possible when employing the limited teaching of the '995 patent.

Furthermore, because of the thin pointed interior edge of a link manufactured to the specifications of the '995 patent, the interior edges are fragile and can easily be damaged
25 due to the softness of the precious metal (e.g., gold) and due to the abuses that may be inflicted on the rope chain while in use (excessive bending or twisting). Such inadvertent, but normal, usage can compress the width of the links, resulting in a loose interfitting of the links.

Other prior art teaches forming flat surfaces on both sides of a link element to produce a double spiral effect within the already double spiral effect of an otherwise conventional rope chain. Both U.S. Patent Nos. 5,425,228 and 5,285,625 show flattened sides on the link elements, the latter patent showing the effects of such flattened sides in Figure 5 thereof. However, neither of these patents teach constructing a rope chain which has two visually different helixes.

SUMMARY OF THE INVENTION

The present invention provides the means and method for assembling links in a manufacturing process to produce a rope chain piece of jewelry in which each link exhibits a unique visual property, i.e., surface texture, coloration, attribute, feature, characteristic, or physical appearance. Such unique visual property traits for the succession of links results in a more attractive, fanciful, more delicate and interesting fashion jewelry item.

In one aspect of the invention, each of the interconnected links has a first side surface exhibiting a first visual property and an opposite second side surface exhibiting a second, perceptively different, visual property.

In another aspect of the invention, rather than having each link side surface of a uniform visual property, one of the side surfaces, or both such side surfaces, may exhibit perceptively different visual properties in accordance with a predetermined pattern arrangement on each side surface. The two side surfaces so configured may be identical on both first and second side surfaces, or they may be different one from the other. For example, a portion of each first side surface may be of a first color, and another portion may be of a second color. Similarly, a portion of each second side surface may be of a first color, and another portion may be of a second color, and the design of the arrangement of different colored portions may be different on the first and second side surfaces.

Instead of, or in addition to, differently colored portions, the two side surfaces may exhibit differently textured or patterned portions, e.g., one portion may be shiny while another portion may have a patterned, sandblasted, frosted, or matte finish appearance. Also, either side may be of a solid color, texture, or pattern, while the other side is portioned as

described. Thus, it will be understood that in all of the examples of the accompanying figures and the related text, where different colors are shown and described, texture or patterns can be shown, and the terms "texture" or "pattern" can be substituted. To avoid unnecessary duplication, however, color will be used as exemplary of other visual
5 properties including surface texture and patterns.

Instead of, or in addition to, differently colored, patterned, and/or textured portions, the interconnecting links may have different shapes or shaped portions. For example, some or all of the links making up the rope chain may be smoothly circular, circular with peripheral undulations or crenels, circular with peripheral gear-like teeth, may be star shaped,
10 baguette shaped, square shaped, rectangular shaped, oval shaped, diamond shaped, heart shaped, etc. Similarly, different portions of each link may have such different physical shapes.

As a result of the various combinations possible in the manufacture of jewelry rope chains in accordance with the present invention, a virtually limitless number of different design
15 possibilities exist, and preferred ones of such possibilities are shown and described herein. It is to be understood, however, that all combinations of: the number of interconnected links in the repeated pattern along the rope chain; solid or portioned coloration and/or texturing; different designs of the portioned regions of each side surface of the links; and different physical shape and/or visual properties as identified in this description may be
20 employed in the manufacture of jewelry rope chains and are contemplated as variations of the preferred embodiment specifically shown and described.

The present invention provides the means and method for constructing rope chain link elements in a way to produce a rope chain piece of jewelry in which each link element, or selected link elements, and therefore the rope chain itself, exhibits a unique visual
25 property, e.g., surface texture, coloration, surface reflectivity, pattern feature or characteristic, shape, or other physical appearance attributes. Such unique visual property traits for the succession of link elements results in a more attractive, fanciful, more delicate and interesting fashion jewelry item.

In addition to exhibiting unique visual properties, employing the concepts of the present invention can produce lengths of rope chains in which one of the apparent strands of “rope” has a different visual appearance than the intertwining “rope” strand. That is, the appearance of a rope strand at any point along the length of rope chain will be visually
5 different than the adjacent strand. For example, one strand may have an apparent smaller diameter than that of the adjacent strand. Or, the texture, coloration, surface reflectivity, pattern, shape, or other physical attribute of one strand may be totally distinct relative to the adjacent strand.

Additionally, in the process of altering the physical shape of the individual link elements,
10 simultaneously with the enhancement of the visual effect due to the shape altering techniques, small amounts of the precious metal making up the link elements are removed without reducing the effective dimensional characteristics of the elements and, therefore, without diminishing the structural integrity of the finished rope chain product. Moreover, although not intended to be limiting, most of the variations of the present invention
15 maintain a rectangular cross section for all or portions of the link elements. Thus, a distinct and decorative rope chain of a given length may have the identical effective rope diameter as one made with a common C-shaped link of constant cross sectional area, and yet result in substantial manufacturing cost savings due to less material being used in the manufacture of each individual link element, and due to the ability to form the links using
20 inexpensive stamping techniques.

It can therefore be appreciated that creating link elements having variably changing cross sections to provide uniquely shaped building blocks for producing exciting and beautiful visual effects in the construction of rope chains, may simultaneously have the synergistic effect of making such physically altered link elements, and thus the rope chains from
25 which they are made, less expensive.

In accordance with one aspect of the invention, there is provided, in a length of jewelry rope chain of the type comprising a series of tightly interfitting gapped link elements and having the appearance of intertwining helical strands, gapped link elements each having a first major surface, an opposite second major surface, an interior edge, and an exterior

edge, the improvement wherein: link width is defined as a distance, measured along either of the major surfaces, between a pair of parallel lines perpendicular to the major surfaces and tangent to, respectively, the interior and exterior edges; and at least some of the link elements in the length of rope chain have an irregular link width.

- 5 Preferably, at least some of the link elements in the length of rope chain have a non-symmetrical irregular link width along the extent of the link element.

In another aspect of the invention, each of the link elements that have an irregular link width is divided into segments, each segment possessing a unique link width character relative to an adjacent segment.

- 10 One variation of a gapped link element made in accordance with the invention has a smooth interior edge and an irregular, preferably patterned, exterior edge.

An alternative variation has a smooth exterior edge and an irregular, or patterned, interior edge.

- In another aspect of the invention, both interior and exterior edges may be irregular or
15 patterned, the exterior edge preferably patterned for an attractive visual effect and to reduce the amount of precious metal, and the interior edge irregular solely to reduce the amount of precious metal needed to form the link element.

- In yet another aspect of the invention, rather than having the major, substantially planar, upper and lower surfaces of each link element uniformly smooth, one of the major
20 surfaces, or both such major surfaces, may exhibit perceptively different physical shapes in accordance with a predetermined engraved, etched, diamond cut or other formed pattern arrangement on each major surface. The two major surfaces so configured may be identical on both upper and lower major surfaces, or they may be different one from the other. For example, small portions of each upper major surface may be cut away in a
25 desired pattern, and other portions may be cut away in a second desired pattern. Similarly, small portions of each lower major surface may be cut away in a third desired pattern, and

other portions may be cut away in a fourth desired pattern. The designs and arrangement of different patterns may be the same or different on the upper and lower major surfaces.

Instead of, or in addition to, differently shaped major surfaces, the two major surfaces may exhibit differently textured portions, e.g., one portion of a link element may be shiny while
5 another portion may have a sandblasted, frosted, patterned, matte, or diamond cut finish appearance. Also, either major surface may be of a uniform shape and/or texture, while the other major surface is portioned as described.

A further variation has half of the link at a reduced annular width, which reduces material but nonetheless gives the appearance of a rope chain having an effective diameter the same
10 as if the reduced half was of normal annular width.

Instead of reducing the annular width of one half of a gapped link, one half may be enlarged in annular width and provided with openings in the enlarged half. The net amount of precious metal is reduced, as desired, and yet the finished rope chain will have a
15 large diameter and enhanced detail and beauty.

Thus, the interconnecting links may have differently colored, patterned, and/or textured portions, and may have different irregular or patterned shapes or shaped portions. For example, some or all of the link elements making up the rope chain may be partially or wholly smoothly circular with patterned major surfaces, circular with peripheral
20 undulations, circular with peripheral gear-like teeth, circular with diamond cut gouges or notches, may have constantly varying cross sectional portions, may have multiple or relatively large openings therethrough from one major surface to the other, and/or may have an overall configuration that is star shaped, baguette shaped, square shaped, rectangular shaped, oval shaped, diamond shaped, heart shaped, etc. Similarly, different
25 portions of each link element may have such different physical shapes.

A jewelry rope chain link element constructed in accordance with the invention preferably, but not necessarily, may have the shape and configuration of a standard annular link

element with at least a portion removed and has a maximum link width equal to that of a similar standard annular link element without any portion removed.

Similarly, a length of rope chain employing link elements as described in the previous paragraph, has an effective maximum diameter equal to that of a similar length of rope chain constructed of solid, standard size annular link elements without any portion removed.

From the viewpoint of a finished length of rope chain, the invention provides an improvement over the prior art, wherein: each link element in the length of rope chain comprises a link portion exhibiting a first visual property, and another link portion exhibiting a second, different, visual property; whereby, when viewed from one side of the length of rope chain, the appearance of one of the helical rope strands is different than the appearance of the other, adjacent, helical rope strand along the length of rope chain.

For example, in one variation, the one helical rope strand is of a predetermined effective diameter, and the adjacent helical rope strand is of a different effective diameter than that of the one rope strand.

In another variation, the one helical rope strand has the shape of a helical cylindrical tube intertwined with the adjacent helical rope strand, and the adjacent helical rope strand has the shape of a helical cylindrical tube with an outer surface portion thereof cutaway along the length of the helical cylindrical tube.

For the latter variation, the outer surface cutaway portion of the adjacent helical rope strand may be formed by a diamond cut process operating on pre-assembled link elements.

As a result of the various combinations possible in the manufacture of jewelry rope chains in accordance with the present invention, a virtually limitless number of different design possibilities exist, and preferred ones of such possibilities are shown and described herein. It is to be understood, however, that all combinations of: the number of interconnected link elements in the repeated pattern along the rope chain; solid or portioned coloration and/or

texturing; different designs of the portioned regions of each major surface of the link elements; and different physical shape and/or visual properties as identified in this description may be employed in the manufacture of jewelry rope chains and are contemplated variations of the preferred embodiments specifically shown and described.

- 5 The present invention provides the means and methods for constructing rope chain link elements in a way to produce a rope chain piece of jewelry in which each link element, or selected link elements, and therefore the rope chain itself, exhibits unique visual properties.

10 By providing individual link elements with different visual properties, including different shapes, the ultimate appearance of the completed rope chain can be determined. For example, if each individual link exhibits two colors, the resulting rope chain will exhibit those two colors. Since the link elements overlap, and since they are placed in pre-determined positions when they are interlinked, the location of the colors will have an influence on the appearance of the finished product.

- 15 Coloration is only one type of "visual property", and may vary according to the type or formulation of the material or materials from which a link element is made. Reflectivity, surface texture, pattern feature or characteristic, in addition to shape, are among other visual properties of a link that can influence the appearance of a finished rope chain. Such unique visual property traits for the succession of link elements results in a more attractive,
20 fanciful, more delicate and interesting fashion jewelry item.

In addition to exhibiting unique visual properties, employing the concepts of the present invention, lengths of rope chains can be fabricated in which one of the apparent strands of "rope" has a different visual appearance than the intertwining "rope" strand. That is, the appearance of a rope strand at any point along the length of rope chain may not only be
25 visually different than another point along the length of rope chain, but may also be visually different than the adjacent strand. For example, one strand may have an apparent smaller diameter than that of the adjacent strand. Or, the texture, coloration, surface

reflectivity, pattern, shape, or other physical attribute of one strand may be totally distinct relative to the adjacent strand.

In accordance with one aspect of the present invention, the annular, or generally C-shaped, link elements may be formed by a stamping process whereby the desired visual effects on
5 the link elements are preliminarily provided on the sheet of material from which the link elements are later stamped. Alternatively, especially when the visual property is surface texture or shape, the desired visual effects on the link elements may be created during or after the stamping process.

In accordance with another aspect of the invention, the annular, or generally C-shaped, link
10 elements may be manufactured by bending a thin elongated wire of prescribed dimensions into the desired C-shape. The wire may be supplied on spools and formed by machine. For example, a Link-O-Matic® machine, such as the Model 534 available from Crafford Precision Products Co., One Industrial Court, Riverside, Rhode Island 02915, can feed, cut, and form a gapped, or non-gapped, link element each cycle of operation. The wire
15 may undergo a preliminary surface texturing process, such as serrating, prior to being cut and formed into a link element by the machine, or the machine can form the link element and a subsequent surface texturing and/or coloration process may be employed.

The sheet of material may be fabricated from one or more species of the same substance (e.g., gold) or from a combination of substances (e.g., gold and silver). A first portion of
20 the sheet may have a first visual property, and a second portion of the sheet may have a second visual property. Again, the visual property may be the result of coloration, reflectivity, surface texture, pattern feature or characteristic, or shape, or other visual property attribute that provides one portion of the resulting link with a different appearance than another portion of the link.

25 Importantly, as will be described in detail hereinafter, in the stamping process, in addition to die-cutting the outline for the overall generally C-shaped configured link element from the sheet of material provided, the die tools or devices may be fabricated to impress, on one or more of the major or side edge surfaces of the link element being die-cut, a surface

texture or shape. That is, any surface or surface portion of the stamped link element may exhibit a desired surface texture or shape produced by an impression on, in, or to that surface by the tooling or device employed by the stamping process, effectively imprinting a desired shape, form, or finish.

- 5 Portions of a link element may also be shaped by the die-cutting action of the stamping machine.

As indicated, surface texturing may precede or follow the stamping process. However, simultaneous die-cutting and surface texturing is more efficient and is preferred.

- 10 After a link element is die-cut from the sheet of material, a subsequent pressure stamping process may be employed to impress designs or patterns on the side edges of the link element.

- By interconnecting together a plurality of link elements made in accordance with the invention, a rope chain can be manufactured that exhibits visual properties in a distinctive and decorative pattern. Intermixing link elements exhibiting different visual properties in
15 a particular sequence during assembly of the rope chain can likewise produce visually pleasing lengths of rope chain.

- In the process of altering the physical shape of the individual link elements, simultaneously with the enhancement of the visual effect due to the texturing and/or shape altering techniques, small amounts of the precious metal making up the link elements are removed
20 without reducing the effective dimensional characteristics of the elements and, therefore, without diminishing the structural integrity of the finished rope chain product.

- Several examples of impressing lines (simulating scoring), serrations, depressions, and other patterns or designs are described in this specification. It should be appreciated that when impressions are made in a soft material, such as gold, during a pressure stamping
25 process, there exists a physical displacement of the material previously occupying the depressed area. Thus, whatever material is pushed out of the depressed area moves to the

adjacent regions, thereby making the thickness of the link element greater at such adjacent regions. This is significant, since a thinner sheet of material, at less cost, can be provided. For example, when creating a serrated major surface on a link element being pressure stamped, material pushed out of each groove of the serration necessarily moves into the
5 space between the grooves, increasing the actual maximum thickness of the sheet of material. Again, the combination of enhanced beauty and lower material cost is realized.

Although not intended to be limiting, variations of the present invention, shown and described herein, are distinguished by a changing or varying cross section for portions of the link elements while maintaining at least a portion of at least some of the link elements
10 at a standard sized cross section. Thus, a distinct and decorative rope chain of a given length may have the identical effective rope chain diameter as one made with standard sized C-shaped link elements of constant cross sectional area, and yet result in substantial manufacturing cost savings due to less material being used in the manufacture of each individual link element, aside from the savings realized by forming the link elements using
15 inexpensive stamping techniques.

It can therefore be appreciated that fabricating link elements having variably changing visual properties and/or variably changing cross sections, to provide uniquely shaped building blocks for producing exciting and beautiful visual effects in the construction of rope chains, may simultaneously have the synergistic effect of making such physically
20 altered link elements, and thus the rope chains from which they are made, less expensive.

In accordance with one aspect of the invention, there is provided a gapped link element, and a method of manufacturing such a gapped link element, of the type that is assembled with other link elements to form a rope chain, each of the link elements being generally C-shaped in configuration to define a gap between facing ends thereof, each of the link
25 elements having a first major surface, an opposite second major surface, an interior edge, and an exterior edge, the method comprising: providing a sheet of material having a plurality of regions, adjacent ones of which exhibit different visual properties; and stamping, with a stamping device, a link element from the sheet, the link element so produced comprising segments of at least two of the plurality of regions.

In another aspect of the invention, there is provided a jewelry rope chain link element of the type that is assembled with other link elements to form a rope chain, each of the link elements being generally C-shaped in configuration to define a gap between facing ends thereof, the link element comprising: a first major surface; an opposite second major
5 surface; an interior edge; and an exterior edge; wherein the link element is manufactured by: providing a sheet of material; and stamping, with a stamping device, a link element from the sheet, the link element so produced departing from the shape and configuration of a standard link element by the provision of voids therein formed by the stamping device.

In yet another aspect of the invention, there is provided a jewelry rope chain link element
10 of the type that is assembled with other link elements to form a rope chain, each of the link elements being generally C-shaped in configuration to define a gap between facing ends thereof, the link element comprising: a first major surface; an opposite second major surface; an interior edge; and an exterior edge; wherein the link element is manufactured
15 by: providing a sheet of material; and stamping, with a stamping device, a link element from the sheet, the link element so produced departing from the annular shape and configuration of a standard link element.

In yet another aspect of the invention, there is provided a method of manufacturing a link element of the type that are assembled to form a rope chain, the method comprising: providing a sheet of material having a plurality of regions, adjacent ones of which exhibit
20 different visual properties; stamping, with a stamping device, an elongated, substantially rectangular, strip of the material, the strip having a prescribed length, width, and thickness; and forming the strip into a rope chain link element having a generally C-shaped configuration, a first major surface, an opposite second major surface, an interior edge, and an exterior edge, the link element so produced comprising portions of the sheet of material
25 that exhibit at least two of the visual properties.

In yet another aspect of the invention, there is provided A method of manufacturing a gapped link element of the type that is assembled with other link elements to form a rope chain, each of the link elements being generally C-shaped in configuration to define a gap between facing ends thereof, each of the link elements having a first major surface, an

opposite second major surface, an interior edge, and an exterior edge, the method comprising: providing an elongated strip of bendable material having a left end, a right end, an elongated upper surface, an elongated lower surface, and elongated front surface, an elongated rear surface, and a surface ornamentation on at least one of the elongated
5 surfaces; and bending the strip into a generally C-shaped configuration until the left and right ends face one another in a spaced relationship defining the gap between facing left and right ends. Optionally, the link element may have differently textured and/or colored upper and lower major surfaces.

Instead of, or in addition to, differently textured and/or colored major surfaces, the two
10 major surfaces may exhibit differently textured or colored portions, e.g., one portion of a link element may be shiny and yellow gold in color, while another portion may have a sandblasted, frosted, patterned, matte, or simulated diamond cut finish appearance and white gold in color. Also, either major surface may be of a uniform shape and/or texture, while the other major surface is portioned as described.

15 A further variation has a portion of the link at a reduced annular width, which reduces material but nonetheless gives the appearance of a rope chain having an effective diameter the same as if the reduced portion was of normal annular width.

The interconnecting link elements may have differently colored, patterned, and/or textured portions, and may have different irregular or patterned shapes or shaped portions. For
20 example, some or all of the link elements making up the rope chain may be partially or wholly smoothly circular with patterned major surfaces, circular with peripheral undulations, circular with peripheral gear-like teeth, circular with gouges or notches, may have constantly varying cross sectional portions, and/or may have an overall configuration that is star shaped, baguette shaped, square shaped, rectangular shaped, oval shaped,
25 diamond shaped, D-shaped, heart shaped, etc. Similarly, different portions of each link element may have such different physical shapes.

A jewelry rope chain link element constructed in accordance with the invention preferably, but not necessarily, may have the shape and configuration of a standard annular link

element with at least a portion removed and has a maximum link width equal to that of a similar standard annular link element without any portion removed.

Similarly, a length of rope chain employing link elements as described in the previous paragraph, has an effective maximum diameter equal to that of a similar length of rope chain constructed of solid, standard size annular link elements without any portion removed.

From the viewpoint of a finished length of rope chain, the invention provides a further improvement over the prior art, wherein: each link element in the length of rope chain may comprise a link portion exhibiting a first visual property, and another link portion exhibiting a second, different, visual property; whereby, when viewed from one side of the length of rope chain, the appearance of one of the helical rope strands is different than the appearance of the other, adjacent, helical rope strand along the length of rope chain.

For example, in one variation, the one helical rope strand is of a predetermined effective diameter, and the adjacent helical rope strand is of a different effective diameter than that of the one rope strand.

In another variation, the one helical rope strand has the shape of a helical cylindrical tube intertwined with the adjacent helical rope strand, and the adjacent helical rope strand has the shape of a helical cylindrical tube with an outer surface portion thereof cut away along the length of the helical cylindrical tube. The outer surface cutaway portion of the adjacent helical rope strand is formed during the stamping or die-cutting process.

When stamped from a sheet of material comprised of a number of edge-joined flat strips or regions, one helical rope strand may be a helical cylindrical tube displaying a particular color pattern and intertwined with the adjacent helical rope strand which may display the same or a different color pattern. For example, one helical rope strand may be of a solid color, while the adjacent helical rope strand may have an outer surface portion thereof of one color and an inner surface portion, adjacent a channel of the rope chain, of another color.

As a result of the various combinations possible in the manufacture of jewelry rope chains in accordance with the present invention, a virtually limitless number of different design possibilities exist, and preferred ones of such possibilities are shown and described herein. It is to be understood, however, that all combinations of: the number of interconnected link
5 elements in the repeated pattern along the rope chain; solid or portioned coloration and/or texturing; different designs of the portioned regions of each major surface and/or side peripheral edges of the link elements; and different physical shape and/or visual properties as identified in this description may be employed in the manufacture of jewelry rope chains and are contemplated variations of the preferred embodiments specifically shown
10 and described.

The present invention relates to a jewelry rope chain exhibiting distinctive visual properties and to related means and methods for creating distinctive visual properties in an assembled rope chain. The distinctive visual properties may be imparted to a length of rope chain assembled with link elements all of the same material, shape, configuration,
15 texture, and/or color, or such distinctive visual properties may be imparted to a length of rope chain assembled with link elements differing in material, shape, configuration, texture, and/or color.

For example, in one aspect of the invention, a manufacturing process may be employed to produce a length of jewelry rope chain in which each link element, or a group of link
20 elements, may exhibit a common visual property, i.e., each link element, or group of link elements may have the same surface texture, coloration, attribute, shape, configuration, or other physical appearance prior to assembly, and subsequently be altered to enhance the beauty of the jewelry article by further coloration or texturing process steps.

Thus, in addition to exhibiting unique visual properties, employing the concepts of the
25 present invention, lengths of rope chains can be fabricated in which one of the apparent strands of "rope" has a different visual appearance than the intertwining "rope" strand. That is, the appearance of a rope strand at any point along the length of rope chain may not only be visually different than another point along the length of rope chain, but may also be visually different than the adjacent strand. For example, one strand may have an

apparent smaller diameter than that of the adjacent strand. Or, the texture, coloration, surface reflectivity, pattern, shape, or other physical attribute of one strand may be totally distinct relative to the adjacent strand.

In another aspect of the invention, a manufacturing process may be employed to produce a length of jewelry rope chain in which each link element, or a group of link elements, may exhibit a unique visual property, i.e., surface texture, coloration, attribute, shape, configuration, or physical appearance prior to assembly, and subsequently be altered to enhance the beauty of the jewelry article by further coloration or texturing processes.

In either case, such unique visual property traits for the succession of link elements results in a more attractive, fanciful, more delicate and interesting fashion jewelry item.

It will be understood that in all of the examples of the accompanying figures and the related text, where different colors are shown and described, texture or patterns can be implied, and the terms "texture" or "pattern" could be substituted for "color". To avoid unnecessary duplication, however, "color" will be used as exemplary of other visual properties including surface texture and patterns.

Some or all of the link elements making up the length of rope chain may be smoothly circular (e.g., annular), circular with peripheral undulations or crenels, circular with peripheral gear-like teeth, and/or may be star shaped, baguette shaped, square shaped, rectangular shaped, oval shaped, diamond shaped, heart shaped, etc. Similarly, different portions of each link element may have such different physical shapes.

As a result of the various combinations possible in the manufacture of jewelry rope chains in accordance with the present invention, a virtually limitless number of different design possibilities exist, and preferred ones of such possibilities are shown and described herein. It is to be understood, however, that all combinations of: the number of interconnected link elements in the repeated pattern along the length of rope chain; solid or portioned coloration and/or texturing; different designs of the portioned regions of each side surface of the link elements; and different physical shapes and/or visual properties of the

individual link elements may be employed in the manufacture of jewelry rope chains and are contemplated as variations of the preferred embodiments specifically shown and described.

According to an aspect of the present invention there is provided a generally C-shaped gapped link element of a type that is interlinked with a series of other such link elements to produce a jewelry rope-chain having the appearance of intertwining helical strands, each of the gapped link elements having a first major surface, an opposite second major surface, an interior edge and an exterior edge, wherein:

- said first major surface is divided into portions, a first major-surface portion exhibiting a first visual property perceptively different than a second visual property exhibited by an adjacent first major-surface portion; and

- said visual properties are color properties, surface-pattern properties or surface-texture properties, or combinations of color properties, surface-pattern properties or surface texture properties.

According to another aspect of the present invention there is provided a jewelry rope-chain of a type comprising a series of tightly-interfitting gapped links and having an appearance of intertwining helical strands, wherein:

- at least some of the gapped links comprise multiple segments formed by stamping a multi-segmented material blank, each segment of the multi-segmented material blank exhibiting a different visual property than an adjacent segment of the material blank; and

- each of said links has a first side surface exhibiting a first visual property and an opposite second side surface exhibiting a second, perceptively different, visual property.

According to a further aspect of the present invention there is provided a jewelry rope-chain of a type comprising a series of tightly-interfitting gapped links and having an appearance of intertwining helical strands, each gapped link having spaced ends defining a gap therebetween, each of said gapped links having a first side surface and an opposite second side surface, and wherein each said first side surface of at least some of said gapped links is divided into portions disposed according to a predetermined pattern along the span of said link between said ends, each first side surface portion exhibiting a first

20 a

visual property perceptively different than a second visual property exhibited by an adjacent first side surface portion.

According to a further aspect of the present invention there is provided a jewelry rope-chain comprising a series of tightly-interfitting gapped links having an appearance of intertwining helical strands with a helical channel being defined between intertwined first and second helical strands, the first and second helical strands exhibiting at least two distinctly different visual properties along the length of said helical channel.

According to a further aspect of the present invention there is provided a method of manufacturing a gapped link element of a type that is assembled with other such link elements to form a jewelry rope-chain, each of the link elements being generally C-shaped in configuration to define a gap between facing ends thereof, and each of the link elements having a first major surface, an opposite second major surface, an interior edge and an exterior edge, the method comprising:

- providing a material having a plurality of regions, adjacent ones of which exhibit different visual properties; and

- forming a link element from said material, the link element so produced comprising segments of at least two of said plurality of regions.

According to a further aspect of the present invention there is provided a method of manufacturing a jewelry rope-chain comprised of a series of interlinked gapped link elements, each of said link elements being generally C-shaped in configuration to define a gap between facing ends thereof, each of said link elements having a first major surface, an opposite second major surface, an interior edge and an exterior edge, and link width is defined as a distance, measured along either of said major surfaces, between a pair of parallel lines perpendicular to said major surfaces and tangent to, respectively, said interior and exterior edges, the method comprising:

- providing a sheet of material of precious metal;

- forming a link element from said sheet of material, said link element divided into segments, each segment possessing a unique link-width character relative to an adjacent segment; and

- assembling a plurality of said link elements to form a rope-chain.

20 b

According to a further aspect of the present invention there is provided a method for manufacturing a jewelry rope-chain, the method comprising:

providing a multi-segmented material blank, each segment of said multi-segmented material blank exhibiting a different visual property than an adjacent segment of said material blank;

stamping a plurality of gapped links from said multi-segmented material blank, each of said gapped links having a first side surface exhibiting a first visual property and an opposite second side surface exhibiting a second, perceptively different, visual property; and

tightly interfitting a series of said gapped links to construct a length of rope chain having the appearance of intertwining helical strands.

According to a further aspect of the present invention there is provided a method for manufacturing a jewelry rope-chain, the method comprising:

providing a plurality of gapped links, each gapped link having spaced ends defining a gap therebetween, each of said gapped links having a first side surface and an opposite second side surface, the first side surface of at least some of said gapped links being divided into portions disposed according to a predetermined pattern along the span of said link between said ends, each said first side surface portion exhibiting a first visual property perceptively different than a second visual property exhibited by an adjacent first side surface portion; and

tightly interfitting a series of said gapped links to construct a rope chain having the appearance of intertwining helical strands.

BRIEF DESCRIPTION OF THE DRAWING

Further objects and advantages and a better understanding of the present invention may be had by reference to the following detailed description taken in conjunction with the accompanying drawings in which Figures 6X, 18X, 17X, 34X, 35X, 36X, and 37X are lined for color, and in which certain other figures are lined for color or texture.

20 c

FIGURE 1 is a plan view of an annular link element which is the basic building element for the construction of jewelry rope chains as known in the prior art;

FIGURE 2 is a cross sectional view of a solid core annular link element taken along the lines 2-2 in Figure 1, also known in the prior art;

FIGURE 2A is a view similar to that of Figure 2, except that the link element is rectangular and hollow in cross section, known in the prior art;

FIGURE 2B is a view similar to that of Figure 2A, except that the link element is circular and hollow cross section;

FIGURE 3 is a side elevational view showing a section of a prior art rope chain during the manufacturing process, before removing a forming wire used to maintain proper orientation of the series of links;

FIGURE 4 is a front elevational view of the outward appearance of a jewelry rope chain of the prior art showing a uniform visual appearance for all links in the chain for the entire length thereof;

FIGURE 5 is a perspective view of a number of loosely interconnected links in an expanded view to show the method of interlinking to form sets of links in the series of links along the rope chain, as is known in the prior art;

FIGURE 6 is a side elevational view of an annular link used in the manufacture of one
5 embodiment of a rope chain in accordance with the present invention;

FIGURE 7 is a plan view of a first example of an annular link showing a pattern of regions on the surface of the link exhibiting different visual properties;

FIGURE 8 is a plan view of a second example of an annular link showing a pattern of regions on the surface of the link exhibiting different visual properties;

10 FIGURE 9 is a plan view of a third example of an annular link showing a pattern of regions on the surface of the link exhibiting different visual properties;

FIGURE 10 is a plan view of a fourth example of an annular link showing a pattern of regions on the surface of the link exhibiting different visual properties;

FIGURE 11 is a plan view of a fifth example of an annular link showing a pattern of
15 regions on the surface of the link exhibiting different visual properties;

FIGURE 12 is a schematic representation of a rope chain segment employing annular links of the type shown in Figure 6, the figure lined for the colors yellow gold and white gold;

FIGURE 13 is another embodiment of a rope chain segment employing annular links of the type shown in Figure 7, the figure visually suggesting alternate helical rope strands
20 lined to show the color yellow gold alternating with the color white gold;

FIGURE 14 is a view similar to that of Figure 13, with a number of annular links inserted in the series of links in reverse direction every two twists of the apparent strands of the rope chain;

FIGURE 15 is an elevational view of section of rope chain manufactured using the style of annular link shown in Figure 7, and with the orientation of adjacent links reversed every six links along the axis of the rope chain;

FIGURE 16 is a left side elevational view of the segment of rope chain shown in Figure 15;

FIGURE 17 is a right elevational view of the segment of rope chain shown in Figure 15;

FIGURE 18 is a plan view of a sixth example of an annular link showing a pattern of regions on the surface of the link exhibiting four different visual color properties;

FIGURE 19 is a plan view of a seventh example of an annular link showing a pattern of regions on the surface of the link exhibiting four different visual color properties;

FIGURE 20 is a plan view of an eighth example of an annular link showing a pattern of four regions on the surface of the link exhibiting two different visual color properties;

FIGURE 21 is a perspective view of a gapped link, similar to any one of those depicted in Figures 1, 6-11, 18, and 19, except that it has a virtually flat, but non-planar upper and lower major surfaces;

FIGURE 22 is a plan view of a ninth example of a rope chain gapped link which has a baguette shape, the link having the possibility of displaying a pattern of regions on the surfaces of the link exhibiting different colors, textures, or other visual properties;

FIGURE 23 is a plan view of a tenth example of a rope chain gapped link which has a square shape, the link having the possibility of displaying a pattern of regions on the surfaces of the link exhibiting different colors, textures, or other visual properties;

FIGURE 24 is a plan view of an eleventh example of a rope chain gapped link which has an oval shape, the link having the possibility of displaying a pattern of regions on the surfaces of the link exhibiting different colors, textures, or other visual properties;

FIGURE 25 is a plan view of a twelfth example of a rope chain gapped link which has a
5 diamond shape, the link having the possibility of displaying a pattern of regions on the surfaces of the link exhibiting different colors, textures, or other visual properties; and

FIGURE 26 is a plan view of a thirteenth example of a rope chain gapped link which is heart shaped, the link having the possibility of displaying a pattern of regions on the surfaces of the link exhibiting different colors, textures, or other visual properties.

10 FIGURE 1X is a plan view of an annular link element which is the basic building element for the construction of jewelry rope chains as known in the prior art;

FIGURE 2X is a cross sectional view taken along the line 2X-2X in Figure 1X, also known in the prior art;

FIGURE 2AX is a view similar to that of Figure 2X, except that the link element is
15 rectangular and hollow in cross section, known in the prior art;

FIGURE 2BX is a view similar to that of Figure 2AX, except that the link element is circular and hollow cross section;

FIGURE 2CX is a view similar to that of Figure 2AX, except that the generally rectangular cross sectioned link element does not have straight sides, but rather sides of an
20 indeterminate shape;

FIGURE 2DX is a view similar to that of Figure 2BX, except that the generally circular cross sectioned link element does not have smooth sides, but rather sides of an indeterminate shape;

FIGURE 3X is a side elevational view showing a section of a prior art rope chain during the manufacturing process, before removing a forming wire used to maintain proper orientation of the series of link elements;

FIGURE 4X is a front elevational view of the outward appearance of a jewelry rope chain of the prior art showing a uniform visual appearance for all link elements in the chain for the entire length thereof;

FIGURE 5X is a perspective view of a number of loosely interconnected link elements in an expanded view to show the method of interlinking to form sets of link elements in the series of link elements along the rope chain, as is known in the prior art;

FIGURES 6X-45X show plan views of link elements each of which are uniquely different in shape, texture, color, or configuration than other link elements in the accompanying figures, illustrating a variety of possibilities for the design and structure of the link elements which are assembled to form a rope chain, Figure 6X depicting a link element in which one half is of one color and of one shape, and the other half is of another color and of another shape;

FIGURE 7X is a plan view of a link element having a smooth interior edge and a full undulated exterior edge 22X;

FIGURE 8X is a plan view of a link element having a crenelated interior edge and an undulated exterior edge 28X;

FIGURE 9X is a plan view of a link element having a smooth exterior edge and a crenelated interior edge;

FIGURE 10X is a plan view of a link element having smooth exterior and interior edges, and a patterned area along a central major surface;

FIGURE 11X is a plan view of a link element having smooth exterior and interior edges with a patterned area along a major surface thereof;

FIGURE 12X is a plan view of a link element having smooth exterior and interior edges, and with a textured patterned groove along a central major surface;

- 5 FIGURE 13X is a plan view of a link element having smooth exterior and interior edges with textured depressions in a major surface thereof adjacent the exterior and interior edges;

FIGURE 14X is a plan view of a segmented link element, one half having a narrow annular width and the other half gradually increasing to a wider width at its middle;

- 10 FIGURE 15X is a plan view of a segmented link element, one half having a narrower than normal annular width, and the other half having a non-linear relatively wider annular width;

- FIGURE 16X is a plan view of a segmented link element, one half having a narrow annular width, and the other half having a relatively wider annular width with an opening
15 therein;

FIGURE 17X is a plan view of a segmented link element, one half having a narrow annular width, and the other half having a relatively wider annular width with an opening therein and a portion with a different material or differently colored material;

- FIGURE 18X is a plan view of a segmented link element, one half having a narrower
20 annular width, and the other half having a relatively wider annular width largely open with tendril-like filigree filaments bridging across the opening;

FIGURE 19X is a plan view of a segmented link element, one half having a narrower annular width, and the other half having a relatively wider annular width with a repeating symbol therein or thereon;

FIGURE 20X is a plan view of a link element similar to that shown in Figure 9X, but with one half having an undulated exterior edge and no interior crenels;

FIGURE 21X is a plan view of a link element similar to that shown in Figure 9X with only one side having a crenelated interior edge, and with the other half having smooth interior
5 and exterior edges;

FIGURE 22X is a plan view of a link element similar to that shown in Figure 1X, but with a double bumped projection on the exterior edge thereof;

FIGURE 23X is a plan view of a link element similar to that shown in Figure 22X, but with an opening in the projection;

10 FIGURE 24X shows a baguette shaped link element configuration version of the link element of Figure 11X;

FIGURE 25X shows a square shaped link element configuration;

FIGURE 26X shows an oval shaped link element configuration version of the link element of Figure 10X;

15 FIGURE 27X shows a diamond shaped link element configuration;

FIGURE 27AX shows a heart shaped link element configuration;

FIGURE 28X shows a link element in which an arcuate concave cut is made in each side;

FIGURE 28AX is a partial plan view of a link element variation of the link element shown in Figure 28X;

20 FIGURE 29X shows a link element having a smooth interior edge and a crenelated exterior edge;

FIGURE 30X shows a link element similar to that of Figure 28X, but with flat, rather than concave, side cutouts;

FIGURE 31X shows a link element having smooth exterior and interior edges, the annular width of which is less than standard;

- 5 FIGURES 32X and 33X are plan and side elevational views, respectively, of a link element which has notches or depressions spaced around the periphery;

FIGURE 34X shows a link element having a side of a first material and an opening therein, and a side of narrow annular width with undulations and of a second material;

- 10 FIGURE 35X shows a link element of having a first side made of a first material with openings therein separated by a solid annular segment of a second material, and a second side of a third material and of a narrowed annular width;

FIGURE 36X shows a link element having a side of a first material and with a plurality of spaced differently shaped openings, the other side made of a second material and having a narrower-than-standard annular width;

- 15 FIGURE 37X shows a link element having a side of a first material and with a flattened edge, the other side made of a second material and having a standard annular width;

FIGURE 38X is a partial side elevational view of a link element in which one or both of the textured major surfaces are serrated, or knurled;

- 20 FIGURE 39X is a partial side elevational view of a link element in which one or both of the textured major surfaces have connected angled plate-like segments producing a saw-toothed profile;

FIGURE 40X is a partial side elevational view of a link element in which one or both of the textured major surfaces have V-shaped grooves;

FIGURE 41X is a partial side elevational view of a link element in which the exterior edge is serrated, scored, or knurled, and the major surfaces are planar;

FIGURE 42X is a partial side elevational view of a link element in which both major surfaces and the exterior edge are serrated, or knurled;

- 5 FIGURE 43X is a plan view of a link element having smooth exterior and interior edges, and with a serrated, scored, or knurled, major surface;

FIGURE 44X is a plan view of a link element having a smooth interior edge, a serrated, scored, or knurled, exterior edge, and a serrated, scored, or knurled, major surface;

- 10 FIGURE 45X is a partial plan view of a link element having portions of its major surface smooth and portions serrated, scored, or knurled;

FIGURE 46X is a length of rope chain in which each link element comprises differently sized segments resulting in one of the apparent rope strands being of a larger diameter than the adjacent strand; and

- 15 FIGURE 47X is a length of rope chain in which each link element comprises differently shaped segments resulting in one of the apparent rope strands exhibiting a much different visual property than that of the adjacent strand.

Figures 48AX, 48BX, 48CX, and 48DX show how a number of identical link elements are interconnected in a special way.

- 20 Figures 49AX, 49BX, 49CX, and 49DX also show how a number of identical link elements are interconnected in a special way. The link elements in Figures 49AX-49DX are similar to, but have a different visual appearance than the link elements in Figures 48AX-48DX.

FIGURE 1Y is a plan view of an annular link element which is the basic building element for the construction of jewelry rope chains as known in the prior art;

- 25 FIGURE 2Y is a front elevational view of the outward appearance of a jewelry rope chain of the prior art showing a uniform visual appearance for all link elements in the chain for the entire length thereof;

FIGURE 3Y is a plan view of a sheet of material showing multi-colored edge-joined flat strips or regions and, in dashed lines, the location and orientation of a link element to be stamped from such sheet of material;

FIGURE 4Y is a view similar to that of Figure 3Y, but with more colored adjoined strips
5 and a different orientation of the link element to be stamped from such sheet of material;

FIGURE 5Y is a view similar to that of Figure 3Y, but with different widths of the colored strips making up the sheet of material;

FIGURE 6Y is a view similar to that of Figure 3Y, but showing a different orientation of the link element to be stamped from such sheet of material;

10 FIGURE 7Y is a view similar to that of Figure 5Y, but with different widths of the colored strips making up the sheet of material and a reversal of the colored strips;

FIGURE 7AY is an example of a link element stamped from a multicolored sheet of material;

FIGURE 8Y is a view similar to that of Figures 3Y or 6Y, but showing a different
15 orientation of the link element to be stamped from such sheet of material;

FIGURE 9Y is a view similar to that of Figure 8Y, but with a different number and arrangement of colored strips making up the sheet of material;

FIGURE 10Y is a plan view of a sheet of material having an intermediate textured region and, in dashed lines, the location and orientation of a link element to be stamped from such
20 sheet of material;

FIGURE 11Y is a plan view of a sheet of material having multiple textured regions, thereby exhibiting three different visual properties, and, in dashed lines, the location and orientation of a link element to be stamped from such sheet of material;

FIGURES 12Y and 12AY are perspective views of the segment of sheet material shown in Figure 11Y taken along the line 12Y-12Y in Figure 11Y, for the respective embodiments in which textured regions are present in the top only, or in both the top and bottom major surfaces of the sheet of material;

- 5 FIGURE 13Y is a view similar to that of Figure 10Y, but with the position of the textured region in a different location and having lines representing the texturing perpendicular to the length of the sheet of material;

FIGURE 14Y is a plan view of a sheet of material in which a preparatory step of imprinting surface texturing has taken place, prior to die-cutting out a link element from
10 the material;

FIGURE 15Y is a cross sectional view of the sheet of material taken along the line 15Y-15Y in Figure 14Y, and showing two possible die-cut patterns for stamping out a link element;

FIGURE 16Y is a plan view of one configuration for a link element die-cut, or stamped,
15 from the material shown in Figure 14Y;

FIGURE 17Y is a plan view of another configuration for a link element die-cut, or stamped, from the material shown in Figure 14Y, exhibiting a bulging effect to the segments of the link element that extend between the imprinted surface texturing;

FIGURE 18Y is a perspective view of a laminated sheet of material from which slices can
20 be cut and eventually formed into a link element similar to that shown in Figure 49Y or 49AY;

FIGURE 19Y is a perspective view of a slice from a relatively thick sheet of material that can be bent, or rolled, to form a link element which has texturing on its major and/or edge surfaces;

FIGURE 20Y is a perspective view of a slice from a relatively thin sheet of material that can be bent, or rolled, to form a link element which has texturing on its major and/or edge surfaces;

5 FIGURE 21Y is a plan view of a length of sheet material from which slices can be taken and formed into a link element having surface texturing on one major surface and one peripheral edge thereof;

FIGURE 22Y is a side elevational view of the slice of material shown in Figure 20Y and taken along the line 22Y-22Y in Figure 21Y;

FIGURE 23Y is a top plan view of the slice of material shown in Figure 22Y;

10 FIGURE 24Y is a plan view of a length of sheet material from which slices can be taken and formed into a link element with surface texturing on both major surfaces and both interior and exterior edge surfaces thereof;

FIGURE 25Y is a side elevational view of a slice of material similar to that shown in Figure 20Y, but taken along the line 25Y-25Y in Figure 24Y;

15 FIGURE 26Y is a top plan view of a link element shown in Figure 25Y;

FIGURE 27Y is a perspective view of a link element formed from the slice of material shown in Figures 25Y and 26Y;

FIGURE 28Y is a perspective view similar to that of Figure 19Y, but with deep cut and textured, elongated, and linear recesses formed in the sheet of material from which a slice
20 is to be taken;

FIGURE 29Y is a perspective view of a link element made from the slice of material shown in Figure 28Y;

FIGURE 30Y is an action perspective view showing four time positions of a slice of material, or a wire, illustrating the bending positions of a straight textured and shaped slice or wire into the configuration of a link element;

FIGURE 31Y is a view similar to that shown in Figure 36Y, but without showing
5 intermediated bending positions, and with a different pattern of surface texturing;

FIGURE 32Y shows examples of different surface texturing that may be selected to cover portions or the entire major or edge surfaces of a link element made in accordance with the present invention;

FIGURES 33Y is a plan view of a link element of standard annular configuration and
10 displaying examples of major surface texturing;

FIGURE 34Y is a plan view of a link element in which the exterior edge is serrated;

FIGURES 35Y-39Y are plan views of link elements each of a standard annular size and configuration and displaying different preferred color and/or texture patterns on a major surface thereof;

15 FIGURE 40Y is a plan view of a link element showing a major surface with alternating and spaced lining adjacent the interior and exterior edges, the lining being in the form of depressions formed during the stamping process;

FIGURE 41Y is a plan view of a link element showing cutout patterns along the interior and exterior peripheral edges, formed during the stamping process;

20 FIGURE 42Y is a plan view of a link element showing a major facial surface with evenly distributed lining adjacent the exterior edge, formed during the stamping process;

FIGURE 43Y is a plan view of a link element showing a configuration departing from the standard annular configuration and formed by stamping;

FIGURE 44Y is a plan view of a link element showing a configuration departing from the standard annular configuration, one half with beads formed along the exterior side thereof, all formed during the stamping process;

FIGURES 45Y-48Y are a plan views of link elements each having a configuration
5 departing from the standard annular configuration and formed by stamping;

FIGURE 49Y is a plan view of a link element formed by bending a layered wire or a slice of a sheet of layered material such that the major surfaces exhibit multiple colors or textures, and the inner and outer edges exhibit a single color or texture;

FIGURE 49AY is an edge side view of a link element formed by bending a layered wire or
10 a slice of a sheet of layered material such that each major surface exhibits a single color or texture, and the inner and outer edges exhibit multiple colors or textures;

FIGURE 50Y is a plan view of a link element having a smooth interior edge and a stepped cutout on one side exterior edge;

FIGURES 51Y-59Y are plan views of link elements each having a shaped configuration
15 departing from the standard annular configuration and formed by stamping, Figures 53Y, 55Y, and 56Y showing all or a portion of the link element as a series of adjacently connected geometric or design shapes;

FIGURE 60Y is a schematic representation showing the assembly sequence of link elements forming a length of rope chain, employing link elements of standard, or
20 substandard, annular widths alternating with link elements having a portion relatively enlarged in annular width such as that shown in Figure 43Y;

FIGURE 61Y is a schematic representation showing the assembly sequence of link elements forming a length of rope chain, employing link elements each having a portion relatively enlarged in annular width such as that shown in Figure 43Y;

FIGURE 62Y is a schematic representation showing the assembly sequence of link elements forming a length of rope chain, employing aligned link elements each having a portion relatively enlarged in annular width such as that shown in Figure 43Y;

5 FIGURE 63Y is a schematic representation showing the assembly sequence of link elements forming a length of rope chain, employing link elements, whether annularly shaped or otherwise, of different dimensions alternating every six link elements;

FIGURE 64Y is a schematic representation showing the assembly sequence of link elements forming a length of rope chain, employing link elements of standard, or substandard, annular widths alternating with link elements having relatively enlarged
10 annular widths;

FIGURE 65Y is a schematic representation showing the assembly sequence of link elements forming a length of rope chain, employing pairs of link elements of standard, or substandard, annular widths alternating with pairs of link elements having relatively enlarged annular widths;

15 FIGURE 66Y is a plan view of a sheet of material having multiple colored or textured regions, thereby exhibiting five different visual properties, and, in dashed lines, the location and orientation of link elements to be stamped from such sheet of material;

FIGURE 67Y is a plan view similar to that of Figure 66, but with the orientation of link elements rotated 180°;

20 FIGURE 68Y is a plan view of a sheet of material having multiple colored or textured regions, thereby exhibiting five different visual properties, and, in dashed lines, the location and orientation of link elements to be stamped from such sheet of material;

FIGURE 69Y is a fragment representation of the sheet of material shown in Figure 66Y or 67Y;

FIGURE 70Y is a front elevational view of the outward appearance of a length of jewelry rope chain showing the color or texture pattern resulting from assembling link elements including link elements stamped from the sheet of material shown in Figures 66Y and 67Y;

- 5 FIGURE 71Y is a fragment representation of the sheet of material shown in Figure 68Y;

FIGURE 72Y is a front elevational view of the outward appearance of a length of jewelry rope chain showing the color or texture pattern resulting from assembling link elements stamped from the sheet of material shown in Figure 68Y;

- 10 FIGURE 73Y is a plan view of a sheet of material having multiple colored or textured regions, thereby exhibiting five different visual properties, and from which some of the link elements shown in Figure 74Y are stamped;

- FIGURE 74Y is a front elevational view of the outward appearance of a length of jewelry rope chain showing the color or texture pattern resulting from assembling link elements stamped from a sheet of material or from different sheets of material, similar to
15 that shown in Figure 73Y, but with offset color/texture patterns on adjacent link elements;

FIGURE 75Y is a plan view of three different link elements, each stamped from a sheet of material or from different sheets of material, similar to that shown in Figure 73Y, each link element exhibiting a different, i.e. offset, arrangement of color/texture patterns from the adjacent link element;

- 20 FIGURE 76Y is a plan view of a sheet of material from which curved slices can be cut and eventually formed into a link element; and

FIGURE 77Y is a plan view of a sheet of material from which link elements can be stamped, the link elements being interlinked in layout and alternating in their gap positions to minimize material waste.

FIGURE 1Z is a plan view of an annular link element which is the basic building element for the construction of jewelry rope chains as known in the prior art;

FIGURE 1AZ is a plan view of a baguette shaped link element which may be used with or without other link elements to construct a jewelry rope chain as known in the prior art;

5 FIGURE 2Z is a cross sectional view of a solid core annular link element taken along the lines 2Z-2Z in Figure 1Z, also known in the prior art;

FIGURE 2AZ is a view similar to that of Figure 2Z, except that the link element is rectangular and hollow in cross section, as known in the prior art;

10 FIGURE 2BZ is a view similar to that of Figure 2AZ, except that the link element is circular and hollow in cross section, as known in the prior art;

FIGURE 3Z is a side elevational view showing a section of a prior art rope chain during the manufacturing process, before removing a forming wire used to maintain proper orientation of the series of link elements;

15 FIGURE 4Z is a front elevational view of a length of rope chain shaded to show the outward appearance of a length of jewelry rope chain of the prior art exhibiting a uniform visual appearance for all link elements in the chain for the entire length thereof;

FIGURE 5Z is a plan view of a first example of an annular link element showing a pattern of two regions on the surface of the link element exhibiting two different visual properties;

20 FIGURE 6Z is a schematic representation of a length of rope chain employing annular link elements of the type shown in Figure 5Z, the figure visually suggesting a pair of intertwined helical rope strands lined to show the color yellow gold alternating with the color white gold;

FIGURE 7Z is a plan view of a second example of an annular link element showing a pattern of three regions on the surface of the link element exhibiting two different visual properties;

FIGURE 8Z is a plan view of a third example of an annular link element showing a pattern
5 of five regions on the surface of the link element exhibiting two different visual properties;

FIGURE 9Z is a plan view of a fourth example of an annular link element showing a pattern of six regions on the surface of the link element exhibiting four different visual color properties;

FIGURE 10Z is a plan view of a fifth example of an annular link element showing a
10 pattern of four regions on the surface of the link element exhibiting four different visual color properties;

FIGURE 11Z is a plan view of an sixth example of an annular link element, as it would be stamped from a multicolored sheet of material, showing a pattern of four regions on the surface of the link element exhibiting two different visual color properties;

FIGURE 12Z is a plan view of a seventh example of an annular link element showing a
15 pattern of five regions on the surface of the link element exhibiting two different visual properties;

FIGURE 13Z is a plan view of an eighth example of a link element formed with one side larger than the other side, the transition between the two sides being a smooth transition;

FIGURE 14Z is a plan view of an ninth example of a link element formed with one side
20 larger than the other side, the relatively abrupt transition between the two sides located on the larger link side;

FIGURE 15Z is a plan view of an tenth example of a link element formed with one side larger than the other side, the relatively abrupt transition between the two sides located on the smaller link side;

FIGURE 16Z is a front elevational view of a first example of a length of rope chain
5 partitioned to show in the upper part of the figure an untreated chain portion, and to show in the lower part of the figure colorization of one of the strands of the rope chain;

FIGURE 17Z is a front elevational view of a second example of a length of rope chain partitioned to show in the upper part of the figure an untreated chain portion, and to show in the lower part of the figure colorization of one of the strands of the rope chain;

10 FIGURE 18Z is a front elevational view of a third example of a length of rope chain partitioned to show in the upper part of the figure an untreated chain portion, and to show in the lower part of the figure colorization of one of the strands of the rope chain;

FIGURE 19Z is a front elevational view of a fourth example of a length of rope chain partitioned to show in the upper part of the figure an untreated chain portion, and to show
15 in the lower part of the figure colorization of one of the strands of the rope chain;

FIGURE 20Z is a front elevational view of a fifth example of a length of rope chain partitioned to show in the upper part of the figure an untreated chain portion, and to show in the lower part of the figure colorization of one of the strands of the rope chain;

FIGURE 21Z is a front elevational view of a sixth first example of a length of rope chain
20 partitioned to show in the upper part of the figure an untreated chain portion, and to show in the lower part of the figure colorization of one of the strands of the rope chain;

FIGURE 22Z is a front elevational view of a seventh first example of a length of rope chain partitioned to show in the upper part of the figure an untreated chain portion, and to show in the lower part of the figure colorization of one of the strands of the rope chain;

FIGURE 23Z is a front elevational view of an eighth example of a length of rope chain partitioned to show in the upper part of the figure an untreated chain portion, and to show in the lower part of the figure colorization of one of the strands of the rope chain;

5 FIGURE 24Z is a front elevational view of a ninth example of a length of rope chain partitioned to show in the upper part of the figure an untreated chain portion, and to show in the lower part of the figure colorization of one of the strands of the rope chain;

FIGURE 25Z is a front elevational view of another length of rope chain showing a colored helical stripe along the outer periphery of one of the intertwined rope chain strands;

10 FIGURE 26Z is a front elevational view of another length of rope chain showing a colored helical stripe along the outer periphery of both of the intertwined rope chain strands;

FIGURE 27Z is a front elevational view of another length of rope chain showing a colored helical stripe along the inner side of one channel of the rope chain;

FIGURE 28Z is a front elevational view of another length of rope chain showing a colored helical stripe along both inner sides of one channel of the rope chain;

15 FIGURE 29Z is a front elevational view of another length of rope chain showing a colored helical stripe along both inner sides of both channels of the rope chain;

FIGURE 30Z is a front elevational view of another length of rope chain showing cut portions on four sides;

FIGURE 31Z is an end view of the length of rope chain shown in Figure 30Z;

20 FIGURE 32Z is an end view of another embodiment of rope chain showing cut portions on eight sides;

FIGURE 33Z is an end view of another embodiment of rope chain showing cut portions of unequal spacing from the axis of the chain;

FIGURE 34Z is a front elevational view of another length of rope chain showing two different diameters of rope strands and cut portions on four sides;

5 FIGURE 35Z is an end view of the length of rope chain shown in Figure 34Z;

FIGURE 36Z is an end view of another embodiment of rope chain showing cut portions on eight sides;

FIGURE 37Z is an end view of another embodiment of rope chain showing cut portions of unequal spacing from the axis of the chain;

10 FIGURE 38Z is a front elevational view of another length of rope chain showing helical cut portions on only the larger of the two rope strands; and

FIGURE 39Z is a front elevational view of another length of rope chain showing alternating colored chain segments along the length of the rope chain.

DETAILED DESCRIPTION OF THE FIRST EMBODIMENTS

15 Figure 1 is a plan view of an annular link used in the construction of jewelry rope chains as known in the prior art. In general, Figures 1-5 depict a conventional rope chain arrangement (Figures 3 and 4), a typical annular link (Figures 1 and 2) employed as a basic building element in the construction of the rope chain, and a number of loosely interconnected annular links (Figure 5) to illustrate the positional relationship of adjacent
20 annular links along the rope chain.

For the purposes of this description, the following definitions are provided.

"Rope chain" is a series of sets of interlinked, or interconnected, link elements which has the appearance of a plurality of braided, or helically intertwined, multi-fiber strands of hemp, flax, or the like.

5 A "set" is the number of adjacent interlinked, or interconnected, links making up a structurally repeated pattern along the chain. In the accompanying drawings and associated text, a six-link set is used for purposes of ease of visual presentation and description. The preferred number of links in a set is eight.

10 A "group" is a number of adjacent interlinked, or interconnected, links exhibiting identical visual properties. The number of links in a group may be the same or different than the number of links in a set. Groups may be uniformly or randomly distributed along the rope chain.

15 A "link" is the basic building element, a number of which are assembled in series to form a rope chain. A link is typically annular in shape with an open gap having a length slightly greater than the width of the annular link. In accordance with the invention, a link may have a circular, baguette, oval, diamond, rectangular, square, heart shaped, or other geometrical shape, and each is provided with a gap at a selected position along the perimeter thereof. Accordingly, while the links of a rope chain are not necessarily annular, it is the preferred configuration for the basic building element of a rope chain, and for that reason an annular link will be used in most of the examples shown and described herein.

20 A "channel" is the path which the eye follows in passing along the rope chain at the apex of the V-shaped helical groove formed between the apparent intertwined rope braids. Hence, in the preferred embodiments described herein, the rope chain has the appearance of a pair of intertwined braids of ropes, and thus there exists two such helical channels offset from one another by one-half of the pitch of either helix.

25 A "visual property", as used herein, is a characteristic of an object which presents a particular visual image to the eye. Such characteristics include, but are not limited to, color, texture, pattern, or physical shape. Although shape is also a physical property of an

object, in the art of jewelry making, it is often the physical shapes which impart beauty and delicateness to a fashion item.

Referring now to Figures 1 and 2, an annular link 1 is shown to have a generally rectangular cross section (Figure 2) and a gap 3 having sloping edges, the narrowest width
5 of gap 3 being slightly larger than the thickness of the annular link 1.

While conventional rope chains are constructed using annular links having a rectangular cross section as shown in Figure 2, variations with different cross sectional geometries are possible. Figures 2A and 2B depict two such variations. The cross section of tubular link 1A in Figure 2A is rectangular and hollow (known from U.S. Patent No. 4,651,517).
10 Another variation is shown in Figure 2B in which the tubular link element 1B has a hollow circular cross section. All of the link element embodiments and variations of the present invention illustrated in Figures 6-26 can be solid or hollow in cross section, and may have any geometrical cross sectional configuration. A non-limiting solid rectangular cross section is chosen as exemplary in the accompanying drawings for illustrative purposes
15 only.

Conventional rope chains, such as those shown in Figures 3 and 4, are made with a systematic and repetitive interlinking of basic annular links 1. The annular link 1 must meet certain dimensional requirements for the interlinking to result in a well-fitting rope chain. Such dimensions are known in the art and will vary from a four-link variety to a
20 six-link variety to an eight-link variety, and so on. Determining the proper dimensions for the annular link 1 and the gap 3 therein, depending upon the number of desired links to form a set of interlinked links, can be readily understood by reference to the aforementioned U.S. patents, especially U.S. Patent No. 4,651,517. As can be viewed in Figures 3 and 4 herein, the intertwined links 1 of a segment of a conventional rope chain 5
25 are shown in Figures 3 and 4 in the form of a six-link variety. In their assembled form, the series of links 1 produce the appearance of a first braid of rope 7 and a second braid of rope 8, the combination of which results in a double intertwined helical appearance.

As best seen in Figures 3 and 4, the apparent intertwining of a pair of rope braids 7 and 8 results in a V-shaped groove between the braids at any position along the rope chain. The path along the apex of such V-shaped groove is referred to herein as a "channel", and since there are two apparent rope braids 7 and 8, there are, likewise, two defined channels

5 indicating Figure 3 by the directional arrows 10 and 12. Channel 10, along the length of the rope chain, defines a helix, as does channel 12. However, the two channels never intersect one another, and are parallel to one another along the length of the rope chain separated axially by one half of the pitch of either of the two channels. In the prior art of Figures 3 and 4, there is no visual difference between following along the two helical

10 channels 10 and 12, since the rope chain is comprised of a repetitive series of sets of links 1, and all links have the same visual property (they are all of the same color, texture, and shape, for example).

Figure 3 is a side elevational view showing a section of a prior art rope chain during the manufacturing process, before removing a forming wire used to maintain proper

15 orientation of the series of links.

Further with respect to Figure 3, in the construction of a rope chain using annular links 1, it is necessary to maintain a tightly interlinking of the annular links until the entire rope chain is completed, and for that purpose, a pair of support wires 6 are positioned in the channels 10 and 12 and are kept in place until such time as a means of fixing the

20 assembled links 1 together is completed. In U.S. Patent 4,651,517, for example, after building up the links in the manner described therein, to form the double helix chain, the links are held in the desired juxtaposition temporarily by a thin metal wire wrapped around the links. Then, solder is intermittently applied to every pair of adjacent links at the external periphery thereof. The wire is then removed and does not comprise a part of the

25 completed rope chain.

Figure 4 is a front elevational view of the outward appearance of a jewelry rope chain of the prior art showing a uniform visual appearance for all links in the chain for the entire length thereof.

In Figure 4, the distance denoted by numeral 9 encompasses the links of a "set" of links, and it will be noted that links 11 and 13 lie in the same plane, but are angularly displaced from one another along the links of the rope chain by 180°. That is, following the position of link 11 counterclockwise (as seen from the top) and downwardly, it will be observed
5 that each subsequent link is angularly spaced at a constant 30° angle, and since there are six links per set, a 180° turn of link 11 downwardly along the rope chain will be effectively rotated 180° to assume the position of link 13. As is clearly visible in Figure 4, a series of sets of links 1 makes up the length of rope chain illustrated.

For an eight-link "set" (not shown, but defining a preferred embodiment), each subsequent
10 link will be angularly spaced at a constant 22.5° angle.

Figure 5 is a perspective view of a set of loosely interconnected links in an expanded view to show the interlinking of the links to form a set of links in the series of links along the rope chain, as is known in the prior art. The drawing of Figure 5 is copied from U.S. Patent No. 4,651,517 (Figure 8g thereof), and shows a number of annular links A1-A6, B1 and
15 B2, each with a gap 3 permitting the complex interlinking arrangement shown. A set of annular links A1-A6, when tightly assembled, results in the structured, repeated, pattern shown in Figure 4 with the annular link A1 of a first set of links lying in the same plane as the first annular link B1 belonging to the next adjacent set of annular links B1-B6 (only links B1 and B2 shown).

20 In the remaining figures to be described, Figures 6-11 illustrate variations of the present invention in which the annular links are manufactured with a variety of different appealing visual properties.

In Figure 6, for example, the plan view of the annular link 21 has one planar side, or facial, major surface 23 (hereinafter referred to as a first side surface) of a first color and the
25 opposite planar side, or facial, major surface 25 (hereinafter referred to as a second side surface) of a different color. The link 21 may be formed, for example, by stamping a flat sheet constructed of two laminated layers of different flat materials, or of two laminated layers of materials of different colors, and/or textures.

In this connection, all of Figures 6-20 have portions lined or marked to show the colors yellow gold, white gold, rose (pink) gold, and green gold, indicating that, for a jewelry article such as a rope chain, the preferred colors are yellow gold and white gold, but rose and/or green gold areas may also be popular, especially with younger people. In all of the
5 Figures 6-20, the portions of the annular links, and therefore the rope chain, lined for gold colors may be a result of gold plating a metallic annular link, such that the color of side surfaces 23 and 25 extends beyond the edges to meet in the middle of the annular edge (as shown), or either one of the colors may extend the full width of the edge of the annular link 21 (not shown). Alternatively, as suggested by Figure 6, the links may, for example,
10 be laminated with a yellow gold layer 27 and a white gold layer 29. It is also within the scope of the present invention to use gapped links that have been enameled or otherwise surface coated.

Figure 7 is a plan view of a first example of an annular link showing a pattern of regions on a surface of a link 31, exhibiting different visual properties. In Figure 7, annular link
15 31 is divided along a line 37 such that one half 33 of the annular link 31 between the dividing line 37 and the gap 3 is yellow gold colored, while the other half 35 is white gold colored. Again (as with all variations shown in Figures 6-11), these colored surfaces 33, 35 may be differently plated, or each link portion may be made from a solid precious metal such as yellow gold and white gold. In the latter case, the gapped links may be stamped
20 from a multicolored flat sheet, striped with a number of alternately colored gold materials, or alternately striped with different materials such as gold and silver. Such a striped flat sheet may be stamped to form gapped links in different orientations relative to the stripe pattern and relative to the gap position, resulting in a variety of interesting colored patterns in the finished rope chain, yet all such links can be stamped from the same striped sheet.

25 Figure 8 is a plan view of a second example of an annular link 41 showing a pattern of regions on the surface of the link exhibiting different visual properties. In Figure 8, the annular link 41 has two major curved portions 43, 44 of yellow gold, while a small section 45 is white gold, the section 45 being defined by separating lines 46 and 47.

Figure 9 is a plan view of a third example of an annular link 51 showing a pattern of regions on the surface of the link exhibiting different visual properties. In Figure 9, the annular link 51 has a major curved portion 55 and a minor curved portion 53 of a yellow gold color, while a sector 57 of the annular link 51 is white gold.

- 5 Figure 10 is a plan view of a fourth example of an annular link 61 showing a pattern of regions on the surface of the link exhibiting different visual properties. This figure shows yet another variety of coloration in which the annular link 61 is divided along a diameter defined by separating lines 68, 69 above which portions 63 and 65 are yellow gold, and below which portion 67 is white gold.
- 10 Figure 11 is a plan view of a fifth example of an annular link 71 showing a pattern of regions on the surface of the link exhibiting different visual properties. Figure 11 shows another possibility in which annular link 71 has a yellow gold band 75, 76 along a diameter of the link defining separating lines 77-80, above which, a pair of curved portions 72, 73 are of white gold, and below which an arcuate portion of the link 71 is also of white
- 15 gold.

Figure 12 is a schematic representation of a rope chain segment employing annular links of the type shown in Figure 6, the figure lined for the colors yellow gold and white gold. The rope chain 81 of Figure 12 is constructed from a continuous series of annular links 21 as shown in Figure 6. One side 23 of the annular link 21 is yellow gold, and the other side 25

20 is white gold, and the white gold side of all links face the same direction along the length of the rope chain 81, as does the yellow gold side but in the opposite direction.

Accordingly, the channel 10 will have a continuous length of white gold at, and extending outwardly from, the apex of the V-shaped channel 10, while the channel 12 will display a continuous color of yellow gold.

- 25 While the flat two-dimensional drawing of Figure 12 is lined accurately with respect to the two different colors yellow gold and white gold, it may appear at first glance that a white gold portion 25 is to the right and a yellow gold portion 23 is to the left at some points along channel 10, for example at the position of the top arrow 10 in Figure 12. However,

when visualizing the three-dimensional aspect of the rope chain, and following channel 10 mentally along the rope chain 81, in passing around the right side of the rope chain 81 toward the rear along channel 10, the right portion of all of the annular links 21 will be viewed from a different angle from that shown in the two-dimensional drawing of Figure 12.

That is, the rear side of each link to the right of the axis of rope chain 81 and shown as yellow gold in Figure 12 is, in fact, white gold, and similarly, the rear side of each white gold colored surface 25 in Figure 12, as viewed from the other side is yellow gold. The rope chain 81 of Figure 12 thus imparts a very interesting and attractive coloration for the rope chain 81 having alternate yellow gold and white gold portions viewable from a particular viewpoint, and yet the rope chain 81 displays the interesting aspect of a continuous yellow gold helical channel paralleling a white gold helical channel.

Figure 13 is another embodiment of a rope chain 91 showing alternate helical strands lined to show the color yellow gold alternating with the color white gold, or a gold material (33 in Figure 7) alternating with a silver material (35 in Figure 7). The yellow gold/white gold (or silver) pattern shown in Figure 13 for the rope chain 91 is the result of assembling a series of annular links 31 as shown in Figure 7. It will be appreciated from the drawing of Figure 13 that the links 31 that are perpendicular to the page and shown as a yellow gold color will have a white gold or silver color as viewed from the rear thereof. Similarly, the white gold or silver colored links 31 shown perpendicular to the page in Figure 13 are yellow gold colored in the rear view thereof. Likewise, any link 31 having a yellow gold colored exposed surface to the right of the axis of rope chain 91 in Figure 13 will have a white gold or silver color on its exposed surface on the left side of the axis, and vice versa. Accordingly, following along channel 10 for the entire length of the rope chain 91, the right side of the channel will be white gold or silver colored and the left side will be yellow gold colored. Similarly, following along channel 12, the left side will be white gold or silver and the right side will be yellow gold.

Thus, in the configuration of Figure 13, although all annular links 31 are identical and arranged in the same direction along the rope chain 91, nevertheless, the visual appearance

is such that an apparent yellow gold colored rope is intertwined with an apparent white gold or silver colored rope, lending an interesting alternately colored appearance along the rope chain 91.

Figure 14 is a rope chain 101 configured similar to that of Figure 13, but with a number of annular links 31 inserted in the series of links in reverse direction every two twists of the strands of the rope chain 101. The rope chain 101 in Figure 14 is thus constructed of a similar series of annular links 31 as shown in Figure 7, except that the yellow gold and white gold halves 33, 35 are arranged adjacent one another for a series of three sets, and then the yellow gold and white gold sides 33, 35 are reversed for the next three sets. For example, in Figure 14, a transition from a white gold colored half to a yellow gold colored half occurs at link 34 near the top of the segment of rope chain 101, while the yellow gold halves are adjacent one another from the bottom of Figure 14 up to point 36 at which the yellow gold and white gold sides are reversed. With this configuration, another interesting yellow gold/white gold attractive pattern is produced which has a repetitive pattern along the rope chain 101 as follows (y meaning yellow gold and w meaning white gold): y,w,y,y,w,y,w,w/y,w,y,y,w,y,w,w/, etc. Of course, the left and right views of Figure 14 would show a transition between yellow gold and white gold at the points 34 and 36, whereby, for example, in a view from the right of Figure 14 at link 34, to the left of link 34 would be white gold and to the right of link 34 would be yellow gold.

Other attractive yellow gold/white gold patterns are possible when employing the concepts of the present invention, including, but not limited to: w,w,y,w,w,y or w,w,w,y,w,w,w,y or w,w,y,y,w,w,y,y, etc. Using other available gold colors, such as rose (r) and green (g), additional color patterns can be created, such as: w,w,y,r,r,y,g,g,y,r,r,y,w,w.

It is to be understood that the described specific examples of color patterns in a repeated set are not to be taken as limiting. An appealing rope chain may be formed by arranging sets of different color patterns in any combination, i.e. such a rope chain will have color patterns that differ along the length of the rope chain set-to-set. For example, a rope chain may have the repetitive set pair y,w,y,y,w,y,w,w and y,y,w,w,y,y,w,w repeated along the chain producing the structure: y,w,y,y,w,y,w,w/y,y,w,w,y,y,w,w//y,w,y,y,w,y,w,w/

y,y,w,w,y,y,w,w/(etc.). Alternatively, a rope chain may have a non-repetitive set pattern with each set along the chain having a different color pattern producing, for example, the color scheme: y,w,y,y,w,y,w,w/y,y,w,w,y,y,w,w/w,r,r,y,g,g,y,w/ (etc.,all sets different). Combinations of a repeated set, repeated set pairs or set triplets or
5 set quads etc., non-repetitive sets, or random sets of different color patterns are also within the scope of the present invention.

A visually pleasing rope chain construction can be created, as another example, using the link element 31 of Figure 7 to produce the rope chain appearance in Figure 13. The Figure 13 pattern as described may extend for a length of one inch with each set being repeated as
10 shown in Figure 13. The next one inch of rope chain may then comprise repeated sets of link elements of different colors, textures, or shapes, as desired, followed by a one inch length duplicating the first one inch segment. Such a finished rope chain will show a series of one inch segments having alternating visual properties.

After the assembly of a rope chain is completed, portions of the chain may be selectively
15 rhodium coated to enhance the brilliance and luster of the coated part. In Figure 13, for example, after construction, the white gold halves 35 of each link element 31 (Figure 7) may be coated with rhodium which brightens the white gold helix and increases the contrast between the rhodium coated helix and the yellow gold helix. To the eye, this increased contrast effect makes the yellow gold helix appear to be even more yellow in
20 color.

If desired, the jewelry designer may choose to give the finished rope chain a soft lusterless appearance, i.e., instead of rhodium coating to increase reflectivity and brilliance, the finished rope chain may be mechanically or chemically treated so as to have a sandblast, matt, or frost like finish.

25 Another possibility with the present invention is the ability to assemble virtually any color, texture, or shape combination along the length of the rope chain not grouped into patterns correlated with the number of links elements in a set. That is, a color/texture/shape combination, repeated or not, may extend along any number of links and not be bounded

by the chosen number of links per set. One example of this is a rope chain having color patterns in groups of thirteen links, while a set for this particular rope chain may comprise eight links. Moreover, it is within the scope of the present invention to construct a rope chain with sets made up of different numbers of links, e.g., 4-link, 6-link, and 8-link sets
5 used in the construction of the same rope chain.

Figures 15-17 show yet another combination of coloring for the rope chain 111. Rope chain 111 is also constructed of annular links 31 (Figure 7) along the entire length thereof. Rope chain 111 is of a six-link variety in which there are six links per set along the series of annular links. However, the annular links 31 are assembled with the colors matching
10 the colors of adjacent links 31 (i.e., all are in the same axial orientation) for a complete set of six along the chain, and then the links are flipped 180° to be assembled in reverse axial orientation for the next set, and so on. As a result, and since there are six annular links 31 per set, rather than the alternately appearing yellow gold and white gold rope strands shown in Figure 13, the right side of rope chain 111 in Figure 15 is all of a white gold
15 color, while the left side is all of a yellow gold color. It will therefore be appreciated that the view of Figure 15 is taken at the reversal transition point of each set, wherein the edge of the link 31 perpendicular to the page is white gold and all link surfaces exposed to the right of the axis are also white gold, while those link surfaces exposed to the left of the center are yellow gold. The view from the rear of Figure 15 would be similar. That is,
20 what is shown as lined for the color white gold in Figure 15 will also appear as white gold, and what is lined for the color yellow gold in Figure 15 will also appear as yellow gold, but the center links (perpendicular to the page) will be seen as yellow gold from the rear.

From the description of Figure 15 above, it will be apparent that the view from the left side of Figure 15 will have an all yellow gold color appearance (Figure 16), while the right side
25 view of Figure 15 will have an all white gold appearance (Figure 17).

The embodiment of Figures 15-17 are particularly attractive from the viewpoint that, the rope chain necklace or bracelet may, from one viewpoint, appear to be yellow gold in color, while from another viewpoint may appear to be white gold in color. From other

viewpoints, the rope chain 111 gives somewhat of a random coloring impression, again imparting beauty and exciting visual stimuli.

The embodiments of the invention shown in Figures 12-17 provide a basis for appreciating the virtually limitless design patterns that can be produced by arranging the differently colored, patterned, or textured annular links such as those shown in Figures 6-11 in a rope chain structure.

Further variations of color patterns are presented in Figures 18-20. Figures 18-20 illustrate the possibility of manufacturing the annular links with either or both planar surfaces having different gold colored areas, shown on the link 120 of Figure 18 symbolically, as yellow (y), white (w), rose (r), and green (g) areas. The link 122 of Figure 19 is lined for the gold colors white, yellow, rose, and green for the respective regions 123-126. Figure 20 shows an annular link 128 having areas 130 and 131 with variations in color, in this example yellow gold areas 130 and white gold areas 131.

Importantly, the different-appearing three embodiments shown in Figures 12-17 are all constructed with the same multi-colored, or multi-textured annular links 21 and 31 shown in Figures 6 and 7, respectively. Even further varieties are possible but not shown.

For example, using the annular link coloring shown in Figure 7, a rope chain may be constructed using a six-link set, but reversing the direction of the yellow gold and white gold patterns every five links along the rope chain. This arrangement gives yet a further interesting and curious visual impression, since there is somewhat of an overall repeated pattern along the chain, but at any segment of the chain, the coloring appears to be somewhat random. On the other hand, following the channels of such an arrangement, each channel would show a link of white gold on both sides of the channel for a distance, followed by a length of yellow gold on both sides of the channel, followed by another length of white gold, etc.

Examples of a completed rope chain using the configurations for the annular links 41, 51, 61, and 71 shown in Figures 8-11 are left to the artisan having the knowledge of the examples given in this specification to follow for guidance.

Obviously, color and texture configurations other than those shown in Figures 6-11 and 18-20 are possible for the manufacture of the annular links, and these are merely examples of preferred visual property combinations which can produce striking results in a finished rope chain construction. Accordingly, it is to be understood that the patterns shown in
5 Figures 6-11, the types of materials used, the coloring, surface texture, surface patterns, arrangement of groups and sets of links along the rope chain, reversed or not, randomly assembled or in strict accordance with a repeated pattern, and the like are all contemplated possibilities and are to be considered within the scope of the present invention.

Figure 21 is a perspective view of a gapped link 132, similar to any one of those depicted
10 in Figures 1, 6-11, 18, and 19, except that it has flat, but non-planar upper and lower major surfaces 133, 134. That is, a radial cross section taken anywhere along the gapped link 132 will reveal a flat, or linear, upper and lower surface edge, and yet the link 132 is slightly skewed such that the upper and lower surfaces 133, 134 are slightly helical, such that the end faces 135, 136 at the gap are not in registration. The gap dimensions are
15 maintained in accordance with the need to interlink the gapped links to form a rope chain with tightly interconnected link elements. The skewed nature of the gapped link elements making up the rope chain produces interesting visual effects, especially as to reflected light, since there will be no planar, i.e., mirror-like reflections. If desired, only one of the upper and lower surfaces 133, 134 may be made flat; the other, opposite, side surface may
20 be rounded, concave, etched, notched, or configured to any desired shape while maintaining a generally annular link configuration.

Figures 22-26 show alternate configurations for the gapped links. The link 137 of Figure 22 is baguette shaped, the link 138 of Figure 23 is square shaped, the link 139 of Figure 24 is oval shaped, the link 140 of Figure 25 is diamond shaped, and the link 141 of Figure 26
25 is heart shaped. Any combination of annular, baguette, square, oval, diamond, heart, or other geometric shaped gapped links may be assembled in a virtually limitless variety of combinations to create interesting rope chain jewelry items in accordance with the concepts and methodology of the present invention. For example, a particularly beautiful rope chain design uses a combination of baguette and annular links along the length of the
30 chain.

It will be understood that the surface colors, textures, patterns, and/or shapes of the gapped links 137-141 in Figures 22-26 may be as varied as those features of the annular links described herein and shown in Figures 6-21

While only certain embodiments have been set forth, alternative embodiments and various
5 modifications will be apparent from the above description to those skilled in the art. For example, while the colors and precious metals used in the descriptions herein are preferred to be yellow, white, rose, and green gold, other colors and metals, or even non-metals, can be employed in the construction of the disclosed rope chain configurations. Notable alternate materials, for example, are rhodium (in various colors), silver, and nickel, either
10 solid or plated, or the links may be enameled using any selectable colored or clear enamel. The examples herein of gapped links with a rectangular cross section are not to be considered limiting. Virtually any cross sectional configuration can be produced for the gapped links while maintaining an overall annular configuration, or other configuration not unlike the examples shown in Figures 22-26. An attractive rope chain, for example, may
15 be formed using annular gapped links having a circular cross section, solid or tubular, resulting in a "soft feel" rope chain with brilliant light reflection patterns. In this connection, if desired, the interior peripheral edge of the links shown in Figures 22-25 may be circular, leaving the exterior peripheral edge as shown. These and other alternatives are considered equivalents and within the spirit and scope of the present invention.

20 **DETAILED DESCRIPTION OF THE SECOND EMBODIMENTS**

Figure 1X is a plan view of an annular link element used in the construction of jewelry rope chains as known in the prior art. In general, Figures 1X-5X depict: a conventional rope chain arrangement (Figures 3X and 4X); a typical annular link element (Figures 1X and 2X) employed as a basic building element in the construction of the rope chain; and a
25 number of loosely interconnected annular link elements (Figure 5X) to illustrate the positional relationship of adjacent annular link elements along the rope chain.

For the purposes of this description, the following definitions are provided.

"Rope chain" is a series of sets of interlinked, or interconnected, link elements which has the appearance of a plurality of braided, or helically intertwined, multi-fiber strands of hemp, flax, or the like.

"Standard" or "Ordinary" refers to the dimensional characteristics of annular link elements without major surface or edge variation and whose dimensions follow the recommendations according to the aforementioned U.S. Patent No. 4,651,517, for example, i.e. whose dimensions result in a tightly fitting series of link elements having the appearance of intertwining helical strands of rope.

10 A "set" is the number of adjacent interlinked, or interconnected, link elements making up a structurally repeated pattern along the chain. In the accompanying drawings and associated text, a six-link set is used for purposes of ease of visual presentation and description. The preferred number of link elements in a set is eight.

15 A "group" is a number of adjacent interlinked, or interconnected, link elements exhibiting identical visual properties. The number of link elements in a group may be the same or different than the number of link elements in a set. Groups may be uniformly or randomly distributed along the rope chain.

A "link" is the basic building element (also referred herein as a "link element"), a number of which are assembled in series to form a rope chain. Link elements of the prior art are annular in shape with an open gap having a length slightly greater than the width of the annular link. In accordance with the present invention, a link element may have a circular, baguette, oval, diamond, rectangular, square, heart, or other geometrical shape. Each is provided with a gap at a selected position along the perimeter thereof thereby maintaining a generally C-shaped overall configuration. In such a generally C-shaped overall configuration, the inner periphery will be referred to herein as an interior edge, and the outer periphery will be referred to as an exterior edge. While the link elements of a rope chain are not necessarily annular, it is the preferred configuration for the basic building element of a rope chain, and for that reason an annular link element will be used in most of the examples shown and described herein.

A "channel" is the path which the eye follows in passing along the rope chain at the apex of the V-shaped helical groove formed between the apparent intertwined rope braids.

Hence, in the preferred embodiments described herein, the rope chain has the appearance of a pair of intertwined braids of ropes, and thus there exists two such helical channels

5 offset from one another by one-half of the pitch of either helix.

A "visual property", as used herein, is a characteristic of an object which presents a particular visual image to the eye. Such characteristics include, but are not limited to, color, texture, pattern, reflectivity, design, or shape. Although shape is also a physical property of an object, in the art of jewelry making, it is often the physical shapes which

10 impart beauty and delicateness to a fashion item.

"Color", as used herein, refers to the quality of the link element or portion thereof with respect to light reflected by it and visually perceived by the eye as a particular hue, saturation, and brightness of the reflected light. In most cases, the different colors exhibited by a link element or portion(s) thereof result from the use of different materials

15 (white gold as differing from yellow gold as differing from rhodium as differing from enamel coatings of different hues, etc.

The "major surface" of a link element refers to the substantially flat or planar upper and lower facial surfaces of the link element. Such surface, although being substantially planar, nevertheless may have raised or depressed patterns therein, or may be notched, gouged,

20 textured, or otherwise physically altered to present a desired pleasing visual effect to the observer. Additionally, the upper and lower facial surfaces need not be flat. For example, the link elements may be tubular, or otherwise circular in cross section, and yet have the uppermost and lowermost surface portions lying in respective parallel planes.

The "interior" and "exterior" edges of a link element are, respectively, the inner and outer

25 peripheral sides which span between the upper and lower major surfaces of a link element.

"Link width" is defined as a distance, measured along either of the major surfaces, between a pair of parallel lines perpendicular to the major surfaces and tangent to, respectively, the interior and exterior edges.

"Link thickness" is defined as a distance between and perpendicular to the planes of the upper and lower major surfaces.

Referring now to Figures 1X and 2X, an annular link element 1X is shown to have a generally rectangular cross section (Figure 2X) and a gap 3X having sloping edges, the narrowest width of gap 3X being slightly larger than the thickness of the annular link element 1X.

10 While conventional rope chains are constructed using annular links having a solid rectangular cross section as shown in Figure 2X, variations with different cross sectional geometries are possible. Figures 2AX and 2BX depict two such variations. The cross section of tubular link 1AX in Figure 2AX is rectangular and hollow (known from U.S. Patent No. 4,651,517). Another variation is shown in Figure 2BX in which the tubular
15 link element 1BX has a hollow circular cross section (known from U.S. Patent No. 5,537,812).

Figure 2CX is a view similar to that of Figure 2AX, except that the generally rectangular cross sectioned link element 1CX does not have straight sides, but rather sides of an indeterminate shape.

20 Figure 2DX is a view similar to that of Figure 2BX, except that the generally circular cross sectioned link element 1DX does not have smooth sides, but rather sides of an indeterminate shape. This figure, and Figure 2CX are presented for representing that the two major surfaces and the interior and exterior edges of a link element can take on any surface shape or texture, not just those illustrated in the other Figures 6X-45X.

25 All of the link element embodiments and variations of the present invention illustrated in Figures 6X-45X can be solid or hollow in cross section, and may have any geometrical

cross sectional configuration. A non-limiting solid rectangular cross section is chosen as exemplary in the accompanying drawings for illustrative purposes only.

Conventional rope chains, such as those shown in Figures 3X and 4X, are made with a systematic and repetitive interlinking of basic annular link elements 1X. The annular link element 1X must meet certain dimensional requirements for the interlinking to result in a well-fitting rope chain. Such dimensions are known in the art and will vary from a four-link variety to a six-link variety to an eight-link variety, and so on. Determining the proper dimensions for the annular link element 1X and the gap 3X therein, depending upon the number of desired link elements to form a set of interlinked link elements, can be readily understood by reference to the aforementioned U.S. patents, especially U.S. Patent No. 4,651,517. As can be viewed in Figures 3X and 4X herein, the intertwined link elements 1X of a segment of a conventional rope chain 5X are shown in Figures 3X and 4X in the form of a six-link variety. In their assembled form, the series of link elements 1X produce the appearance of a first braid of rope 7X and a second braid of rope 8X, the combination of which results in a double intertwined helical appearance.

As best seen in Figures 3X and 4X, the apparent intertwining of a pair of rope strands or braids 7X and 8X results in a V-shaped groove between the braids at any position along the rope chain. The path along the apex of such V-shaped groove is referred to herein as a "channel", and since there are two apparent rope braids 7X and 8X, there are, likewise, two defined channels indicating Figure 3X by the directional arrows 10X and 12X. Channel 10X, along the length of the rope chain, defines a helix, as does channel 12X. However, the two channels never intersect one another, and are parallel to one another along the length of the rope chain separated axially by one half of the pitch of either of the two channels. In the prior art of Figures 3X and 4X, there is no visual difference between following along the two helical channels 10X and 12X, since the rope chain is comprised of a repetitive series of sets of link elements 1X, and all link elements have the same visual property (they are all of the same color, texture, and shape for example).

Figure 3X is a side elevational view showing a section of a prior art rope chain during the manufacturing process, before removing a forming wire used to maintain proper orientation of the series of link elements.

Further with respect to Figure 3X, in the construction of a rope chain using annular link elements 1X, it is necessary to maintain a tightly interlinking of the annular link elements until the entire rope chain is completed, and for that purpose, a pair of support wires 6X are positioned in the channels 10X and 12X and are kept in place until such time as a means of fixing the assembled link elements 1X together is completed. In U.S. Patent 4,651,517, for example, after building up the link elements in the manner described therein, to form the double helix chain, the link elements are held in the desired juxtaposition temporarily by a thin metal wire wrapped around the link elements. Then, solder is intermittently applied to every pair of adjacent link elements at the external periphery thereof. The wire is then removed and does not comprise a part of the completed rope chain.

Figure 4X is a front elevational view of the outward appearance of a jewelry rope chain of the prior art showing a uniform visual appearance for all link elements in the chain for the entire length thereof.

In Figure 4X, the distance denoted by numeral 9X encompasses the link elements of a "set" of link elements, and it will be noted that link elements 11X and 13X lie in the same plane, but are angularly displaced from one another along the link elements of the rope chain by 180° . That is, following the position of link element 11X counterclockwise (as seen from the top) and downwardly, it will be observed that each subsequent link element is angularly spaced at a constant 30° angle, and since there are six link elements per set, a 180° turn of link element 11X downwardly along the rope chain will be effectively rotated 180° to assume the position of link element 13X. As is clearly visible in Figure 4X, a series of sets of link elements 1X makes up the length of rope chain illustrated.

For an eight-link "set" (not shown, but defining a preferred embodiment), each subsequent link element will be angularly spaced at a constant 30° angle.

Figure 5X is a perspective view of a set of loosely interconnected link elements in an expanded view to show the interlinking of the link elements to form a set of link elements in the series of link elements along the rope chain, as is known in the prior art. The drawing of Figure 5X is copied from U.S. Patent No. 4,651,517 (Figure 8g thereof), and
5 shows a number of annular link elements A1X-A6X, B1X and B2X, each with a gap 3X permitting the complex interlinking arrangement shown. A set of annular link elements A1X-A6X, when tightly assembled, results in the structured, repeated, pattern shown in Figure 4X with the annular link element A1X of a first set of link elements lying in the same plane as the first annular link element B1X belonging to the next adjacent set of
10 annular link elements B1X-B6X (only link elements B1X and B2X shown).

The remaining figures to be described, Figures 6X-45X, illustrate examples of a virtually limitless number of variations of the design and construction features of link elements that may be assembled into a distinctively beautiful and unique rope chain having appealing visual properties.

15 It will be appreciated that a link element may exhibit multiple colors due to a variety of possible physical constructions. For example, as described in United States Patent 6,209,306, entitled "Decorative Jewelry Rope Chain", a link element may be of laminated construction, such that one major surface is of one material or color and the opposite major surface is of a different material or color. Additionally, or alternatively,
20 each or both major surfaces may be divided into portions, each portion exhibiting a color different from its adjacent portion.

In Figure 6X, for example, the plan view of the annular link element 15X has, on one planar major facial surface thereof, a first portion 16X of a first color and a second portion 17X of a different color. The link element 15X may be formed, for example, by stamping
25 a flat sheet constructed of two edge-joined layers of different flat materials, or of two edge-joined layers of materials of different colors and/or textures and/or coatings (such as by the application of an enamel).

In this connection, most of the remaining figures, Figures 7X-45X are not lined for color. However, it will be understood that all, or portions, of each of the link elements to be described hereinafter may be of a color selected from a variety of different colors, and/or may be made of a material selected from a variety of different materials. For example, any
5 of the link elements described herein may have the entire surface, or portions thereof, of yellow gold, white gold, rose (pink) gold, green gold, silver, nickel, or rhodium, either solid, plated, or laminated; or such surfaces, or portions thereof, may be enameled.

In some cases, the gapped link elements may be stamped from a multicolored flat sheet, striped with a number of alternately colored gold materials, or alternately striped with
10 different materials such as gold and silver. Such a striped flat sheet may be stamped to form gapped link elements in different orientations relative to the stripe pattern and relative to the gap position, resulting in a variety of interesting colored patterns in the finished rope chain, yet all such link elements can be stamped from the same striped sheet.

As previously mentioned, a major object of the invention is to reduce the amount of
15 material making up the individual link elements to reduce manufacturing costs, while not detracting from the beauty and effective size (diameter) of the finished rope chain. Reducing material can be accomplished in many ways: by removing material from or forming edge depressions in the entire or portions of the exterior edge; by removing material from or forming edge depressions in the entire or portions of the interior edge; by
20 removing material from or forming surface depressions in one or both major link surfaces; by forming openings in or through the major link surfaces; or otherwise narrowing the width of the entire or portions of the link elements. In some embodiments of the invention, part or all of a link element may have a link width larger than standard but with openings provided therein to result in a net reduction of material making up the link
25 element.

The specific example shown in Figure 6X depicts a link element 15X in which one half 16X of the link element is of one color and of one shape, and the other half 17X is of another color and of another shape. In the first half 16X, the interior and exterior edges 16aX, 16bX are smooth, while for the second half 17X, the interior edge 17aX is smooth,

and the exterior edge 17bX has a repeated pattern of undulations or ripples. In this sense, the two link element portions, halves 16X and 17X, exhibit different visual properties, as to both color and shape.

The link element shown in Figure 6X, and those shown in many others of the accompanying figures, has the shape and configuration of a solid standard size annular link element with portions removed (from undulated half 17X), and with other portions intact and undisturbed from a standard shape and configuration (as with standard size half 16X).

A rope chain constructed from a series of link elements 15X as shown in Figure 6X is visually more attractive than one made from standard link elements which have no varying link width characteristics. That is, when a series of link elements 15X are assembled into a length of rope chain having the appearance of two intertwining helical strands, the appearance (visual properties) of one of the strands is different than the appearance (visual properties) of the other, adjacent, strand along the length of rope chain, when viewed from one side of the length of rope chain. Prior art rope chains constructed of standard link elements exhibit the same visual properties for all strands along the chain, as viewed from any direction. This is true even when the cross section of prior art link elements is not standard, for example according to U.S. Patent Number 5,185,995 to Dal Monte.

In accordance with a major feature of the present invention, the inner and/or outer periphery (i.e. the interior and exterior edges) of a link element is varied in shape, so that the resulting rope chain can attain distinctive and decorative configurations and/or result in substantially lower manufacturing costs. In Figure 7X, for example, the outer periphery 22X of the link element 20X is undulated, and the resulting rope chain will have a decorative design as a result of this shaping. In particular, Figure 7X is a plan view of a link element 20X having a smooth interior edge 21X and a full undulated exterior edge 22X. In addition to producing a unique and visually beautiful rope chain, the link variations shown in Figures 6X and 7X use less precious metal than an ordinary annular link configuration such as that shown in Figure 1X, since, preferably, the maximum link width of link element 20X is equal to standard link element width.

Figure 8X is a plan view of a link element 25X having a crenelated interior edge 26X and an undulated exterior edge 28X, i.e., link element 25X has the shape and configuration of a solid standard size annular link element with portions removed from both the interior edge 26X and the exterior edge 28X. Preferably, the effective link width, as measured from the innermost side of the interior edge 26X to the outermost side of the exterior edge 28X, is equal to standard link width. As compared to the link variation shown in Figure 7X, the crenels 27X have the desired effect of removing additional precious metal regions from the interior of the link to further reduce cost, without having any deleterious structural or visual effects in the finished rope chain product. From Figures 3X and 4X, it will be appreciated that no part of the interior edges of the individual link elements are visible. Only an outer annular portion of each link element is visible, so that notches or crenels 27X may have a radial depth approximately equal to one half the width of the annular link. The allowed radial depth of the notches or crenels 27X is a function of the dimensions and configuration of each link element, and can be readily and easily determined by a person of ordinary skill in the art of rope chain manufacture.

Figure 9X is a plan view of a link element 30X having a smooth exterior edge 31X and a crenelated interior edge 32X defined by spaced crenels 33X. The look and feel of a rope chain made with link elements 30X is identical to a conventional one made without interior crenelations. However, the weight and cost of such a rope chain will be less.

Link thickness, as used herein, is defined as a distance between and perpendicular to the plane of the first and second major surfaces, and at least some of the link elements in a rope chain may have an irregular link thickness along the extent of the link element.

Figures 10X-13X, 24X, 26X, 32X, 33X, and 38X-45X show link elements that possess irregular link thicknesses along the extent of the link elements and bear surface ornamentation on each link element that will cause a rope chain to have a more decorative design than the conventional rope chain and yet use less precious metal than a standard link element without such irregular link thickness.

Figure 10X, for example, is a plan view of a link element 35X having smooth exterior and interior edges 36X, 37X, but with a groove, or raised center region, 40X along a central major surface of the link element. Link element 35X, like the link elements of Figures 11X-13X, 24X, 26X, 32X, 38X-40X, and 42X-45X, have the shape and configuration of a solid standard annular link element having portions of one or both major surfaces removed. For the variation in which the numeral 40X represents a raised center portion, the border surfaces 38X,39X are smooth and planar, while the raised center region 40 may be serrated, textured, patterned, or diamond cut, as desired by the designer. For the variation in which the numeral 40X represents a groove, the groove 40X may be formed during the stamping procedure, or it may be formed after stamping by a diamond cutting step or other procedure which removes a desired amount of precious metal according to a desired pattern, leaving planar border surfaces 38X,39X. Border surfaces 38X,39X may be polished to create a glitter effect and to emphasize the groove design pattern for either variation.

Figure 11X is a plan view of a link element 45X having smooth exterior and interior edges 46X, 47X with diamond cut or stamped depressions, or raised regions, 48X,49X formed in a major surface thereof adjacent the exterior and interior peripheral edges 46X, 47X, leaving the central region 50X of a major surface of the link element 45X planar. Like the Figure 10X embodiment, the non-planar border regions 48X, 49X may be raised relative to the planar center region 50X and formed in a similar manner as the Figure 10X embodiment.

Figure 12X is a plan view of a link element 55X having smooth exterior and interior edges 56X, 57X, but with a textured patterned groove, or raised region, 60X along a central major surface of the link element 55X, leaving planar border surfaces 56X, 57X. The textured groove, or raised region, 60X may be formed during the stamping procedure or formed after stamping by an EDM or other mechanical or chemical material remover process.

Figure 13X is a plan view of a link element 65X having smooth exterior and interior edges 66X, 67X with textured depressions, or raised regions, 68X, 69X formed in a major

surface thereof adjacent the exterior and interior edges 66X, 67X leaving the central portion 70X of a major surface of the link element 65X planar. Like the Figure 12X embodiment, the non-planar border regions 68X, 69X may be raised relative to the planar center region 70X and formed in a similar manner as the Figure 12X embodiment.

- 5 Figure 14X is a plan view of a link element 75X that is segmented into two parts. For ease of presentation and illustration herein the terms "half" and "halves" will be used to mean "part" or "parts", a "part not necessarily being a "half". In link element 75X, one half 76X has a narrower annular width, and the other half 77X gradually increasing to a wider annular width at its middle 78X. The narrow half 76X is narrower than standard link
- 10 elements to reduce the amount of material used, while the wider half 77X may be, at its middle 78X, of standard width or greater than standard width. If the maximum width of the wider half 77X is standard, since the finished rope chain is "twisted," the effective diameter of the chain is the same as if all links were of standard width, but with the appearance of a large diameter rope strand braided with a small diameter rope strand.
- 15 In this connection, in the variations of link elements where one half is larger than the other half, such as those shown in Figures 14X-19X, and 35X-37X, a rope chain made from such link elements will have the appearance of a larger diameter rope strand braided with a smaller diameter rope strand.

Again, reducing the amount of precious metal in the manufacture of such gapped links, as

20 in Figure 14X, reduces cost while actually enhancing the aesthetic character of the finished rope chain.

On the other hand, the maximum width of wider width half 77X may be larger than standard, whereby a rope chain made of link elements 75X will have an effective diameter larger than standard, and yet the net amount of precious metal will be the same as a smaller

25 diameter chain due to the offset in weight attributed to the less than standard width half 76X.

If size and appearance is more important than cost, rather than having the net amount of gold less than standard for the link element 75X shown in Figure 14X, the right side 76X may be of standard link width, making the left side 75X of a larger than standard size.

Again, the general overall, effective, diameter of the finished rope chain will be the same
5 as if all link elements were of a constant link width equal to the maximum link width of the left side 77X.

It will thus be understood that, for all of the link elements described herein in which segments of a link element have different link widths, either the relatively smaller or relatively larger, segment may be of standard size.

10 Figure 15X is a plan view of a link element 85X that is segmented into two halves, one half 86X having a narrower than normal annular width, and the other half 87X having a relatively wider annular width, the width of the wider segment 87X being non-linear so as to narrow down to the width of the narrow half segment 86X at their junction 89X.

Comparing Figures 14X and 15X, in a finished length of rope chain, the link 75X has the
15 features of producing a more delicate appearance due to the relatively narrower helix it will form, and reducing more precious metal than that of Figure 15X. On the other hand, a length of rope chain made from the link 85X will have more body due to the relatively wider helix it will form.

Figure 16X is a plan view of a link element 95X that is segmented into two halves, one
20 half 96X having a narrower annular width, and the other half 97X having a relatively wider annular width, the wider segment 97X having a stamped or formed opening 98X therein to define a framed wider segment portion transitioning with the narrower width portion 96X at junction 99X. This figure illustrates the possibility of combining different shapes and different materials, since the open wider half 97X is lined for one color, while the solid
25 narrower half 96X is lined for another color.

Figure 17X is a plan view of a link element 105X that is segmented into two halves, one half 106X having a narrow annular width, and the other half 107X having a relatively wider annular width joining the narrower half 106X at junction 110X. One half or any

portion of the wider segment 107X has an opening 108X stamped or formed therein, and the other, closed, portion 109X is formed or filled with a different material or differently colored material.

Figure 18X is a plan view of a link element 115X that is segmented into two halves, one half 116X having a narrower annular width, and the other half 117X having a relatively wider annular width. Preferably, the wider half 117X is largely open with tendril-like filigree filaments 119X bridging across the opening 118X. Filaments 119X may be formed during the stamping process or attached after stamping. Alternatively, the wider half 117X may be solid with an embossed or engraved design, such as that shown, formed on the major surface thereof. If the wider half 117X is stamped, the filaments 119X will have a significantly thicker appearance than that shown.

Figure 19X is a plan view of a link element 125X that is segmented into two halves, one half 126X having a narrower annular width, and the other half 127X having a relatively wider annular width, a repeating symbol 129X being punched, stamped, or otherwise formed, or embossed, or engraved in the major surface 128X of the wider segment 127X.

Figure 20X is a plan view of a link element 131X similar to that shown in Figure 9X, but with one half 132X of the link element 131X having an undulated exterior edge 133X and no interior crenels.

Figure 21X is a plan view of a link element 134X similar to that shown in Figure 9X with only one side 136X having a crenelated interior edge 137X, and with the other half 135X having smooth interior and exterior edges.

Figure 22X is a plan view of a link element 138X similar to that shown in Figure 1X, but with a double bumped protruding projection 142X on the exterior edge thereof opposite the position of the gap 141X in the link 138X between the two halves 139X, 140X. The two projecting bumps 143X, 144X define a depression 145X. The link width of the arms of the two halves 139X, 140X is preferably narrower than standard. If the entire annular link element 138X had a less-than-standard width, the finished rope chain would be very

loosely interconnected and unattractive. The purpose of the double bumped projection 142X is to simulate, during the assembly process, a link element of appropriate, i.e. standard, annular width at depression 145X. Since the looseness or tightness of the finished rope chain product is dependent, among other factors, upon the width of the link
5 at the location opposite the gap, employing the reduced material design for the link element 138X as shown will result in a perfectly formed rope chain with tightly interconnected links having the same flexibility as if the links were each made with a standard annular width in its entirety. This arrangement thus reduces material by a reduced annular width and by using fewer link elements per unit length of rope chain,
10 making the chain to appear longer than the standard rope chain.

The purpose for the two spaced bumps 143X, 144X is to affect the appearance of the channels between rope strands of a finished rope chain. Due to the spaced bumps 143X, 144X, the rope chain will display more precious metal (e.g., gold) in the channels between strands of the finished rope chain. As to construction concerns, the interior edge of a like
15 adjacent link element 138X will fit perfectly within the depression 145X, and the rope chain will have high structural integrity due to the width of the link element 138X between the interior edge 146X and the depression 145X being of standard dimension.

If desired, the arms 139X, 140X of link element 138X may be of standard width, and the rear edge projection 142X will then be of greater than standard width. In such a case, the
20 gap 141X will necessarily have to be widened to accommodate the projection 142X of an interconnected link since such projection passes through the open gap 141X at an angle so as to have the major surfaces of adjacent link elements in surface contact. One advantage of this variation is that fewer link elements are necessary per unit length of rope chain.

Figure 23X is a plan view of a link element 127X similar to that shown in Figure 22X, but
25 with an opening 128X in the projection 129X, serving to reduce the amount of precious metal in the finished rope chain and to add a degree of delicateness.

An alternative variation, not shown, the double bump projection 142X of Figures 22X and 23X may be disposed on the interior edge of a link element, leaving the exterior edge

smooth. The structure of the finished rope chain will be just as tightly interlinked, but the diameter of the finished rope chain will be equal to the diameter of a rope chain made with all standard annular link elements. Such a jewelry item will have all the same visual properties and size dimensions, yet less precious metal is needed, saving manufacturing costs.

Figures 24X-27AX show alternate configurations for the gapped link elements relative to the typical annular configuration. The link element of Figure 24X is baguette shaped, that of Figure 25X is square shaped, that of Figure 26X is oval shaped, that of Figure 27X is diamond shaped, and that of Figure 27AX is heart shaped. Any combination of annular, baguette, square, oval, diamond, heart, or other geometric shaped gapped link elements may be assembled in a virtually limitless variety of combinations to create interesting rope chain jewelry items in accordance with the concepts and methodology of the present invention. For example, a particularly beautiful rope chain design uses a combination of baguette and annular link elements along the length of the chain.

More specifically, Figure 24X is a plan view of a link element 147X similar to that shown in Figure 11X, but having a generally baguette configuration and having a smooth interior edge 148X, a smooth exterior edge 149X, and depressions, or raised regions, 150X displaying a visual property other than planar. Preferably, the depressions or raised regions 150X are areas where material has been removed, leaving a central major surface region 151X planar.

Figure 25X is a plan view of a link element 152X similar to that shown in Figure 9X, but with a generally square configuration and having a smooth exterior edge 153X and a crenelated interior edge 154X defined by crenels 155X.

Figure 26X is a plan view of a link element 156X similar to that shown in Figure 10X, but having a generally oval configuration and having a smooth interior edge 157X, a smooth exterior edge 159X, and a groove, or raised region, 161X displaying a visual property other than planar. Preferably, the groove or region 161X is where material has been removed, leaving inner and outer planar surfaces 163X.

Figure 27X is a plan view of a link element 165X similar to that shown in Figure 6X, but the interior edge 166X is smooth (non-shaped) having the general configuration of a diamond, with one half 167X of the link element 165X having a smooth exterior edge 168X and the other half 169X having an undulated exterior edge 170X.

- 5 Figure 27AX is a plan view of a link element 171X similar to that shown in Figures 9X and 25X, but with a generally heart shaped configuration and having a smooth exterior edge 172X and a crenelated interior edge 173X defined by crenels 174X. The amount of precious metal removed at the location of the crenels 174X, together with that removed at the cusp 175X at the top as shown in Figure 27AX, is preferably greater than the material
10 added to form the rounded tops on either side of the cusp 175X. The net decrease in material results in a less expensive link element while creating a beautiful and symbolic rope chain design.

Figure 28X shows a link element 180X in which an arcuate concave cut 184X, 185X is made in each side 181X, 182X, respectively. In the complete rope chain constructed of a
15 series of link elements 180X, a helical groove can be seen on top of each simulated helical strand (such as strands 7X and 8X in Figure 3X). The helical groove divides the helix in two, imparting to the rope chain the appearance of having four helixes instead of two using standard link elements such as that shown in Figure 1X.

Figure 28AX is a partial plan view of a link element 180AX which is a variation of the
20 link element 180X of Figure 28X. In Figure 28AX, the arcuate concave cut 185AX is stepped. This creates an interesting multi-faceted helix along one of the intertwining rope strands, which is especially attractive, especially when the flat stepped surfaces are rhodium coated. If both sides of link element 180AX are concave and stepped as shown, a helical groove can be seen on top of each simulated helical rope strand (such as strands 7X
25 and 8X in Figure 3X).

Figure 29X shows a link element 190X having a smooth interior edge 191X and a crenelated exterior edge 192X. The annular width of each wide portion 193X, 195X is of standard dimension, while major portions of the exterior edge 192X are removed to

produce long crenels 194X. Wide rear portion 195X abuts the interior edge of an adjacent link in the series so as to produce a tightly interlinked rope chain. Here, significant precious metal is removed, and yet the effective overall diameter of the finished rope chain appears to be of standard diameter with a number of interesting looking helical ribs (due to the wide portions 193X) along the length of the chain.

Figure 30X shows a link element 200X similar to that of Figure 28X, but with flat, rather than concave, cutouts 203X, 204X on the sides 201X, 202X. As a result, the finished rope chain has the appearance of flat helixes alternating with convex helixes along the chain. This variation gives the effect of a diamond cut being made after the rope chain is assembled. By employing precut link elements, the time and expense of a complex diamond cutting process after a rope chain is fully assembled is avoided. Additionally, the precious metal savings is controlled using precut link elements, while collecting and reprocessing shavings from a diamond cutting process has obvious waste and high labor cost disadvantages.

An improvement in the appeal and beauty of a rope chain made with link elements 201X in Figure 30X is achieved by constructing the link element to have two separate side halves 201X and 202X of different colors/materials connected at the dashed line 205X. For example, in Figure 30X, the left half 201X may be made of white gold, the right half 202X of yellow gold, and the straight cutout 204X may be rhodium coated.

Figure 31X shows a link element 210X having smooth exterior and interior edges 211X, 212X, the annular width 213X of which is less than standard. By combining link element 210X with standard link elements, such as that shown in Figure 1X, or with link elements having an enlarged (equal or greater than standard) rear annular width, such as that shown in Figures 22X and 23X, a tightly, or reasonably tightly, formed rope chain results. Both narrow and wider links have the same inner diameter measured at the location of the gap 3X (Figure 1X). When placed together, the interior openings in the center of the link elements 210X will line up perfectly. The narrower link 210X will be covered by the standard link 1X, saving precious metal. For example, links 210X may alternate with links of any other design or shape such as those shown in the accompanying figures, or sets of

links 210X may be assembled alternately with sets of other such links. In any event, employing link elements 210X in a rope chain will reduce the amount of precious metal used.

It will be understood that, when link elements having edge designs or patterns, such as those shown in Figures 16X-19X and 34X-36X, are assembled, they should not be placed against one another. Otherwise, the designs or patterns will be covered up by adjacent link elements. Link elements 210X are perfectly suited for spacing out the aforementioned link elements having edge designs or patterns.

Figures 32X and 33X show plan and side elevational views of a link element 220X with notches 224X along the exterior edge 221X. When viewed alone, the link element 220X looks incomplete, but when two of the same link elements are viewed together, the notches 224X are covered by the other link. This saves on the use of precious metal, which in turn, reduces cost of this type of rope chain. The notches, or depressions 224X are strategically spaced around the periphery of the link such that they will be hidden from view in a finally assembled rope chain. Due to the overlapping of links, only areas 223X between notches will be visible. The particular pattern of notches may be empirically determined by assembling standard links and making regions that are visible and thus not to be removed.

Figure 34X shows a link element 230X having a side 231X of a first material and an opening 234X therein, and a side 232X of narrow annular width with undulations 235X and of a second material. This example combines material differences, annular width differences, and material removal pattern differences in the two sides 231X, 232X.

The link element 240X of Figure 35X has a first side 241X made of a first material and having arcuate openings 243X therein separated by a solid annular segment 244X made of a second material, the side 241X being of standard annular width. The second side 242X is of a third material and of a narrowed annular width 245X.

Figure 36X shows a link element 250X having a side 251X of a first material and with a plurality of spaced differently shaped openings 254X. The other side 252X is made of a second material and has a narrower-than-standard annular width 255X.

Figure 37X shows a link element 260X having a side 261X of a first material and of standard configuration, i.e., as an annular segment. The other side 262X is made of a second material and has a flat edge 263X. When a number of links 260X are assembled into a rope chain, one of the helical strands will be standard, and the other helical strand will have all of the flat edges 263X of the link elements lying in a helix following the helix formed by the link half 262X.

After a rope chain is formed using link elements having a shape as shown in Figure 37X, the entire right half 262X, for example of white gold, or only the flat edges 263X may be rhodium coated (or coated with other metallic coatings or with enamel). For example, if the left side 261X of link element 260X were made of yellow gold, and the right side was made of white gold, only the flat edge 263X of the white gold side 262X may be rhodium coated. This results in a very unique rope chain in which one helical rope strand is yellow gold along the entire length of the chain, and the other helical rope strand is white gold with a brilliant and shiny center. As shown in Figure 37X, a substantial part of the white gold rope strand will exhibit the shiny rhodium finish. By making the flat edge 263X shorter, a more delicate looking rope chain results, with the appearance of tiny flashes of brilliance evident as the rope chain is moved relative to a light source. Such a rope chain design and appearance cannot be manufactured using standard annular link elements throughout and then diamond cutting an edge on the finished chain, since the diamond cutting process will cut both helical strands, not just one.

Figure 38X is a partial side elevational view of a link element 270X in which one or both of the textured major surfaces 271X, 272X are serrated, or knurled. The maximum link thickness, including the tips of the knurls, equals the thickness of a standard annular link element, thereby reducing the amount of precious metal used in the manufacture of the link element.

Figure 39X is a partial side elevational view of a link element 273X in which one or both of the textured major surfaces 274X,275X have connected angled plate-like segments producing a saw-toothed profile. Again, the maximum thickness, including the tips of the saw-toothed plates, equals the thickness of a standard annular link element, thereby
5 reducing the amount of precious metal used in the manufacture of the link element.

Figure 40X is a partial side elevational view of a link element 276X of standard thickness, in which one or both of the textured major surfaces 277X,278X have V-shaped grooves therein, serving to reduce the amount of precious metal used in the manufacture of the link element.

10 Figures 41X-44X depict, in partial elevational and full plan views, link elements having one or both major surfaces and/or one or both of the interior and exterior edges serrated, or knurled. The link element 279X, for example possesses smooth upper and lower major surfaces 280X,281X and a serrated, scored, or knurled, interior or exterior edge 282X. Link element 283X has both major surfaces 284X, 285X serrated, scored, or knurled, as
15 well as the internal or exterior edge 286X. Link element 287X has planar smooth exterior and interior edges 288X,289X, and a serrated, scored, or knurled, upper or lower major surface 290X. The link element 291X has a serrated, scored, or knurled, exterior edge 292X, a smooth interior edge 293X, and a serrated, scored, or knurled, upper or lower major surface 294X.

20 For convenience of presentation, the major surfaces and/or interior and exterior edges shown in Figures 41X-44X are shown as serrated, or knurled. It is to be understood, however, that these surfaces may have physical surface appearances other than serrated, scored, or knurled, such as textured, patterned, sandblasted, etched, shaped, polished, matted, frosted, diamond cut, or otherwise mechanically deformed.

25 In addition to presenting a softer visual appearance to a completed rope chain, combining serrated, scored, or knurled, link elements selected from those shown in Figures 41X-44X with any of the other link element variations shown and described herein creates unusual and attractive jewelry items.

Additionally, it is known to diamond cut the edges of a completed rope chain and coat with rhodium (or other material) the flattened surfaces created by the diamond cutting process. By constructing a rope chain using, in part or in whole, serrated, scored, or knurled, link elements, and subsequently rhodium coating diamond cut surfaces, a
5 dramatic increase in contrast is seen due to the softer yellow gold color of the serrated, scored, or knurled portions and the mirror-like finish of the coated diamond cut portions of the chain.

Figure 45X is a partial plan view of a link element 295X having portions 297X of its major surface smooth and portions 296X serrated, scored, or knurled. This figure is presented to
10 show the possibility that any portion of a link element may be serrated, scored, or knurled, and such portion may, but need not, span the entire link width or span the entire extent of the link element. Similarly, any color, texture, or pattern on a major surface, or on the interior or exterior edges, of a link element may purposely be limited to only a portion thereof at the discretion of the rope chain designer/manufacturer.

15 As has been suggested by the various embodiments and variations of the invention presented herein, the flexibility of design, appearance, and feel of a rope chain manufactured using the link elements shown and described can stimulate a myriad of possibilities. These attributes of a completed rope chain can be unique with the present invention. Creating similar attributes using prior art techniques would not be considered
20 by the person of ordinary skill in the art, since all attempts to similarly shape, color, texture, or pattern a rope chain after it is completed would not be practical. The uniqueness of a rope chain employing the link elements of the present invention is made possible by the provision of pre-formed, pre-shaped, or otherwise pre-processed individual link elements. Exclusive finished rope chain attributes made possible with the present
25 invention cannot be duplicated by applying post-processing steps, whether a single type link element is used throughout the length of the rope chain, or multiple types of link elements are assembled in a particular or random order.

To illustrate the great extent to which different visual impressions are made possible with the invention, the individual visual properties of different link element types can be

appreciated in the same rope chain by assembling combinations of different link element types. Considering only four of the types of link elements depicted in the accompanying drawing, Figures 1X, 28X, 30X, and 37X, a mix of link elements of any desired order can be used to create a rope chain design which cannot be duplicated by prior art methods. For
5 example, if a length of rope chain comprises link elements of Figures 28X and an adjacent length of rope chain comprises link elements of Figure 30X, the notched edges 184X, 185X, 203X, 204X form a continuous "apparent" helix. Advantageously, however the light reflecting off the concave notches 184X, 185X is visually different from the light reflecting off the flat notches 203X, 204X, especially if optionally rhodium coated.
10 Obtaining this interesting visual effect after a rope chain made with conventional "standard" annular links is practically impossible, since any diamond cutting of the finished chain would be consistent along the entire length of the chain.

Similarly, another visually pleasing rope chain can be manufactured by assembling a chain length, e.g. one inch, of link elements of the Figure 30X type adjacent a length of
15 assembled link elements of the Figure 37X type. In this variation, one of the helixes along the length of the chain will be continuous, and the other helix will be intermittent.

For two other examples of the unique and visually interesting effects achievable using the concepts of the present invention, reference is made to Figures 46X and 47X.

As suggested herein, any visual property, as defined herein, may be combined with any one
20 or more other visual properties in the manufacture of the various link elements making up the completed rope chain.

Figure 46X is an example of a length of rope chain 5AX constructed using any of the link elements described herein in which the links are segmented into large and small width segments. The specific variation shown in Figure 46X uses link element 75X (Figure
25 14X) or 85X (Figure 15X) where the narrow side 76X or 86X is made of a different material or is of a different color than that of the wider side 77X or 87X.

The link elements are selected and assembled so that link elements 1DX have a white gold wide side 77X or 87X and a yellow gold narrow side 76X or 86X. Link elements 1EX have a yellow gold wide side 77X or 87X and a white gold narrow side 76X or 86X. Thus, strand 7AX has a smaller diameter rope strand appearance, and strand 8AX has a larger diameter rope strand appearance. Along channel 10AX, the smaller helical strand 7AX is on the left and the larger helical strand 8AX is on the right. The opposite location of the larger and smaller helical strands is true for channel 12AX. With this choice and arrangement of link elements, each rope strand 7AX and 8AX alternate yellow and gold materials along their respective lengths. The size difference for the two helixes are evident by reference to the two dashed lines "SX" on either side of the rope chain 5AX illustrated in Figure 46X.

Figure 47X shows a length of rope chain 5BX constructed with link elements 260X shown in Figure 37X mixed with similar link elements 260AX, the latter being identical to link elements 260X except that the yellow and white gold materials are switched.

As seen in Figure 47X, rope strand 7BX alternates white and yellow along its length and has a standard annular link element appearance. On the other hand, rope strand 8BX alternates white and yellow along its length, but each link element along the strand has a flat side 263X (white gold side) and 263AX (yellow gold side) creating a single helix within only one of the standard rope chain strands 8BX.

Along channel 10BX, a standard helical rope strand 7BX lies on the left of the channel, and a helical rope strand 8BX with a compound helical series of flat surfaces lies on the right. The opposite is seen left and right along channel 12BX.

It was mentioned above that certain prior art, e.g. U.S. Patent Nos. 5,425,228 and 5,285,625, shows link configurations which reveal flattened sides, the latter patent showing the effects of such flattened sides in Figure 5X thereof. However, neither of these patents teach constructing a rope chain which has two visually different helixes. The present invention teaches that employing link elements having particular visual appearances, and assembling them in accordance with a particular method of linking, will

advantageously result in one helix having a different visual appearance than that of the other helix. The result of applying the particular method is illustrated in the completed rope chains of Figures 46X and 47X, already described. Details of the particular method used to create helixes of differing visual appearances in the same rope chain jewelry piece
5 are presented below having reference to Figures 48AX-DX and 49AX-DX.

In Figures 48AX-DX, a number of identical link elements are interconnected in a special way, each link element 301X-304X comprising a standard segment half 301AX-304AX and serrated segment half 301BX-304BX. Both major surfaces and interior and exterior edges of segments 301BX-304BX are serrated so as to make the two halves of each link
10 notably different in visual appearance.

Also, although a six or eight link set is preferred in the construction of a rope chain, only a four link set is shown in Figures 48AX-DX for convenience of drawing and simplification of description. Additionally, in the following description, it will be understood that each link element has a gap GX without having to complicate the drawing to show each gap of
15 each link element. Extrapolating the method of assembling the links to a six and eight link set will be clear to a person of ordinary skill in the art.

As will be demonstrated, the relative orientation of the links forming the rope chain is important to achieve the desired results.

In Figure 48AX, link 301X is initially oriented so that its gap GX faces a predetermined
20 direction, e.g., facing generally upwardly, with the standard annular link segment 301AX on the right (as viewed on the page) and the serrated annular link segment 301BX on the left.

The second link 302X of the series is then passed through the gap of link 301X, with the gap of link 302X facing downwardly at about 180° relative to the gap of link 301X, as
25 shown in Figure 48BX. It should be observed that, before placement, the second link 302X is either rotated 180° and then flipped horizontally, or not rotated but flipped vertically relative to the orientation of link 301X, so as to orient the standard and serrated

segments 302AX and 302BX on the same side of the assembly as segments 301AX and 301BX, respectively.

Links 301X and 302X are then juxtaposed and intertwined so that they lay against each other, with the outer periphery of the link 302X lying against the inner periphery of link 301X, to the greatest extent possible, thereby creating a relatively large central opening 305X within the pair of intertwined and abutting annular links 301X, 302X. The plane of link 301X lies parallel to the plane of the paper, and the plane of link 302X is slightly skewed from the plane of link 301X.

The gap GX of the third link 303X is then passed through the gap GX of link 302X and over the interior edge of link 301X and laid angularly against links 301X and 302X. The gap GX of link 303X has the same orientation as the gap GX of link 301X, and the segments 303AX and 303BX are oriented the same as link segments 301AX and 301BX, respectively, as shown in Figure 48CX. The plane of link 303X is more greatly skewed than links 301X and 302X. A central opening 307X still remains within the now three intertwined links 301X, 302X, and 303X. The plane of each of the links differs from each other 180° divided by the number of links in a set.

As seen in Figure 48DX, the gap GX of a fourth link 304X is passed over links 301X, 302X, and 303X, through the center opening 307X (Figure 48CX), and thereby envelopes links 301X, 302X, and 303X. The gap GX of link 304X is disposed in the same orientation as the gap GX of link 302X. The link segments 304AX and 304BX are oriented the same as link segments 302AX and 302BX, respectively, as shown in Figure 48DX. Link 304X is then laid against the other links 301X-303X, and its plane lies at approximately the same angle from the plane of link 303X as that between the other adjacent links.

Extrapolating the above assembly procedures to a six or eight link set, and repeating the procedure for adjacent sets of links, produces a very beautiful rope chain jewelry piece with an apparent pair of differently designed rope strands. That is, one of the intertwined

helixes has the visual appearance of a standard rope chain helix, and the other helix exhibits serrations on all of its visible surfaces.

In Figures 49AX-DX, a number of identical link elements are interconnected in a special way, each link element 401X-404X comprising an annular yellow gold segment half
5 401AX-404AX, and an annular white gold segment half 401BX-404BX with a portion cut away defining a single planar side 401CX-404CX. In this variation, the links have different colored segments in addition to having differently shaped segments to make the two halves of each link, and each helix of the completed rope chain, notably different in visual appearance.

- 10 The description of the assembly procedure for Figures 49AX-DX is the same as that for Figures 48AX-DX, except that, in the resultant completed rope chain, one of the intertwined helixes has the visual appearance of a standard yellow gold colored rope chain helix, and the other helix has the visual appearance of a white gold helix with a helix of angularly changing planar portions running through the middle of the white gold helix.
- 15 The planar helix visual effect may be enhanced by either diamond cutting the surface 401CX-404CX and/or rhodium coating such planar surface 401CX-404CX. Again in this variation, the links have different colored segments in addition to having differently shaped segments to make the two halves of each link, and each helix of the completed rope chain, notably different in visual appearance.
- 20 The embodiments of the invention shown in Figures 6X-49X provide a basis for appreciating the virtually limitless number of configurations and shape and design patterns that can be produced in a rope chain structure by employing and creatively arranging the differently colored, patterned, textured, and/or shaped link elements such as those depicted in Figures 6X-49X. Further variations and combinations of color patterns, textures,
- 25 shapes, and configurations are possible and presumed to be within the teaching of the present invention.

Obviously, color, shape, texture, and overall configurations other than those shown in Figures 6X-49X are possible for the manufacture of the link elements, and these are

merely examples of preferred visual property combinations which can produce striking results in a finished rope chain construction. For example, an interesting variation of an undulated shaped edge would be a scalloped edge. Accordingly, it is to be understood that the shape and design patterns shown in Figures 6X-49X, the types of materials used, the coloring, surface texture, surface patterns, arrangement of groups and sets of link elements along the rope chain, reversed or not, randomly assembled or in strict accordance with a repeated pattern, and the like are all contemplated possibilities and are to be considered within the scope of the present invention.

It will be understood that the surface colors, textures, patterns, and/or shapes of the gapped link elements 147X, 152X, 156X, 165X in Figures 24X-27AX may be as varied as those features of the annular link elements described herein and shown in Figures 6X-23X and 28X-49X.

While only certain embodiments have been set forth, alternative embodiments and various modifications will be apparent from the above description to those skilled in the art. For example, while the colors and precious metals used in the descriptions herein are preferred to be yellow, white, rose, and green gold, other colors and metals, or even non-metals, can be employed in the construction of the disclosed rope chain configurations. Notable alternate materials, for example, are rhodium (in various colors), silver, and nickel, either solid or plated. Colored coatings may also be applied, such as enamel or powder coating.

Several references to rhodium coating have been made in this description. It is to be understood that virtually any part of a finished rope chain, constructed from any of the link elements shown in Figures 6X-49X can be rhodium coated, or coated with any other preferred material or substance. Alternatively, if a rope chain is made without the application of heat to weld, or otherwise attach, adjacent link elements together, rhodium (or other material or substance) coating can be applied to the individual link elements prior to assembly, saving much labor expense which would otherwise be required with post assembly coating processes.

In the examples herein showing segmented link elements with one side having different physical characteristics than the other side, the drawings and accompanying text referred to the transition being opposite the placement of the gap. It is within the scope of the present invention to provide segmented regions having different physical characteristics or properties as described herein placed in other positions along the extent of the link elements. One example is providing a dividing line horizontally positioned in any of Figures 6X-45X. These and other alternatives are considered equivalents and within the spirit and scope of the present invention.

DETAILED DESCRIPTION OF THE THIRD EMBODIMENTS

For the purposes of this description, the following definitions are provided.

"Rope chain" is a series of sets of interlinked, or interconnected, link elements which has the appearance of a plurality of braided, or helically intertwined, multi-fiber strands of hemp, flax, or the like.

"Standard" or "Ordinary" refers to the dimensional characteristics of annular link elements without major surface or edge variation and whose dimensions follow the recommendations according to the aforementioned U.S. Patent No. 4,651,517, for example, i.e. whose dimensions result in a tightly fitting series of link elements having the appearance of intertwining helical strands of rope.

A "set" is the number of adjacent interlinked, or interconnected, link elements making up a structurally repeated pattern along the chain. In the accompanying drawings and associated text, a six-link set is used for purposes of ease of visual presentation and description. The preferred number of link elements in a set is eight.

A "group" is a number of adjacent interlinked, or interconnected, link elements exhibiting identical visual properties. The number of link elements in a group may be the same or different than the number of link elements in a set. Groups may be uniformly or randomly distributed along the rope chain.

A "link" is the basic building element (also referred herein as a "link element"), a number of which are assembled in series to form a rope chain. Link elements of the prior art are annular in shape with an open gap having a length slightly greater than the width of the annular link. In accordance with the present invention, a link element may have a circular, baguette, oval, diamond, rectangular, square, polygonal, heart, or other geometrical shape. Each is provided with a gap at a selected position along the perimeter thereof thereby maintaining a generally C-shaped overall configuration. In such a generally C-shaped overall configuration, the inner periphery will be referred to herein as an interior edge, and the outer periphery will be referred to as an exterior edge. While the link elements of a rope chain are not necessarily annular, it is the preferred configuration for the basic building element of a rope chain, and for that reason an annular link element will be used in most of the examples shown and described herein.

A "channel" is the path which the eye follows in passing along the rope chain at the apex of the V-shaped helical groove formed between the apparent intertwined rope braids. Hence, in the preferred embodiments described herein, the rope chain has the appearance of a pair of intertwined braids of ropes, and thus there exists two such helical channels offset from one another by one-half of the pitch of either helix.

A "visual property", as used herein, is a characteristic of an object which presents a particular visual image to the eye. Such characteristics include, but are not limited to, color, texture, pattern, reflectivity, design, or shape. Although shape is also a physical property of an object, in the art of jewelry making, it is often the physical shapes which impart beauty and delicateness to a fashion item.

"Color", as used herein, refers to the quality of the link element or portion thereof with respect to light reflected by it and visually perceived by the eye as a particular hue, saturation, and brightness of the reflected light. In most cases, the different colors exhibited by a link element or portion(s) thereof result from the use of different materials (white gold as differing from yellow gold as differing from rhodium as differing from enamel coatings of different hues, etc.

The "major surface" of a link element refers to the substantially flat or planar upper and lower facial surfaces of a link element. Such surface, although being substantially planar, nevertheless may have raised or depressed patterns therein, or may be notched, gouged, textured, or otherwise physically altered by the stamping process to present a desired
5 pleasing visual effect to the observer. Additionally, the upper and lower facial surfaces need not be flat. For example, the link elements may be tubular, or otherwise circular in cross section, and yet have the uppermost and lowermost surface portions lying in respective parallel planes.

The "interior" and "exterior" edges of a link element are, respectively, the inner and outer
10 peripheral sides which span between the upper and lower major surfaces of a link element. Such interior and exterior edges, may have raised or depressed patterns therein, or may be notched, gouged, textured, or otherwise physically altered by the stamping process to present a desired pleasing visual effect to the observer.

"Link width" is defined as a distance, measured along either of the major surfaces, between
15 a pair of parallel lines perpendicular to the major surfaces and tangent to, respectively, the interior and exterior edges.

"Link thickness" is defined as a distance between and perpendicular to the planes of the upper and lower major surfaces.

"Configuration" refers to the overall appearance of a link element. Typical link elements
20 are annular with a gap in the annulus to permit interlinking with other link elements. As disclosed herein, link elements can have shapes other than annular. However, all link elements have an overall C-shaped configuration.

"Die-cutting" as used herein refers to the process and tooling with which a die, constructed of hardened metal with sharp edges, is brought into contact with a sheet of material cutting
25 portions out of the sheet of material according to a predetermined pattern of the sharp edges of the die.

“Stamping”, can have the same meaning as “die-cutting” when meaning that a pattern is stamped (cut) out of a sheet of material. However, “stamping” is also defined as imprinting, striking, pounding, marking, or otherwise providing a distinctive character to a surface by the pressure of a die pattern against such surface. Thus, “stamping” can mean cutting of and/or impressing on a sheet of material. In particular, “pressure stamping” impresses a material under pressure, but does not cut through the material.

With reference to Figures 1Y and 2Y, conventional rope chains, such as that shown in Figure 2Y, are made with a systematic and repetitive interlinking of basic annular link elements 1Y such as that shown in Figure 1Y. The annular link element 1Y must meet certain dimensional requirements for the interlinking to result in a well-fitting rope chain. Such dimensions are known in the art and will vary from a four-link variety to a six-link variety to an eight-link variety, and so on. Determining the proper dimensions for the annular link element 1Y and the gap 3Y therein, depending upon the number of desired link elements to form a set of interlinked link elements, can be readily understood by reference to the aforementioned U.S. patents, especially U.S. Patent No. 4,651,517. As can be viewed in Figure 2 herein, the intertwined link elements 1Y of a segment of a conventional rope chain are shown in Figure 2Y in the form of a six-link variety. In their assembled form, the series of link elements 1Y produce the appearance of a pair of braids of rope, the combination of which results in a double intertwined helical appearance.

As seen in Figures 2Y, the apparent intertwining of a pair of rope strands or braids results in a V-shaped groove between the braids at any position along the rope chain. The path along the apex of such V-shaped groove is referred to herein as a "channel", and since there are two apparent rope braids, there are, likewise, two defined channels indicating Figure 2Y by the directional arrows 8AY and 8BY. Channels 8AY and 8BY, along the length of the rope chain, define the transition points between the two helixes. However, the two channels never intersect one another, and are parallel to one another along the length of the rope chain separated axially by one half of the pitch of either of the two channels. In the prior art of Figure 2Y, there is no visual difference between following along the two helical channels 8AY and 8BY, since the rope chain is comprised of a

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repetitive series of sets of link elements 1Y, and all link elements have the same visual property (they are all of the same color, texture, and shape for example).

The remaining figures to be described, Figures 3Y-65Y, illustrate examples of a virtually limitless number of variations of the design and construction features of link elements that
5 may be assembled into a distinctively beautiful and unique rope chain having appealing visual properties.

It will be appreciated that a link element may exhibit multiple colors due to a variety of possible physical constructions. For example, as in the aforementioned United States Patent 6,209,306 titled "Decorative Jewelry Rope Chain", a link element may
10 be of laminated construction, such that one major surface is of one material or color and the opposite major surface is of a different material or color. Additionally, or alternatively, each or both major surfaces may be divided into portions, each portion exhibiting a color, texture, or shape different from its adjacent portion.

In describing Figures 3Y-65Y, it should be understood that the link elements so shown are
15 all manufactured employing a stamping and/or die-cutting operation. In some embodiments, the link elements are stamped, or die-cut, in their final shape. In other embodiments, texturing is pre-applied prior to stamping or die-cutting. In yet other embodiments, the link elements are formed by bending strips of material which themselves were stamped, or die-cut, from a sheet of material.

20 In Figure 3Y, the plan view of a sheet of material 4Y has regions 5Y and 6Y exhibiting different visual properties, represented in Figure 3Y as different colors. When stamped from the sheet of material 4Y, the annular link element 7Y, the position and orientation of which is shown in dashed lines, will have, on at least one planar major facial surface thereof, a first segment 5AY of a first visual property, e.g. color, and a second segment
25 6AY of a second visual property, e.g. color. The link element 7Y may be formed, for example, by stamping a flat sheet constructed of two edge-joined strips of different flat materials, or of two edge-joined strips of materials of different colors and/or textures and/or coatings (such as by the application of an enamel).

It will be noted in Figure 3Y that the link element 7Y to be stamped from the sheet of material 4Y has its gap 9Y oriented at approximately a two o'clock position, such that a short portion on the left side, or arm, of the link element 7Y near the gap 9Y will be of white gold color, while the remainder of the left side will be of a yellow gold color. The
5 opposite is true of the right side, or arm, of link element 7Y, i.e. a large segment of the right side adjacent the gap 9Y is of a white gold color, while a shorter segment of the right side is of a yellow gold color. When a number of such link elements 7Y are assembled into a rope chain, an interesting color pattern will be observed in the double helical length of rope chain. That is, one of the helixes will have a predominant white color with a small
10 portion of the helix being of a yellow color adjacent one of the rope chain channels, while the other helix will be primarily of a yellow color with a small portion of the helix being of a white color adjacent one of the rope chain channels.

In this connection, most of the remaining figures are not lined for color. However, it will be understood that all, or portions, of each of the link elements to be described hereinafter
15 may be of a color selected from a variety of different colors, and/or may be made of a material selected from a variety of different materials. For example, any of the link elements described herein may have the entire surface, or portions thereof, of yellow gold, white gold, rose (pink) gold, green gold, silver, nickel, or rhodium, either solid, plated, or laminated; or such surfaces, or portions thereof, may be enameled.

20 In some cases, the gapped link elements may be stamped from a multicolored flat sheet comprising a number of edge-joined strips of alternately colored gold materials, or alternately of different materials such as gold and silver. Such a multicolored flat sheet may be stamped to form gapped link elements in different orientations relative to the strip pattern and relative to the gap position, resulting in a variety of interesting colored patterns
25 in the finished rope chain, yet all such link elements can be stamped from the same multicolored stripped sheet.

Figure 4Y is a view similar to that of Figure 3Y, except that the sheet of material 11Y comprises a larger number of colored strips 12Y-17Y, and the link element 18Y to be stamped from the sheet of material 11Y has a different orientation relative to the

longitudinal extent of the edge-joined strips 12Y-17Y. With the gap 19Y oriented at the twelve o'clock position, a length of rope chain constructed by assembling a number of link elements 18Y will produce a length of rope chain of two intertwined helixes, but with the outermost surface of each helix being of the same color, since strips 12Y and 17Y are
5 lined for the same color of material. On either side of the outermost peripheral surface of each helix, a short length of a different color will be observed from one helix to the other, since strips 13Y and 16Y are lined to indicate two different colors, although they could be the same if desired. Then, the extreme visible inner portion of each helix, along the rope chain channels, will have yet a third and fourth color visible to the observer, due to the
10 different colored strips 14Y and 15Y lined in Figure 4Y to indicate different coloration between the two strips.

In the remaining figures to be described, the relative position of the gap in the link chain to be produced and the number of strips, width of each strip, and color of each strip will obviously produce different visual effects, and the description of Figures 3Y and 4Y above
15 will serve as a basis for understanding the resulting color/texture/shape or pattern that will be visible in the intertwining helixes. Moreover, by reference to the aforementioned Patent Application No. 09/337,455 entitled "Jewelry Rope Chain Link Element", U.S. Patent No. 4,651,517, and U.S. Patent No. 5,301,498, an appreciation of the display of visual properties of a length of rope chain will be fully understood by a person of ordinary skill in
20 the art of making rope chains. Accordingly, minute details of the visual effects resulting from manufacturing and assembling the link elements yet to be described, and resulting from assembling combinations of link elements described in this specification, are unnecessary.

Figures 5Y and 7Y illustrate how the visual properties of the link elements 27Y and 47Y,
25 respectively can be varied by varying the widths and arrangement of the visual properties of the sheet of material 21Y, 41Y.

Figure 5Y is a view similar to that of Figure 3Y, except that the sheet of material 21Y is comprised of two edge-joined strips 23Y, 25Y which are not only of different colors but are of different widths. With the gap 29Y oriented at about a one o'clock position, one of

the helixes of the finished rope chain will be of an all yellow gold color, while the other helix will be both yellow and white gold in color.

Figure 6Y is also a view similar to that of Figure 3Y, but showing a different orientation of the link element 37Y to be stamped from the sheet of material 31Y comprised of edge-joined colored strips 33Y and 35Y. With the gap 39Y oriented at the twelve o'clock position, the two helixes will both be of a single color, but one helix will be of white gold and the other will be of yellow gold in color. The lined colors shown in Figure 6Y, and in all of the accompanying figures, are intended to be representative of any two, or multiple, colors, and thus the two strips 33Y and 35Y in Figure 6Y may be both of yellow gold, but with one strip being of a relatively low gold karat weight and the other of a relatively higher gold karat weight.

Figure 7Y is a view similar to that of Figure 5Y, but with the sheet of material 41Y comprised of two differently colored edge-joined strips 43Y and 45Y having different widths than those shown in Figure 5Y and a color reversal of the stripped regions 43Y and 45Y. The gap 49Y, however, is oriented similar to that shown in Figure 5Y.

Figure 7AY is an example of a link element 50Y stamped from a multicolored sheet (not shown) of material, resulting in a major yellow gold portion 52Y, a minor gold portion 54Y, and a central segment 56Y of white gold on one of the halves of the link element 50Y. A rope chain constructed from link elements 50Y, if central segments 56Y are all aligned link-to-link, would have the appearance of a primarily yellow gold rope chain with the outermost peripheral edge of one of the helical rope strands displaying a central helical path of white gold.

Figure 8Y is a view similar to that of Figures 3Y or 6Y, but showing a different orientation of the gap 59Y for the link element 57Y to be stamped from the sheet of material 51Y comprising colored elongated regions 53Y and 55Y. A length of rope chain constructed of link elements 57Y, alternating with link elements of similar construction but with the colors in regions 53Y and 55Y reversed, would thus display one-half of each of the two

helixes as white gold and the other half as yellow gold, with one side of each channel (8AY and 8BY, Figure 2Y) of white gold, and the other side of yellow gold.

Figures 6Y and 8Y show how the visual properties of the link elements 37Y, 57Y can be varied by stamping, from sheets with substantially the same visual properties, link
5 elements with their respective gaps 39Y, 59Y in different angular orientations. For example, in Figure 6Y, the stamping produces a link element 37Y with a gap 39Y oriented such that the link element is bifurcated in half through the gap 39Y, and each half of the link element 37Y is of a different visual property. By simply setting the stamping of the link element to be in a different angular position (as in Figure 8Y), where the gap 59Y is
10 rotated 90Y degrees, the orientation of the visual properties on the link element 57Y is also offset by 90 degrees. This has significance, because certain parts of a link element relative to its gap have more visibility in the finished rope chain than other parts. The foregoing is just one example of how the position of visual properties on the individual link elements may be changed by varying the angular position of stamping without
15 changing the arrangement of visual properties of the sheet on which the stamping is applied.

By the combination of varying: 1) the visual properties of a sheet on which stamping is applied; and 2) the angular position of stamping, a myriad of link elements with different visual properties may be produced that will, in turn, result in a great number of rope chains
20 of varying visual properties.

In Figure 9Y, the sheet of material 51Y has wide white gold edge-joined strips 63Y and 65Y with a central yellow gold strip 64Y of smaller width. With the gap 69Y in the nine o'clock position, as shown, a link element 67Y stamped from the sheet of material 51Y would display both helixes as white gold in color with a yellow gold helical band directly
25 in the center of each helix.

Figure 10Y illustrates that, instead of, or in addition to, color elongated edge-joined strips, a sheet of material 71Y may have a preformed length of textured surface 74Y leaving the surface areas 73Y and 75Y on each side of the textured surface 74Y non-textured. With

the gap 79Y at the twelve o'clock position, as shown, a link element 77Y will present a non-textured outer surface of each of the two helixes, while the inner sides of the helixes, i.e. on a major facial surface along the channels of the rope chain (see reference numerals 8AY and 8BY in Figure 2Y) will be textured.

- 5 In Figure 10Y and other figures showing preformed regions of textured surfaces, parallel lines are typically depicted, suggesting a scored or serrated textured appearance. It is to be understood that this showing of pre-textured surfaces are examples only, and that any other known pre-texturing process can be used. Other examples include forming at least one of the regions of different surface textures employing at least one process selected from the
- 10 group consisting of serrating, scoring, knurling, lining, patterning, pressure stamping, impressing, sandblasting, etching, shaping, polishing, matting, frosting, and diamond cutting.

Figure 11Y illustrates the possibility of providing a sheet of material 91Y with two different regions of surface texturing shown at 92Y and 94Y in Figure 11Y, leaving the

15 regions 93Y, 95Y, and 96Y non-textured. With the gap 99Y at the three o'clock position, as shown, each of the two helixes of an assembled rope chain will show a pair of spaced textured helical stripes equally spaced from the outermost surface of the helixes.

Figures 12Y and 12AY illustrates one possible physical structure for the double textured sheet of material 91Y shown in Figure 11Y. In Figure 12Y, it will be observed that the

20 two textured surfaces 92Y and 94Y on the upper side of the sheet of material 91Y have different geometrical properties, and that similar textured regions (not numbered) can optionally be formed on the lower surface of the sheet of material 91Y and may have the same or different textured patterns.

In Figure 13Y, the sheet of material 101Y has two differently textured regions 103Y and

25 105Y, the region 103Y being a textured surface, and the region 105Y being either textured differently or non-textured. With the gap 109Y at the twelve o'clock position, as shown, a length of rope chain constructed of link elements 107Y would display one helix with a

textured major surface and the other with no texturing or a different textured major surface.

Figure 14Y is a plan view of a sheet of material 111Y in which a link element 115Y or 117Y can be die-cut from the sheet of material 111Y and display radially directed texture patterns 113AY-113DY as shown. Figure 14Y also shows that the pattern of the cutting edges in the die-cutting process can produce an annular shaped link element 115Y or a link element 117Y having features departing from the standard annular configuration. In a preferred embodiment of the invention, either link element 115Y or 117Y may be die-cut simultaneously with the stamping of the upper planar surface of the sheet of material 111Y forming the radially directed impressed lined patterns 113AY-113DY. Alternatively, a lined pattern such as that shown in dashed lines as numeral 114Y may be formed on the sheet of material in a preparatory step of imprinting the surface texturing at specific locations, after which the die-cutting process will cut the link element 115Y or 117Y from the sheet 111Y. The textured pattern 114Y intentionally extends a length greater than the annular radius of the link elements 115Y, 117Y to allow for tolerance in the registration of the pressure stamping process which impresses the texture pattern and the die-cutting process which severs the link element 115Y, 117Y from the sheet of material 111Y.

Although Figure 14Y shows a particular pattern for a number of radially directed stamped, or impressed, lines, the illustration in Figure 14Y is exemplary only, and any pattern of surface texturing can be applied along a portion or the entire extent of the link element 115Y, 117Y to be die-cut from the sheet 111Y, depending upon the choice of the designer.

Figure 15Y is a cross sectional view of the sheet of material 111Y taken along the lines 15Y-15Y in Figure 14Y. This figure shows the character of the impressed textured areas 113AY-113DY relative to the thickness of the sheet of material of 111Y.

Figure 16Y illustrates the plan view of a link element 115Y die-cut from a sheet 111Y shown in Figure 14Y for an annular configuration of the link element.

Figure 17Y illustrates the plan view of a link element 117Y die-cut from a sheet 111Y shown in Figure 14Y for an alternate configuration of the link element, with bulging portions 119Y of the link element 117Y extending between the imprinted surface textured areas 113AY-113DY, for decorative purposes.

- 5 Figure 18Y is a perspective view of a laminated sheet of material 151Y comprised of, for example, a layer of white gold 156Y and a layer of yellow gold 158Y (or both layers 156Y, 158Y can be of yellow gold of different gold karat weights). In a stamping, or die-cutting, process, slices 150Y can be cut from the sheet of layered material 151Y and eventually formed into a link element by a bending or rolling process to be described
- 10 hereinafter with reference to the forming method depicted in the action perspective view of Figure 30Y, and with reference to the layered link element shown in Figures 49Y and 49AY. A length of rope chain constructed from a group of assembled link elements as shown in Figure 49Y, would thus have the general appearance of a rope chain having essentially the color of the outer layer on the link element so formed.
- 15 While Figures 18Y, 49Y, and 49AY depict one color representing yellow gold and the other color representing white gold or silver, it may be desirable to laminate together two yellow gold layers of different gold karat weight. If the two layers 156Y, 158Y are both yellow gold of different karat weights, 7K and 14K for example, and the link element is formed with a 14K outer layer, the visual impression of a finished rope chain will be
- 20 essentially that of a 14K gold rope chain, giving a purchaser the desired visual quality at lower cost.

In this connection, Figures 18Y-31Y are all concerned with the forming or shaping of a strip of material into the configuration of a link element after the strip has been sliced, e.g. die-cut, from a sheet of material. Figure 18Y, as noted above, may be sliced and bent into

25 annular shape to produce the layered link element shown in Figure 49Y. In Figure 49Y, the major surfaces exhibit multiple colors or textures 323Y, 325Y, and the inner and outer edges each exhibit a single color or texture 323Y, 325Y, while in Figure 49AY each major surface 328Y, 340Y exhibits a single color or texture, and the inner and outer edges (inner edge not visible in Figure 49AY) exhibit multiple colors or textures.

It should be noted that, depending upon the choice of material thicknesses and width of the slices 150Y and 150AY, the slices 150Y and 150AY can be bent in any of four different directions to produce a major surface with either material 152AY or 154AY and the other major surface with the other material (or both yellow of different gold karat weights, cf.

- 5 Figure 6Y of the aforementioned U.S. Application No. 09/287,972), or to produce a major surface having the interior edge of one material 152Y and the exterior edge of the other material 154Y, or vice versa (cf. Figure 49Y). Figure 18Y is illustrative of two thicknesses of laminated materials 156Y and 158Y on either side of a transition region 151AY permitting construction of link elements of the types just described.
- 10 Figures 19Y-31Y are specifically directed to the formation of textured surfaces on the major surfaces of the ultimate link element and/or on the peripheral edges of the ultimate link element. Both major surface texturing and edge surface texturing will be dealt with in the ensuing paragraphs.

Figure 19Y, like Figure 18Y, shows a sheet of material 131Y from which strips 133Y may
15 be sliced, the strips 133Y having the precise dimensions of width, thickness, and length so as to meet the specifications and requirements for interlinking link elements formed therefrom with other similar link elements to form a rope chain. In Figure 19Y, the sheet of material 131Y is not shown to be layered, but it may be layered, if desired. However, whether layered or not, the strips 133Y are stamped and/or die-cut from the sheet of
20 material 131Y with the die-cutting device having spaced apart zig-zag cutting edge portions to form the vertical textured surfaces 135Y shown in Figure 19Y. Additionally, as the die-cutting tool (not shown) slices through the sheet of material 131Y, the tooling simultaneously impresses a secondary series of textured surfaces 139Y on the top surface of the sheet of material 131Y. If the strip 133Y shown in Figure 19Y has its ends bent
25 downwardly about a mandrel, a link element similar to that shown in Figure 27Y, except for the textured interior edge, would result. Specifically, the link element shown in Figure 27Y results from a slightly different process as will now be described.

From the description of Figure 19Y, it will be appreciated that the sheet of material 131Y has a thickness greater than the width of the slice 133Y, so that the link element formed by

bringing the ends of the strip 133Y downwardly around a mandrel will produce a link element of the proper physical dimensions for the construction of a rope chain.

An alternate, and preferred, method is to provide a thinner sheet of material 141Y such as that shown in Figure 20Y and die-cutting strips 147Y of wider dimension, as shown. This method has two advantages. First, it is easier to die-cut a strip from a thin material than it is from a thicker material. Secondly, since a link element formed by bending the strip 147Y requires the ends of the strip 147Y as shown in Figure 20Y to be bent toward the observer about a mandrel, this permits the stamping/die-cutting procedure to form zig-zag edge patterns 145Y on both the front and rear edges of the strip 147Y. This process will be described in connection with Figures 24Y-27Y.

Figure 21Y is a top plan view of the sheet of material 141Y showing four groups of lined patterns 149Y representing any desired texturing design formed on a sheet of material 141Y prior to the slicing of the sheet of material 141Y into strips to be formed into link elements. The die-cutting tool, in order to produce the strip 147Y necessarily has three spaced zig-zag patterns on its front edge to form the zig-zag textured surface 145Y on the strip 147Y so produced. With every other slice line formed by the die-cutting tool being non zig-zagged, the textured pattern 145Y is formed on only one peripheral edge of two adjacent strips 147Y simultaneously.

Figure 22Y is a side elevational view of the slice of material 147Y shown in Figures 20Y and 21Y, better illustrating the positioning of the major surface texturing 149Y and the peripheral edge texturing 145Y prior to the strip 147Y being formed into a link element.

Figure 23Y is a top plan view of the slice of material 147Y shown in Figure 22Y.

Figure 24Y is a view similar to that of Figure 21Y except that both peripheral edges of all strips 147AY have the peripheral edge texturing pattern 145Y. Moreover, it is to be understood that the bottom surface of the sheet of material 141Y in Figure 24Y has the identical texturing pattern 149Y as shown on the top surface of the sheet. Accordingly, Figure 25Y shows surface texturing 149Y on the top major surface of the strip 147AY,

while the numeral 153Y represents the spaced texturing design patterns on the bottom surface of the strip 147AY.

As best seen in Figure 26Y, as described in connection with Figure 24Y, the zig-zag textured portions 145Y on the peripheral edges of the strip 147AY are on both peripheral
5 edges.

Figure 27Y thus is a perspective view of a link element formed from the slice of material 147AY shown in Figures 25Y and 26Y.

Figure 28Y is a perspective view similar to that shown in Figure 19Y, but with deep cut notches forming textured recesses 139AY formed in the sheet of material prior to slicing
10 the sheet 131Y to form strips 133AY.

Employing the process of forming a strip 133AY suggested by Figure 28Y, a link element having the characteristics shown in Figure 29Y results.

It will be understood that, for ease of drawing and description, the textured patterns shown in Figures 10Y-17Y and 19Y-29Y are shown as a group of parallel lines for ease of
15 presentation only. The stamping and/or die-cutting tool may just as easily be manufactured to have any desired surface texturing or pattern at the whim of the designer. Each of the areas shown to be lined patterns may simply be regions of simulated sand blasting, matting, serration, knurling, or may be some design having geometrical figures as its content, or other design patterns, such as happy faces, heart shapes, flower petals, leaf
20 patterns, and the like.

Stamping is merely one method of fabricating annular link elements for the manufacture of rope chains. Link elements can also be made from wire. As in the case of "stamping", different visual properties can first be made on the wire prior to the making of the link element. Figure 30Y shows a portion of a wire 161Y that can be made into an annular link
25 element for the purpose of making rope chains with a distinctive and decorative design.

The removal or omission of material from the wire, as shown, has an additional benefit of savings of precious metal resulting in lowered cost of materials.

Figure 30Y is an action perspective view showing four time positions of a slice of material 161Y or a prepared strip or wire, illustrating the bending of a straight textured and shaped
5 slice or wire into the configuration of a link element. As can be seen in Figure 30Y, a rather scalloped design of impressions 163Y may be formed on any portion of a strip of material 161Y which, after forming of the link element, produces a notched interior edge 163Y. Similarly, the right bottom side of the strip 161Y may have V-grooves 167Y formed therein so that the formed link will have the V-grooves 167Y on its outer
10 peripheral edge. Using any of the process steps mentioned above, the sides of the strip 161Y may be provided with a pattern of textured regions 165Y which then show as textured regions on the major surface or surfaces of the ultimately produced link element.

Although it has been adequately described earlier in this specification, the notches 163Y, V-grooves 167Y, and side serrations or textured patterns 165Y of the link element shown
15 in Figure 30Y all contribute to removing precious metal from the otherwise solid annular ring-shaped link element. As a result, not only is precious metal conserved without diminishing the structural integrity of the link element, but interesting patterns of the rope chain from which the link elements are made can be produced as described herein. The link element produced by the process described in connection with Figures 28Y and 29Y,
20 for example, result in a significant savings in precious metal content.

Figure 31Y is a view similar to that shown in Figure 30Y, but without showing intermediate bending positions, and with a different pattern of surface texturing, i.e. serrations 175Y formed on the major surface of the wire or strip of material/link element 171Y, and additional serrations 173Y formed on the exterior peripheral edge. Figure 31Y
25 thus shows the manufacture on an annular link 171Y exhibiting serration-like characteristics from a wire or strip 171Y first formed with such serration-like characteristics.

Figures 30Y and 31Y are exemplary only. The wire or strip may be formed with a variety of different visual properties as illustrated in Figure 32Y which schematically shows examples of different surface texturing 181Y-189Y that may be selected to cover portions or the entire major or edge surfaces of a link element made in accordance with the present invention. Figure 32Y illustrates that the surface texturing may include parallel serrated strips 181Y, random raised lineation 182Y, cross-serrations 183Y, lineal serrations 184Y, raised portions 185Y, filigreed elements 186Y, either raised beads or depressed beads 187Y, parallel serrated strips 188Y in a direction different than that of 181Y, and sandblasted texturing 189Y. Again, these are provided for the purpose of illustration only, as there are an endless number of visual properties that can be imparted to the wire or strip prior to fabricating the link element.

Figures 33Y-59Y illustrate examples of link elements that can be formed to exhibit different visual properties. Some of these are for decorative purposes only while others provide for savings in the amount of materials used to make rope chains. Some provide both benefits.

Figure 33Y shows an annular link element 191Y having the entirety of one of its major surfaces 193Y textured, simulating a sandblasted surface. This is made possible by fabricating the stamper tooling device with a sandblasted inner surface. When the link element is die cut from a sheet of material, the pressure of the stamper simultaneously creates the simulated sandblasted effect on the major surface which the stamper contacts.

Figure 34Y shows an annular link element 195Y having a smooth major surface 197Y, and with the exterior edge 199Y serrated. This is made possible by providing the stamper tooling device with a serrated cutting edge.

Figure 35Y shows an annular link element 201Y having the entirety of one of its major surfaces 203Y serrated. This is made possible by fabricating the stamper tooling device with a serrated inner surface, or, preferably, creating serrations along the entire length and width of the sheet of material from which the link element 201Y will be cut.

Figure 36Y is similar to that of Figure 35Y but with the stamper rotated 90Y degrees with respect to the sheet of material.

Figure 37Y shows an annular link element 209Y having segments 213Y of the major surface 211Y serrated. This is made possible by fabricating the stamper tooling device
5 with a serrated inner surface having the same pattern in reverse. If a pre-textured sheet of material is to be provided, it could not have continuous serrations, similar to the situation described in connection with Figure 14Y.

Figure 38Y shows an annular link element 215Y having segments 219Y of the major surface 217Y serrated. This also is made possible by fabricating the stamper tooling
10 device with a serrated inner surface having the same pattern in reverse. Preferably, however, a pre-textured sheet of material will be provided having an elongated center region of continuous serrations, and the stamper is simply oriented with the gap position aligned with the extent of the serrations.

Figure 39Y shows an annular link element 221Y having segments 225Y, 227Y of the
15 major surface 223Y provided with a knurled effect. This is made possible by fabricating the stamper tooling device with a knurled inner surface having the same pattern in reverse. If a pre-textured sheet of material is to be provided, it could not have a continuous knurled pattern, similar to the situation described in connection with Figure 14Y.

Figure 40Y shows an annular link element 231Y having segments 235Y, 237Y of the
20 major surface 233Y lined, simulating scoring of the major surface 233Y. This is made possible by fabricating the stamper tooling device with a lined pattern on its inner surface of similar, but reversed, design.

Figure 41Y shows an annular link element 241Y having segments 245Y, 247Y of the
25 major surface 243Y notched. This is made possible by fabricating the stamper tooling device with a complementary notched cutting edge.

Figure 42Y shows an annular link element 251Y having the outer extent of the major surface 253Y provided with lining 255Y simulating scoring of the major surface 253Y. This is made possible by fabricating the stamper tooling device with a lined inner surface having the same pattern in reverse.

- 5 Figure 43Y shows a stamped link element 261Y with a lobbed side 265Y. The dotted line 269Y is the outline of a side that the link element would take if it were annular, like the other side 263Y, and is provided for comparison purposes only. Employing a number of link elements 261Y in a rope chain, and with proper arrangement, produces one of the helixes having a larger effective diameter than the other helix.
- 10 Figure 44Y shows an annular link element 271Y having a smooth major surface 273Y, and with one half the exterior edge 275Y beaded. This is made possible by providing the stamper tooling device with a beaded pattern along one half of its cutting edge.

- Figure 45Y is a plan view of a link element 281Y similar to that shown in Figure 1Y, but with a double bumped protruding projection 285Y on the interior edge thereof opposite the
- 15 position of the gap in the link element 281Y between the two halves 283Y. The two projecting bumps 287Y define a depression 289Y. The link width of the arms of the two halves 283Y is preferably narrower than standard. If the entire annular link element 281Y had a less-than-standard width, the finished rope chain would be very loosely interconnected and unattractive. The purpose of the double bumped projection 285Y is to
- 20 simulate, during the assembly process, a link element of appropriate, i.e. standard, annular width at depression 285Y. Since the looseness or tightness of the finished rope chain product is dependent, among other factors, upon the width of the link at the location opposite the gap, employing the reduced material design for the link element 281Y as shown will result in a perfectly formed rope chain with tightly interconnected link
- 25 elements having the same flexibility as if the link elements were each made with a standard annular width in its entirety. This arrangement thus reduces material by a reduced annular width and by using fewer link elements per unit length of rope chain, making the chain to appear longer than the standard rope chain.

The purpose for the two spaced bumps 287Y is to affect the appearance of the channels between rope strands of a finished rope chain. Due to the spaced bumps, the rope chain will display more precious metal (e.g., gold) in the channels between strands of the finished rope chain. As to construction concerns, the interior edge of a like adjacent link element 281Y will fit perfectly within the depression 289Y, and the rope chain will have high structural integrity due to the width of the link element 281Y between the exterior edge and the depression 289Y being of standard dimension.

If desired, the arms 283Y of link element 281Y may be of standard width, and the edge projection 285Y will then be of greater than standard width. In such a case, the gap will necessarily have to be widened to accommodate the projection 285Y of an interconnected link since such projection passes through the open gap at an angle so as to have the major surfaces of adjacent link elements in surface contact. One advantage of this variation is that fewer link elements are necessary per unit length of rope chain.

Figure 46Y shows a stamped annular link element 291Y having a standard width annular shaped side arm 293Y and a rectangular side arm 295Y. The overall configuration is D-shaped with a circular interior edge 297Y.

Figure 47Y shows a stamped annular link element 301Y having a standard width annular shaped top half 303Y and a less than standard annular width lower half 305Y.

Figure 48Y shows a stamped annular link element 311Y having a rectangular exterior edge 313Y and a circular interior edge 315Y.

Figure 49Y shows a layered link element 321Y having a yellow gold outer layer 323Y and a white gold inner layer 325Y, the link element 321Y being fabricated employing the method described in connection with Figure 18Y and 30Y.

As with the embodiment of the multilayered sheet of material shown in Figure 18Y, if desired, rather than two different materials or distinctly differently colored materials being laminated together, the inner layer 325Y of link element 321Y may be made of a yellow

gold of relatively low gold karat weight, e.g. 7 karat gold, while the outer layer 323Y may be made of a relatively high gold karat weight, e.g. 14 karat gold. In this manner, the visual impression of a finished rope chain will be essentially that of a 14K gold rope chain, giving a purchaser the desired visual quality at lower cost.

- 5 Figure 49AY shows a layered link element 322Y formed of two layers 324Y and 326Y and having a yellow gold major surface 328Y and a white gold major surface 340Y, the link element 322Y being fabricated employing the method described in connection with Figure 18Y and 30Y. In Figure 49AY, each major surface 328Y, 340Y exhibits a single color or texture, and the inner and outer edges (inner edge not visible in Figure 49AY)
- 10 exhibit multiple colors or textures;

Figure 50Y is a plan view of a link element 331Y having an arcuate, but stepped, concave cutout 335Y. This may create an interesting multi-faceted helix along one of the intertwining rope strands, which is especially attractive, especially when the flat stepped surfaces are rhodium coated. A multi-faceted helix on one of the intertwining rope strands

15 is made possible by reversing every other link element in the assembly procedure.

However if both sides of link element 331Y are symmetrically concave and stepped as shown, a helical groove can be seen on top of each simulated helical rope strand without having to reverse every other link element.

Figure 51Y shows a stamped annular link element 341Y having a polygonal exterior edge 343Y, a square interior edge 347Y, and a fanciful cutout design 345Y on one side arm.

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Figure 52Y shows a stamped annular link element 351Y having a circular exterior edge 353Y, a square interior edge 355Y, and a cutout region 357Y opposite the location of the gap in the link element 351Y.

Figure 53Y shows a stamped annular link element 361Y having a standard width annular side arm 363Y and a series of symbols cut out on the other side arm 365Y. The symbols

25 may be of any desired design and need be connected only with enough precious metal for strength and durability, so as not to obscure the nature of the design of the symbols. This

is another example of significant savings in precious metal with the synergistic effect of enhancing the decorative value of the piece of jewelry from which it is constructed.

Figure 54Y shows a stamped annular link element 371Y having a generally D-shaped exterior edge 373Y, a square interior edge 379Y, and an undulated exterior edge 377Y on one of its side arms.

Figure 55Y shows a stamped annular link element 381Y having a standard width annular side arm 383Y and a series of circular symbols cut out on the other side arm 385Y.

Figure 56Y shows a stamped annular link element 391Y having an average standard annular width but with the entire extent of the link element 391Y formed with an interconnected series of heart symbols 393Y.

Figure 57Y shows a stamped annular link element 401Y having a polygonal exterior edge 403Y, a square interior edge 407Y, and a fanciful cutout design 405Y on one side arm.

Figure 58Y shows a stamped annular link element 411Y having a polygonal exterior edge 413Y, a square interior edge 417Y, and a fanciful cutout design 415Y on one side arm.

Figure 59Y shows a stamped annular link element 421Y having an egg shaped exterior edge with a circular portion 423Y and an oval portion 425Y, and a square interior edge 427Y.

Figure 60Y represents, schematically, an example of assembling a rope chain 431Y by alternating link elements 261Y (Figure 43Y) having lobbed sides 265Y with conventionally shaped annular link elements 1Y (Figure 1Y). The lobbed side 265Y of the sequence of link elements 261Y are placed alternately opposite one another, thereby producing a length of rope chain having the appearance of a larger overall diameter as indicated by dashed lines 440Y.

Figure 61Y is a schematic representation of an arrangement for a rope chain 441Y, whereby only link elements 261Y with lobbed sides 265Y are used with consecutive link elements 261Y placed such that the lobbed sides 265Y alternate in opposite orientation, thereby producing a length of rope chain having the appearance of a larger overall diameter
5 as indicated by dashed lines 450Y.

Figure 62Y is a schematic representation of an arrangement for a rope chain 451Y, whereby only link elements 261Y with lobbed sides 265Y are used but with consecutive link elements 261Y placed such that the lobbed sides 265Y are in the same general orientation. Since the finished rope chain 451Y will have a helical character, visually the
10 rope chain 451Y has an apparent larger diameter as indicated at 452Y.

Figures 63Y-65Y schematically illustrate how link elements, whether annularly shaped or otherwise, of different dimensions can be interconnected together to form a rope chain resulting in a chain of different diameters along the length of the chain. This type of arrangement, in addition to its resulting distinctive appearance, can also contribute to
15 savings in material costs, and yet the overall effect renders a visual effective diameter equal to that of the larger diameter link elements.

Figure 63Y shows a chain 461Y comprised of link elements 463Y, 465Y of different dimensions every six link elements.

Figure 64Y shows a chain 471Y in which every other link element 473Y is of the same
20 dimension and is interspersed with every other link element 475Y of a different dimension. The overall outline of this chain would give the general appearance of a chain made only from the link elements of larger dimension.

Figure 65Y illustrates a chain 481Y in which every two consecutive link elements 483Y and 485Y are of a different diameter.

25 The illustrations in Figures 60Y-65Y are presented for exemplary purposes only. The visual properties and the arrangements can be varied depending on the desired effect.

Figure 66Y is a plan view of a sheet of material 511Y having multiple colored or textured regions 512Y-516Y, thereby exhibiting five different visual properties, and, in dashed lines, the location and orientation of link elements 517Y to be stamped from such sheet of material 511Y.

- 5 Figure 67Y is a plan view similar to that of Figure 66Y, but with the orientation of link elements 519Y rotated 180°.

Figure 68Y is a plan view of a sheet of material 521Y having multiple colored or textured regions 522Y-526Y, thereby exhibiting five different visual properties, and, in dashed lines, the location and orientation of link elements 527Y to be stamped from such sheet of
10 material 521Y.

Figure 69Y is a fragment representation of the sheet of material 511Y shown in Figure 66Y or 67Y. The sheet of material 511Y has five different strips of material 512Y-516Y, and the figure lining is not intended to represent any particular color or texture which may be selected from any of the colors or textures described in this specification. It is to be
15 noted that every other link element of a rope chain is inverted, i.e., if the gap of a particular link element is oriented upwardly, the gap of each adjacent link element will be oriented downwardly. For this reason, a rope chain constructed of elements 517Y would be uninteresting because there would be no color/texture pattern correlation link-to-link. That is, on one link element the visual properties top-to-bottom would be in the order 512Y-
20 516Y, while on each adjacent link element the visual properties top-to-bottom would be in reverse order of 516Y-512Y.

However, if the sheet of material 511Y, or the stamping machine (not shown), were reversed in orientation, as shown in Figure 67Y, with the link element 519Y possessing the same coloring/texturing but in reverse order relative to the gap position, then an
25 assembled rope chain will have color/texture pattern correlation link-to-link, and will display a plurality of helical color/texture patterns along the rope chain 531Y. This is shown in Figure 70Y in the lower segment "BY". Segment "BY" is comprised of alternate

link elements 517Y and 519Y, with the fragment of Figure 6Y aligned with link element 520Y as a reference.

In addition to multiple colored helixes, as described above, it will be noted that in segment “BY”, one side of each channel 535Y has the color/texture of strip 512Y (Figures 66Y, 67Y), while the other side of each channel 535Y has the color/texture of strip 516Y. Color/texture 514Y creates a thin helical stripe along the extreme periphery of each strand the rope chain 531Y.

Instead of manufacturing two different, oppositely patterned, multicolored link elements 517Y and 519Y, a length of rope chain can be made with link elements alternating with either link elements 517Y or 519Y and a standard single color link element, e.g., one of solid yellow gold. When assembled, the length of rope chain will have the appearance as shown in segment “AY” of Figure 70Y. With this arrangement, it is not necessary to have two different multi-colored or multi-textured link elements, and yet a plurality of helical color/texture patterns will be seen along the rope chain 531Y, the helical patterns interrupted by alternate solid yellow gold link elements. To some tastes, this more subtle helical patterning may be more appealing than the somewhat “busy” appearance of the helical patterning shown in segment “BY”.

Figure 71Y is a fragment representation of the sheet of material shown in Figure 68Y. The sheet of material 511Y has five different strips of material 522Y-526Y, and the lining is not intended to represent any particular color or texture which may be selected from any of the colors or textures described in this specification. It is to be noted that the color/texture pattern on sheet 521Y is symmetrical, with strips 522Y and 526Y having the same color or texture, and strips 523Y and 525Y having the same color or texture but different than strips 522Y and 526Y. Strip 524Y is likewise of a different color or texture than any other strip.

Because of the symmetry of color/texture strips in sheet 521Y, there is no need to stamp out differently oriented link elements, since each link element 527Y has the same color/texture pattern in both orientations of the gap. Thus, an assembled rope chain 536Y,

shown in Figure 72Y, will have color/texture pattern correlation link-to-link, and will display a plurality of helical color/texture patterns along the rope chain 536Y.

In addition to multiple colored helixes, as described above, it will be noted that in Figure 72Y, both sides of each channel 537Y has the color/texture of strips 522Y and 526Y (Figure 68Y). Color/texture 524Y creates a thin helical stripe along the extreme periphery of each strand of the rope chain 536Y.

In the embodiments shown in Figures 66Y-72Y, five strips of materials, colors, and/or textures are shown, but any other number of strips can make up the multiple strip sheets 511Y and 521Y. Further, while it has been suggested that any of the strips 512Y-516Y and 522Y-526Y can be different materials, different colors, and/or different textures, when different textures are selected for certain strips, the textured strips should alternate with non-textured strips. If all strips, or adjacent strips, were textured, even with different types of textures, the distinction between different textures will be difficult to see and appreciate. Additionally, while the orientations of the stamped link elements shown in Figures 66Y-68Y are such that the gaps are at 12:00 o'clock and 6:00 o'clock positions, any angular orientation is easily achieved by rotating the stamping die or the sheet of material being stamped, therefore producing link elements exhibiting an unlimited number of different patterns. Following the above methods of assembling multiple patterned link elements, the visual appearance of rope chains manufactured using such multiple patterned link elements will be self evident to a person of ordinary skill in the art.

Figure 73Y is a plan view of a segment of a sheet of material having multiple colored or textured regions 542Y-546Y similar to that of Figures 66Y, 67Y, and 69Y. However, only every fifth link element 549Y in the rope chain shown in Figure 74Y is stamped from sheet 541Y. A second sheet (not shown) having the same color/texture patterns as sheet 541Y but shifted laterally by one color/texture strip width is stamped to produce link elements 551Y, also spaced every fifth link element position, and placed adjacent link elements 549Y made from sheet 541Y. Similarly, a third sheet (not shown) having the same patterns but shifted another color/texture strip width is stamped to produce link elements 553Y, also spaced every fifth link element position, and placed adjacent link

elements 551Y. Link elements 549Y, 551Y, and 553Y are shown in Figure 75Y oriented with their gaps alternating from 12:00 o'clock to 6:00 o'clock as they would be in the assembly process. Another two sets of link elements (not shown) are stamped from another two separate sheets each having the color/texture pattern 542Y-546Y shifted an additional strip width. These additional two sets of link elements complete the five sets of distinctively color/texture striped link elements need to produce the rope chain shown in Figure 74Y. It is not necessary to show the color/texture patterns of the latter two link element sets in Figure 74Y, since their color/texture patterns and orientation are self-evident from the description of the first three link elements 549Y, 551Y, and 553Y.

- 10 The net result of assembling five different sets of link elements just described is a rope chain 547Y which exhibits a pleasing and surprisingly unique repeated pattern of laterally striped color/texture segments, as illustrated in Figure 74Y.

As will be understood by reference to Figure 75Y, rather than manufacturing five different multi-striped sheets of material from which to stamp out the five differently striped link elements 549Y, 551Y, 553Y, etc. (only three are shown), a single sheet of material (not shown) having nine strips in the order 1Y-2Y-3Y-4Y-5Y-1Y-2Y-3Y-4Y, representing the five different colors/textures, can be manufactured and stamped to produce all five different link elements from the same sheet to construct rope chain 547Y. However, considerable waste of precious metal would be involved, and the decision as to how many sheets of how many color/texture strips is left to the discretion of the manufacturer.

Figure 76Y is a plan view of a sheet of material 561Y from which curved slices 563Y can be cut and eventually formed into link elements. The purpose for this methodology is to minimize or completely eliminate cracking and stress blemishes that may result in curling a straight piece of precious metal into a "C" shaped link element (cf. Figure 30Y). By starting with a partially curved stamped slice of material, less bending is needed. Of course, some small amount of waste in the regions 567Y, due to forming flat ends 565Y on the link element slices 563Y, will be realized, but this may be more than offset by the savings in damaged link elements made from straight wires or slices.

Figure 77Y is a plan view of a sheet of material 571Y from which link elements 573Y and 575Y can be stamped, the link elements being interlinked in layout and alternating in their respective gap positions 577Y, 579Y. Shapes other than square are obviously possible using this stamping technique, and the sheet of material 571Y optionally can be multi-
5 colored or multi-textured similar to those shown in Figures 66Y-68Y, 69Y, 71Y, and 73Y. Depending upon the shape of the link elements desired, and the gap width needed, layouts different than that shown in Figure 77Y will be self-evident to a person of ordinary skill in the art. Interlinking in the manner shown and described serves to minimize material waste.

It will be understood that, when link elements have specific edge designs or patterns, such
10 as those shown in Figures 53Y-56Y, it may be preferable to not place them against one another. Otherwise, the designs or patterns will be covered up by adjacent link elements. A number of thinner than standard link elements (not shown) are perfectly suited for spacing out the aforementioned link elements having edge designs or patterns.

Additionally, it is known to diamond cut the edges of a completed rope chain and coat,
15 with rhodium or other material, the flattened surfaces created by the diamond cutting process. By constructing a rope chain using, in part or in whole, serrated, scored, or knurled, link elements, and subsequently rhodium coating diamond cut surfaces, a dramatic increase in contrast is seen due to the softer yellow gold color of the serrated, scored, or knurled portions and the mirror-like finish of the coated diamond cut portions of
20 the chain. Diamond cutting techniques can be easily adapted to the methods of the present invention, especially for those embodiments in which a sheet of material is pre-textured prior to stamping out link elements therefrom.

As has been suggested by the various embodiments and variations of the invention presented herein, the flexibility of design, appearance, and feel of a rope chain
25 manufactured using the link elements shown and described can stimulate a myriad of possibilities. These attributes of a completed rope chain can be unique with the present invention. Creating similar attributes using prior art techniques would not be considered by the person of ordinary skill in the art, since all attempts to similarly shape, color, texture, or pattern a rope chain after it is completed would not be practical. The

uniqueness of a rope chain employing the link elements of the present invention is made possible by the provision of forming, shaping, or otherwise processing individual link elements prior to assembly. Exclusive finished rope chain attributes made possible with the present invention cannot be duplicated by applying post-assembled processing steps, 5 whether a single type link element is used throughout the length of the rope chain, or multiple types of link elements are assembled in a particular or random order.

As suggested herein, any visual property, as defined herein, may be combined with any one or more other visual properties in the manufacture of the various link elements making up the completed rope chain. Visual properties of any one portion of a link element, or the 10 rope chain or a helical strand thereof, may include at least one of the group consisting of color, material, different gold karat weights, texture, shape, reflectivity, pattern, size, and design.

As previously mentioned, one object of the invention is to reduce the amount of material making up the individual link elements to reduce manufacturing costs, while not detracting 15 from the beauty and effective size (diameter) of the finished rope chain. Reducing material can be accomplished in many ways: by removing material from or forming edge depressions in the entire or portions of the exterior edge; by removing material from or forming edge depressions in the entire or portions of the interior edge; by removing material from or forming surface depressions in one or both major link surfaces; by 20 forming openings in or through the major link surfaces; or otherwise narrowing the width of the entire or portions of the link elements. In some embodiments of the invention, part or all of a link element may have a link width larger than standard but with openings provided therein to result in a net reduction of material making up the link element.

Link thickness, as used herein, is defined as a distance between and perpendicular to the 25 plane of the first and second major surfaces, and at least some of the link elements in a rope chain may have an irregular link thickness along the extent of the link element. Link elements have been described herein that possess irregular link thicknesses along the extent of the link elements due to impressions or the formation of surface texturing. Such link elements that bear surface ornamentation on each link element will cause a rope chain

to have a more decorative design than the conventional rope chain and yet use less precious metal than a standard link element without such irregular link thickness.

The embodiments of the invention shown in the figures provide a basis for appreciating the virtually limitless number of configurations and shape and design patterns that can be produced in a rope chain structure by employing and creatively arranging the differently colored, patterned, textured, and/or shaped link elements such as those depicted in the accompanying drawings. Further variations and combinations of color patterns, textures, shapes, and configurations are possible and presumed to be within the teaching of the present invention.

Obviously, color, shape, texture, and overall configurations other than those shown in the accompanying figures are possible for the manufacture of the link elements, and these are merely examples of preferred visual property combinations which can produce striking results in a finished rope chain construction. For example, an interesting variation of an undulated shaped edge would be a scalloped edge. Accordingly, it is to be understood that the shape and design patterns shown in the accompanying figures, the types of materials used, the coloring, surface texture, surface patterns, arrangement of groups and sets of link elements along the rope chain, reversed or not, randomly assembled or in strict accordance with a repeated pattern, and the like are all contemplated possibilities and are to be considered within the scope of the present invention.

While only certain embodiments have been set forth, alternative embodiments and various modifications will be apparent from the above description to those skilled in the art. For example, while the colors and precious metals used in the descriptions herein are preferred to be yellow, white, rose, and green gold, other colors and metals, or even non-metals, can be employed in the construction of the disclosed rope chain configurations. Notable alternate materials, for example, are rhodium (in various colors), silver, and nickel, either solid or plated. Colored coatings may also be applied, such as enamel or powder coating.

Several references to rhodium coating have been made in this description. It is to be understood that virtually any part of a finished rope chain, constructed from any of the link

elements shown in the accompanying figures can be rhodium or gold plated, or coated with any other preferred material or substance. Alternatively, if a rope chain is made without the application of heat to weld, or otherwise attach, adjacent link elements together, rhodium (or other material or substance) coating can be applied to the individual link
5 elements prior to assembly, saving much labor expense which would otherwise be required with post assembly coating processes.

Rhodium, gold, or other precious metal plating may be applied by a variety of commonly known plating equipment and processes. For methods and equipment to plate assembled rope chains, reference is made to Pro-Craft® Pen Platers, No. 45.400 and No. 45.403
10 available from Gorbet USA® Tools, Supplies and Equipment for Technicians and Craftsmen, through NK Supply, Inc. Jewelry Supplies 608 S. Hill St. Suite 602, Los Angeles, CA 90014. These pen platers can use formulated pen plating solutions, also available from Gorbet USA®, such as Gorbet USA® No. 45.414 Pro-Craft® plating solution, for plating rhodium. Other pen plating solutions are available for plating metals
15 other than rhodium plating solutions. For example Gorbet USA® Nos. 45.410 through 45.412 are Pro-Craft® gold plating solutions, and No. 45.415 is a Pro-Craft® black rhodium plating solution.

Another method for plating rhodium, gold, or other precious metal on only one helical rope strand, or to selected portions, of an assembled rope chain plating involves three
20 major steps: protective coating all areas of an assembled rope chain that are not to be plated; immersing the partially protected chain in a plating bath (e.g., an electro-plating bath); and removing the protective coating. This results in a chain having some non-plated areas (that were protected) and some plated areas added by the plating process. This method is a widely known and therefore does not warrant listing sources for plating
25 materials or plating equipment.

In lieu of rhodium or gold plating, the link elements, prior to assembly, and/or the exterior surface, or portions of the exterior surface, of one or both rope strands of an assembled length of rope chain can be colorized by a blackener process, by an oxidizer process, or by applying and curing a hard colored enamel. The above-mentioned Gorbet USA® source

supplies Jax® Blackeners such as No. 45.906, Vigor® Oxidizers such as No. 45.0329, and Ceramit™ low temperature curing, hard enamels such as No. 45.800.

All of the above-mentioned plating, blackening, oxidizing, and enameling process result in either a visually attractive color coordinated length of rope chain, or a rope chain in which the different colors exhibited are in much greater contrast than conventional rope chains without any post assembly surface colorization.

It will also be understood that, for all of the link elements described herein in which segments of a link element have different link widths, either the relatively smaller or relatively larger, segment may be of standard size.

In the examples herein showing segmented link elements with one side having different physical characteristics than the other side, the drawings and accompanying text referred to the transition being opposite the placement of the gap. It is within the scope of the present invention to provide segmented regions having different physical characteristics or properties as described herein placed in other positions along the extent of the link elements. One example is providing a dividing line horizontally positioned in any of the accompanying figures. These and other alternatives are considered equivalents and within the spirit and scope of the present invention.

DETAILED DESCRIPTION OF THE FOURTH EMBODIMENTS

Figure 1Z is a plan view of an annular link element used in the construction of jewelry rope chains as known in the prior art. In general, Figures 1Z-4Z depict a conventional rope chain arrangement (Figures 3Z and 4Z) and a typical annular link element (Figures 1Z, 1AZ, 2Z, 2AZ, and 2BZ) employed as a basic building element in the construction of a rope chain. The baguette shaped link element 4Z in Figure 1AZ may be used alone or in combination with standard annular link elements, such as shown in Figure 1Z, to construct a rope chain having an appealing appearance.

For the purposes of this description, the following definitions are provided.

"Rope chain" is a series of sets of interlinked, or interconnected, link elements which, after assembly, have the appearance of a plurality of braided, or helically intertwined, multi-fiber strands of hemp, flax, or the like.

5 A "set" is the number of adjacent interlinked, or interconnected, link elements making up a structurally repeated assembly procedure along the chain. In the accompanying drawing and associated text, a four-link set is used for purposes of ease of visual presentation and description. The number of link elements in a set may be different than the number of link elements making up a repeated visual pattern along the chain.

10 A "group" is a number of adjacent interlinked, or interconnected, link elements exhibiting identical visual properties. The number of link elements in a group may be the same or different than the number of link elements in a set. Groups may be uniformly or randomly distributed along the rope chain.

15 A "link element" is the basic building element of a rope chain, a number of which are assembled in a series of interconnected and overlapping link elements to form the rope chain. A link element is typically annular in shape with an open gap having a span slightly greater than the width of the annular link element. However, in accordance with the invention, a link element may have a circular, baguette, oval, diamond, rectangular, square, heart, or other geometrical shape, and each is provided with a gap at a selected position along the length thereof. Accordingly, while the link elements of a rope chain are not
20 necessarily annular, it is the preferred configuration for the basic building element of a rope chain, and for that reason an annular link element will be used in most of the examples shown and described herein.

A "channel" is the path which the eye follows in passing along the rope chain at the apex of a V-shaped helical groove formed between the apparent intertwined rope strands.
25 Hence, in the preferred embodiments described herein, the rope chain has the appearance of a pair of helically intertwined strands of ropes, and thus there exists two such helical channels offset from one another by one-half the pitch of either helix.

A "visual property", as used herein, is a characteristic of an object which presents a particular visual image to the eye. Such characteristics include, but are not limited to, color, texture, pattern, and physical shape. Although shape is generally considered a physical property of an object, in the art of jewelry making, it is often the physical shapes
5 which impart beauty and delicateness to a fashion item.

In the accompanying figures, certain color lining is shown to distinguish the various embodiments depicted. The different colors represent different materials, such as gold and silver, as well as different surface treatments. Since the link elements can be made of virtually any metal, or even non-metals, and since surface treatments can take on an
10 infinite number of color hues and saturations, it would be impossible to illustrate all of the possible color combinations contemplated. Accordingly, the color lining shown in the accompanying figures is intended to be exemplary only, and only color differences are intended to be conveyed when two different color linings are shown on the same link element or on the same length of rope chain. The treatment of text descriptions should be
15 similarly interpreted. For example, when white gold is mentioned, silver, rhodium, nickel, or gold colors other than yellow must be understood to be equivalents.

Referring now to Figures 1Z and 2Z, an annular link element 1Z is shown to have a generally rectangular cross section (Figure 2Z) and a gap 3Z having sloping edges, the narrowest width of gap 3Z being slightly larger than the thickness of the annular link
20 element 1Z.

While conventional rope chains are constructed using annular link elements having a rectangular cross section as shown in Figure 2Z, variations with different cross sectional geometries are possible. Figures 2AZ and 2BZ depict two such variations. The cross section of tubular link element 1AZ in Figure 2AZ is rectangular and hollow (known from
25 U.S. Patent No. 4,651,517). Another variation is shown in Figure 2BZ in which the tubular link element 1BZ has a hollow circular cross section (known from U.S. Patent No. 5,129,220). All of the link element embodiments and variations of the present invention illustrated in the accompanying drawing can be solid or hollow in cross section, and may

have any geometrical cross sectional shape. A non-limiting solid rectangular cross section is chosen as exemplary in the accompanying drawings for illustrative purposes only.

Conventional rope chains, such as those shown in Figures 3Z and 4Z, are made with a systematic and repetitive interlinking of basic annular link elements 1Z. Determining the proper dimensions for the annular link element 1Z and the gap 3Z therein, depending upon the number of desired link elements to form a set of interlinked link elements, can be readily understood by reference to the aforementioned U.S. patents, especially U.S. Patent No. 4,651,517. As can be viewed in Figures 3Z and 4Z herein, the intertwined link elements 1Z of a segment of a conventional rope chain 5Z are shown in Figures 3Z and 4Z in the form of a four-link variety. In their assembled form, the series of link elements 1Z produce the appearance of a first helical rope strand 7Z and a second helical rope strand 8Z, the combination of which results in a double intertwined helical appearance.

As best seen in Figures 3Z and 4Z, the apparent intertwining of a pair of helical rope strands 7Z and 8Z results in a V-shaped groove between the strands at any position along the length of rope chain. The path along the apex of such V-shaped groove is referred to herein as a "channel", and since there are two apparent rope strands 7Z and 8Z, there are, likewise, two defined channels indicated in Figure 3Z by the directional arrows 10Z and 12Z. Channel 10Z, along the length of the rope chain, defines a helix, as does channel 12Z. However, the two channels never intersect one another and are parallel to one another along the length of the rope chain separated axially by one half of the pitch of either of the two channels. In the prior art of Figures 3Z and 4Z, there is no visual difference between following along either of the two helical channels 10Z and 12Z, since the rope chain is comprised of a repetitive series of sets of link elements 1Z, and all link elements have the same visual property (they are all of the same color, texture, and shape, for example).

In Figure 4Z, the distance denoted by numeral 9Z encompasses the link elements of a repeated visual pattern as viewed from any fixed viewpoint in space. However, typically, it requires two "sets" of link elements to span the distance 9Z in Figure 4Z. It will be noted that link elements 11Z and 13Z lie in the same plane, but are angularly displaced

from one another along the link elements of the rope chain by 180° . That is, following the position of link element 11Z clockwise (as seen from the top) and downwardly, it will be observed that each subsequent link element is angularly spaced at a constant 22.5° angle. Since there are four link elements per set, and typically two sets per 180° turn, in following
5 the link elements downwardly along the rope chain, link element 11Z will be effectively rotated 180° to assume the position of link element 13Z. As is clearly visible in Figure 4Z, a series of sets of link elements 1Z makes up the length of rope chain illustrated.

In a six-link "set" (not shown), each subsequent link element is angularly spaced at a constant approximately 15° angle.

10 In the remaining figures of unique link elements to be described, Figures 5Z and 7Z-15Z illustrate variations of link elements manufactured with a variety of different appealing visual properties.

In this connection, most of Figures 5Z-29Z have portions lined or marked to show the colors of yellow gold, white gold or silver, rose (pink) gold, green gold, or rhodium. For a
15 jewelry article such as a rope chain, the typical colors are yellow gold and white gold, but rose and/or green gold areas may also be popular, especially with younger people.

Alternatively, or additionally, portions of a rope chain may be made of a non-gold material, e.g. silver, and any link element surface, or any rope strand surface of the non-gold material can be colorized after the rope chain is assembled. For example, such non-
20 gold material can be subjected to a process for applying a coating of rhodium or other substance to enhance its visual appearance, or it can be coated with a colored enamel, or treated with a blackener or an oxidizer or other surface treatment, the blackener and oxidizer treatments giving the treated material a dark color, e.g., gray to black.

In all of the Figures 5Z-29Z, the portions of the annular link elements, and therefore the
25 length of rope chain, lined for gold colors may be the result of providing a gold wire and bending segments thereof to form link elements, or the result of stamping the links out of a single or multicolored gold strip, or the result of gold plating a metallic, or even non-

metallic, link element. Alternatively, the link elements may, for example, be laminated with a solid yellow gold layer and a solid white gold layer (see the aforementioned U.S. Patent Application No. 09/337,455). It is also within the scope of the present invention to use gapped link elements that have been enameled, rhodium coated, blackened, oxidized, or otherwise surface treated.

Figure 5Z is a plan view of a first example of an annular link element showing a pattern of regions on a surface of a link element 31Z, exhibiting different visual properties. In Figure 5Z, annular link element 31Z is divided along a line 37Z such that one half 33Z of the annular link element 31Z between the dividing line 37Z and the gap 3Z is yellow gold colored, while the other half 35Z is white gold colored.

Again (as with all variations shown in Figures 5Z and 7Z-12Z), these colored surfaces 33Z, 35Z may be differently plated, or each link element portion may be made from a solid precious metal such as yellow gold and white gold. In the latter case, the gapped link elements may be stamped from a multicolored flat sheet, striped with a number of alternately colored gold materials, or alternately striped with different materials such as gold and silver. Such a striped flat sheet may be stamped to form gapped link elements in different orientations relative to the stripe pattern and relative to the gap position, resulting in a variety of interesting colored patterns in the finished length of rope chain, yet all such link elements can be stamped from the same striped sheet.

Figure 6Z depicts an embodiment of a length of rope chain 91Z showing alternate helical strands 33Z, 55Z lined to show the color yellow gold alternating with the color white gold, or a gold material (e.g., 33Z in Figure 5Z) alternating with a silver material (35Z in Figure 5Z). The yellow gold and white gold, or silver, pattern shown in Figure 6Z for the length of rope chain 91Z is the result of assembling a series of annular link elements 31Z in a particular way. Since physical assembly requires every other link element to be inverted relative to its adjacent link element (see U.S. Patent No. 4,651,517), in order to achieve the two distinctly colored rope strands shown in Figure 6Z, during assembly every other link element is additionally reversed in orientation about the axis of the rope chain. It will be appreciated from the drawing of Figure 6Z that the link elements 31Z that are

perpendicular to the page and shown as a yellow gold color will have a white gold or silver color as viewed from the rear thereof. Similarly, the white gold or silver colored link elements 31Z shown perpendicular to the page in Figure 6Z are yellow gold colored in the rear view thereof. Likewise, any link element 31Z having a yellow gold colored exposed surface to the right of the axis of rope chain 91Z in Figure 6Z will have a white gold or silver color on its exposed surface on the left side of the axis, and vice versa. Accordingly, following along channel 10Z for the entire length of the rope chain 91Z, the right side of the channel 10Z will be white gold or silver colored, and the left side will be yellow gold colored. Similarly, following along channel 12Z, the left side will be white gold or silver, and the right side will be yellow gold.

Thus, in the embodiment of Figure 6Z, although all annular link elements 31Z are identical, nevertheless, the visual appearance of the finished rope chain is such that an apparent yellow gold colored rope strand is intertwined with an apparent white gold or silver colored rope strand, lending an interesting and attractive alternately colored appearance along the rope chain 91Z.

Figure 7Z is a plan view of a second example of an annular link element 51Z showing a pattern of regions on the surface of the link element exhibiting different visual properties. In Figure 7Z, the annular link element 51Z has a major curved portion 55Z and a minor curved portion 53Z of a yellow gold color, while a sector 57Z of the annular link element 51Z is lined for white gold or silver. A rope chain constructed of a series of link elements 51Z may have the appearance of an all yellow gold chain with a white gold or silver colored helical path running along the outer periphery of one of the rope strands.

Figure 8Z is a plan view of a third example of an annular link element 71Z showing a pattern of regions on the surface of the link element exhibiting different visual properties. Figure 8Z shows another possibility in which annular link element 71Z has a yellow gold band 75Z, 76Z extending a short distance along a diameter of the link element defining separating lines 77Z-80Z, above which, a pair of curved portions 72Z, 73Z are of white gold or silver, and below which an arcuate portion of the link element 71Z is also of white gold or silver. A rope chain constructed of a series of link elements 71Z may have the

appearance of an all white gold or silver chain with small yellow gold helical paths running along the outer periphery of each rope strand.

Further variations of color patterns on the link elements are presented in Figures 9Z-12Z. Figures 9Z-12Z illustrate the possibility of manufacturing the annular link elements with
5 either or both planar surfaces having different gold colored areas, shown for example on the link element 120Z of Figure 9Z symbolically, as yellow (y), white (w), rose (r), and green (g) areas. The link element 122Z of Figure 10Z is lined for the gold colors white, yellow, rose, and green for the respective regions 123Z-126Z.

Figure 11Z shows a multicolored link element 127Z stamped from a multicolored sheet
10 127AZ, link element 127Z exhibiting the color yellow gold in segments 129Z and in strips 129AZ, and the color white gold or silver in segments 128Z and in strip 128AZ. A rope chain constructed using the link element 127Z may produce a primarily yellow gold colored rope chain having the outer periphery of one rope strand exhibiting a white gold or silver helix and one side of one channel of the rope chain also exhibiting white gold or
15 silver.

Figure 12Z shows an annular link element 132Z having areas 130Z and 131Z with variations in color, in this example yellow gold areas 130Z and white gold or silver areas 131Z. A rope chain constructed using links 132Z may exhibit yellow gold channels and white gold or silver helixes in the peripheries of both rope strands.

20 Figure 13Z is a plan view of a link element 151Z formed with one side 155Z larger than the other side 153Z, the transition at 159Z between the two sides 153Z, 155Z being a smooth transition, and the link width at the gap 158Z and transition region 159Z being of standard width. The dashed line 157Z indicates the location of the exterior surface of side 155Z if it were not enlarged. When a number link elements 151Z are assembled into a
25 length of rope chain, one of the helical rope chain strands will appear to have a larger diameter due to the larger link element width of side 155Z, and the other helical rope chain strand will appear to have a smaller diameter.

Figure 14Z is a plan view of a link element 161Z formed with one side 165Z larger than the other side 163Z, the relatively abrupt transition 169Z between the two sides 163Z,165Z located on the larger link side. The dashed line 167Z indicates where the location of the exterior surface of side 163Z would be if not reduced in width. The reduction of precious metal in forming the thinner side 163Z contributes greatly to lowering the cost of a finished rope chain employing perhaps hundreds of such link elements. When a number of link elements 161Z are assembled into a length of rope chain, one of the helical rope chain strands will appear to have a larger diameter due to the larger link element width of side 165Z, and the other helical rope chain strand will appear to have a smaller diameter.

Figure 15Z is a plan view of a link element 171Z formed with one side 175Z larger than the other side 173Z, the relatively abrupt transition 178Z between the two sides 173Z,175Z located on the smaller link side. The dashed line 177Z indicates where the location of the exterior surface of side 173Z would be if not reduced. The reduction of precious metal in forming the thinner side 173Z contributes greatly to lowering the cost of a finished rope chain employing perhaps hundreds of link elements. When a number link elements 171Z are assembled into a length of rope chain, one of the helical rope chain strands will appear to have a larger diameter due to the larger link element width of side 175Z, and the other helical rope chain strand will appear to have a smaller diameter. Figures 23Z and 24Z are examples which are yet to be described.

Because the transition 178Z is on the narrower link side 173Z as shown in Figure 15Z, the assembled length of rope chain will be tighter than a length of rope chain assembled using the link elements 161Z shown in Figure 14Z. This more desirable characteristic for rope chains comes at a price, however, i.e., the additional precious metal needed to extend the wider side 175Z up to the transition region 178Z.

Further varieties of unique colored, textured, or configured link elements other than those shown are possible depending upon the creativity of the jewelry designer following the general concepts presented herein, and reference is made to the aforementioned U.S. Patent Application Nos. 09/287,972 and 09/337,455.

Examples of a completed length of rope chain, other than those shown in the accompanying drawing, using combinations of the color patterns and configurations for the link elements shown in Figures 5Z and 7Z-15Z are left to the artisan having the knowledge of the examples given in this specification to follow for guidance.

- 5 After the assembly of a rope chain is completed, portions of the chain may be selectively colorized or textured by post assembly processing. For example, portions of a rope chain may be selectively rhodium coated, or plated, to enhance the brilliance and luster of the coated part. In Figure 6Z, for example, after construction, the non-gold rope strand 35'Z (e.g., silver or other non-gold metal) comprised of the non-gold halves 35Z of each link
- 10 element 31Z (Figure 5Z) may be coated with rhodium which brightens the non-gold helix 35'Z and dramatically increases the contrast between the rhodium coated helix 35'Z and the yellow gold helix 33'Z. To the eye, such increased contrast effect makes the yellow gold helix 33'Z appear to be even more yellow in color. This synergistic enhanced visual effect is in addition to beneficially rendering the cost of the completed rope chain much lower.
- 15 It is to be understood that, in this description, any suggestion to colorize one or both rope strands of an assembled length of rope chain includes: colorizing the entire outer surface of a rope strand; or colorizing a portion of the rope strand, such as, but not limited to, just the outer periphery of the rope strand, or just the common channel region between rope strands.
- 20 Rhodium, gold, or other precious metal plating may be applied to only one helical rope strand, or to selected portions, of an assembled rope chain by a variety of methods and equipment, and reference is made to Pro-Craft® Pen Platers, No. 45.400 and No. 45.403 available from Gorbet USA® Tools, Supplies and Equipment for Technicians and Craftsmen, through NK Supply, Inc. Jewelry Supplies 608 S. Hill St. Suite 602, Los
- 25 Angeles, CA 90014. These pen platers can use formulated pen plating solutions, also available from Gorbet USA®, such as Gorbet USA® No. 45.414 Pro-Craft® plating solution, for plating rhodium. Other pen plating solutions are available for plating metals other than rhodium plating solutions. For example Gorbet USA® Nos. 45.410 through

45.412 are Pro-Craft® gold plating solutions, and No. 45.415 is a Pro-Craft® black rhodium plating solution.

Another method for plating rhodium, gold, or other precious metal on only one helical rope strand, or to selected portions, of an assembled rope chain plating involves three
5 major steps: protective coating all areas of an assembled rope chain that are not to be plated; immersing the partially protected chain in a plating bath (e.g., an electro-plating bath); and removing the protective coating. This results in a chain having some non-plated areas (that were protected) and some plated areas added by the plating process. This method is a widely known and therefore does not warrant listing sources for plating
10 materials or plating equipment.

In lieu of rhodium or gold plating, the exterior surface, or portions of the exterior surface, of one or both rope strands of an assembled length of rope chain can be colorized by a blackener process, by an oxidizer process, or by applying and curing a hard colored enamel. The aforementioned Gorbet USA® source supplies Jax® Blackeners such as No.
15 45.906, Vigor® Oxidizers such as No. 45.0329, and Ceramit™ low temperature curing, hard enamels such as No. 45.800.

All of the above-mentioned plating, blackening, oxidizing, and enameling process result in either a visually attractive color coordinated length of rope chain, or a rope chain in which the different colors exhibited are in much greater contrast
20 than conventional rope chains without any post assembly surface colorization.

Examples of colorized lengths of rope chain are shown in the accompanying Figures 16Z-33Z.

Figure 16Z is a front elevational view of a length of rope chain 181Z showing, in the top portion thereof, before colorization, both rope strands 183Z, 185Z being of any color (the
25 color yellow gold being representative) and, in the bottom portion thereof, below the dividing line 187Z, after colorization, one of the rope strands 189Z is the color of rhodium, and the other rope strand 190Z is without color change, i.e., it is the same as at 183Z. The

rhodium may be plated onto rope strand 189Z as shown in Figure 16Z, or onto any rope strand shown in any of the figures yet to be described and which are intended to exhibit the color of rhodium, using a plating process employing one of the aforementioned pen platers.

5 Figure 17Z is a front elevational view of a length of rope chain 191Z showing, in the top portion thereof, before colorization, both rope strands 193Z, 195Z being of any color (the color yellow gold being representative), and, in the bottom portion thereof, below the dividing line 197Z, after colorization, one of the rope strands 199Z is of a color different than its original color, and the other rope strand 200Z is without color change, i.e., it is the
10 same as at 193Z. Rope strand 199Z may be colorized by any one of the above-mentioned surface treating processes, including rhodium plating, plating with other metals such as gold of a particular gold karat weight or gold of differing gold karat weights, treating the surface with a blackener, with an oxidizer, or by coating the rope strand with enamel. Application of a blackener treatment on silver or gold will produce a dark, black antique
15 finish, while application of an oxidizer on silver or gold will produce all shades from French gray to black. With the application of a low temperature curing, hard enamel, the rope strand surface to be colorized can be changed to virtually any desired color.

Figure 18Z is a front elevational view of a length of rope chain 201Z showing, in the top portion thereof, before colorization, one rope strand 205Z is of any color other than yellow
20 gold and the other rope strand 203Z is of the color yellow gold, and, in the bottom portion thereof, below the dividing line 207Z, after colorization, the non-yellow gold rope strand 209Z is the color of rhodium, and the other rope strand 210Z is without color change, i.e., it is the same as at 203Z. In the case where rope strand 205Z is made of silver or other metal lower in cost than gold, and rope strand 205Z is rhodium plated, a beautiful finished
25 rope chain will result exhibiting an attractive contrast between the untreated yellow gold rope strand 210Z and the bright rhodium treated rope strand 209Z. Yet, the cost of the rope chain is significantly less than a chain assembled with all yellow gold link elements.

Figure 19Z is a front elevational view of a length of rope chain 211Z showing, in the top portion thereof, before colorization, one rope strand 215Z is of any color other than yellow

gold and the other rope strand 213Z is of the color yellow gold, and, in the bottom portion thereof, below the dividing line 217Z, after colorization, the non-yellow gold rope strand 219Z is of a color different than its original color, and the other rope strand 220Z is without color change, i.e., it is the same as at 213Z. As with the length of rope chain
5 shown in Figure 17Z, the coloring of rope strand 219Z may be achieved by any one of the aforementioned processes including treating the surface with a blackener or oxidizer, or by applying a coat of enamel.

Figure 20Z is a front elevational view of a length of rope chain 221Z showing, in the top portion thereof, before colorization, one rope strand 223Z is yellow gold of a relatively
10 small gold karat weight and the other rope strand 225Z is yellow gold of a relatively larger gold karat weight, and, in the bottom portion thereof, below the dividing line 227Z, after colorization, one rope strand 230Z is the color of rhodium, and the other rope strand 229Z is without color change, i.e., it is the same as at 225Z. A finished rope chain employing this method of manufacture can be described as an all gold chain, with one rope strand
15 highlighted by a plate of rhodium. Again, a cost savings is realized by the use of a lower grade of gold under the plated rhodium.

Figure 21Z is a front elevational view of a length of rope chain 231Z showing, in the top portion thereof, before colorization, one rope strand 233Z is yellow gold of a relatively small gold karat weight and the other rope strand 235Z is yellow gold of a relatively larger
20 gold karat weight, and, in the bottom portion thereof, below the dividing line 237Z, after colorization, one rope strand 240Z is of a color different than its original color, and the other rope strand 239Z is without color change, i.e., it is the same as at 235Z. A finished rope chain employing this method of manufacture can be described as an all gold chain, with one rope strand highlighted by treatment with a blackener or oxidizer, or colored with
25 a coat of hard enamel. Cost savings is realized by the use of a lower grade of gold under the treated or coated rope strand.

Figure 22Z is a front elevational view of a length of rope chain 241Z showing, in the top portion thereof, before colorization, one rope strand 243Z is yellow gold of a relatively small gold karat weight and the other rope strand 245Z is yellow gold of a relatively larger

gold karat weight, and, in the bottom portion thereof, below the dividing line 247Z, after colorization, both rope strands 249Z, 250Z are of the same gold color and, at least on the surface, of the same gold karat weight. A finished rope chain employing this method of manufacture may be described as an all gold chain, with one rope strand brought to a high karat gold weight by gold plating the originally lesser gold karat weight rope to match that of the other untreated strand. Cost savings is realized by the use of a lower grade of gold under the gold plated rope strand.

Figure 23Z is a front elevational view of a length of rope chain 251Z, constructed of link elements of the type shown in Figures 13Z-15Z, or other similar configurations. Shown in Figure 23Z, in the top portion thereof, before colorization, is one rope strand 253Z of any color and of a relatively large diameter. The other rope strand 255Z is of any color and of a relatively small diameter. In the bottom portion thereof, below the dividing line 257Z, after colorization, the small diameter rope strand 259Z is the color of rhodium, and the other, larger, rope strand 260Z is without color change, i.e., it is the same as at 253Z. This construction conserves precious metal in two ways, first by using less metal in the smaller rope chain strand, and second by plating the small rope chain strand, which may be made from a non-gold material, with rhodium to enhance its appearance. Preferably, rope strand 253Z is of yellow gold.

Figure 24Z is a front elevational view of a length of rope chain 261Z showing, in the top portion thereof, before colorization, one rope strand 263Z is of any color and of a relatively large diameter and the other rope strand 265Z is of any color and of a relatively smaller diameter, and, in the bottom portion thereof, below the dividing line 267Z, after colorization, the large diameter rope strand 270Z is the color of rhodium, and the other, smaller, rope strand 269Z is without color change, i.e., it is the same as at 265Z. This construction has similar advantages mentioned in connection with Figure 23Z, the only difference being that the larger diameter rope strand is rhodium plated instead of the smaller one. This makes the overall look of the chain more brilliant and to have exceptional luster.

Figures 25Z-33Z depict embodiments of the invention wherein not all of a rope strand is treated with a change of color. In these figures, an all yellow gold rope chain is selected as a base for further color processing. It will be understood, however, that any color or any material suitable for the construction of a rope chain can be selected for the manufacture of
5 the link elements making up the chain.

In any event, portions of one or both rope chain strands are treated after assembly using any one or more of the aforementioned processes of rhodium plating, application of blackeners or oxidizers, coating with enamels, and gold plating.

In the specific examples of Figures 25Z-29Z, yellow gold rope strands are selected as the
10 basis upon which a stripe of rhodium is plated along a helical path along either or both helical rope strands. Although the figures show a continuous line along either or both helical strands, the stripes of rhodium may be intermittently applied according to any desired pattern. Similarly any combination of striping among the figures can be chosen for unusual effects. Thus, the particular patterns shown in Figures 25Z-29Z are not intended
15 to be limiting.

Figure 25Z is a front elevational view of a length of rope chain 271Z showing the color of yellow gold for both rope strands 273Z, 275Z. A helical stripe 277Z the color of rhodium is superimposed on one of the rope strands 275Z.

Figure 26Z is a front elevational view of a length of rope chain 281Z showing the color of
20 yellow gold for both rope strands 283Z, 285Z. Helical stripes 287Z and 289Z, respectively, the color of rhodium are superimposed on the rope strands 283Z and 285Z.

Figure 27Z is a front elevational view of a length of rope chain 291Z showing the color of yellow gold for both rope strands 293Z, 295Z. A helical stripe 297Z the color of rhodium is superimposed on one side 299Z of one channel 300Z between rope strands.

Figure 28Z is a front elevational view of a length of rope chain 301Z showing the color of yellow gold for both rope strands 303Z, 305Z. A helical stripe 307Z the color of rhodium is superimposed on both sides 309Z of one channel 310Z between rope strands.

5 Figure 29Z is a front elevational view of a length of rope chain 311Z showing the color of yellow gold for both rope strands 313Z, 315Z. A helical stripe 316Z the color of rhodium is superimposed on both sides 318Z of one channel 321Z between rope strands, and a helical stripe 317Z the color of rhodium is superimposed on both sides 319Z of the other channel 320Z between rope strands.

10 Figures 30Z and 31Z are, respectively, a front elevational view and an end view of another length of rope chain 341Z showing cut portions 343Z, 345Z, 347Z, and 349Z on four sides, the cut portions defining linear paths along the length of rope chain 341Z extending parallel to the rope chain axis 371Z. In Figures 30Z and 31Z, the plane of cut portions 343Z, 345Z, 347Z, and 349Z are all equidistant from the axis 371Z, and widths of the linear paths they follow define flat surfaces on certain link elements 342Z, 344Z making up
15 the length of rope chain 341Z shown by example with reference numerals 351Z, 353Z, 355Z, 357Z, 359Z, and 361Z. Link elements 342Z and 344Z are shown to be representative of those link elements that form the separate rope chain strands, one strand being made up of link elements 342Z and the other strand made up of link elements 344Z.

20 The cut, or faceted, portions 343Z, 345Z, 347Z, and 349Z may be formed in any desired way. A preferred way is to diamond cut four linear paths of cut portions 343Z, 345Z, 347Z, and 349Z by first laying the length of rope chain 341Z out taught between two guides, or by stretching the chain taught around a drum, and then diamond cutting one linear path 343Z for example. The chain is then rotated 90° and a second linear path 345Z is diamond cut. The process is continued until all four paths are diamond cut.

25 Instead of cutting continuous linear paths of cut portions 343Z, 345Z, 347Z, and 349Z along the length of rope chain 341Z, any or all paths can be cut intermittently along the length of chain. This permits the eye to see more non-plated surfaces, such as yellow gold, and allows deeper cuts without displaying too much shiny rhodium plating which may be

overpowering if the cuts on all four sides are deep and plated. Intermittent linear cutting would also be beneficial for the eight facet variation of the invention shown in Figures 32Z and 36Z yet to be described, for the same reasons.

After diamond cutting the four paths of cut portions 343Z, 345Z, 347Z, and 349Z, the flat
5 edge portions 351Z, 353Z, 355Z, etc. may optionally be colorized to enhance the beauty of the rope chain. Colorization may include plating the flat edge portions 351Z, 353Z, 355Z, etc. with rhodium or gold, or the flat edge portions 351Z, 353Z, 355Z, etc. may be surface treated with a blackener or oxidizer, or the edge portion may be enameled, any of such process being conducted in the manner hereinbefore described.

10 The length of rope chain 341Z so produced may thus be constructed of all yellow gold link elements, and a bright rhodium plating on the diamond cut surfaces presents a highly desirable contrast difference in color along the chain, enhancing its appearance and rendering it more desirable to a prospective purchaser.

Figure 32Z is an end view of another embodiment of rope chain 381Z showing cut
15 portions on eight sides 383Z-390Z. In Figure 32Z, the path width of the diamond cut, for example, is smaller than that of Figures 30Z and 31Z, due to the larger number of facets involved. The link elements in between those that show flat cut edges are not affected by the diamond cutting procedure.

A side view of the embodiment according to Figure 32Z is not shown or necessary, since
20 such a view would be self evident to a person skilled in the jewelry art as to precisely how a side view would appear, especially after observing the side view of the four faceted rope chain segment shown in Figure 30Z.

The eight faceted rope chain of Figure 32Z is particularly attractive when a yellow gold chain is diamond cut along the eight small width paths and then plated with rhodium. The
25 overall look is a primarily yellow gold chain with thin delicate paths of contrasting bright rhodium accenting the appearance of the chain.

As with the previous embodiment, the diamond cut paths of Figure 32Z are all parallel to the axis 382Z and equidistant therefrom. The process for forming the flat surfaces 383Z-390Z may be the same as that described in connection with Figures 30Z and 31Z, except the chain will be rotated about its axis 45° seven times after the first cut along the chain.

- 5 Also, the distance of the diamond cutter tool to the axis 382Z will be greater.

Colorizing the cut edges may be performed in the same manner described in connection with Figures 30Z and 31Z.

- Figure 33Z is an end view of another embodiment of rope chain 391Z showing cut portions 393Z-400Z on four sides, the cut portions defining linear paths along the length of rope chain 391Z extending parallel to the rope chain axis 371Z. In Figure 33Z, the cut portions 393Z and 397Z, on opposite sides of the chain, are equidistant from the axis 392Z. Similarly, the planes of cut portions 394Z-396Z and 398Z-400Z, on opposite sides of the chain are also equidistant from the axis 371Z. However, the planes of cut portions 394Z-396Z and 398Z-400Z are closer to the axis 392Z than the cut portions 393Z and 397Z. As a result, the widths of adjacent linear paths defined by the diamond cut portions are different, and when rhodium plated, give a unique appearance to the chain in the form of alternate large and small width bright rhodium paths extending along a yellow gold chain, for example.
- 10
- 15

- A side view of the embodiment according to Figure 33Z is not shown or necessary, since such a view would be self evident to a person skilled in the jewelry art as to precisely how a side view would appear, especially after observing the side view of the four faceted rope chain segment shown in Figure 30Z.
- 20

- The cut, or faceted, portions 393Z-400Z may be formed in any desired way. A preferred way is to diamond cut four linear paths of cut portions by first laying the length of rope chain 391Z out taught between two guides, or by stretching the chain taught around a drum, and then diamond cutting one linear path 393Z for example at a prescribed distance from the axis 392Z. The chain is then rotated 180° and a second linear path 397Z is diamond cut. The chain is then rotated 90° , the cutter is moved closer to the axis 392Z, and
- 25

a third linear path (in the plane of cut portions 394Z-396Z) is diamond cut. The chain is then rotated 180° and a fourth linear path (in the plane of cut portions 398Z-400Z) is diamond cut.

Colorizing the cut edges may be performed in the same manner described in connection with Figures 30Z and 31Z.

The length of rope chain 341Z so produced may thus be constructed of all yellow gold link elements, and a bright rhodium plating on the diamond cut surfaces presents a highly desirable contrast difference in color along the chain, enhancing its appearance and rendering it more desirable to a prospective purchaser.

10 In Figures 30Z-33Z, and in the descriptions of such figures, it is assumed that the link elements 342Z, 344Z are all annular links with constant annular widths. Employing non-symmetrical link elements, such as those shown in Figures 13Z-15Z, rope chains such as those shown in Figure 23Z and 24Z can be constructed, with one rope strand of a relatively large diameter and the other rope strand of a relatively small diameter. Applying post
15 assembly diamond cutting and colorization techniques, interesting and attractive patterns on the finished rope chain can be accomplished.

For example, Figures 34Z-37Z are near duplicates of Figures 30Z-33Z, except that the rope chains of Figures 34Z-37Z are constructed of link elements like those of Figures 13Z-15Z to produce one rope strand of a relatively large diameter and the other rope strand of a relatively small diameter. A full understanding of Figures 34Z-37Z can be appreciated by
20 the description to follow and by the fact that prime numbers have been used to designate like details to those of Figures 30Z-33Z discussed above.

Using such a wide/narrow link element configuration, the assembled rope chain can be subjected to a diamond cutting procedure, and such diamond cuts will be effective to
25 remove precious metal only on the wider halves of the individual link elements, in Figures 34Z-37Z, these being link elements 342'Z. Link elements 344'Z are of a smaller diameter,

and the corresponding smaller diameter rope chain strand is unaffected by the diamond cutting procedure.

As a result, with four and eight faceted linear diamond cuts along the length of the rope chain 341'Z, every other rope strand is faceted, and every in-between strand is not faceted, producing an interesting visual effect. The diamond cutting of one rope strand and not the other can best be seen in the end views of Figures 35Z-37Z. Of course, if desired, the diamond cuts can be made deeper, or the smaller diameter rope strand can be made larger such that both the relatively larger and smaller strands are diamond cut. If the smaller diameter strand is only slightly diamond cut, i.e. at the outer peripheries of the link elements 344'Z, an attractive combination of wide band cuts and narrow band cuts will result.

As with the colorization of rope chain strands or portions of rope chain strands heretofore shown and described, the diamond cut portions of the rope chains shown in Figures 34Z-37Z can be similarly colorized employing the methods and materials for gold plating, rhodium plating, blackening, oxidizing, and enameling. Additionally, in the rope chain examples of Figures 34Z-37Z, an extra dimension of colorization is made possible. For example, a rope chain can be produce having a yellow gold large diameter rope strand 342'Z and a less expensive silver small diameter rope strand 344'Z. After assembly and diamond cutting as shown in Figures 34Z and 35Z, the large diameter gold strand 342Z may have its diamond cut edges rhodium plated, and a blackener can be applied to the entire smaller diameter silver rope strand, giving a three-color highly unique rope chain pattern in which the yellow gold portion is prominent, with a rhodium streak intermittently showing on the gold strand, and the smaller strand of a darker color.

Figure 38Z is yet another example of length of rope chain 401Z that has unique coloration and patterned features. Like rope chain 341Z, it is made up link elements to produce a relatively large diameter strand 403Z alternating with a relatively small diameter strand 405Z. Instead of diamond cutting a linear path parallel to the axis of the rope chain, the chain 401Z is subjected to selective diamond cutting along the periphery of the larger diameter strand 403Z. This produces a helical diamond cut path along the outer periphery

of strand 403Z. After colorization of the diamond cut portions 407Z, a yet further unique rope chain results. This model of rope chain can be further enhanced by employing other techniques and procedures noted above, concerning the change of depth of the diamond cut, the type and color choice of the colorization procedure, and treating the smaller
5 diameter strand 405Z differently than that of the larger diameter strand 403Z.

It is to be understood that the diamond cut paths shown in Figures 30Z-38Z can be of any practical width, at the discretion of the jewelry designer.

Additionally, rather than forming a flat, or planar, diamond cut path, any desired configuration of the cutter can be chosen to produce, for example, concave, convex,
10 stepped, rounded, or serrated edge surfaces on the link elements comprising the rope chain.

Although it has been described that the length of rope chain is held taught while forming linear paths parallel to the axis, completed rope chains have much flexibility, and it is inherent in rope chains that some twisting, in use, is natural and expected. Thus, while the diamond cut paths are made in a linear pass along the length of the rope chain during the
15 cutting procedure, in use the paths may take on variable orientations and configurations. This characteristic of rope chains adds to the visual attraction of the jewelry article, since otherwise the chain would exhibit all parallel lines and lose the glitter and surprising light reflecting phenomenon associated with flexible rope chains.

Figure 39Z is a front elevational view of a length of rope chain 411Z which has portions
20 colored subsequent to assembly of the link elements making up the chain. Employing any of the plating methods described herein, whole segments of chain are plated around the entire body of the chain segment for a prescribed length, alternating with segments that are not plated. For example, in the embodiment shown in Figure 39Z, a rope chain 411Z, initially constructed of solid yellow gold link elements, has a short non-plated segment
25 413Z followed by a short rhodium plated segment 413Z, then another non-plated segment 417Z, and then another rhodium plated segment 419Z, etc., giving the finished rope chain a “zebra” look. For purposes of illustration only, the plated and non-plated segments are all one full helical turn in length. It is to be understood that any length of plated segments

alternating with any length of non-plated segments are contemplated, at the discretion of the jewelry designer, while maintaining the “zebra” pattern.

If desired, the jewelry designer may choose to give any of the described embodiments of the finished rope chain a soft lusterless appearance, i.e., instead of rhodium coating to
5 increase reflectivity and brilliance, the finished rope chain may be mechanically or chemically treated so as to have a sandblast, matt, or frost like finish. Such surface texturing can be achieved by selectively acid etching one rope strand or portions thereof, or by electro-etching away surface material in the manner of EDM electro-machining, or by applying a surface ablating or surface furbishing or surface grinding with a small rotary
10 tool or diamond cutting tool.

Another possibility with the present invention is the ability to assemble virtually any color, texture, or shape combination along the length of the rope chain not grouped into patterns correlated with the number of links elements in a set. That is, a color/texture/shape combination, repeated or not, may extend along any number of link elements and not be
15 bounded by the chosen number of link elements per set. One example of this is a length of rope chain having color patterns in groups of thirteen link elements, while a set for this particular length of rope chain may comprise four link elements. Moreover, it is within the scope of the present invention to construct a length of rope chain with sets made up of different numbers of link elements, e.g., 4-link, 6-link, and 8-link sets may be assembled in
20 the construction of the same rope chain.

The embodiments of the invention shown in Figures 16Z-38Z provide a basis for appreciating the virtually limitless design patterns that can be produced by arranging the differently colored, patterned, or textured annular link elements such as those shown in Figures 5Z and 7Z-15Z in a rope chain structure and optionally applying a coating or
25 otherwise treating the surface or a portion of the surface of one or both rope strands of an assembled length of rope chain.

Obviously, color and texture configurations other than those shown in Figures 5Z and 7Z-15Z are possible for the manufacture of the annular link elements, and these are merely

examples of preferred visual property combinations which can produce striking results in a finished rope chain construction. Accordingly, it is to be understood that the patterns shown, the types of materials used, the coloring, implied surface texture and surface patterns, arrangement of groups and sets of link elements along the length of rope chain, 5 reversed or not, randomly assembled or in strict accordance with a repeated pattern, and the like are all contemplated possibilities and are to be considered within the scope of the present invention.

In some embodiments described in this specification and shown in the accompanying drawing, only one helical rope strand is colorized or textured, in whole or in part. The 10 benefits of this processing and construction have been detailed above. It is intended that the same concepts of the invention can be applied to embodiments where both strands are colorized or textured, in whole or in part. For example, a rope chain made with low karat weight yellow gold for both strands may be subjected to a rhodium plating on one rope strand and a high karat weight plating on the other strand. Similarly, one strand can be 15 high gold karat weight plated and the other strand could be subjected to the application of a blackener or oxidizer, or coated with hard enamel. It is thus to be understood that any process or construction described herein directed to coloring or texturing only a single rope strand applies equally well to coloring or texturing both rope strands.

Moreover, multiple treatments of one or both strands of a length of rope chain are within 20 the scope of the present invention. For example, any of the embodiments described in the previous paragraph, or similar embodiments, resulting in a yellow gold or relatively dark color after treating both rope strands could be subjected to yet another treatment for one or both rope chains in the manner of rhodium striping as shown in Figures 25Z-29Z.

Thus, while only certain embodiments have been set forth, alternative embodiments and 25 various modifications will be apparent from the above description to those skilled in the art.

While the colors and precious metals used in the descriptions herein are preferred to be yellow, white, rose, and green gold, other colors and other metals, or even non-metals, can

be employed in the construction of the disclosed rope chain configurations. Notable alternate materials, for example, are rhodium (in various colors), silver, and nickel, either solid or plated.

The link elements, and/or rope strands after assembly may be enameled using any
5 selectable colored or clear enamel. Similarly, the links and/or rope strands after assembly may be subjected to a surface treatment using blackeners or oxidizers or enamels.

In this connection, new colorization process are continually being developed, and such new colorization processes can be employ in carrying out the inventions equally as well as those specifically described herein. Such new colorization processes may include coloring
10 agents molecularly bonding with the material, or coloring agents penetrating the surface of the material to be embedded several microns below the surface, forming an integral part of the material being colored. The invention is thus not to be considered limited to the specific products and processes shown and described in this specification.

The examples herein of gapped link elements with a rectangular cross section are not to be
15 considered limiting. Virtually any cross sectional configuration can be produced for the gapped link elements while maintaining an overall annular configuration, or other configuration not unlike the examples shown in Figures 16Z-33Z. An attractive rope chain, for example, may be formed using annular gapped link elements having a circular cross section, solid or tubular, resulting in a "soft feel" rope chain with brilliant light
20 reflection patterns.

In this connection, if desired, the interior peripheral edges of the link elements shown in Figures 5Z and 7Z-15Z may be circular, as shown, or non-circular, leaving the exterior peripheral edges as shown. Alternatively, any combination of circular and non-circular interior peripheral edges and circular and non-circular exterior peripheral edges of the link
25 elements employed in the construction of a rope chain employing the concepts of the present invention are possible, provided the link elements can be assembled in a rope chain fashion.

These and other alternatives are considered equivalents and within the spirit and scope of the present invention.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A generally C-shaped gapped link element of a type that is interlinked with a series of other such link elements to produce a jewelry rope-chain having the appearance of intertwining helical strands, each of the gapped link elements having a first major surface, an opposite second major surface, an interior edge and an exterior edge, wherein:
said first major surface is divided into portions, a first major-surface portion exhibiting a first visual property perceptively different than a second visual property exhibited by an adjacent first major-surface portion; and
said visual properties are color properties, surface-pattern properties or surface-texture properties, or combinations of color properties, surface-pattern properties or surface texture properties.
2. A link element as claimed in claim 1, wherein each said major-surface portion of said first major surface extends from said interior edge to said exterior edge along the extent of said link element.
3. A link element as claimed in claim 1 or 2, wherein said first major surface exhibits a visual property perceptively different than the visual property of said opposite second major surface.
4. A link element as claimed in claim 1, 2 or 3, wherein said first major-surface portions are made of different materials.
5. A link element as claimed in any one claim 1, 2 or 3, wherein said first and second major surfaces are made of different materials.
6. A link element as claimed in any one of claims 1 to 5, wherein said second major surface is divided into portions, a second major-surface portion exhibiting a third visual property perceptively different than a fourth visual property exhibited by an adjacent second major-surface portion.

7. A link element as claimed in claim 6, wherein said third and fourth visual properties of said second major-surface portions are color properties, surface-pattern properties or surface-texture properties, or combinations of color properties, surface-pattern properties, or surface-texture properties.
8. A link element as claimed in claim 7, wherein said second major-surface portions are made of different materials.
9. A link element as claimed in any one of claims 1 to 8, wherein link width is defined as a distance, measured along either of said major surfaces, between a pair of parallel lines perpendicular to said major surfaces and tangent to, respectively, said interior and exterior edges; and said link element has an irregular link width along an extent of said link element.
10. A link element as claimed in claim 9, wherein said link element is divided into segments, each said segments possessing a unique link-width character relative to an adjacent segment.
11. A link element as claimed in claim 10, wherein one of said segments possessing a unique link-width character is annular in shape; and an adjacent segment has an undulated exterior edge.
12. A link element as claimed in claim 11, wherein the link width of said annular-shaped segment is greater than the link width of said segment having an undulated exterior edge.
13. A link element as claimed in claim 10, wherein one of said segments is annular in shape and has a first link width; and an adjacent segment is annular in shape and has a second link width less than that of said one segment.
14. A link element as claimed in claim 10, wherein each said segment has a first end and a second end; one of said segments has a relatively narrow link width; and another of said segments gradually increases to a relatively wider width intermediate said ends.

15. A link element as claimed in claim 10, wherein one said segments has a relatively narrow link width; another segment has a relatively wider link width; and the width of the wider segment is nonlinear so as to narrow down to the width of the narrow segment at a location where said one segment and said other segment are joined.

16. A link element as claimed in claim 10, wherein one segment has a relatively narrow link width; another segment has a relatively wider link width; and said wider segment has an opening formed therein.

17. A link element as claimed in claim 16, wherein at least a portion of said opening in said wider segment is filled with a material different than the material from which said wider segment is made.

18. A link element as claimed in claim 16, wherein said opening in said wider segment has a plurality of tendril-like filigree filaments bridging across said opening.

19. A link element as claimed in any one of claims 9 to 18, wherein said link element has a non-symmetrical irregular link width along the extent of said link element.

20. A link element as claimed in any one of claims 9 to 18, wherein said link element has a repeating pattern of link-width variation along the extent of said link element.

21. A link element as claimed in any one of claims 10 to 20, wherein one of said segments is one color and of one shape; and another of said segments is another color and of another shape.

22. A link element as claimed in any one of claims 1 to 21, wherein said exterior edge is undulated.

23. A link element as claimed in any one of claims 1 to 22, wherein said link element has a crenelated interior edge.

24. A link element as claimed in any one of claims 1 to 9, wherein said interior edge is rectangular in shape; and said exterior edge is substantially circular.
25. A link element as claimed in any one of claims 1 to 24, wherein said different visual properties are asymmetrical along the extent of said link element.
26. A link element as claimed in any one of claims 1 to 25, wherein said link element has an overall configuration selected from annular, square, oval, diamond, heart shaped or baguette.
27. A link element as claimed in any one of claims 1 to 26, wherein said link element has facing ends defining a gap therebetween; and said exterior edge has a recess therein at a location opposite said gap.
28. A link element as claimed in any one of claims 1 to 27, wherein at least a portion of one of said first major surface, said second major surface, said interior edge and said exterior edge is textured on at least one of said segments.
29. A link element as claimed in any one of the claims 1 to 28, wherein said exterior edge is serrated on at least a portion of one of said segments.
30. A link element as claimed in any one of claims 1 to 29, wherein said different visual properties on said first major surface are color or texture; and said link element has a planar cutout formed on said exterior edge of one of said first major surface portions.
31. A link element as claimed in any one of claims 1 to 30, wherein said exterior edge has an arcuate concave cutout formed therein.
32. A link element as claimed in any one of claims 1 to 30, wherein said exterior edge has a stepped concave cutout formed therein.
33. A link element as claimed in any one of claims 1 to 32, wherein link thickness is defined as a distance between and perpendicular to the planes of said first and second

major surfaces; and said link element has an irregular link thickness along the extent of said link element.

34. A link element as claimed in any one of claims 1 to 33, wherein at least a portion of one of said major surfaces, interior edge and exterior edge is textured in the form of a serrated surface, a sandblasted surface, a series of angled plate-like surfaces having a saw-toothed profile, a V-shaped grooved surface or a diamond-cut surface.

35. A link element as claimed in any one of claims 1 to 34, wherein at least a portion of said link element has a colorized surface that is a thickness of plated rhodium, a thickness of plated gold, a thickness of a blackener, a thickness of an oxidizer, or a thickness of an enamel.

36. A jewelry rope-chain of a type comprising a series of tightly-interfitting gapped links and having an appearance of intertwining helical strands, wherein:

at least some of the gapped links comprise multiple segments formed by stamping a multi-segmented material blank, each segment of the multi-segmented material blank exhibiting a different visual property than an adjacent segment of the material blank; and each of said links has a first side surface exhibiting a first visual property and an opposite second side surface exhibiting a second, perceptively different, visual property.

37. A jewelry rope-chain as claimed in claim 36, wherein said first and second side surfaces are made of different materials, giving rise to said first and second visual properties.

38. A jewelry rope-chain as claimed in claim 36 or 37, wherein each said gapped link is generally C-shaped, has an overall configuration which is annular, square, oval, diamond, heart shaped or baguette, and is solid in cross section.

39. A jewelry rope-chain as claimed in claim 36 or 37, wherein each said gapped link is generally C-shaped, has an overall configuration which is annular, square, oval, diamond, heart shaped or baguette, and is hollow in cross-section.

40. A jewelry rope-chain as claimed in any one of claims 36 to 39, wherein said series of tightly-interfitting gapped links comprises combinations of differently-configured gapped links having overall shape configurations which are annular, square, oval, diamond, heart shaped or baguette.
41. A jewelry rope-chain as claimed in any one of claims 36 to 40, wherein said first and second visual properties are color properties.
42. A jewelry rope-chain as claimed in any one of claims 36 to 40, wherein said first and second visual properties are surface pattern properties.
43. A jewelry rope-chain as claimed in any one of claims 36 to 40, wherein said first and second visual properties are physical surface appearance properties.
44. A jewelry rope-chain as claimed in any one of claims 36 to 43, wherein said first surface of each of said links faces the same direction along said series of links.
45. A jewelry rope-chain as claimed in any one of claims 36 to 43, wherein:
said first surface of each of a first contiguous group of said series of links faces in a forward direction along said series of links;
said first surface of each of a second contiguous group of said series of links faces in a direction opposite said forward direction along said series of links; and
like groups of said first and second contiguous groups of links alternate along said series of links.
46. A jewelry rope-chain as claimed in any one of claims 36 to 43, wherein:
said first surface of each of a first contiguous group of said series of links exhibits a first visual property for a prescribed length along said series of links;
said first surface of each of a second contiguous group of said series of links exhibits a second visual property for a prescribed length along said series of links; and
like groups of said first and second contiguous groups of links alternate along said series of links.

47. A jewelry rope-chain as claimed in claim 46, wherein each of said first and second contiguous groups of links comprises the same number of links.
48. A jewelry rope-chain as claimed in claim 46, wherein said first contiguous group of links comprises a number of links different from the number of links in said second contiguous group.
49. A jewelry rope-chain as claimed in claim 46, 47 or 48, wherein:
said links in said series of links are arranged in a systematic and repeated pattern, the pattern repeating every X number of links along said series of links; and
the number of links in each of said first and second contiguous groups of links is equal to X.
50. A jewelry rope-chain as claimed in claim 46, 47 or 48, wherein:
said links in said series of links are arranged in a systematic and repeated pattern, said pattern repeating every X number of links along said series of links; and
the number of links in each of said first and second contiguous groups of links is not equal to X.
51. A jewelry rope-chain as claimed in any one of claims 36 to 50, wherein at least one of said first and second side surfaces of each said gapped link is flat along a cross-section of said gapped link.
52. A jewelry rope-chain as claimed in claim 51, wherein said at least one said side surface is planar.
53. A jewelry rope-chain as claimed in claim 51, wherein said at least one said side surface is non-planar.
54. A jewelry rope-chain of a type comprising a series of tightly-interfitting gapped links and having an appearance of intertwining helical strands, each gapped link having spaced ends defining a gap therebetween, each of said gapped links having a first side surface and an opposite second side surface, and wherein each said first side surface of at

least some of said gapped links is divided into portions disposed according to a predetermined pattern along the span of said link between said ends, each first side surface portion exhibiting a first visual property perceptively different than a second visual property exhibited by an adjacent first side surface portion.

55. A jewelry rope-chain as claimed in claim 54, wherein each said second side surface of at least some of said gapped links is divided into portions, each second side surface portion exhibiting a third visual property perceptively different than a fourth visual property exhibited by an adjacent second side surface portion.

56. A jewelry rope-chain as claimed in claim 55, wherein said surface portions are made of different materials, giving rise to said first and second visual properties.

57. A jewelry rope-chain as claimed in claim 55 or 56, wherein said third and fourth visual properties on said second side portions are color.

58. A jewelry rope-chain as claimed in claim 55 or 56, wherein said third and fourth visual properties on said second side portions are physical surface appearance.

59. A jewelry rope-chain as claimed in any one of claims 54 to 58, wherein each said gapped link is generally C-shaped, has an overall configuration which is annular, square, oval, diamond, heart shaped or baguette, and is solid in cross-section.

60. A jewelry rope-chain as claimed in any one of claims 54 to 58, wherein each said gapped link is generally C-shaped, has an overall configuration which is annular, square, oval, diamond, heart shaped or baguette, and is hollow in cross-section.

61. A jewelry rope-chain as claimed in any one of claims 54 to 58, wherein said series of tightly-interfitting gapped links comprises combinations of differently-configured gapped links having overall shape configurations which are annular, square, oval, diamond, heart shaped or baguette.

62. A jewelry rope-chain as claimed in any one of claims 54 to 61, wherein said first and second visual properties on said first side portions are color.

63. A jewelry rope-chain as claimed in any one of claims 54 to 61, wherein said first and second visual properties on said first side portions are physical surface appearance.

64. A jewelry rope-chain as claimed in any one of claims 54 to 63, wherein said first surface of each of said links faces the same direction along said series of links.

65. A jewelry rope-chain as claimed in any one of claims 54 to 63, wherein:
said first surface of each of a first contiguous group of said series of links faces in a forward direction along said series of links;
said first surface of each of a second contiguous group of said series of links faces in a direction opposite said forward direction along said series of links; and
like groups of said first and second contiguous groups of links alternate along said series of links.

66. A jewelry rope-chain as claimed in claim 65, wherein each of said first and second contiguous groups of links comprises the same number of links.

67. A jewelry rope-chain as claimed in claim 65, wherein said first contiguous group of links comprises a number of links different from the number of links in said second contiguous group.

68. A jewelry rope-chain as claimed in claim 65, 66 or 67, wherein:
said links in said series of links are arranged in a systematic and repeated pattern, said pattern repeating every X number of links along said series of links; and
the number of links in each of said first and second contiguous groups of links is equal to X.

69. A jewelry rope-chain as claimed in claim 65, 66 or 67, wherein:
said links in said series of links are arranged in a systematic and repeated pattern, said pattern repeating every X number of links along said series of links; and

the number of links in each of said first and second contiguous groups of links is not equal to X.

70. A jewelry rope-chain as claimed in any one of claims 54 to 69, wherein at least one of said first and second side surfaces of each said gapped link is flat along a cross-section of said gapped link.

71. A jewelry rope-chain as claimed in claim 70, wherein said at least one said side surface is planar.

72. A jewelry rope-chain as claimed in claim 70, wherein said at least one said side surface is non-planar.

73. A jewelry rope-chain comprising a series of tightly-interfitting gapped links having an appearance of intertwining helical strands with a helical channel being defined between intertwined first and second helical strands, the first and second helical strands exhibiting at least two distinctly different visual properties along the length of said helical channel.

74. A jewelry rope-chain as claimed in claim 73, wherein said first helical strand exhibits a visual property along said helical channel different from the visual property exhibited along said channel by said second helical strand.

75. A jewelry rope-chain as claimed in claim 73 or 74, wherein the visual property exhibited by said first helical strand is a first color, and the visual property exhibited by said second helical strand is a second color, different than said first color.

76. A jewelry rope-chain as claimed in claim 73 or 74, wherein:
the visual property exhibited by said first helical strand is a predetermined changing of colors along the length of said helical channel according to a first color change scheme;
and

the visual property exhibited by said second helical strand is a predetermined changing of colors along the length of said helical channel according to a second color change scheme.

77. A jewelry rope-chain as claimed in claim 76, wherein said first color change scheme and said second color change scheme are identical but relatively displaced along the length of said rope chain.

78. A jewelry rope-chain as claimed in claim 76, wherein both said first and second color change schemes produce alternating colors along the length of said helical channel.

79. A jewelry rope-chain as claimed in claim 76, wherein:
said first and second helical strands exhibit at least two distinctly different visual properties along a first length of said rope chain; and
said first and second helical strands exhibit at least two distinctly different visual properties along a second length of said rope chain.

80. A jewelry rope-chain as claimed in any one of claims 73 to 79, comprising a plurality of said first lengths of said rope-chain alternating with a plurality of said second lengths of said rope-chain.

81. A method of manufacturing a gapped link element of a type that is assembled with other such link elements to form a jewelry rope-chain, each of the link elements being generally C-shaped in configuration to define a gap between facing ends thereof, and each of the link elements having a first major surface, an opposite second major surface, an interior edge and an exterior edge, the method comprising:
providing a material having a plurality of regions, adjacent ones of which exhibit different visual properties; and
forming a link element from said material, the link element so produced comprising segments of at least two of said plurality of regions.

82. A method as claimed in claim 81, including the steps of:

with a stamping device stamping said link element from a sheet of said material having adjacent regions exhibiting different visual properties; and

before stamping, orienting the stamping device, relative to said sheet of material, to achieve a predetermined positional relationship between said sheet of material and said stamping device, thereby to produce a link element with variably selectable multiple segments of different visual properties.

83. A method as claimed in claim 82, including a step of providing a stamping die for use in stamping said link element from said sheet of material, the stamping die being shaped to form any of the link elements defined in any one of claims 1 to 35.

84. A method as claimed in claim 82 or 83, in which a plurality of gapped first link elements are stamped after orienting said stamping device relative to said sheet of material to achieve said predetermined relationship between said sheet of material and said stamping device, such that a relatively large portion of each first link element on both sides of its gap exhibits a first visual property; and the method includes steps of:
reorienting the stamping device relative to the same sheet of material;
stamping a plurality of gapped second link elements in which a relatively small portion of each such link element opposite its gap exhibits a second visual property; and
assembling alternate ones of said first and second link elements to form a rope chain.

85. A method as claimed in any one of claims 81 to 84, wherein said sheet of material is provided with regions of different visual properties which are different colors, different surface textures, different reflectivities or different materials.

86. A method as claimed in claim 85, wherein at least one region of the sheet of material from which said link element is manufactured is textured by employing serrating, scoring, knurling, lining, patterning, pressure-stamping, impressing, sandblasting, etching, shaping, polishing, matting, frosting or diamond cutting.

87. A method as claimed in claim 81, including steps of:

slicing a sheet of said material having a plurality of regions, adjacent ones of which exhibit different visual properties, to produce an elongated strip of bendable material comprising segments of at least two of said plurality of regions; and
bending said strip into a generally C-shaped configuration.

88. A method as claimed in claim 81, in which said material is in the form of an elongated wire having a prescribed width and thickness; and the method includes steps of cutting the wire to a prescribed length, and forming the wire into a rope chain link element having a generally C-shaped configuration.

89. A method as claimed in claim 81, including steps of:
assembling a series of said gapped link elements to construct a length of rope chain having an appearance of intertwining helical rope strands; and
subsequently colorizing at least a surface portion of one of said helical rope strands to exhibit a color for said one helical rope strand different from the color of said helical rope strand beneath said colorized surface portion, the colorizing consisting of rhodium plating, gold plating, applying a blackener, applying an oxidizer or enameling.

90. A method as claimed in claim 89, in which, subsequent to said link elements being assembled, and prior to said one helical rope strand being colorized, said one helical rope strand is of a first color and the other helical rope strand is of a second color different than said first color.

91. A method as claimed in claim 89, in which said material has regions of different gold karat weights, such that, after said link elements are assembled, and prior to said one helical rope strand being colorized, said helical rope strands are likewise of different gold karat weights; and the step of colorizing includes plating the helical rope strand made of the lesser karat gold weight with gold having a greater karat gold weight.

92. A method as claimed in claim 89, in which said material has a region of gold and a region of non-gold, such that, after said link elements are assembled, and prior to said one helical rope strand being colorized, said helical rope strands are likewise of

respective gold and non-gold material; and the step of colorizing includes gold plating the helical rope strand made of the non-gold material.

93. A method as claimed in claim 81, including a step of interlinking a series of link elements selected from any link element defined in any one of claims 1 to 35, in accordance with a conventional assembly procedure to form a jewelry rope-chain.

94. A method of manufacturing a jewelry rope-chain comprised of a series of interlinked gapped link elements, each of said link elements being generally C-shaped in configuration to define a gap between facing ends thereof, each of said link elements having a first major surface, an opposite second major surface, an interior edge and an exterior edge, and link width is defined as a distance, measured along either of said major surfaces, between a pair of parallel lines perpendicular to said major surfaces and tangent to, respectively, said interior and exterior edges, the method comprising:

providing a sheet of material of precious metal;

forming a link element from said sheet of material, said link element divided into segments, each segment possessing a unique link-width character relative to an adjacent segment; and

assembling a plurality of said link elements to form a rope-chain.

95. A method as claimed in claim 93 or 94, in which said rope-chain has the appearance of intertwining first and second rope strands, the first and second strands exhibiting at least two distinctly different visual properties along a length of at least one of said rope strands.

96. A method as claimed in claim 93 or 94, in which said link element is non-symmetrical about a link-element center point, and a length of rope-chain made from said non-symmetrical link elements gives the length of rope-chain the appearance of a large diameter helical rope strand intertwined with a relatively smaller diameter helical rope strand; and the method further includes cutting, colorizing, or cutting and colorizing only said larger diameter helical rope strand.

97. A method for manufacturing a jewelry rope-chain, the method comprising:

providing a multi-segmented material blank, each segment of said multi-segmented material blank exhibiting a different visual property than an adjacent segment of said material blank;

stamping a plurality of gapped links from said multi-segmented material blank, each of said gapped links having a first side surface exhibiting a first visual property and an opposite second side surface exhibiting a second, perceptively different, visual property; and

tightly interfitting a series of said gapped links to construct a length of rope chain having the appearance of intertwining helical strands.

98. A method as claimed in claim 97, wherein said first and second side surfaces are made of different materials, giving rise to said first and second visual properties.

99. A method as claimed in claim 97 or 98, including steps of forming each said gapped link into a generally C-shape to have an overall configuration which is annular, square, oval, diamond, heart shaped or baguette, and has a solid cross section.

100. A method as claimed in claim 97 or 98, including steps of forming each said gapped link into a generally C-shape to have an overall configuration which is annular, square, oval, diamond, heart shaped or baguette, and has a hollow cross section.

101. A method as claimed in claim 97 or 98, wherein said series of tightly interfitting gapped links comprise combinations of differently-configured gapped links having overall shape configurations which are annular, square, oval, diamond, heart shaped or baguette.

102. A method as claimed in any one of claims 97 to 101, wherein said first and second visual properties are color.

103. A method as claimed in any one of claims 97 to 101, wherein said first and second visual properties are physical surface appearance.

104. A method as claimed in any one of claims 97 to 103, wherein said first surface of each of said links is oriented to face in a same direction along said series of links.

105. A method as claimed in any one of claims 97 to 103, wherein:

said first surface of each of a first contiguous group of said series of links is oriented to face in a forward direction along said series of links;

said first surface of each of a second contiguous group of said series of links is oriented to face in a direction opposite said forward direction along said series of links; and

like groups of said first and second contiguous groups of links are arranged to alternate along said series of links.

106. A method as claimed in any one of claims 97 to 103, wherein:

said first surface of each of a first contiguous group of said series of links exhibit a first visual property for a prescribed length along said series of links;

said first surface of each of a second contiguous group of said series of links exhibit a second visual property for a prescribed length along said series of links; and

said method includes alternating like groups of said first and second contiguous groups of links along said series of links.

107. A method as claimed in claim 106, wherein each of said first and second contiguous groups of links comprises the same number of links.

108. A method as claimed in claim 106, wherein said first contiguous group of links comprises a number of links different from the number of links in said second contiguous group.

109. A method as claimed in any one of claims 106, 107 or 108, wherein:

said links in said series of links are arranged in a systematic and repeated pattern, said pattern repeating every X number of links along said series of links; and

the number of links in each of said first and second contiguous groups of links is equal to X.

110. A method as claimed in claim 106, 107 or 108, wherein:

said links in said series of links are arranged in a systematic and repeated pattern, said pattern repeating every X number of links along said series of links; and

the number of links in each of said first and second contiguous groups of links is not equal to X.

111. A method for manufacturing a jewelry rope-chain, the method comprising:

providing a plurality of gapped links, each gapped link having spaced ends defining a gap therebetween, each of said gapped links having a first side surface and an opposite second side surface, the first side surface of at least some of said gapped links being divided into portions disposed according to a predetermined pattern along the span of said link between said ends, each said first side surface portion exhibiting a first visual property perceptively different than a second visual property exhibited by an adjacent first side surface portion; and

tightly interfitting a series of said gapped links to construct a rope chain having the appearance of intertwining helical strands.

112. A method as claimed in claim 111, wherein the second side surface of at least some of said gapped links is divided into portions, each said second side surface portions exhibiting a third visual property perceptively different than a fourth visual property exhibited by an adjacent second side surface portion.

113. A method as claimed in claim 111 or 112, wherein said surface portions are made of different materials, giving rise to said first and second visual properties.

114. The method as claimed in claim 111, 112 or 113, wherein said first and second side surfaces are substantially planar.

115. A method as claimed in any one of claims 111 to 114, including steps of forming each said gapped link into a generally C-shape to have an overall configuration which is annular, square, oval, diamond, heart shaped or baguette, and has a solid cross-section.

116. A method as claimed in any one of claims 111 to 114, including steps of forming each said gapped link into a generally C-shape to have an overall configuration which is annular, square, oval, diamond, heart shaped or baguette, and has a hollow cross-section.

117. A method as claimed in claim 116, wherein said series of tightly-interfitting gapped links comprises combinations of differently-configured gapped links having overall shape configurations which are annular, square, oval, diamond, heart shaped or baguette.

118. A method as claimed in any one of claims 111 to 117, wherein said visual property on said first and second side portions is color.

119. A method as claimed in any one of claims 111 to 117, wherein said visual property on said first and second side portions is physical surface appearance.

120. A method as claimed in any one of claims 111 to 119, wherein said first surface of each of said links is oriented to face the same direction along said series of links.

121. A method as claimed in any one of claims 111 to 119, wherein:

said first surface of each of a first contiguous group of said series of links is arranged to face in a forward direction along said series of links;

said first surface of each of a second contiguous group of said series of links is arranged to face in a direction opposite said forward direction along said series of links; and

like groups of said first and second contiguous groups of links are arranged to alternate along said series of links.

122. A method as claimed in claim 121, wherein each of said first and second contiguous groups of links comprises the same number of links.

123. A method as claimed in any one of claims 111 to 119, wherein:

said first surface of each of a first contiguous group of said series of links exhibits a first visual property for a prescribed length along said series of links;

said first surface of each of a second contiguous group of said series of links exhibits a second visual property for a prescribed length along said series of links; and

said method includes alternating like groups of said first and second contiguous groups of links along said series of links.

124. A method as claimed in claim 123, wherein said first contiguous group of links comprises a number of links different from the number of links in said second contiguous group.

125. A method as claimed in claim 123 or 124, wherein:

said links in said series of links are arranged in a systematic and repeated pattern, said pattern repeating every X number of links along said series of links; and

the number of links in each of said first and second contiguous groups of links is equal to X.

126. A method as claimed in claim 123 or 124, wherein:

said links in said series of links are arranged in a systematic and repeated pattern, said pattern repeating every X number of links along said series of links; and

the number of links in each of said first and second contiguous groups of links is not equal to X.

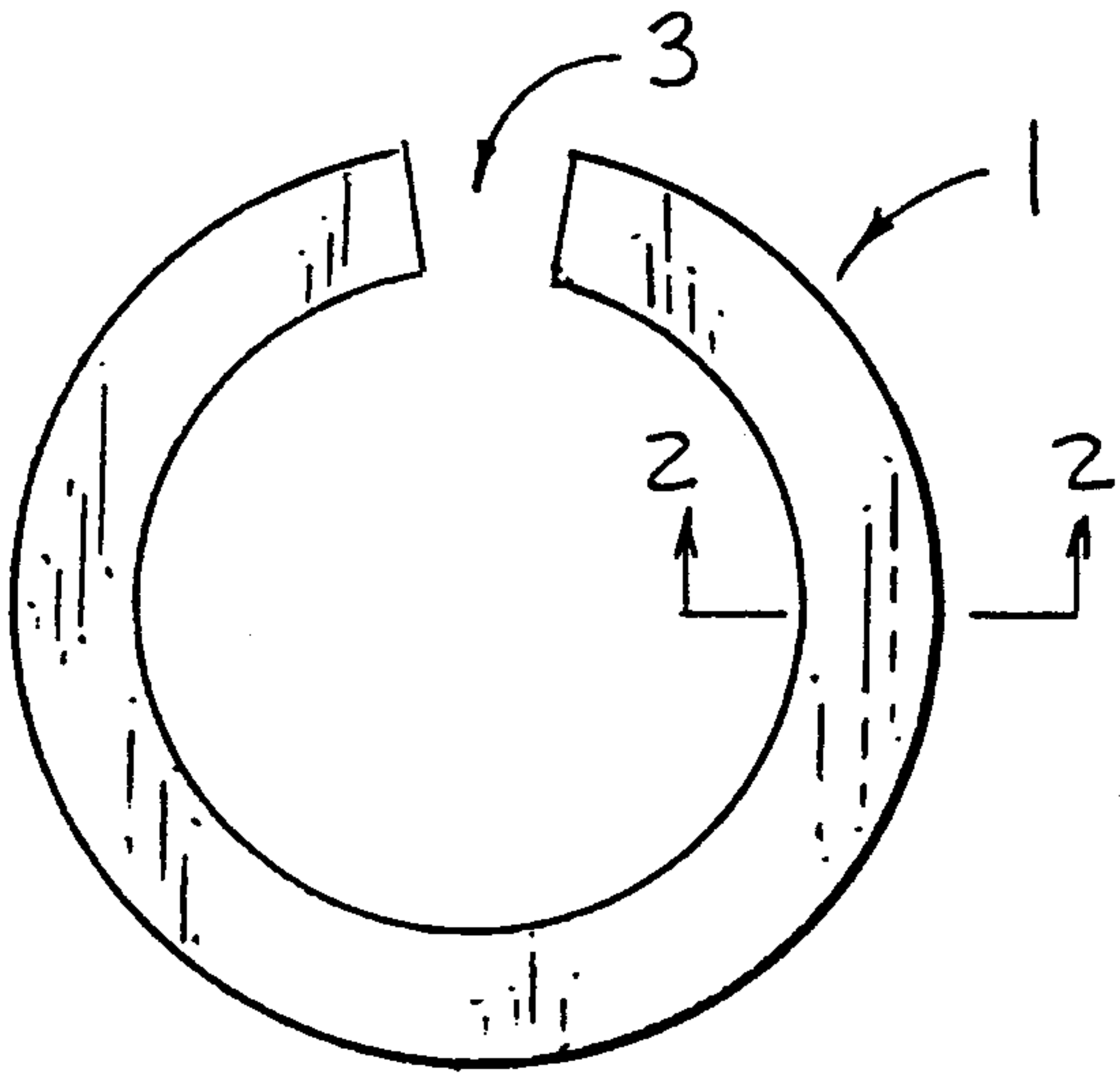


FIG. 1
(PRIOR ART)

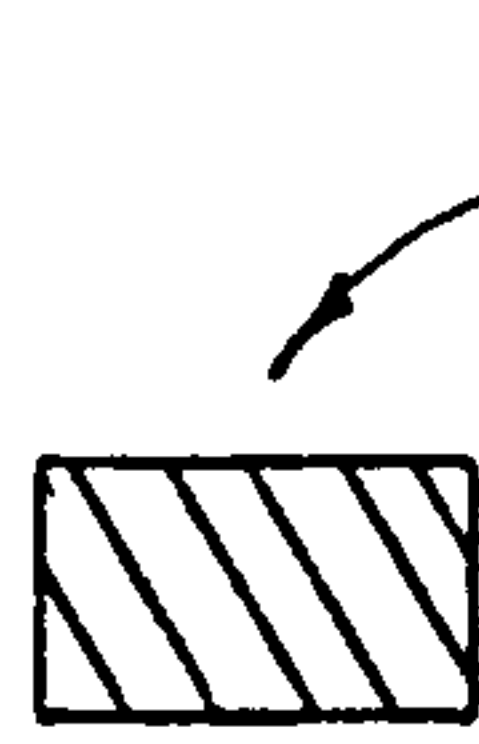


FIG. 2
(PRIOR ART)

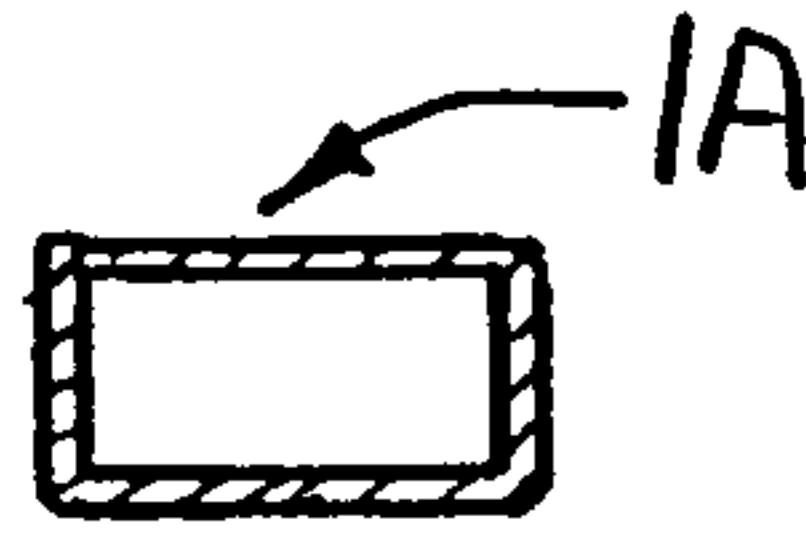


FIG. 2A
(PRIOR ART)

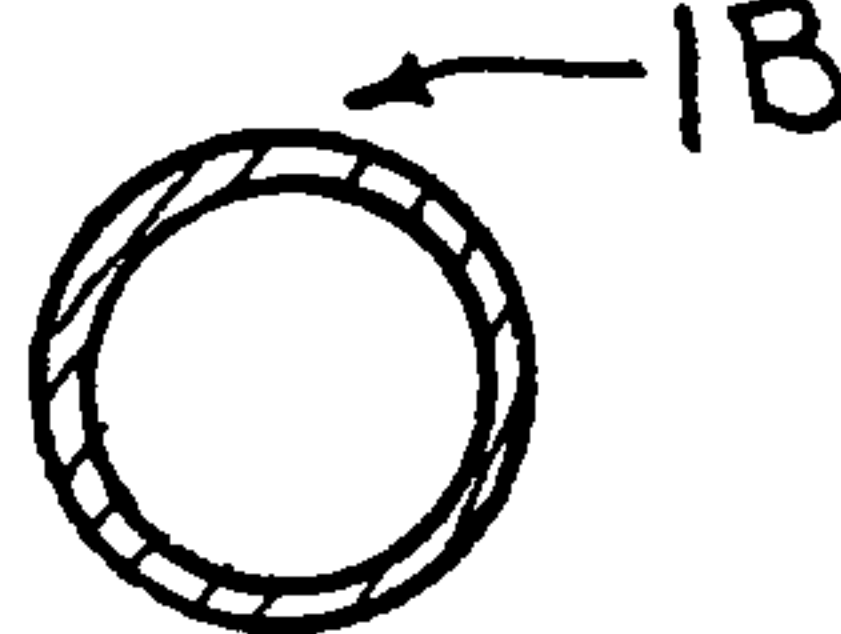


FIG. 2B

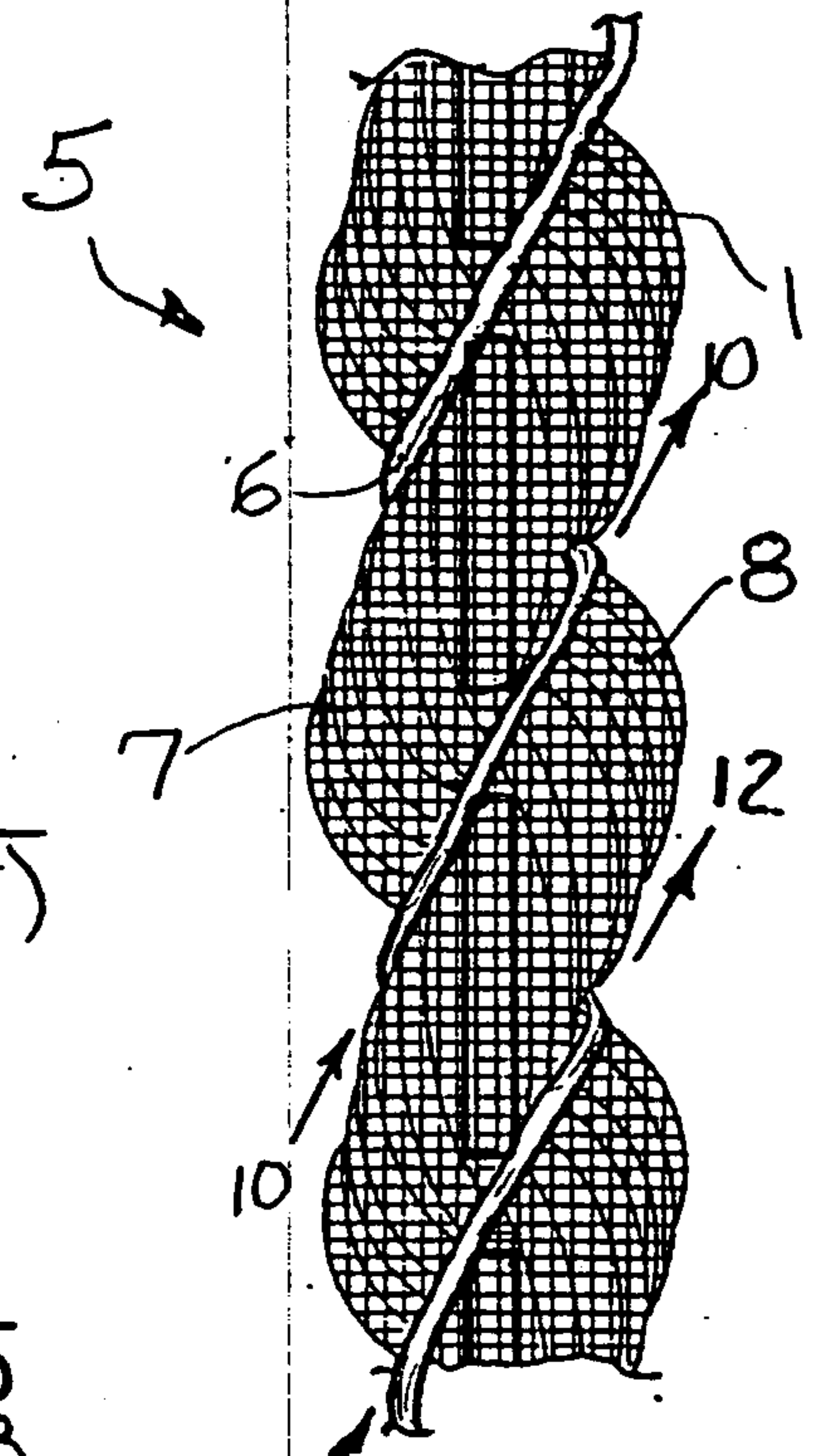


FIG. 3
(PRIOR ART)

FIG. 4
(PRIOR ART)

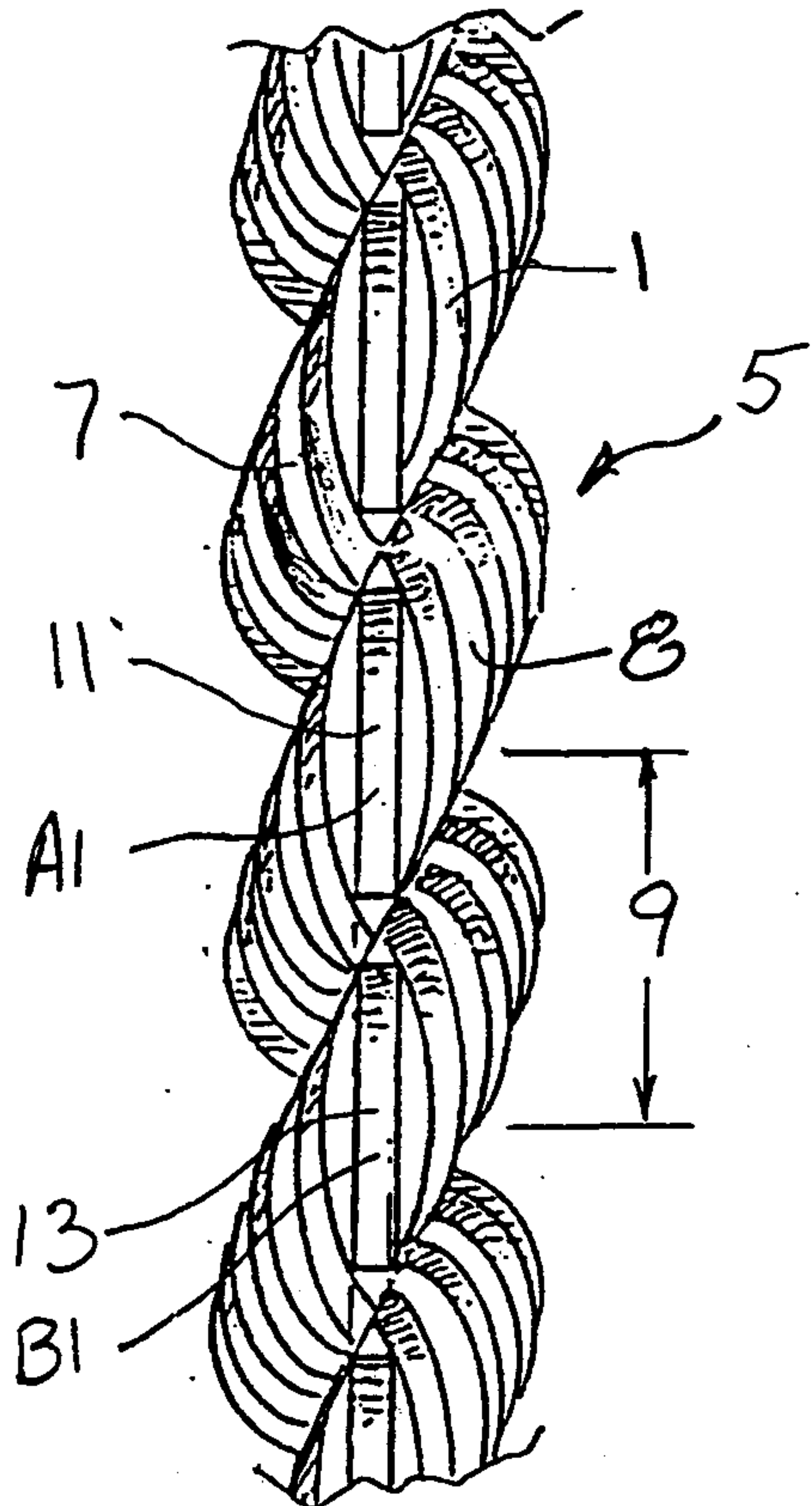
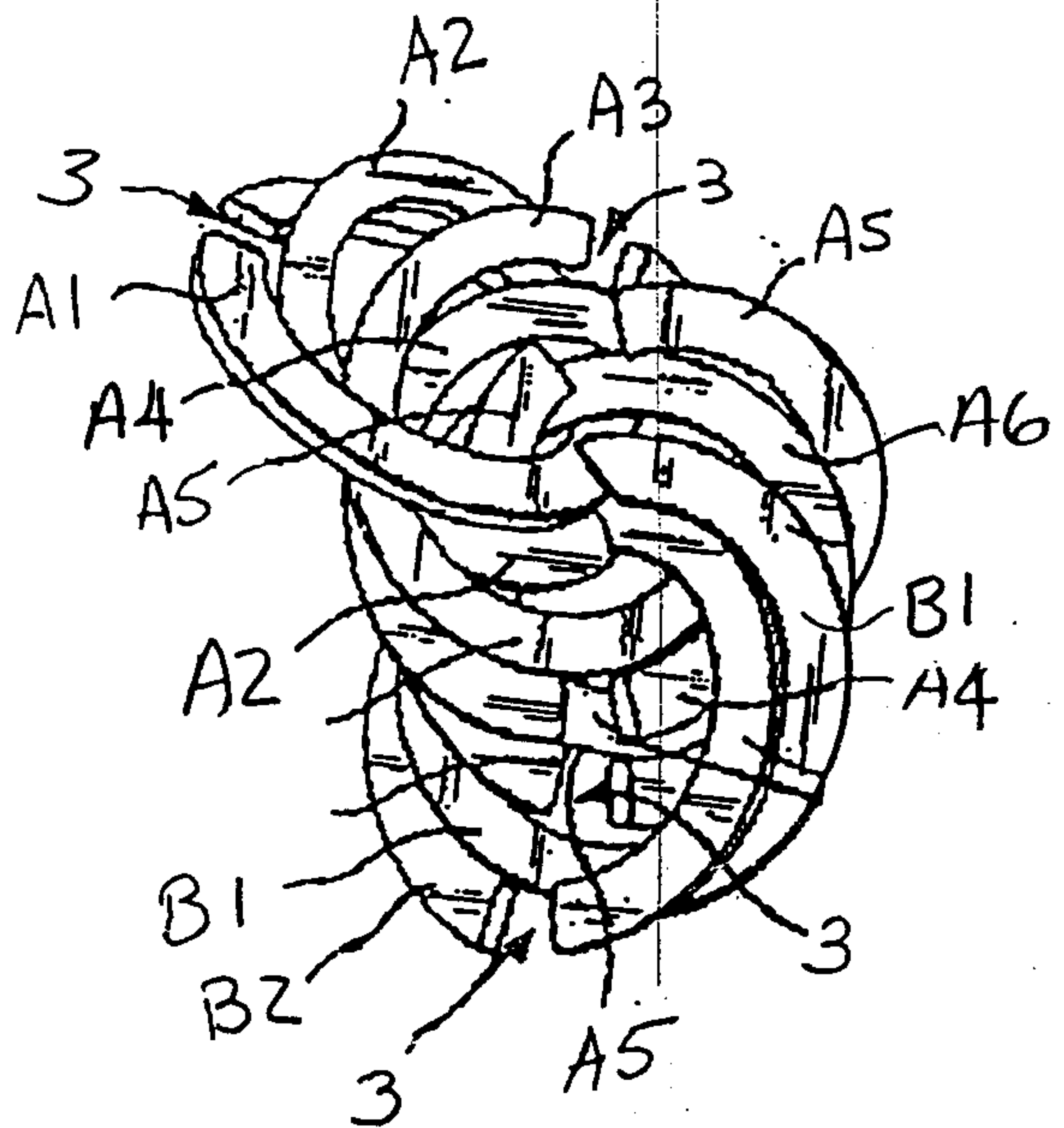
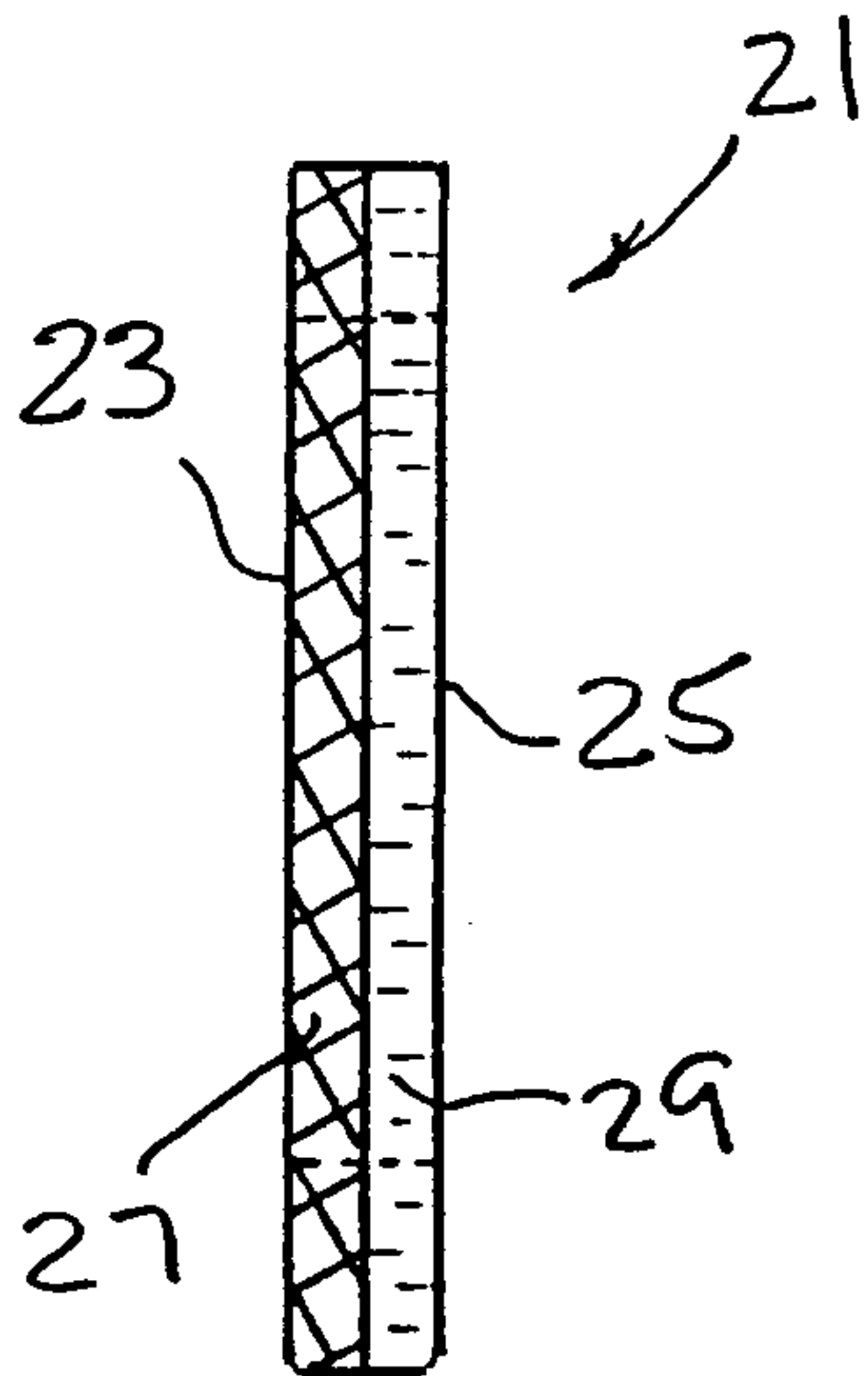
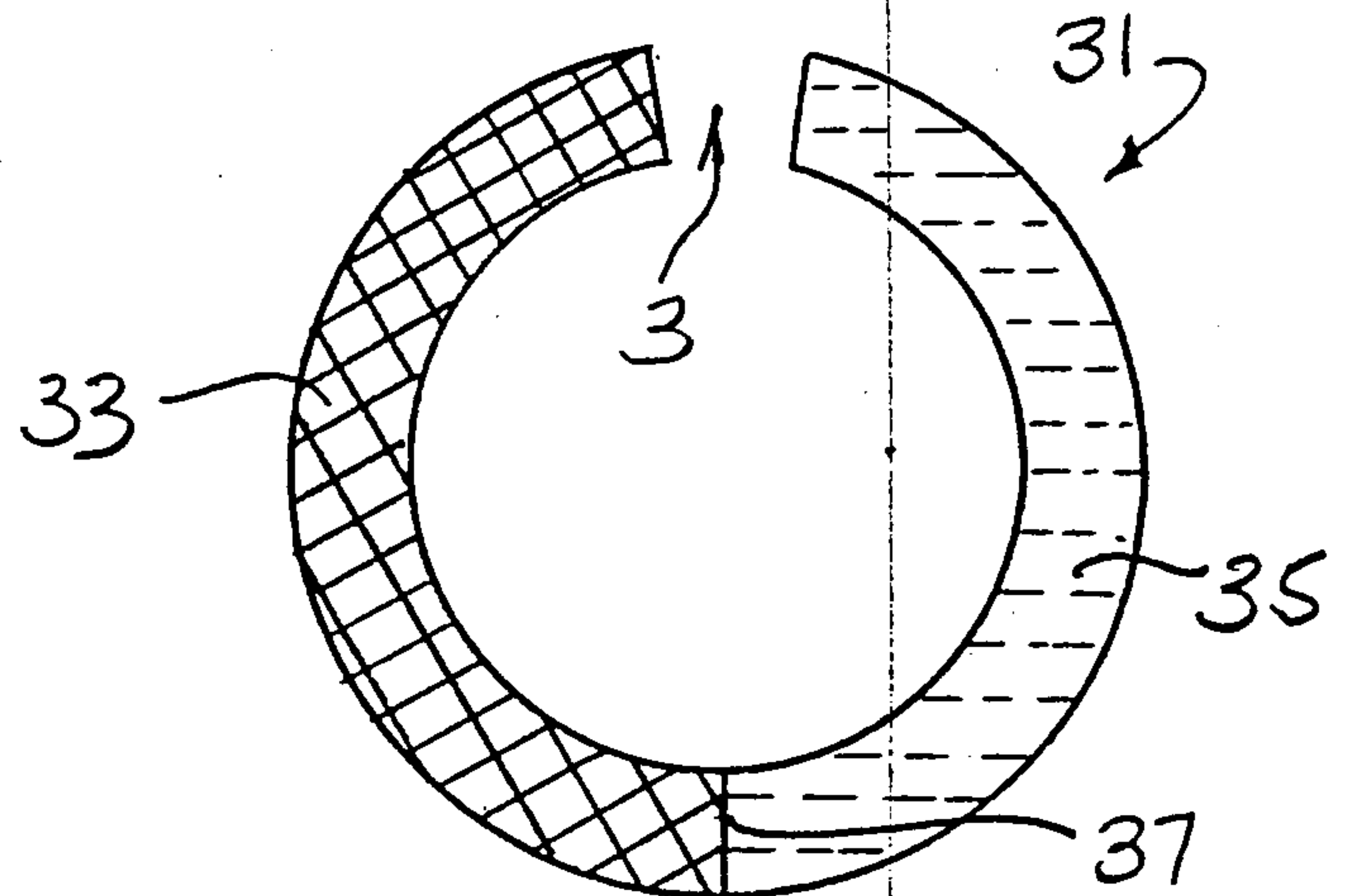
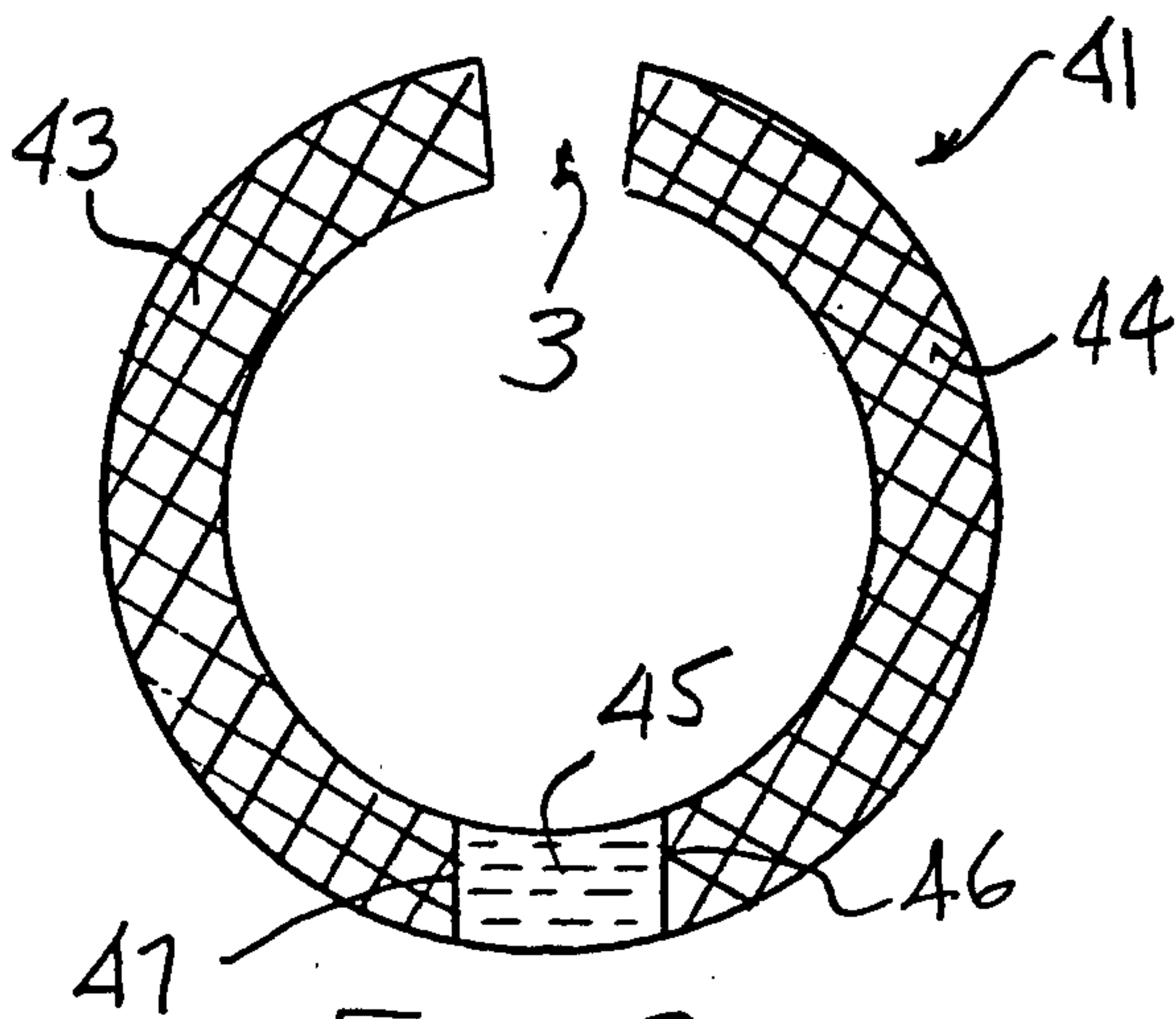
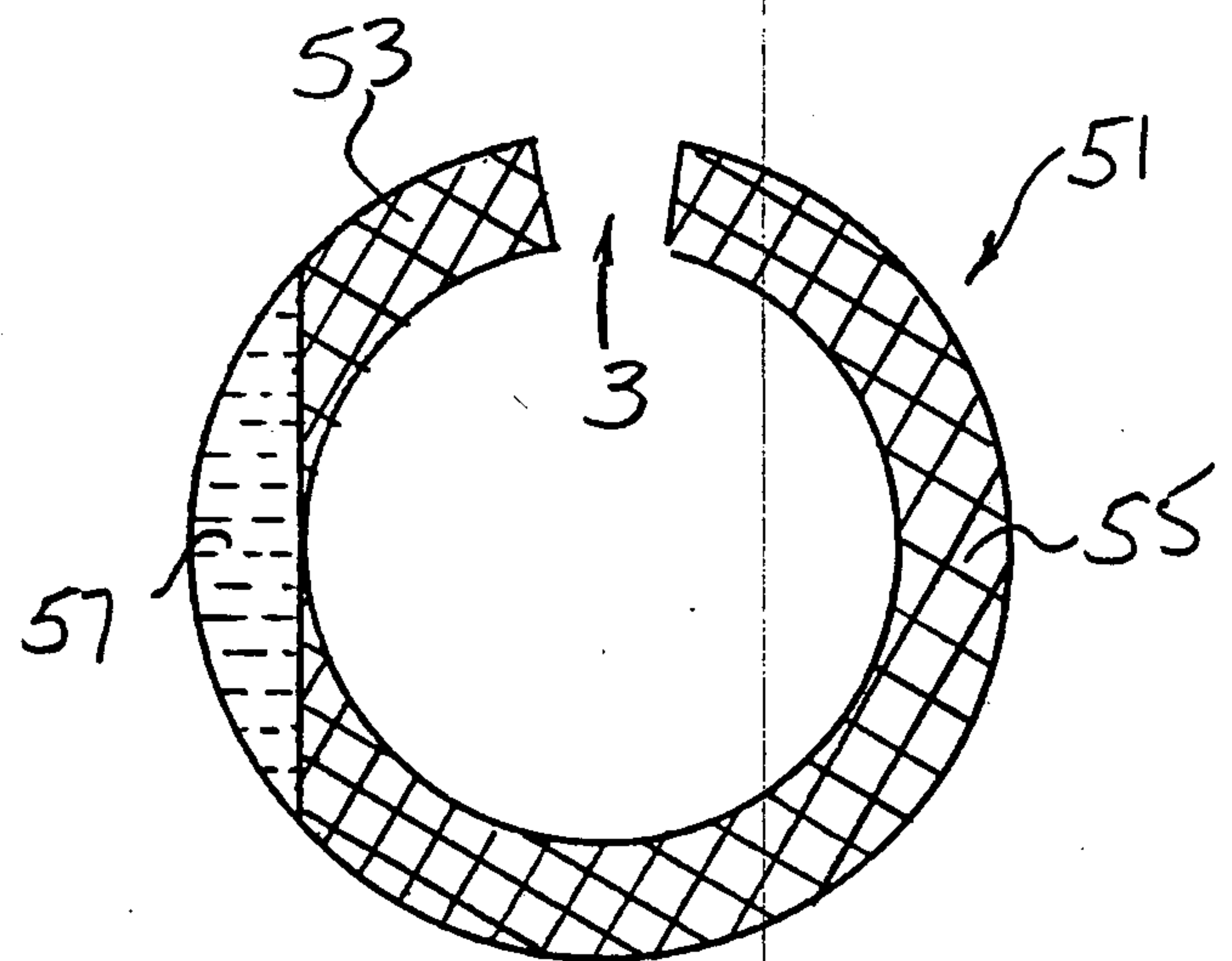
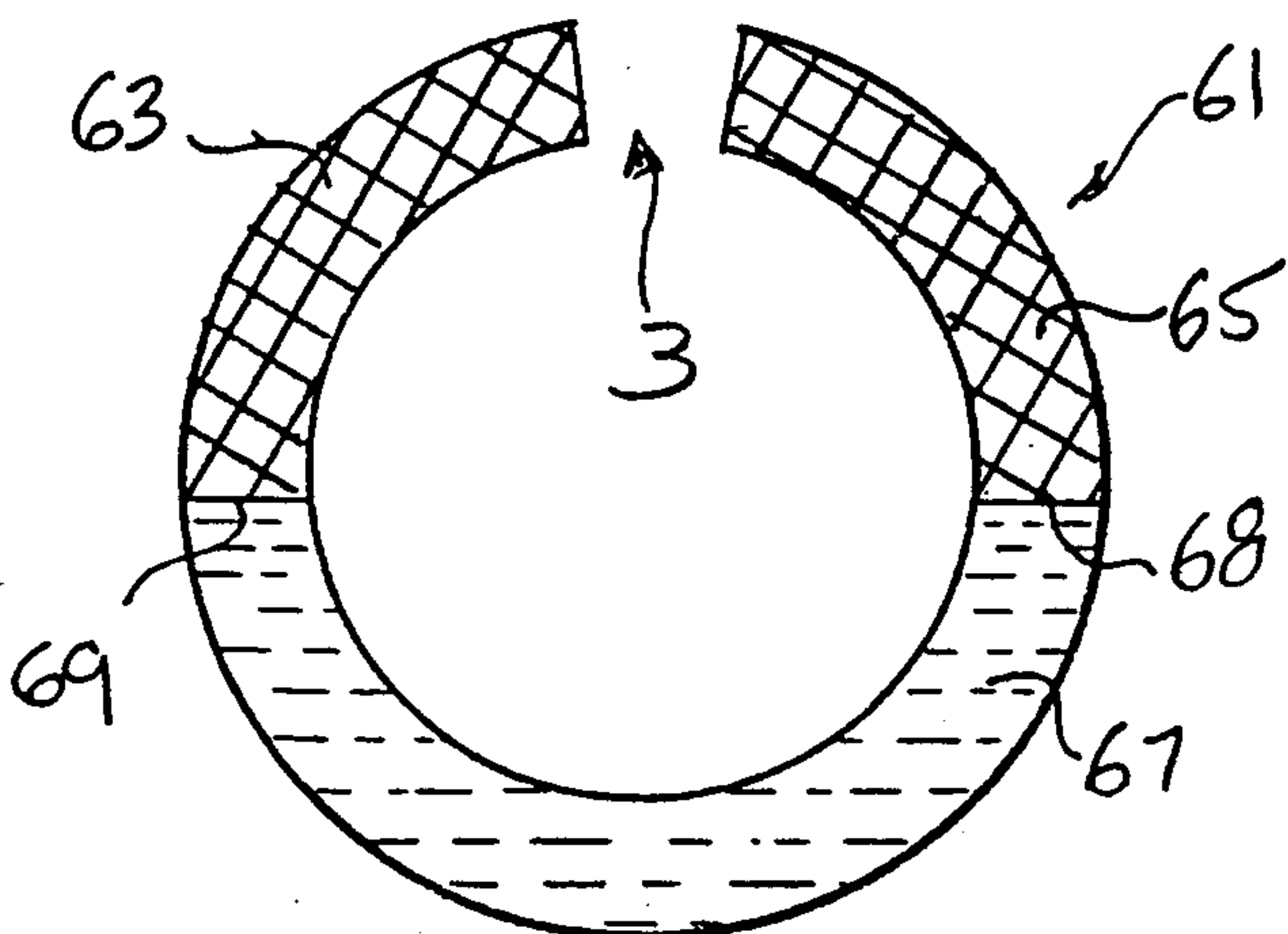
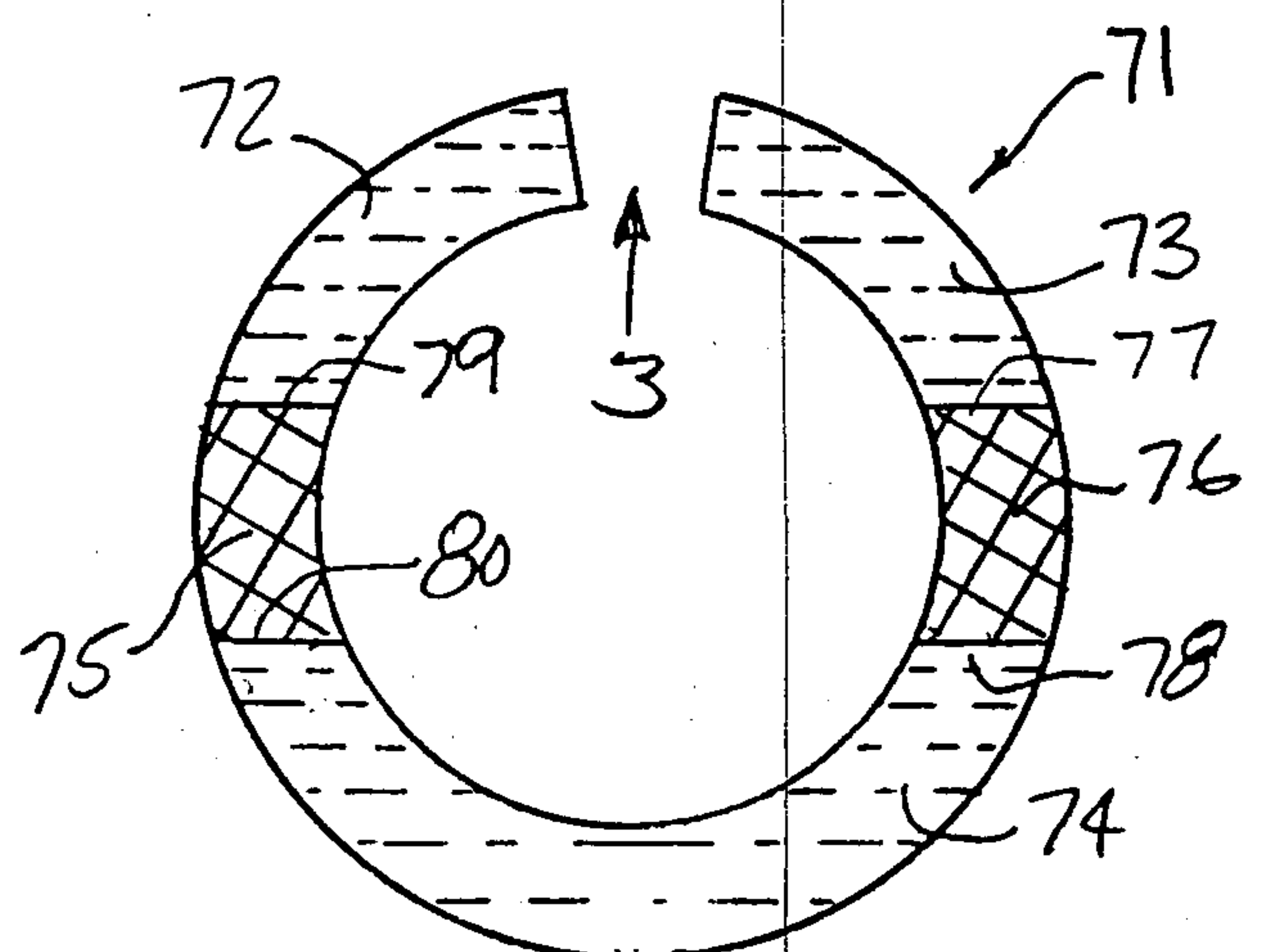


FIG. 5
(PRIOR ART)



FIG. 6FIG. 7FIG. 8FIG. 9FIG. 10FIG. 11

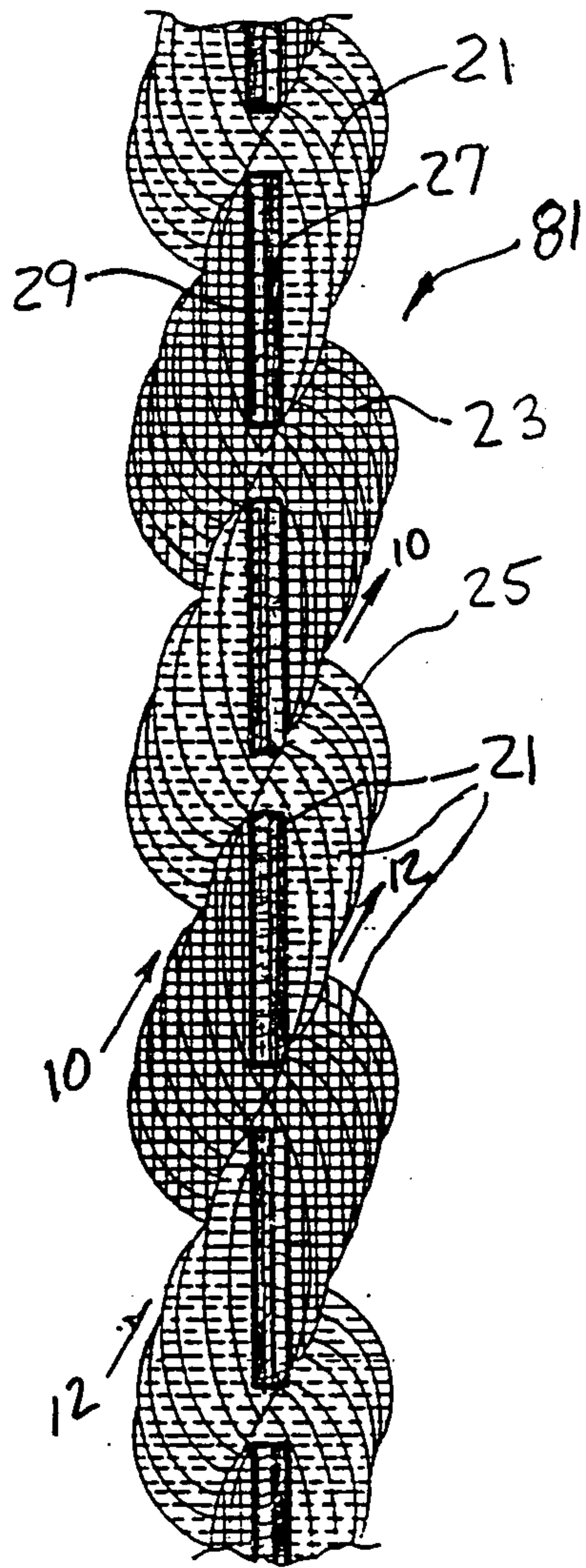


FIG. 12

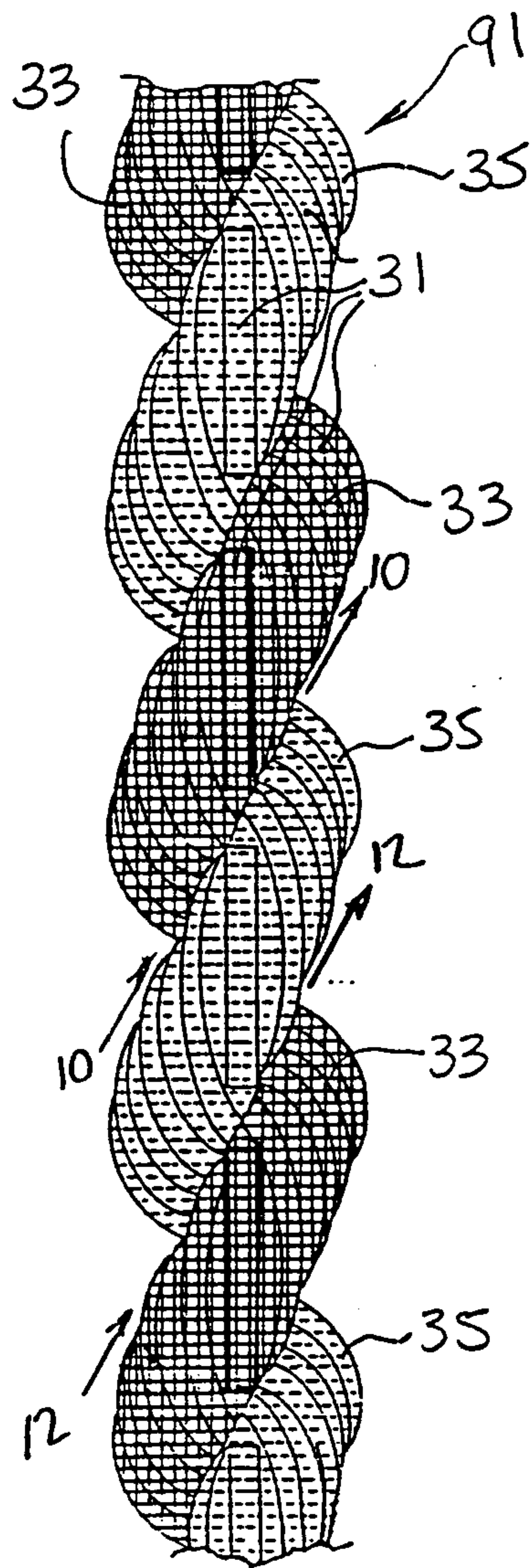


FIG. 13

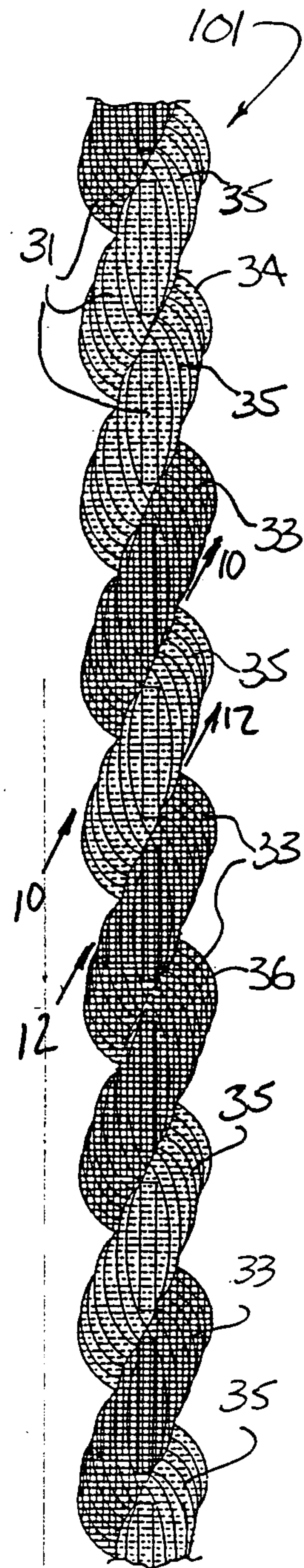


FIG. 14

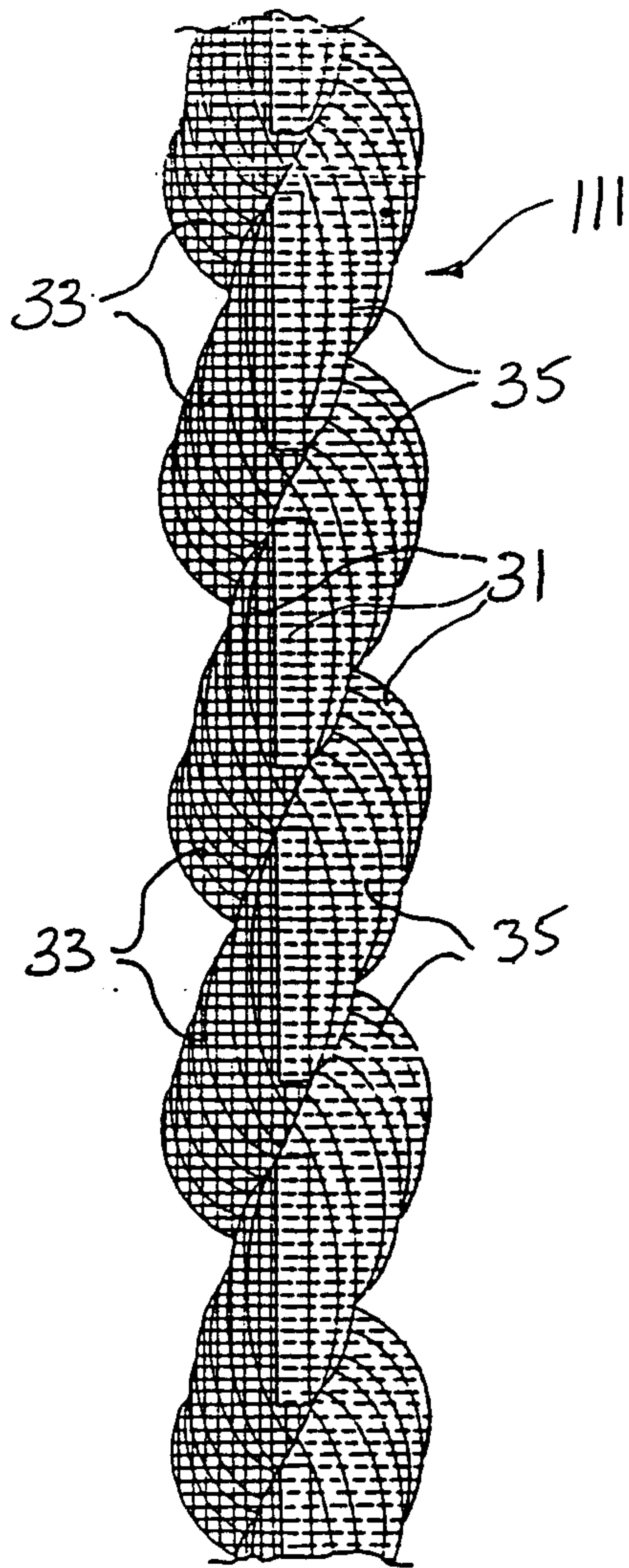


FIG. 15

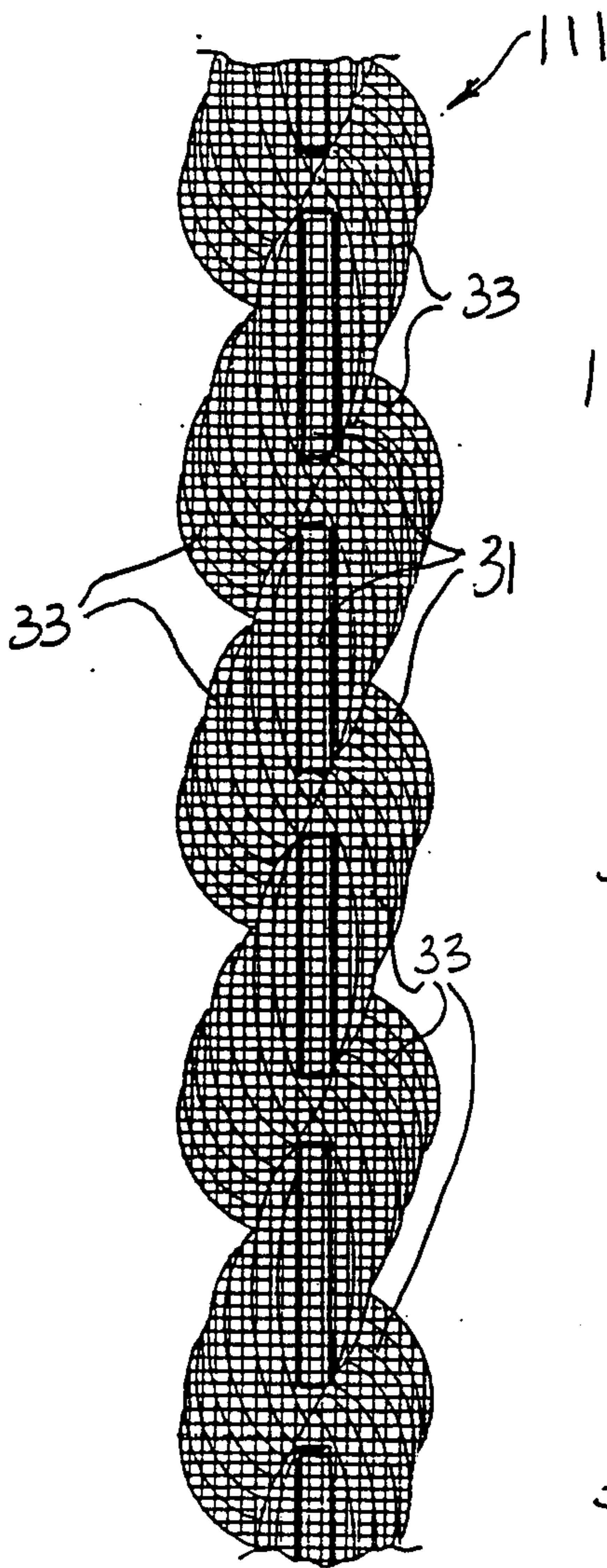


FIG. 16

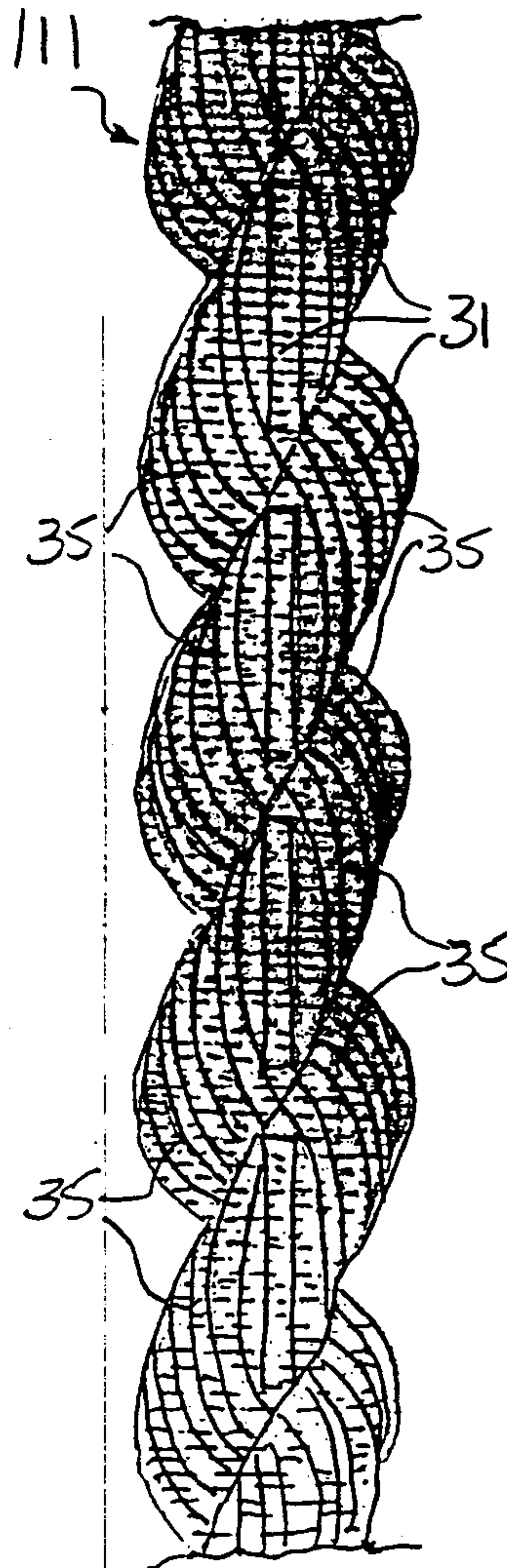


FIG. 17

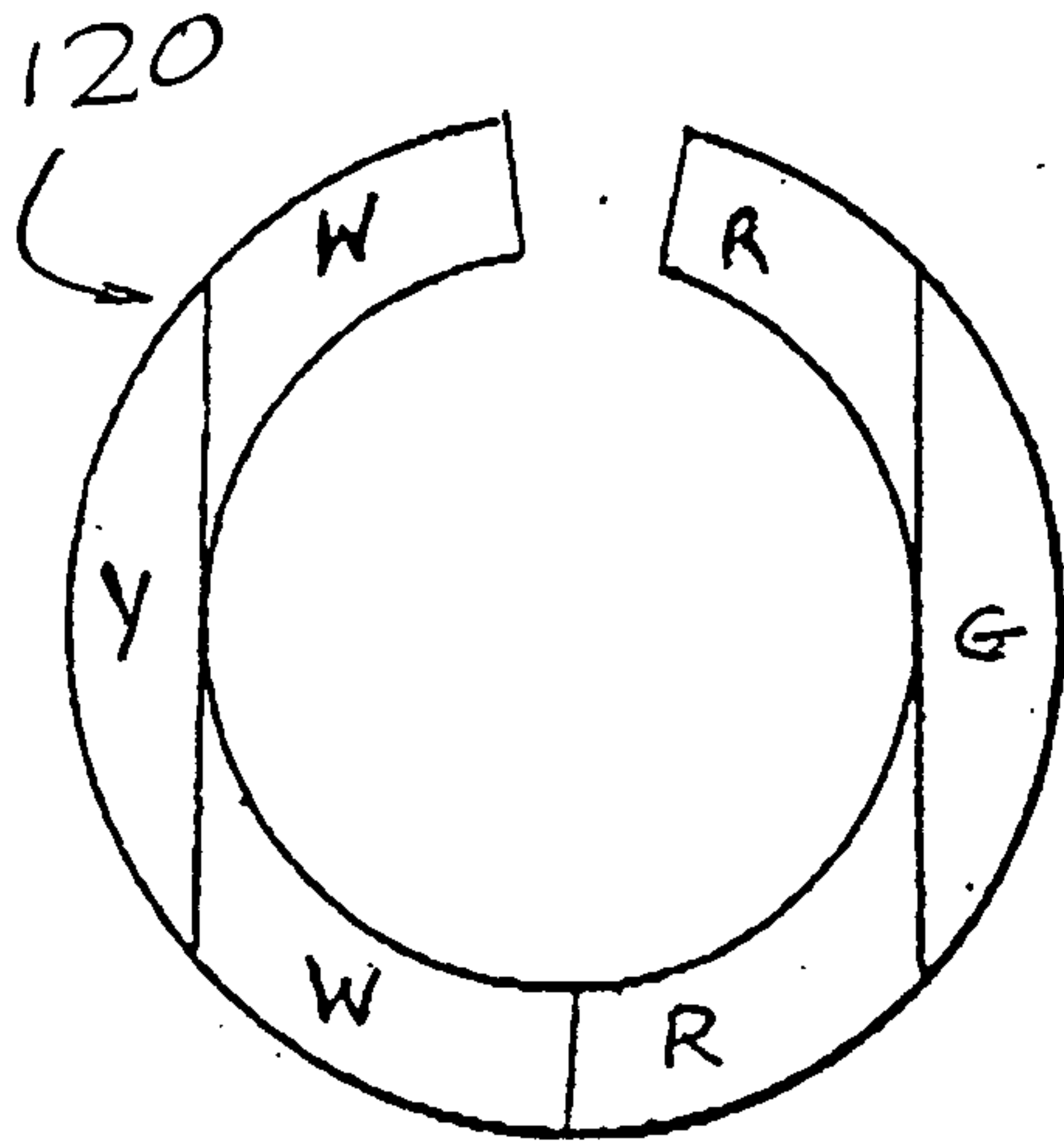


FIG. 18

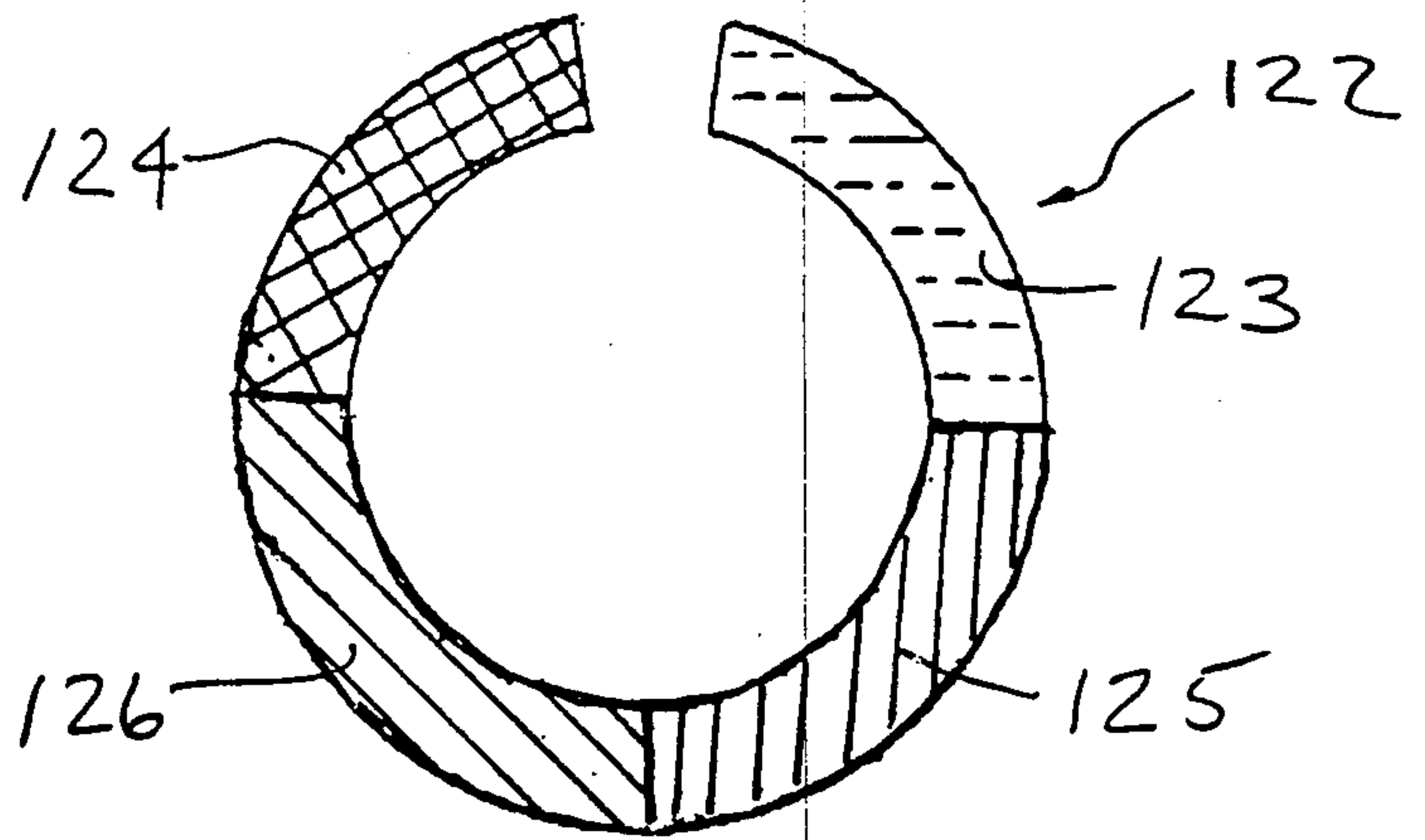


FIG. 19

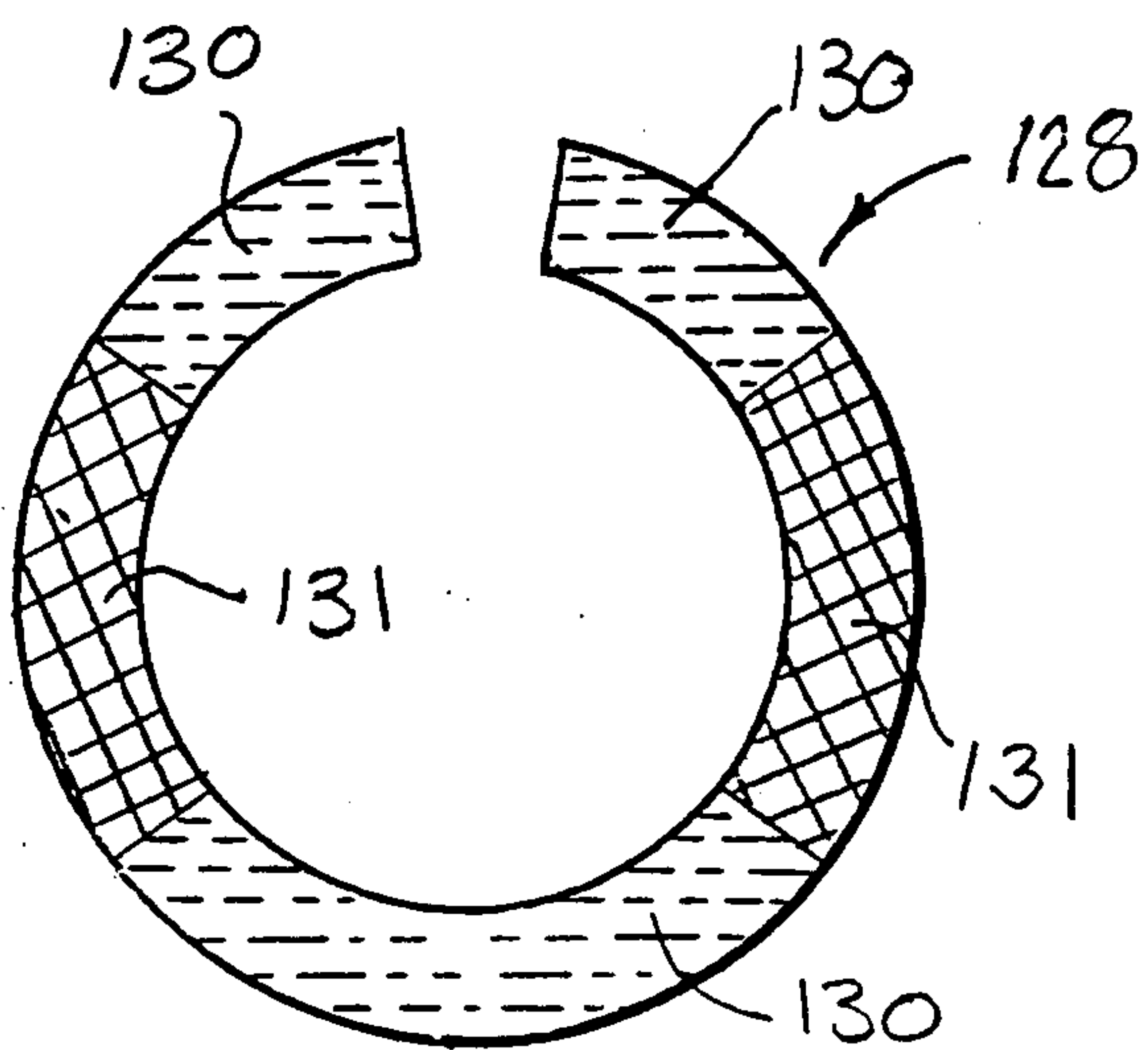


FIG. 20

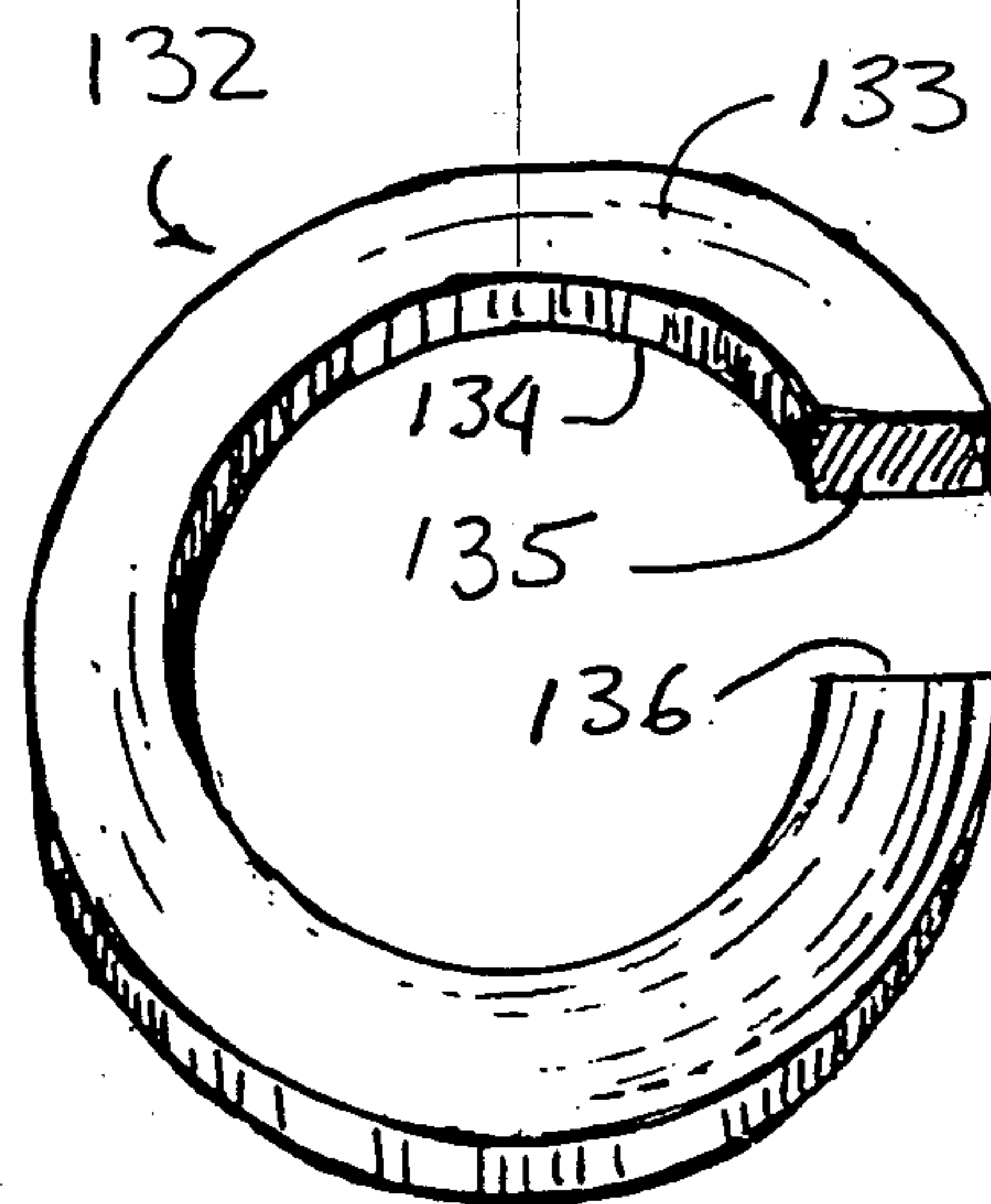


FIG. 21

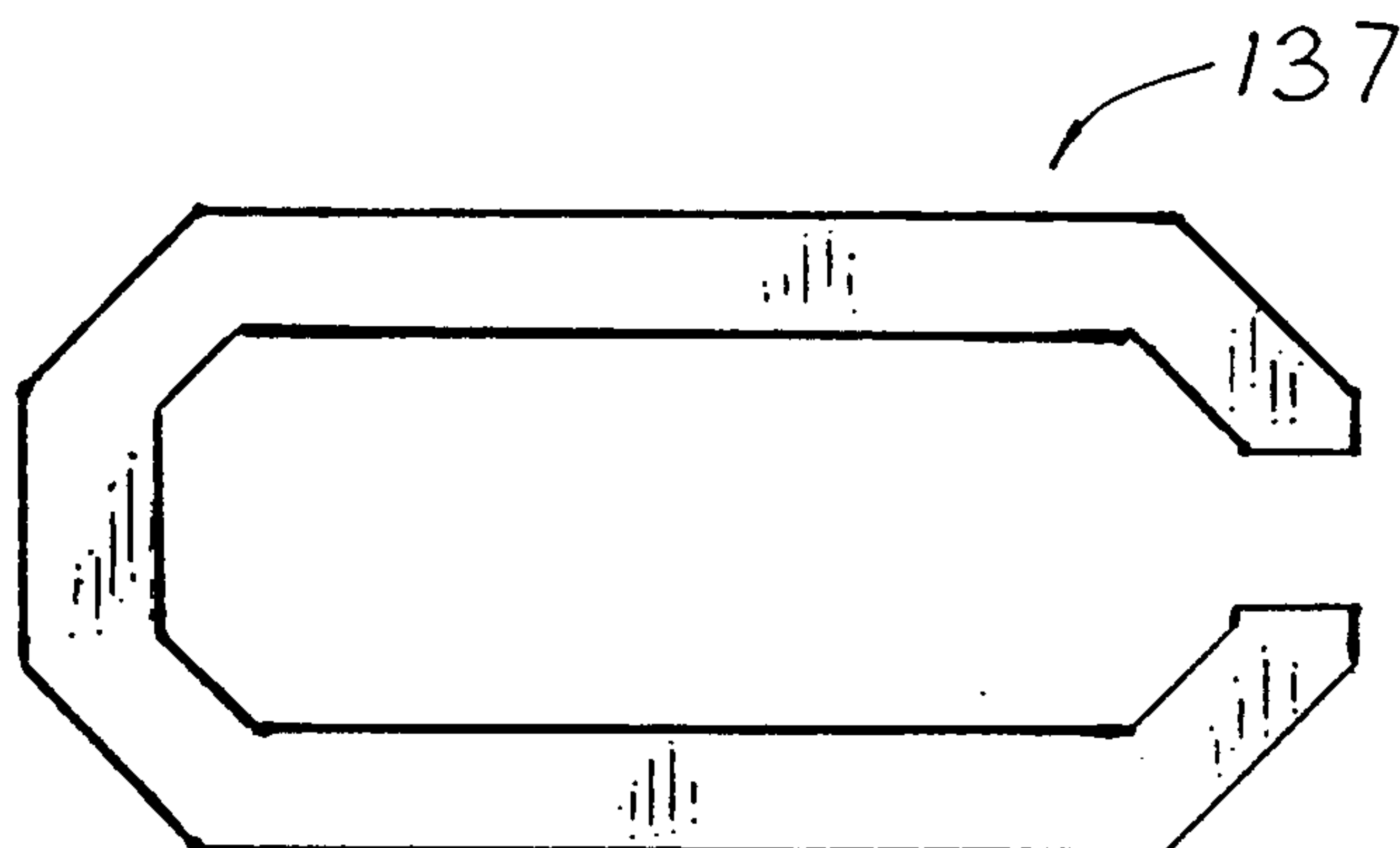


FIG. 22

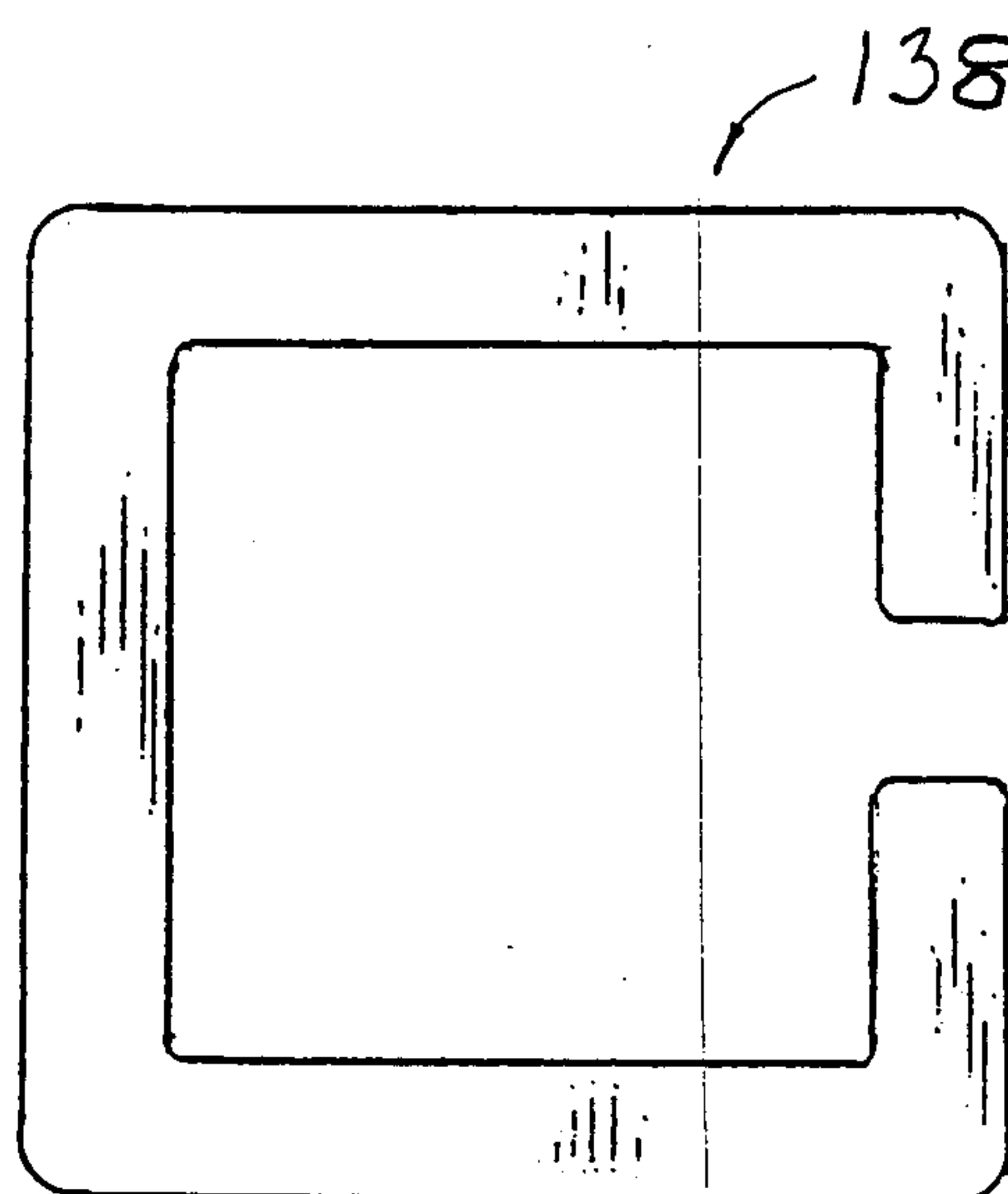


FIG. 23

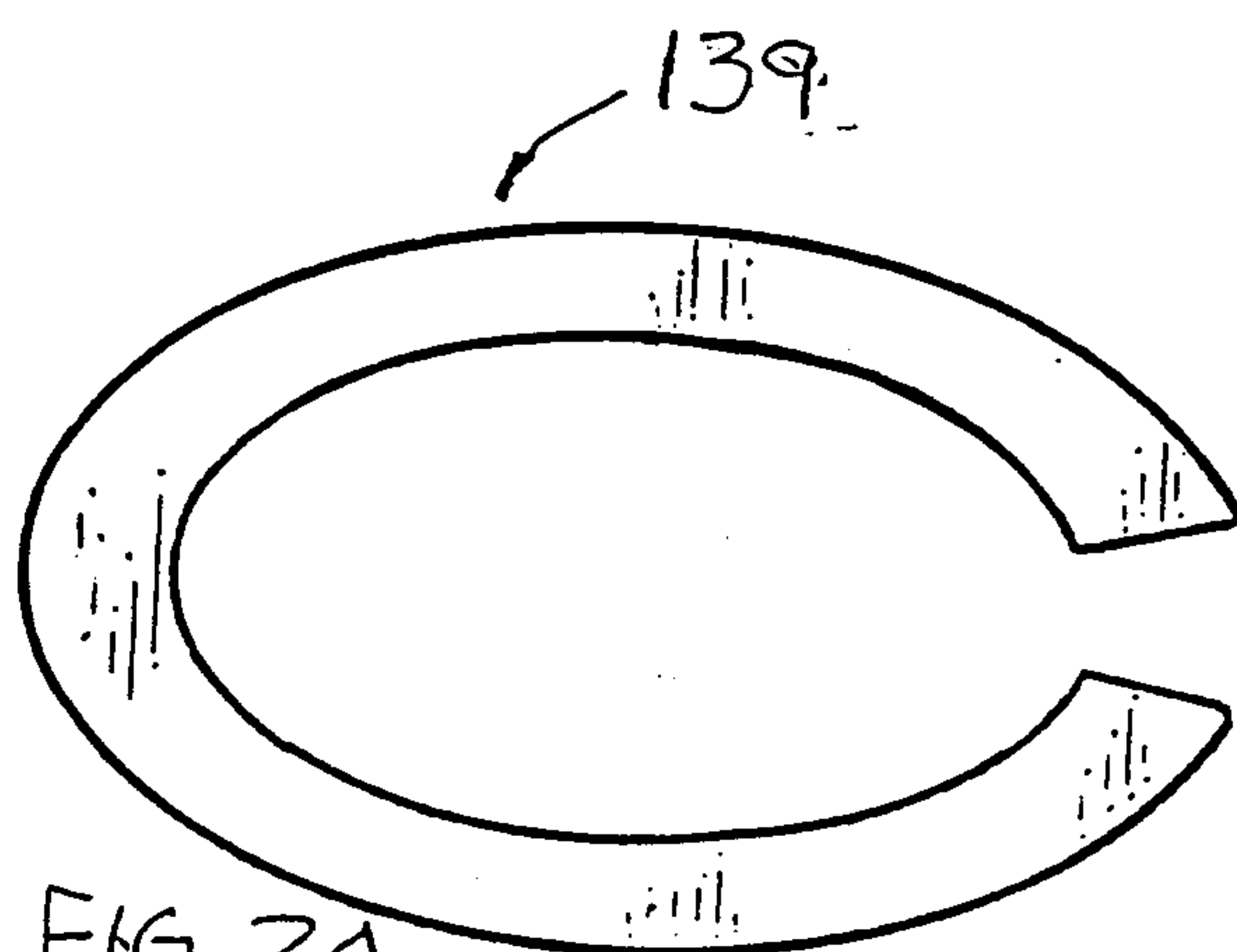


FIG. 24

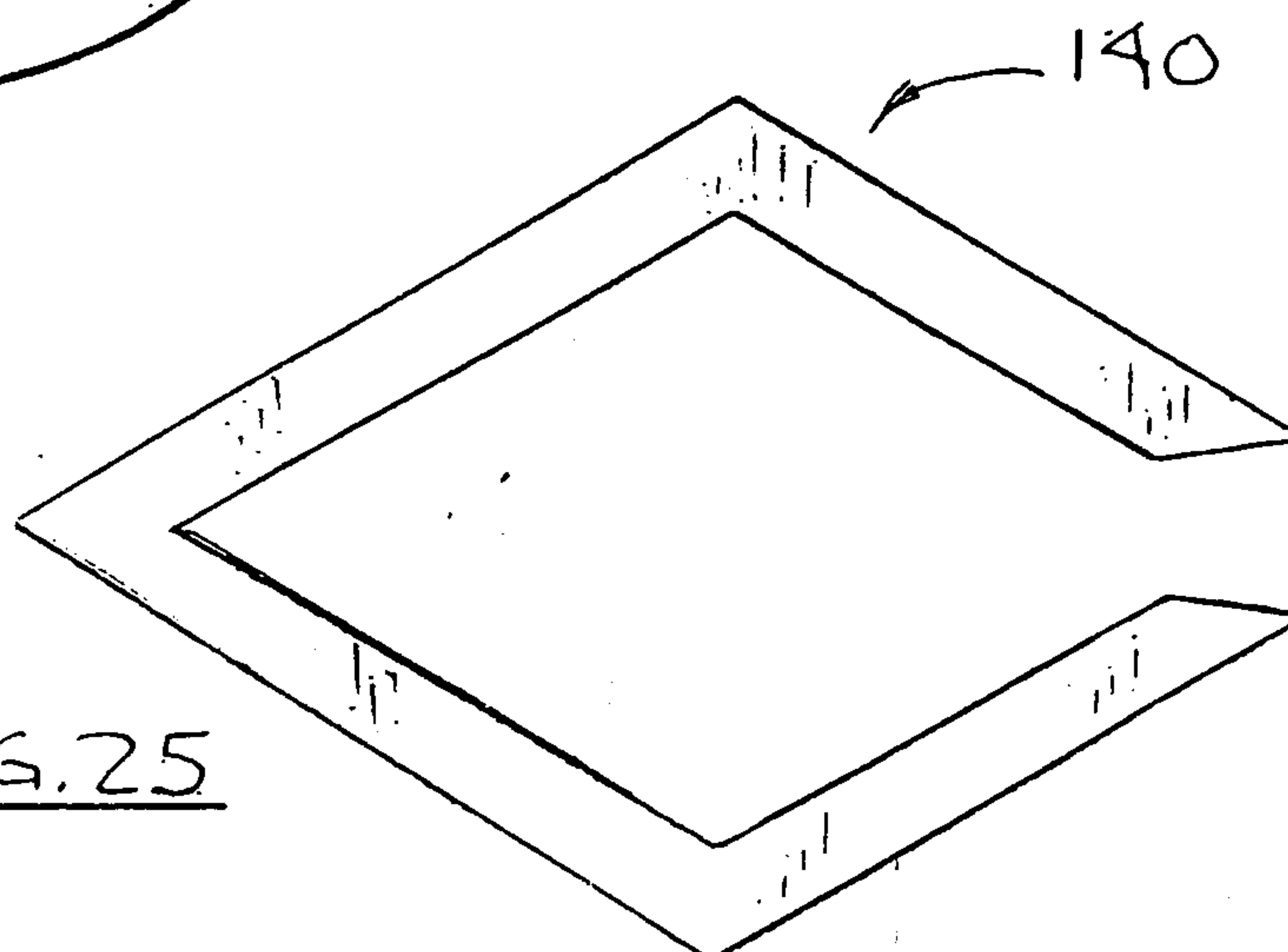


FIG. 25

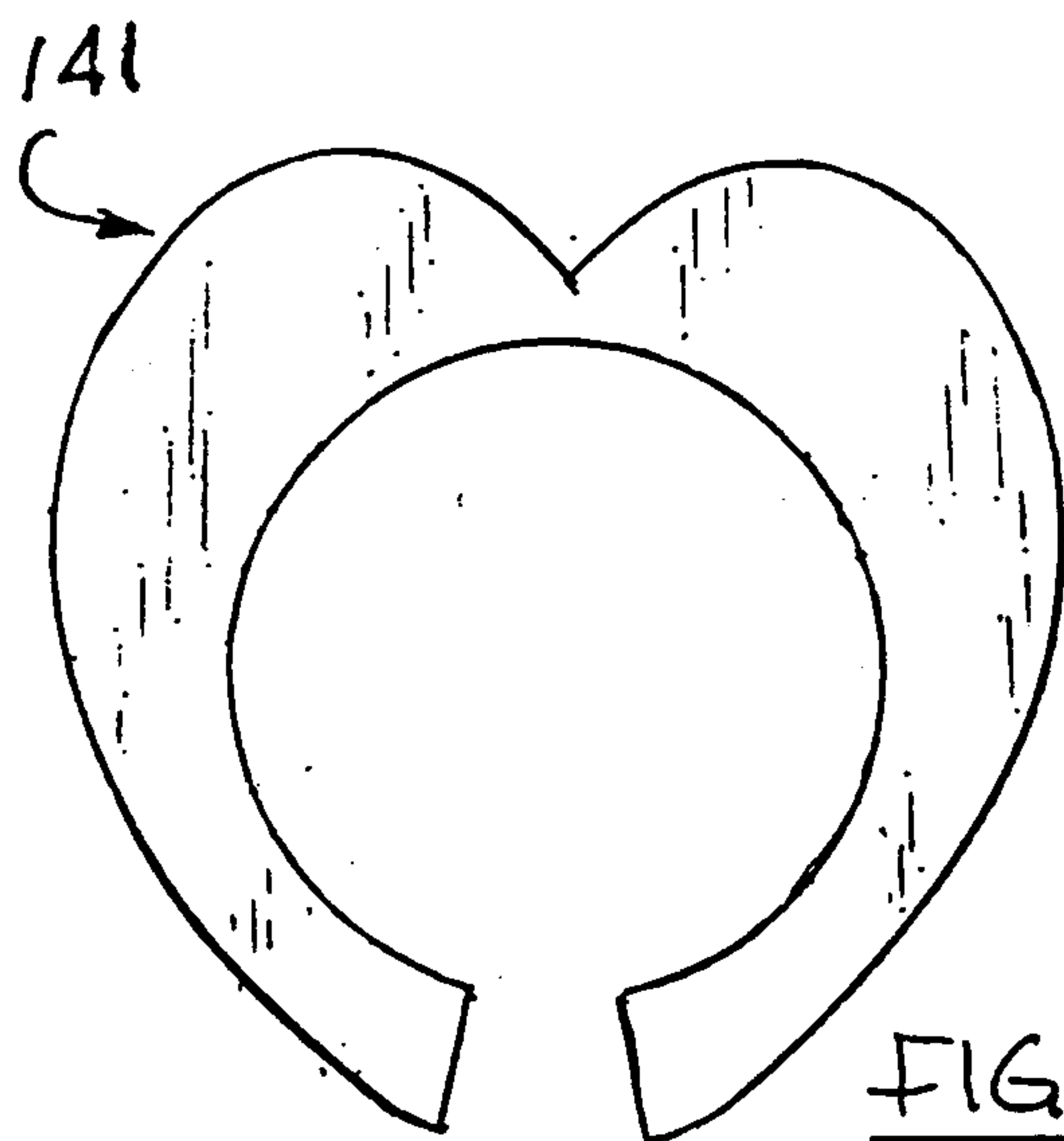


FIG 26

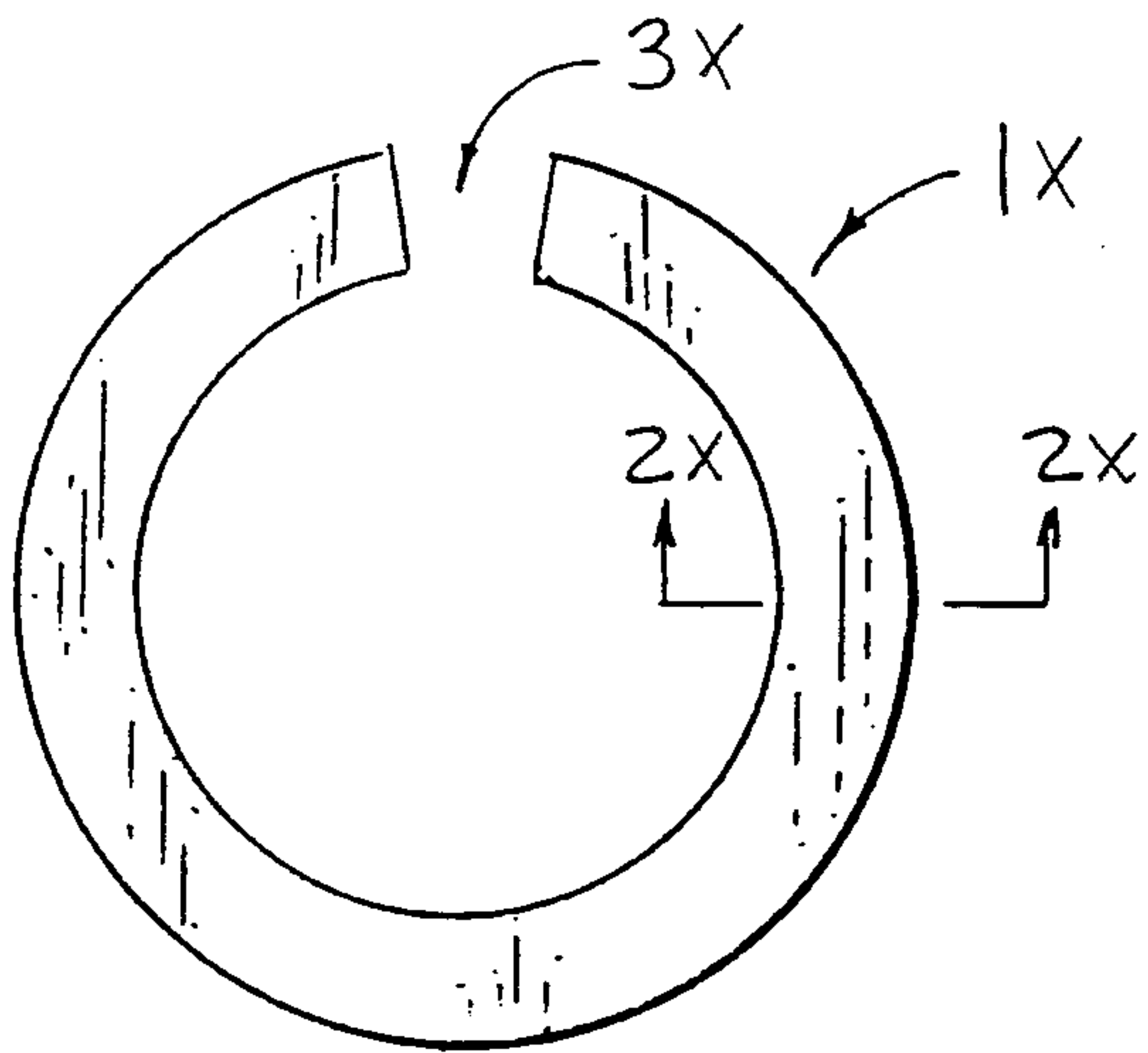


FIG. 1X
(PRIOR ART)

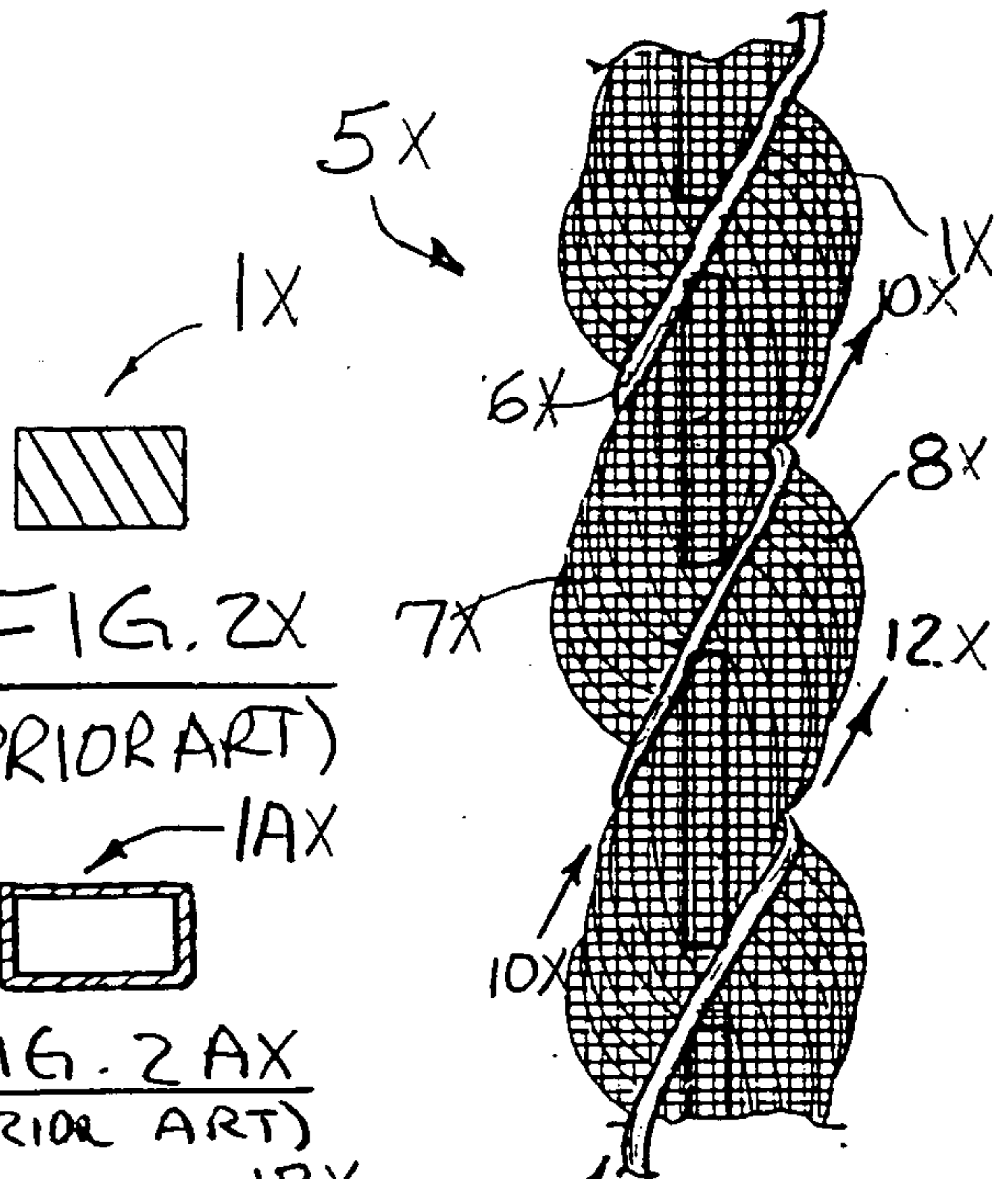


FIG. 2X
(PRIOR ART)

FIG. 2AX
(PRIOR ART)

FIG. 2BX
(PRIOR ART)

FIG. 2CX

FIG. 3X
(PRIOR ART)

FIG. 2DX

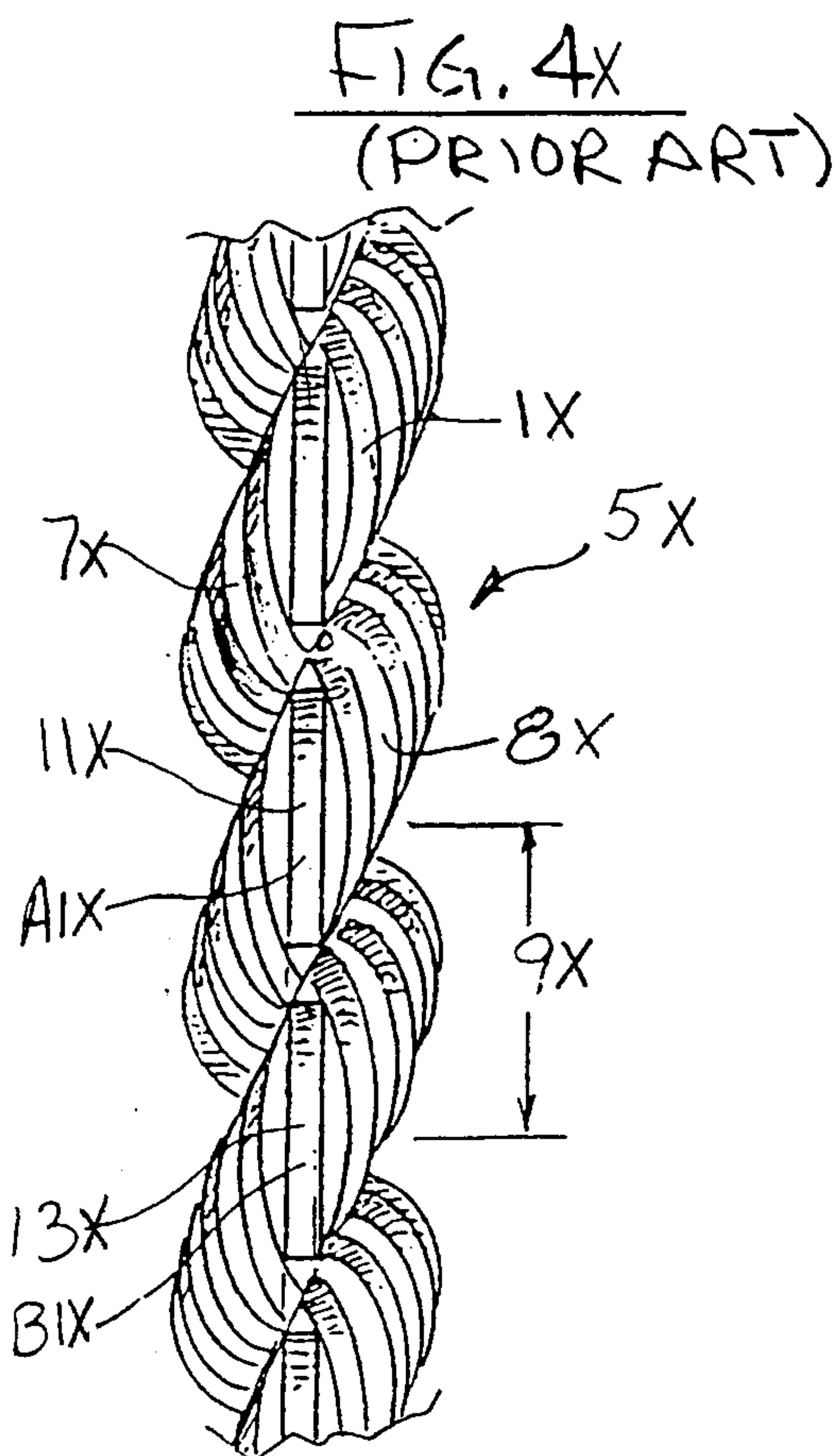


FIG. 4X
(PRIOR ART)

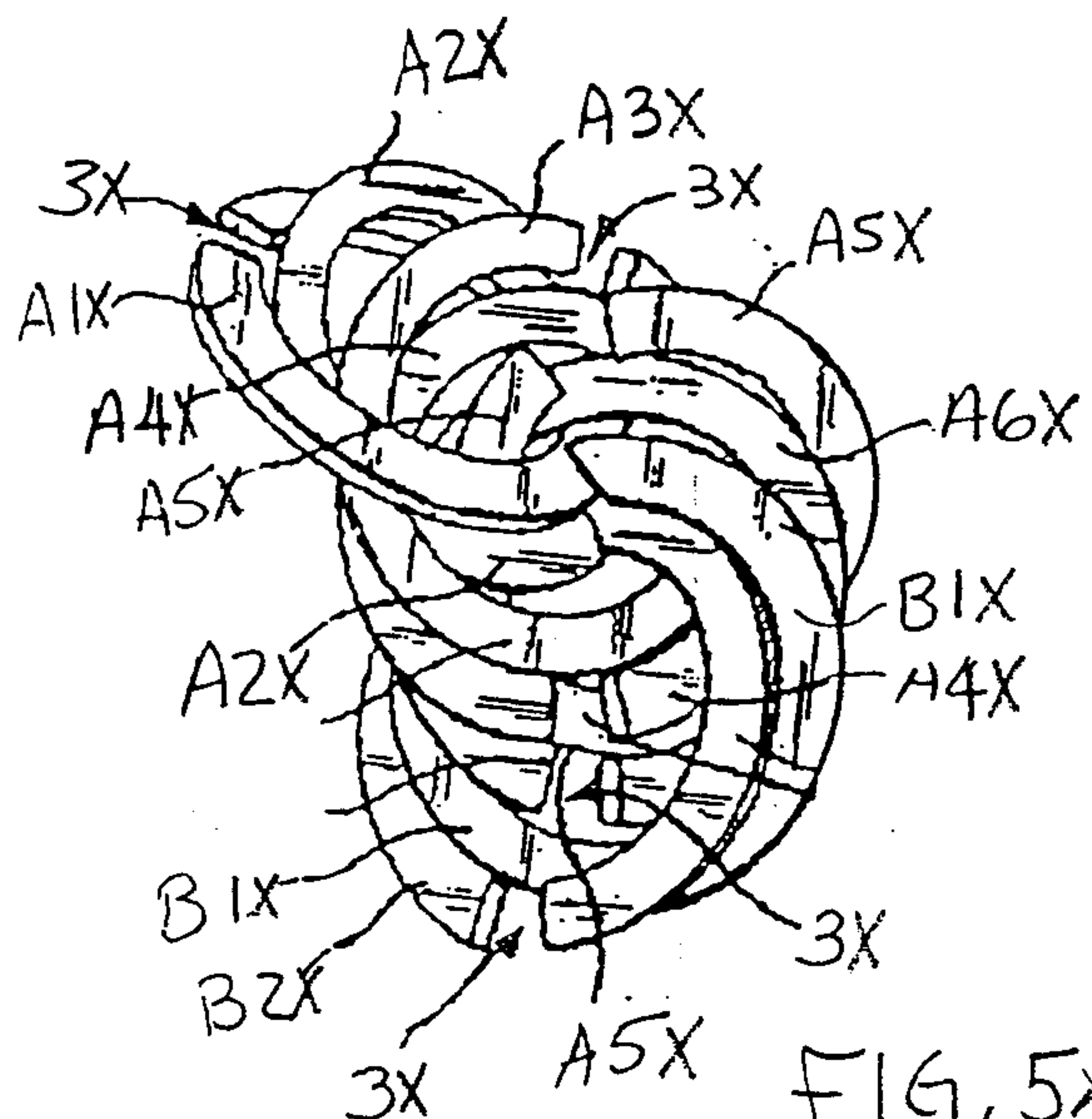


FIG. 5X
(PRIOR ART)

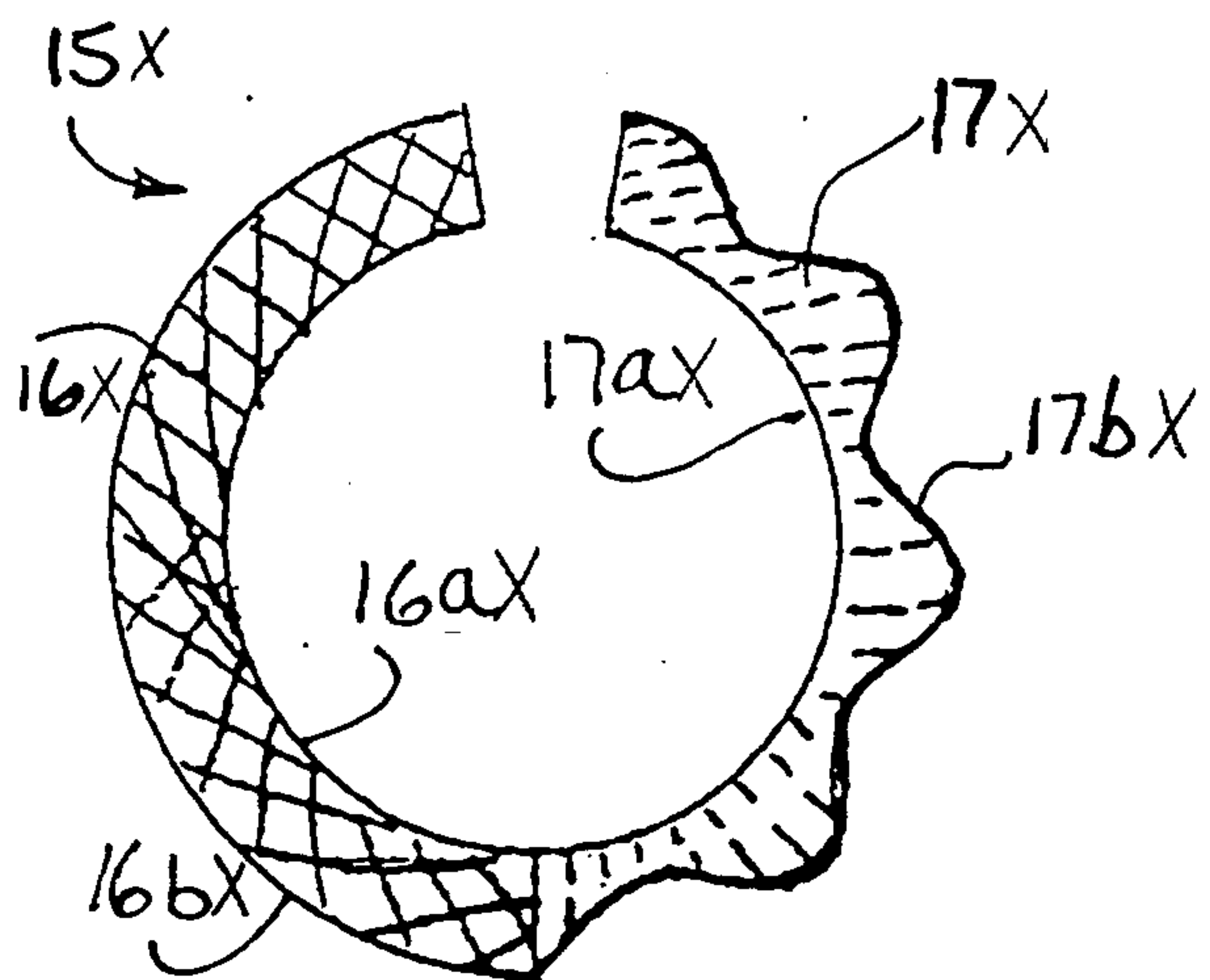


FIG. 6X

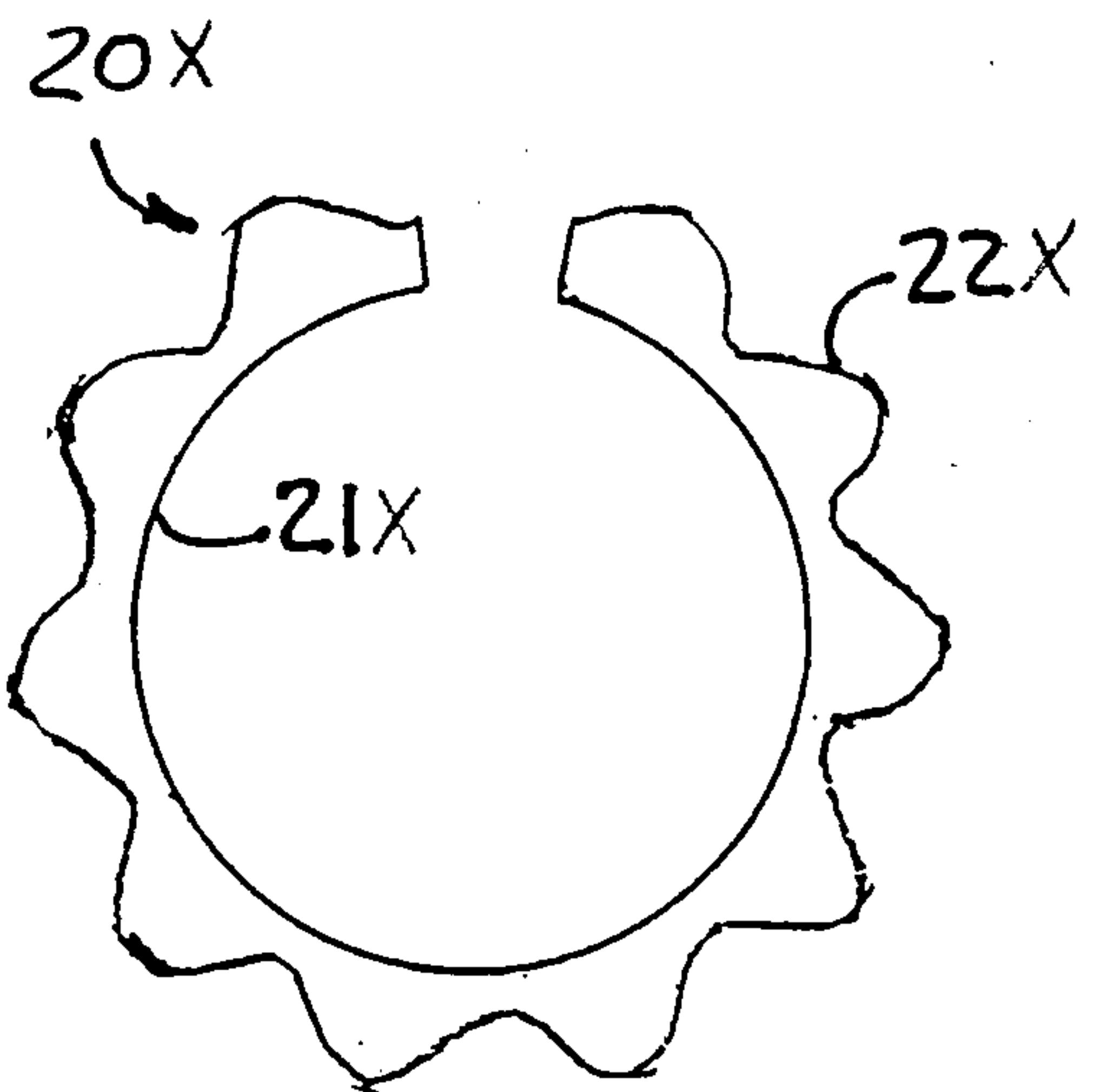


FIG. 7X

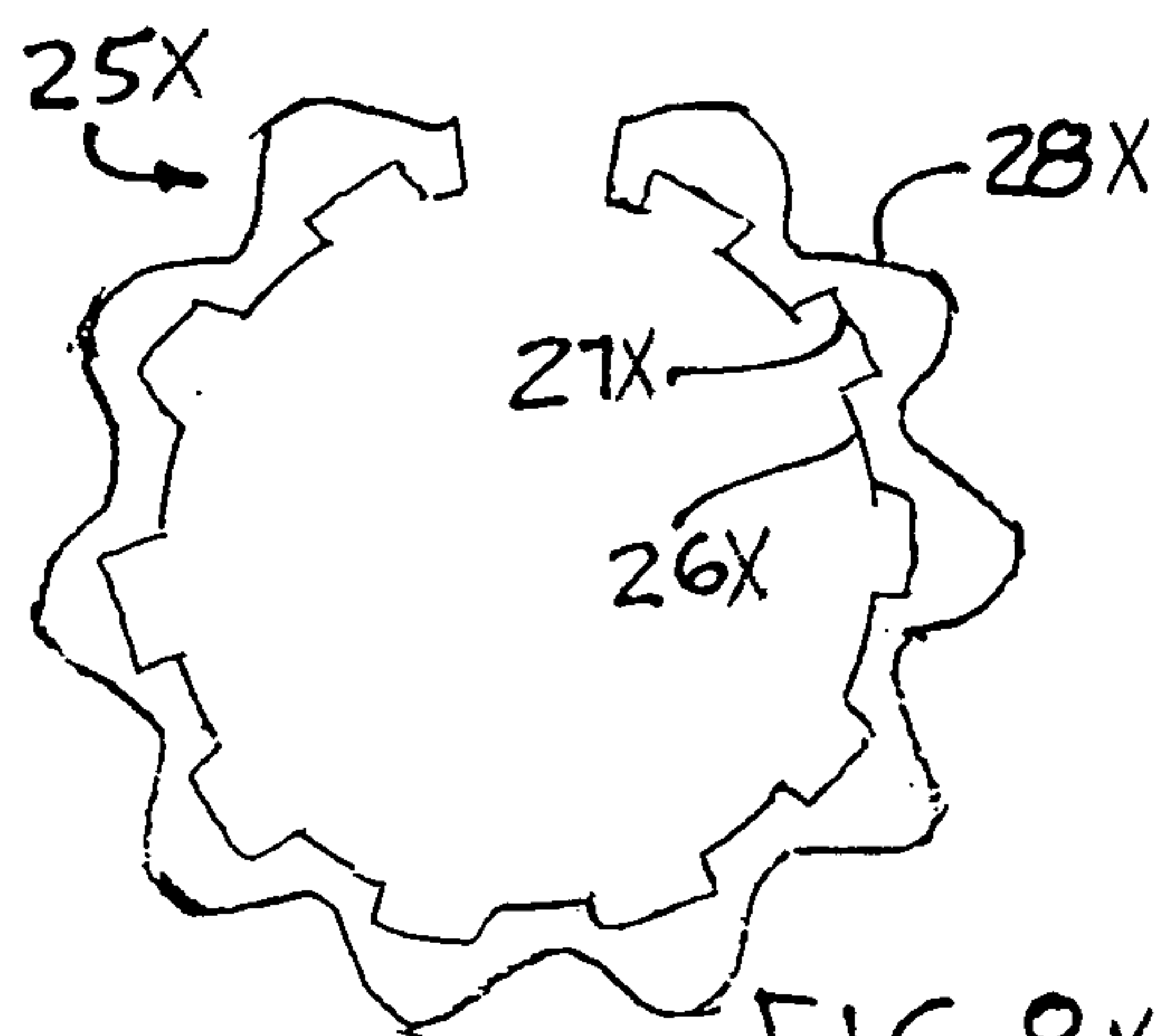


FIG. 8X

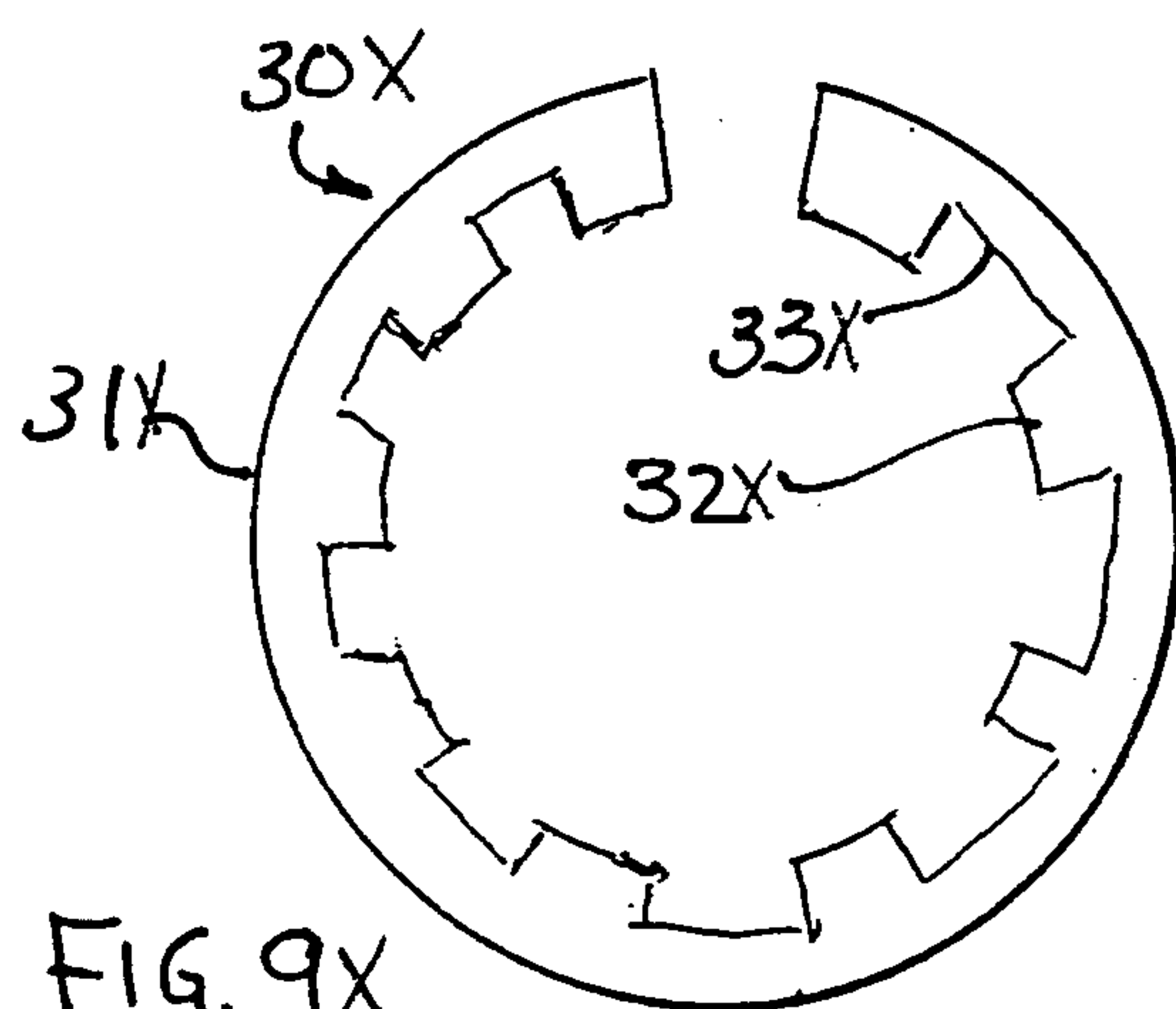


FIG. 9X

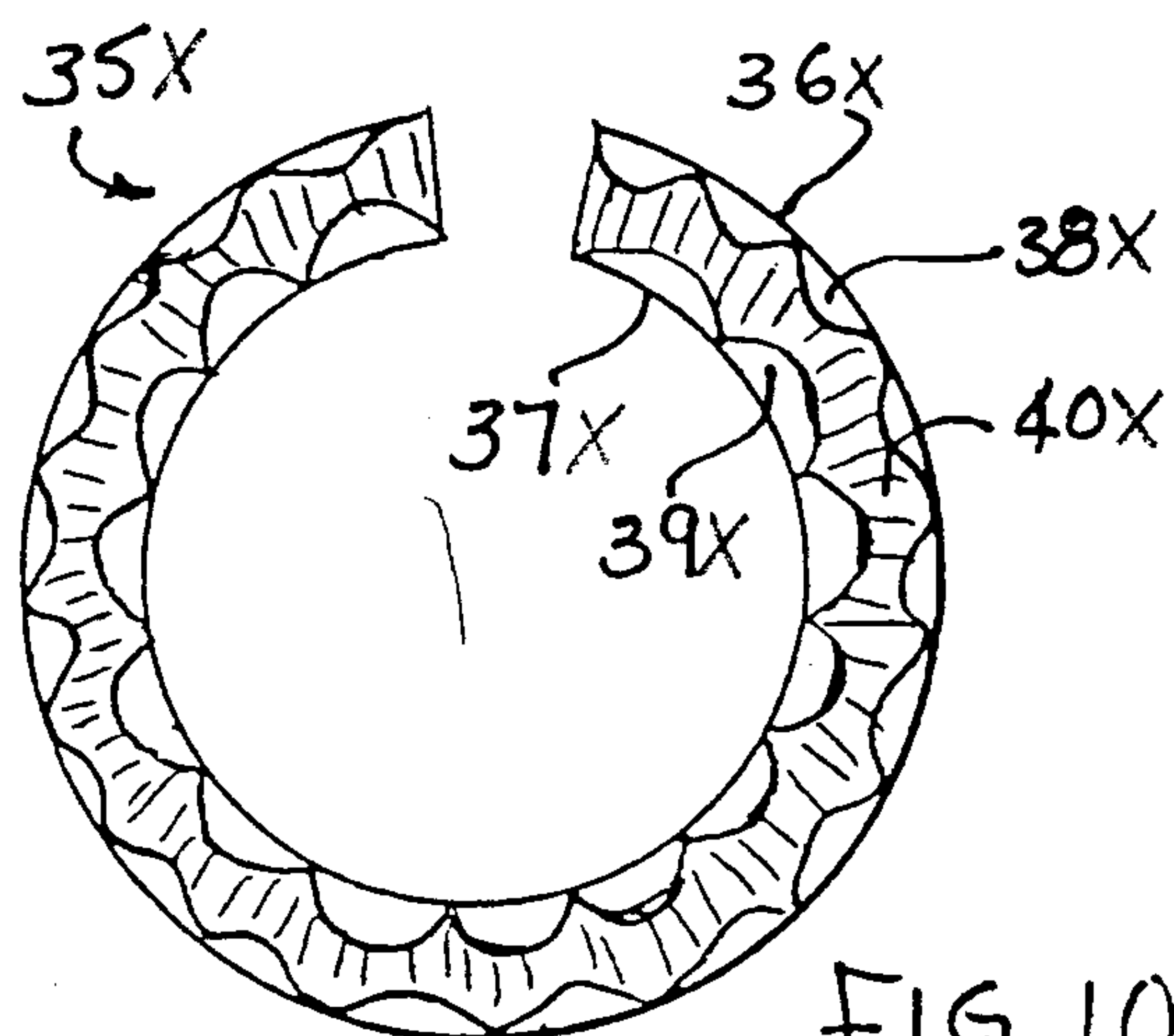


FIG. 10X

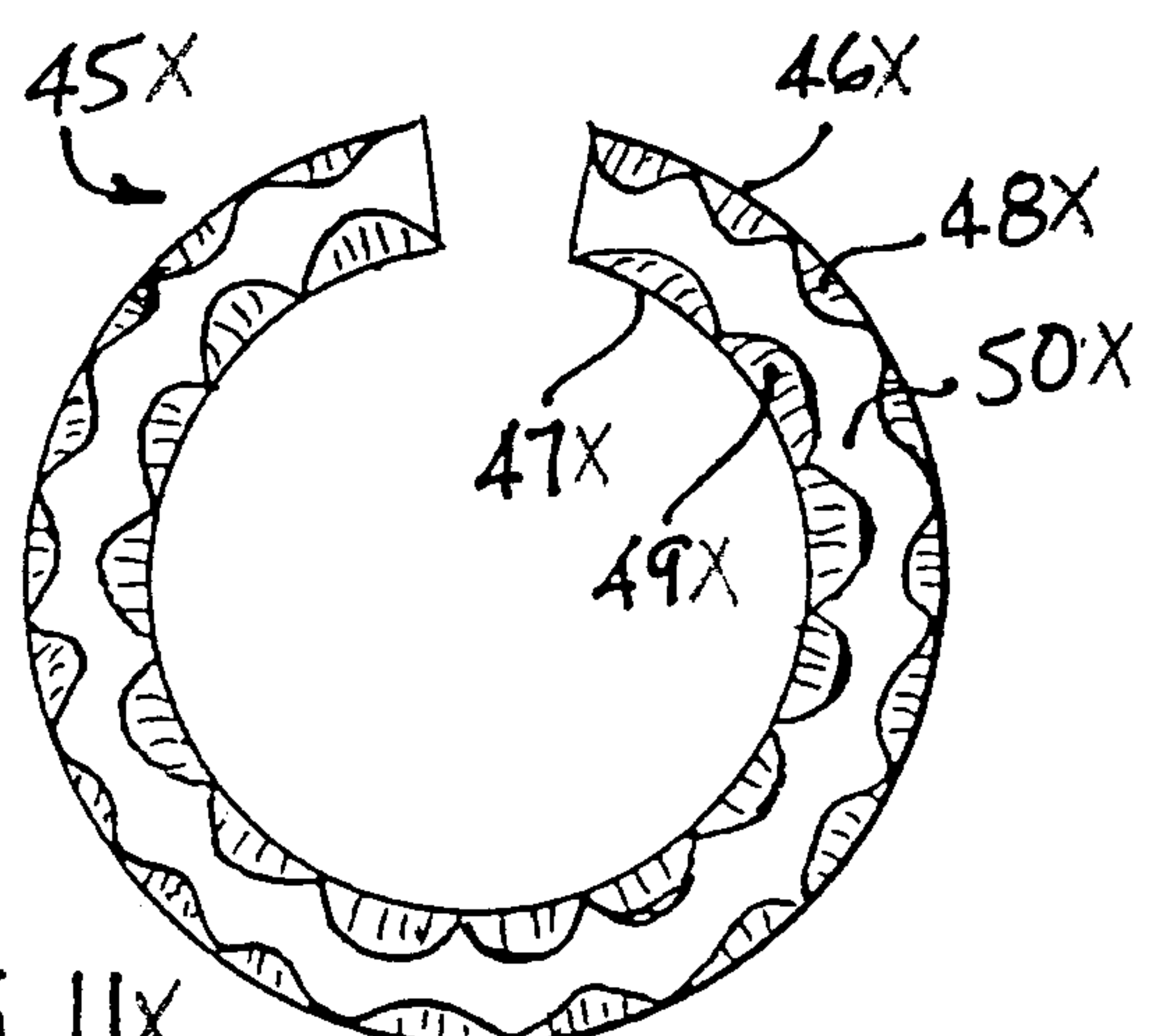
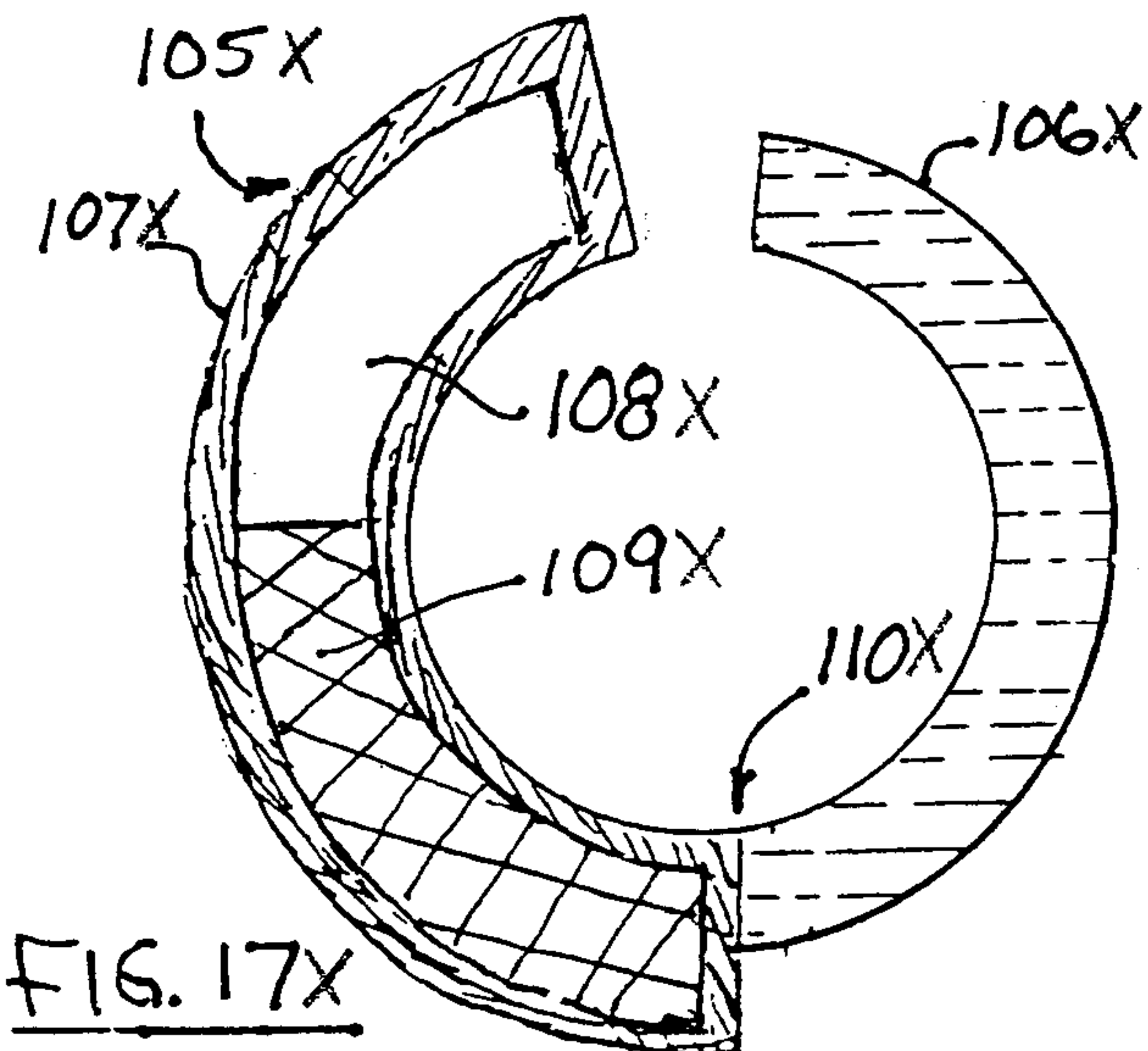
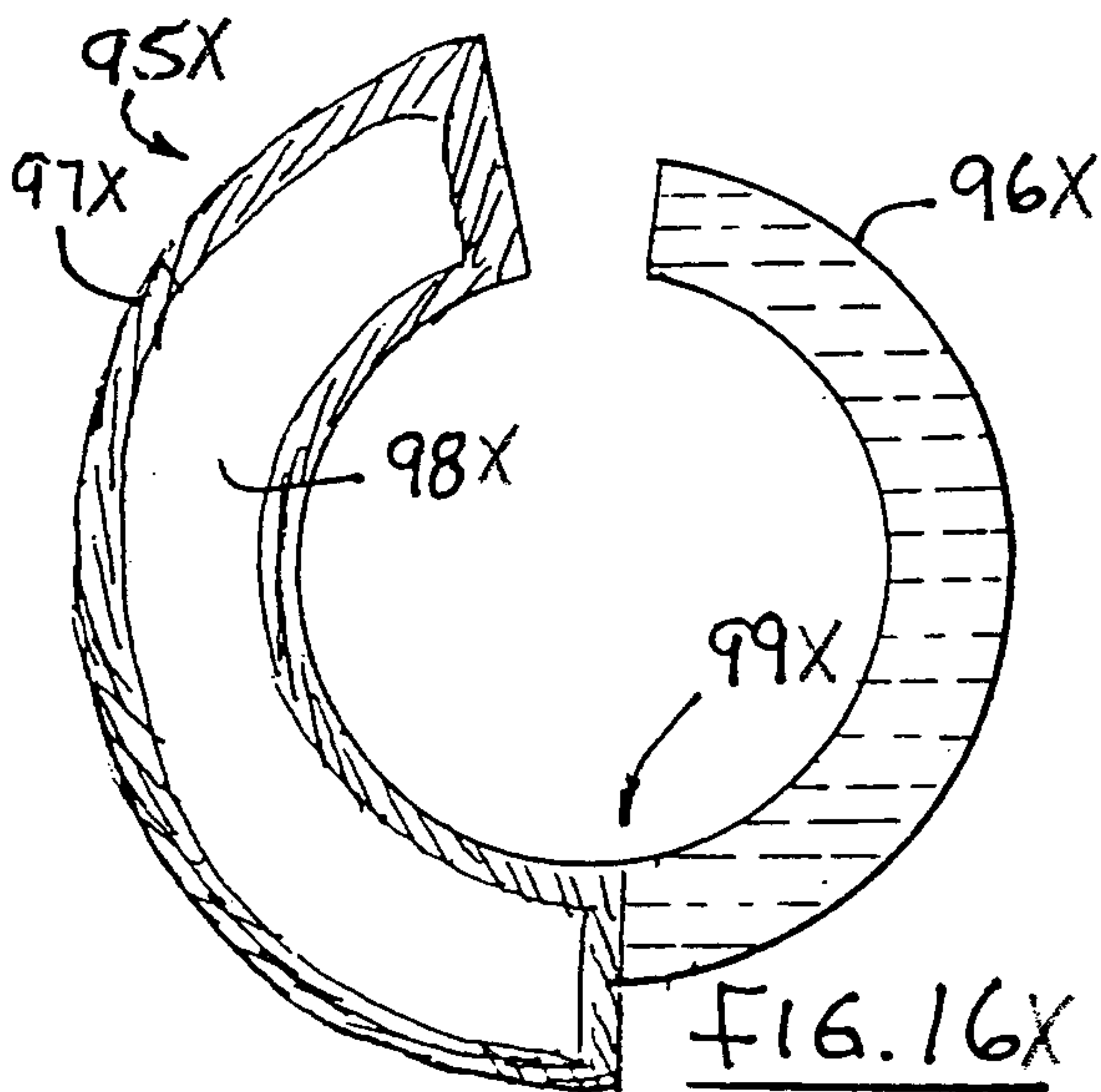
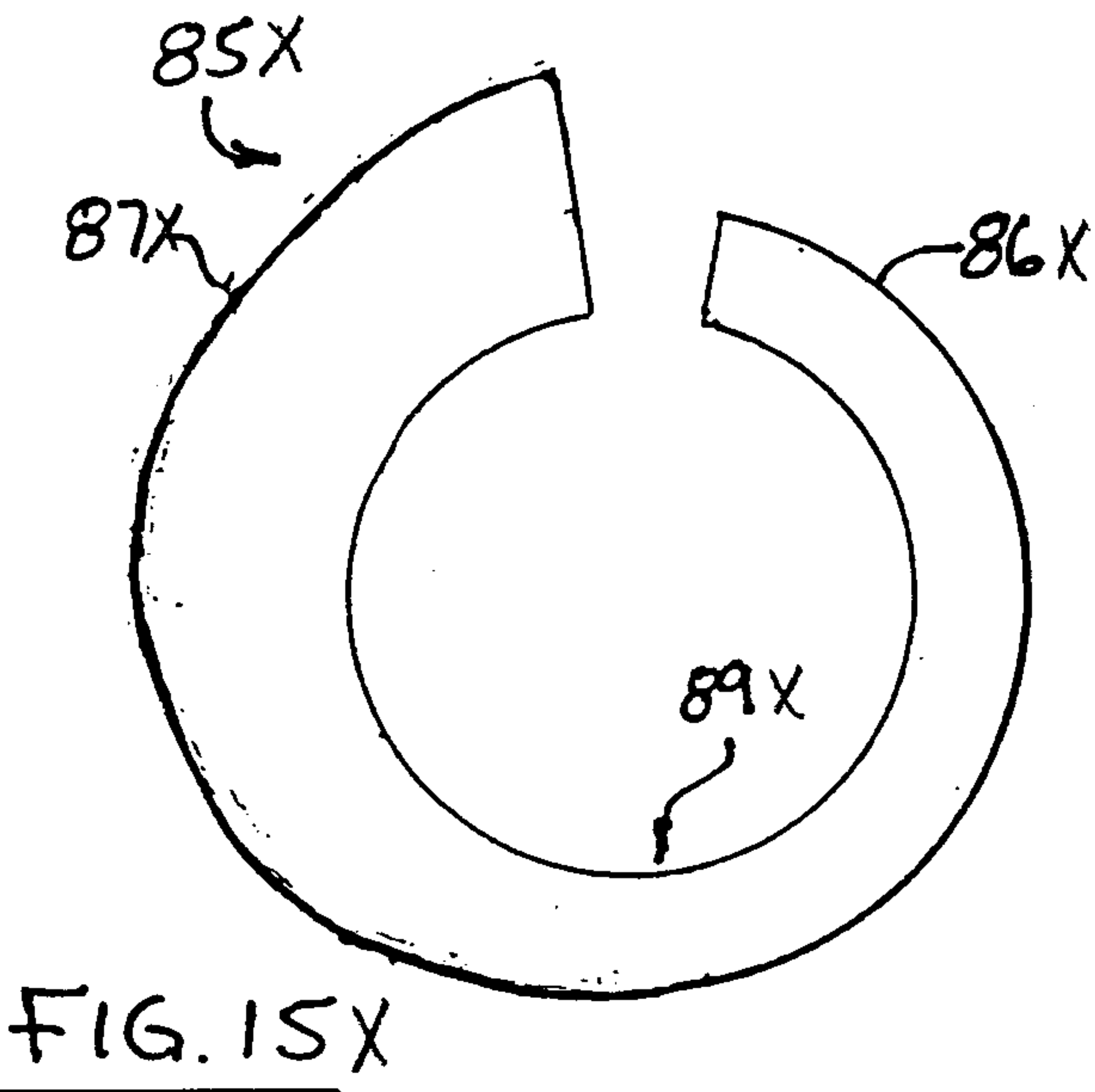
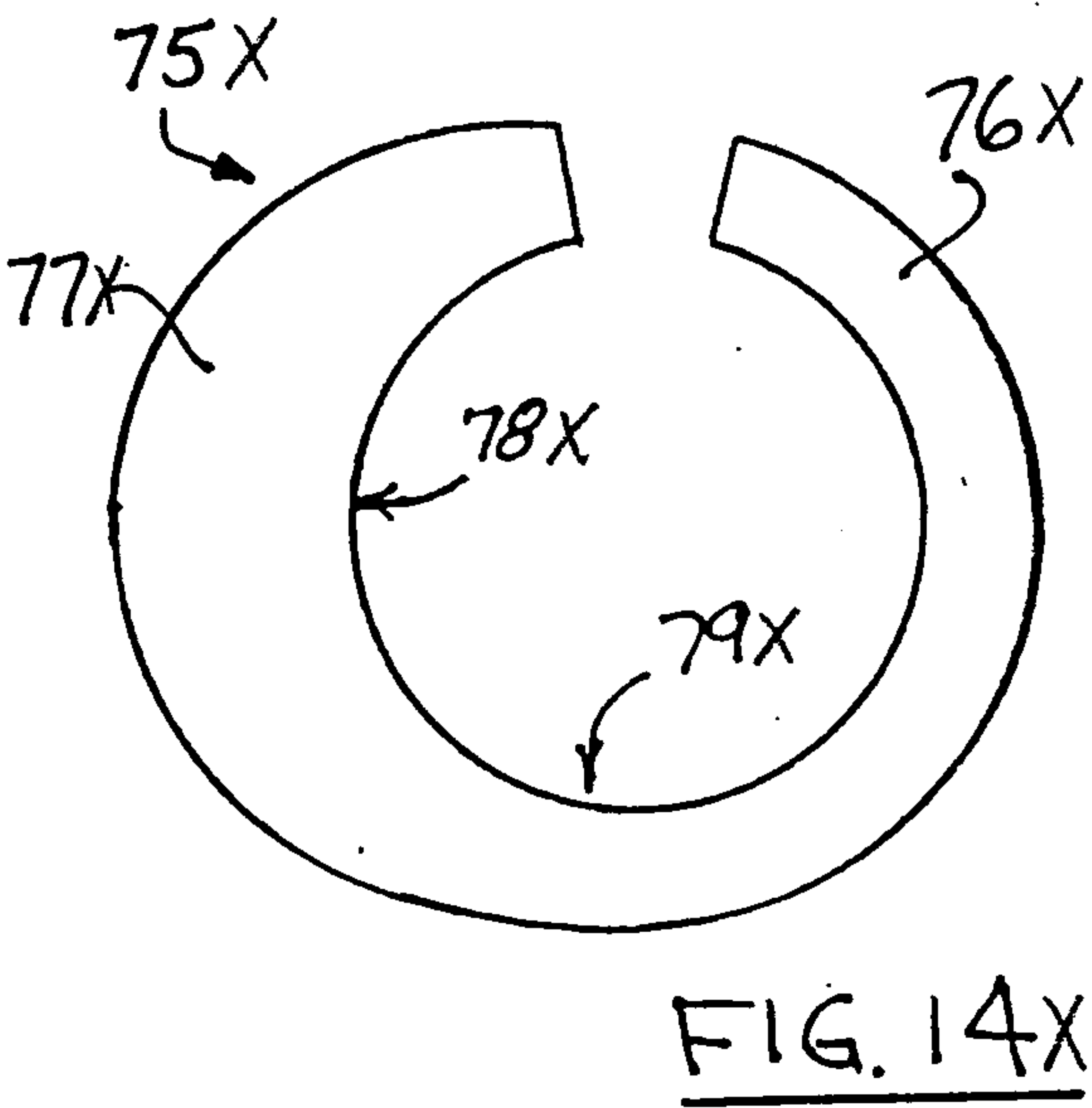
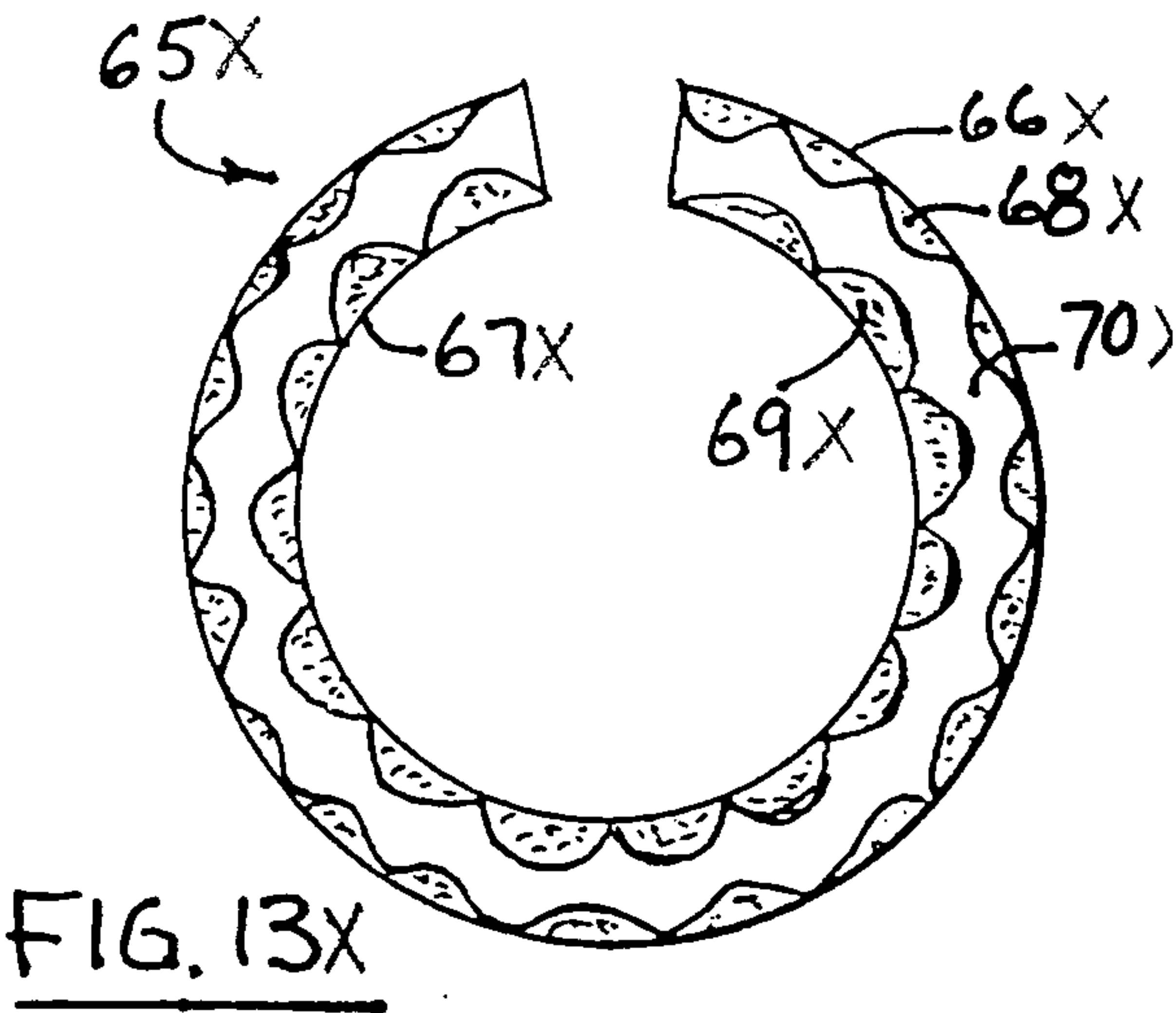
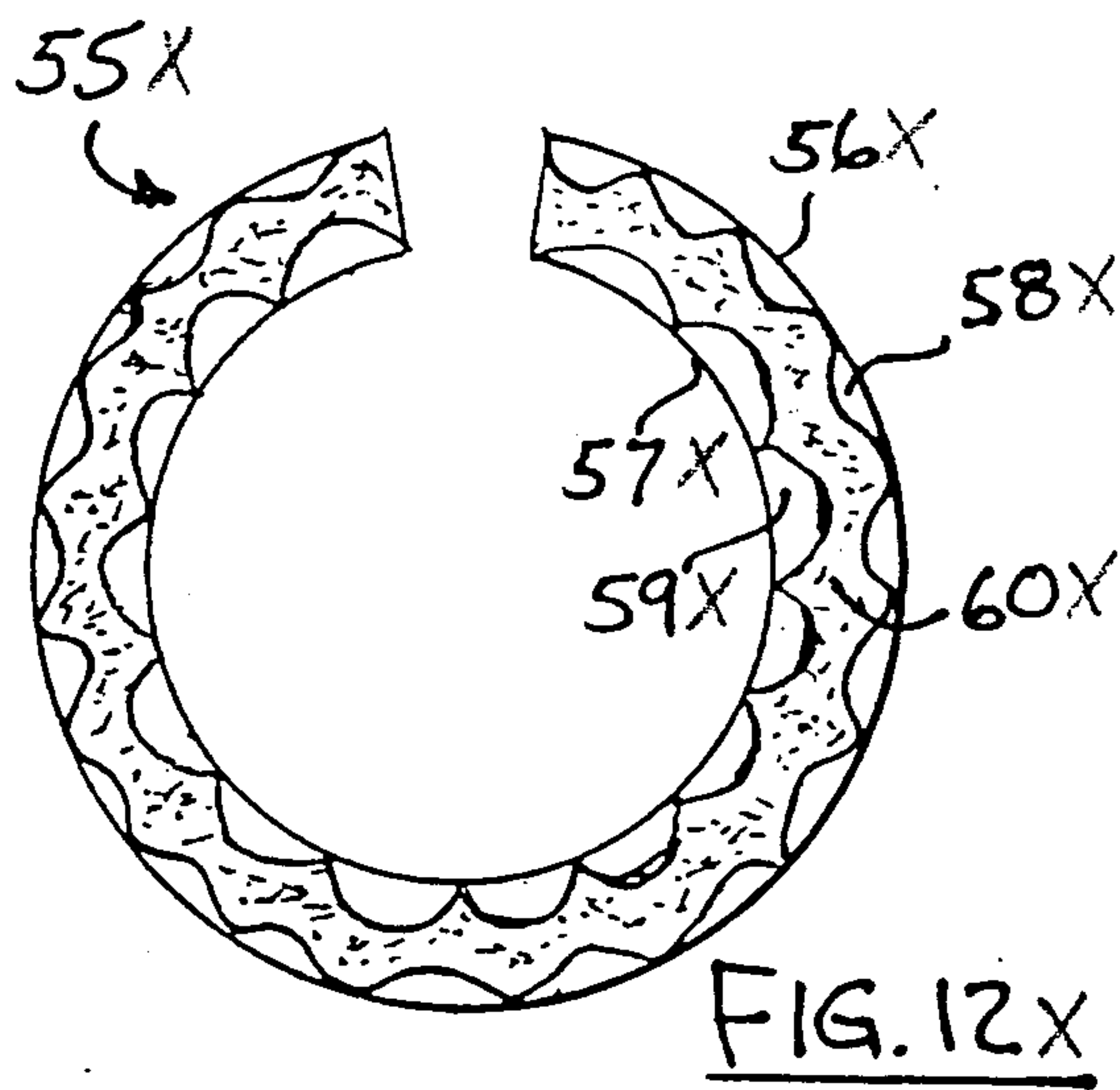


FIG. 11X



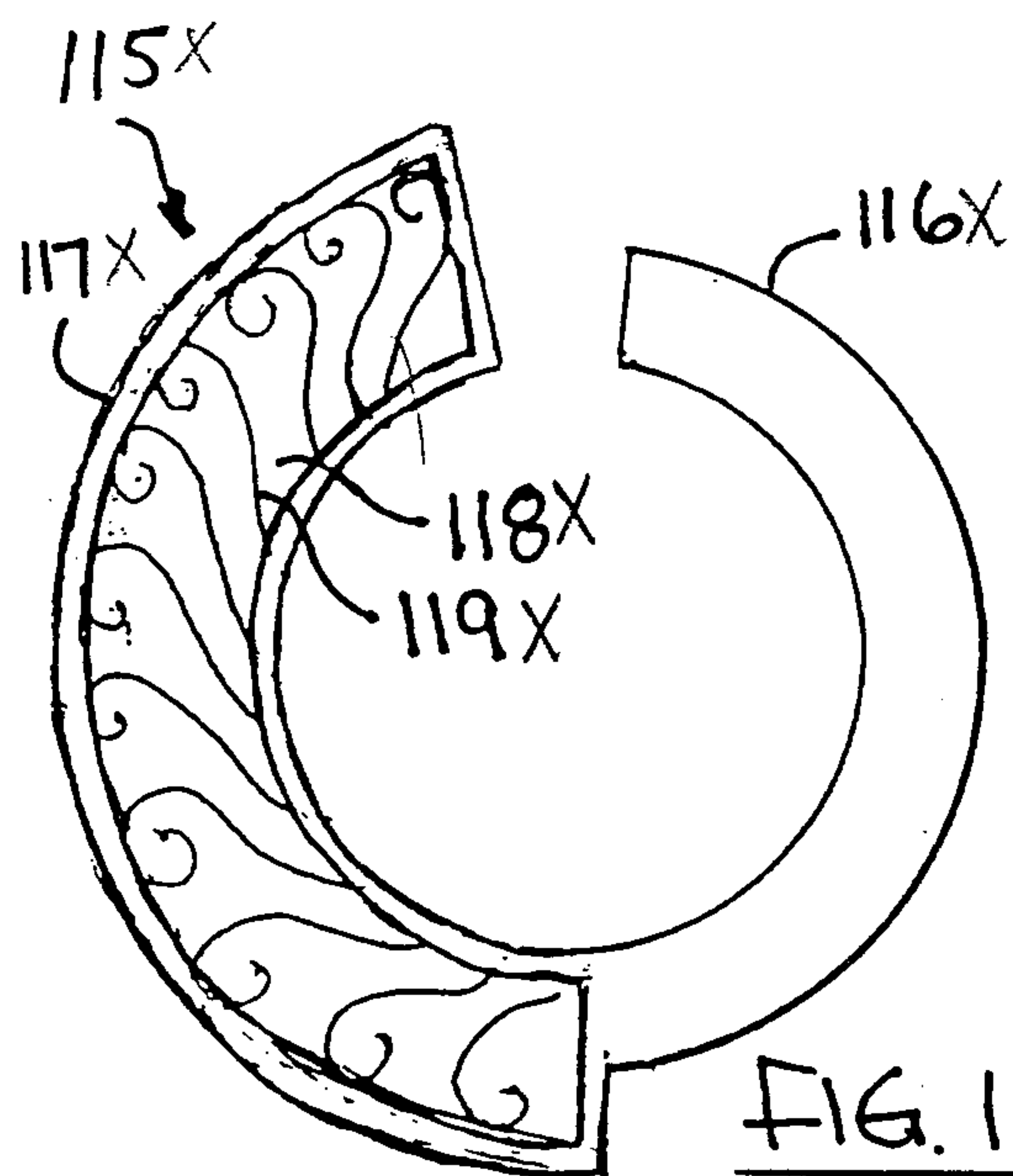


FIG. 18X

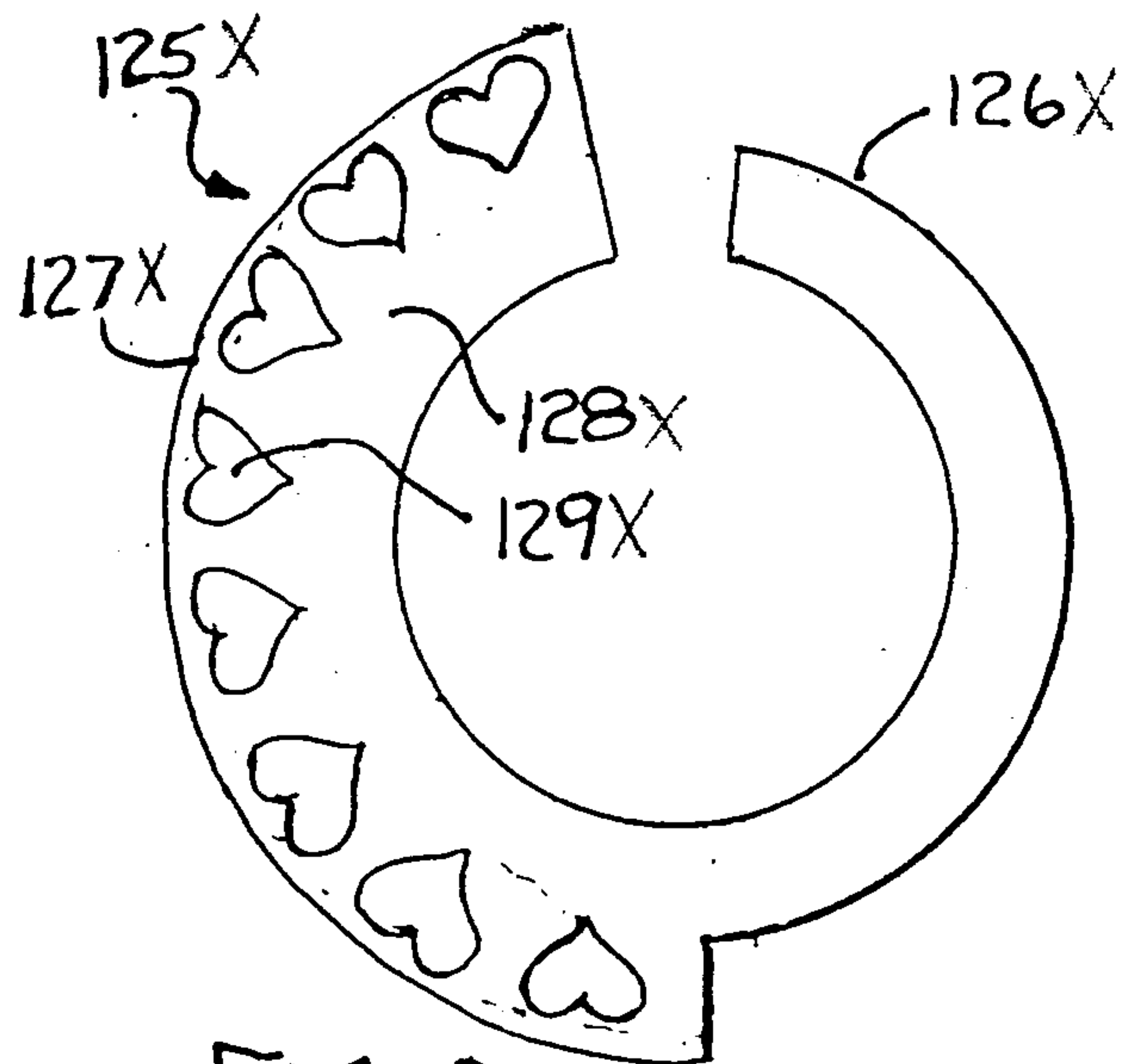


FIG. 19X

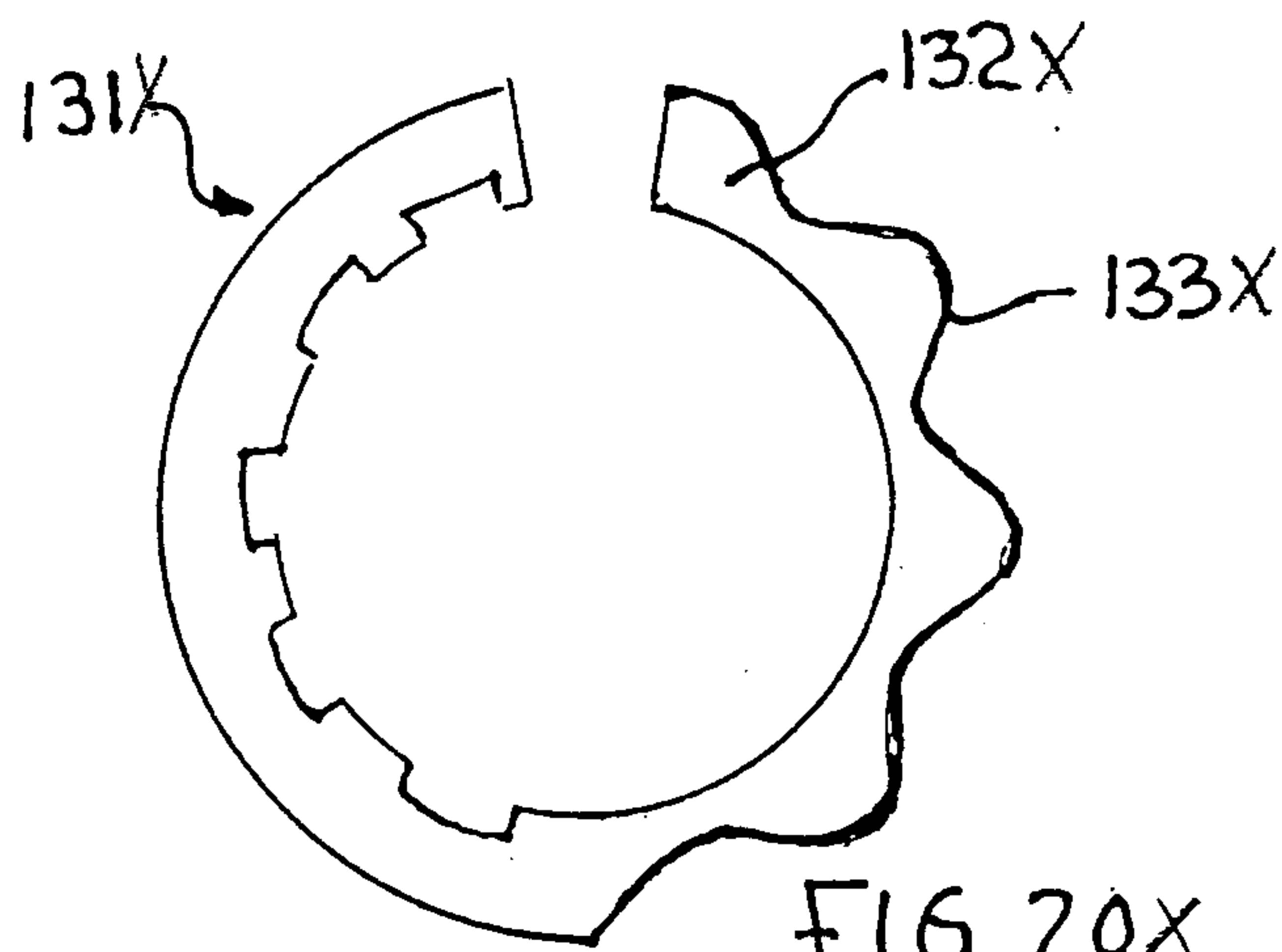


FIG. 20X

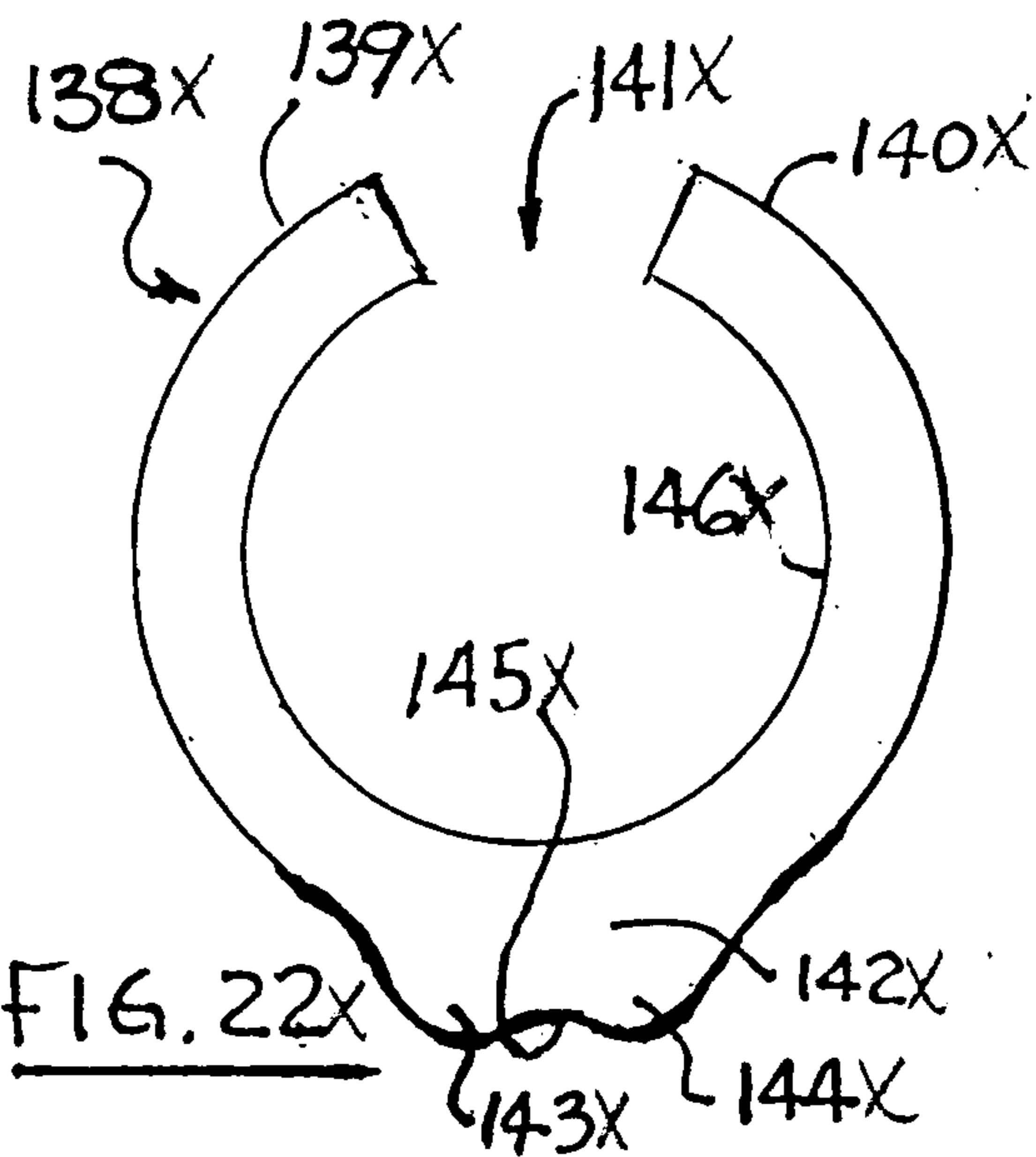


FIG. 22X

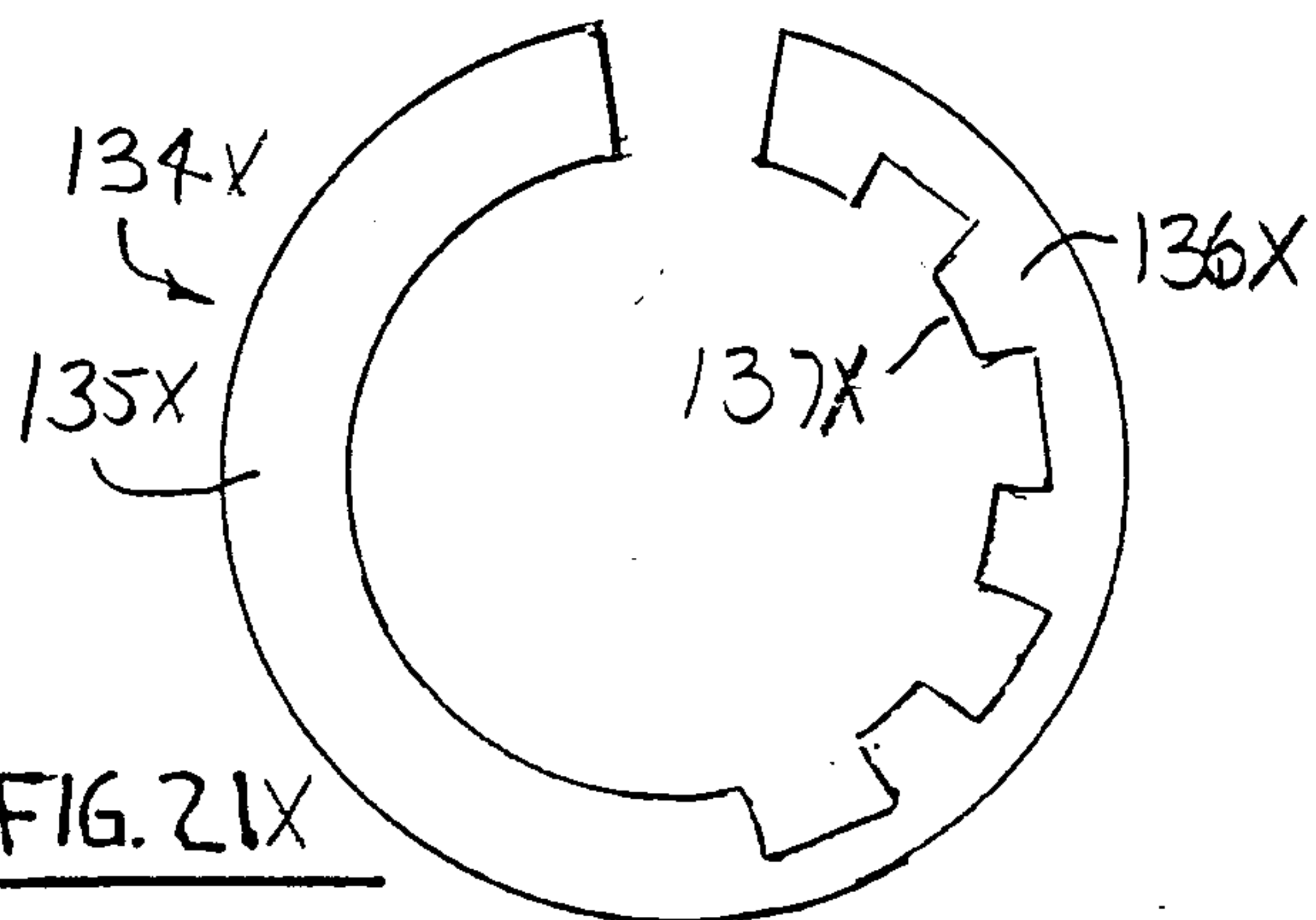


FIG. 21X

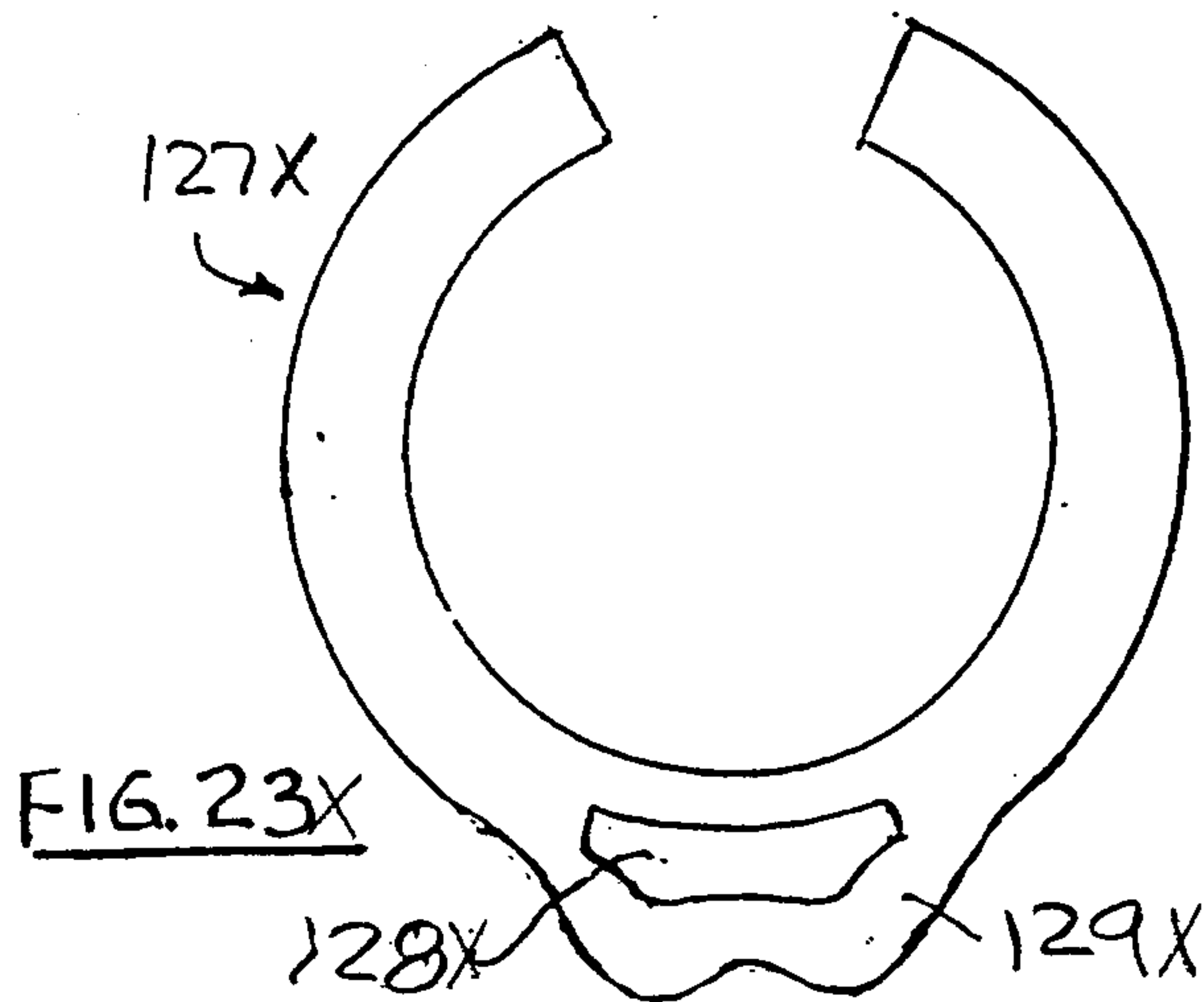


FIG. 23X

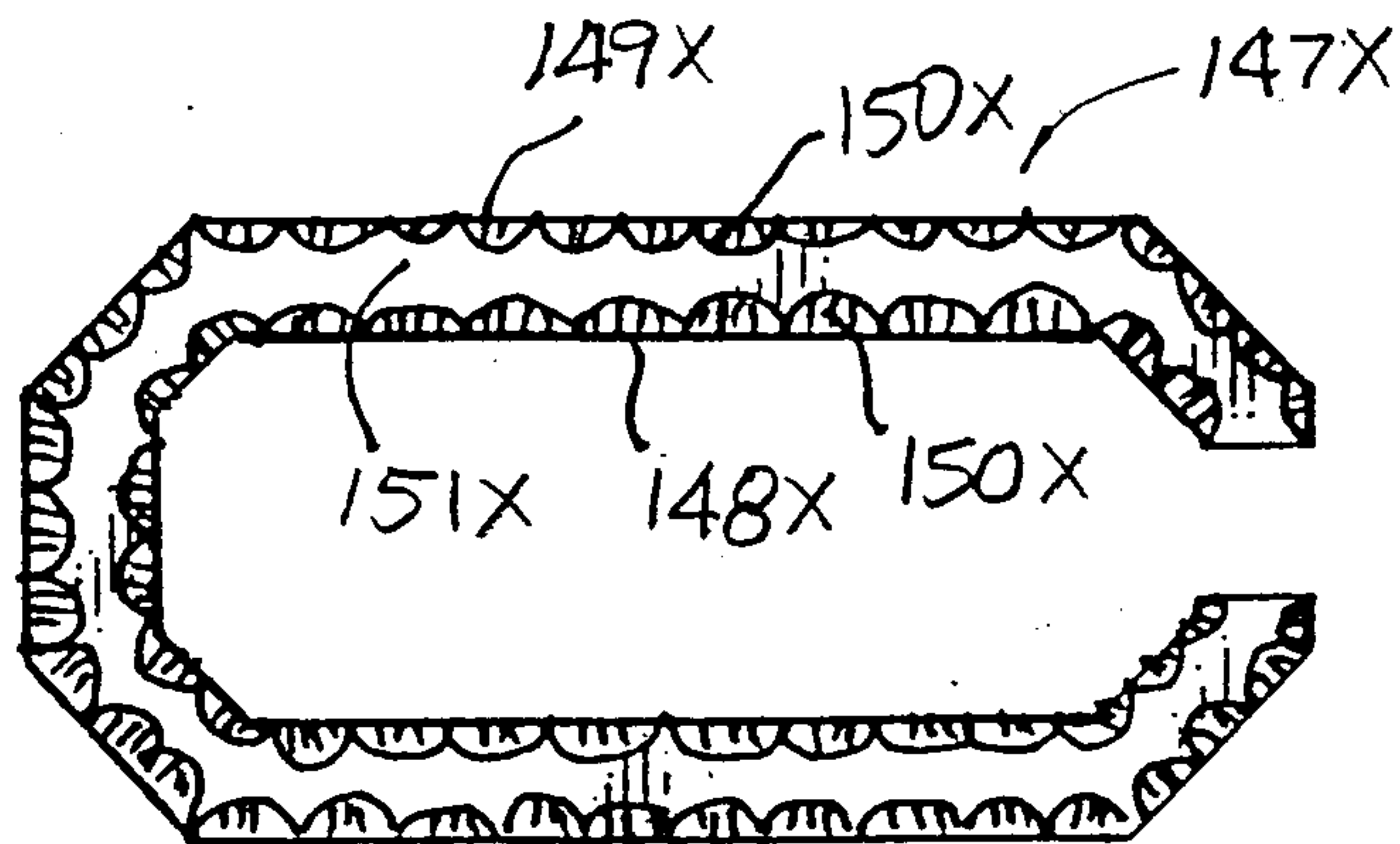


FIG. 24X

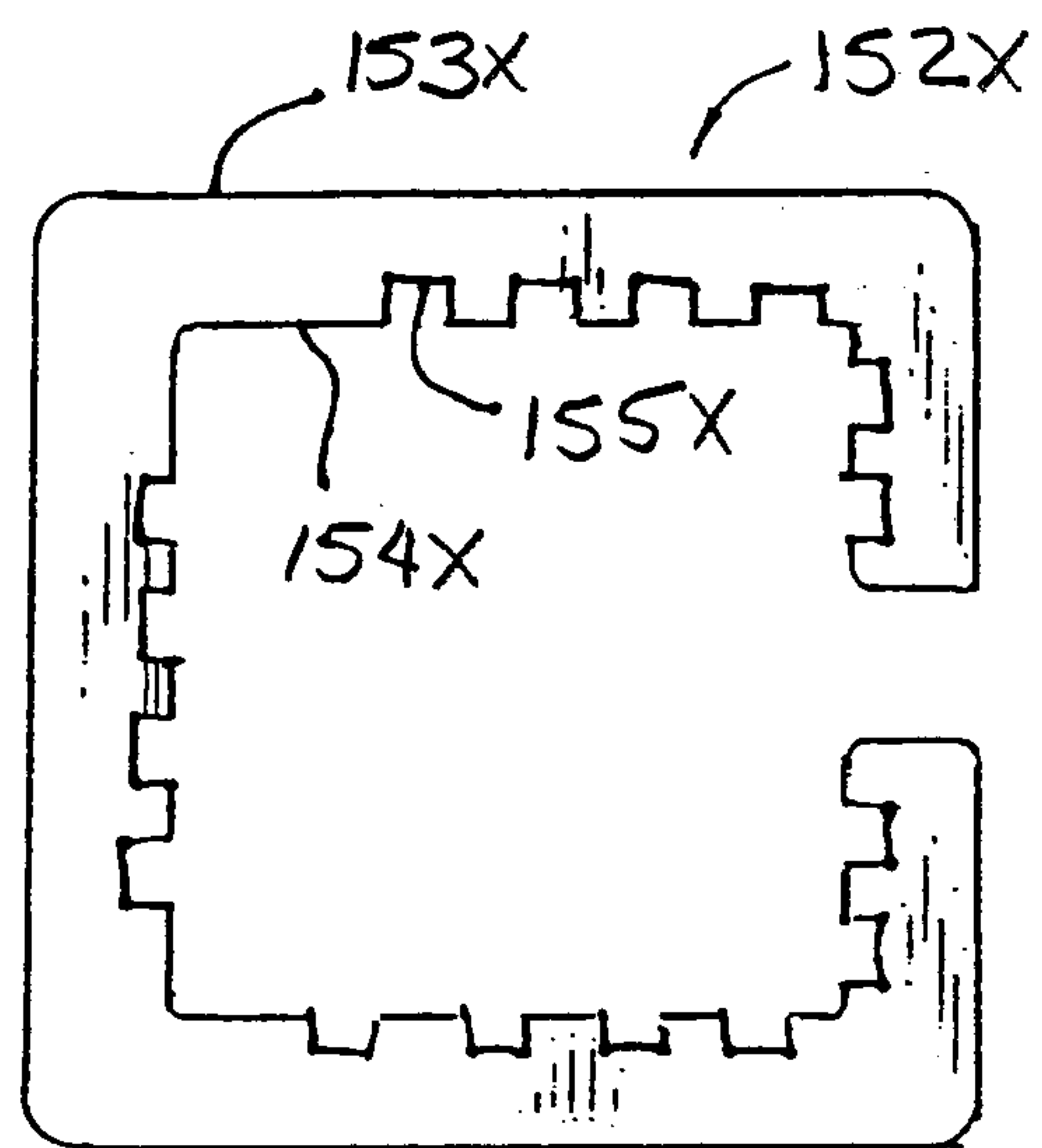


FIG. 25X

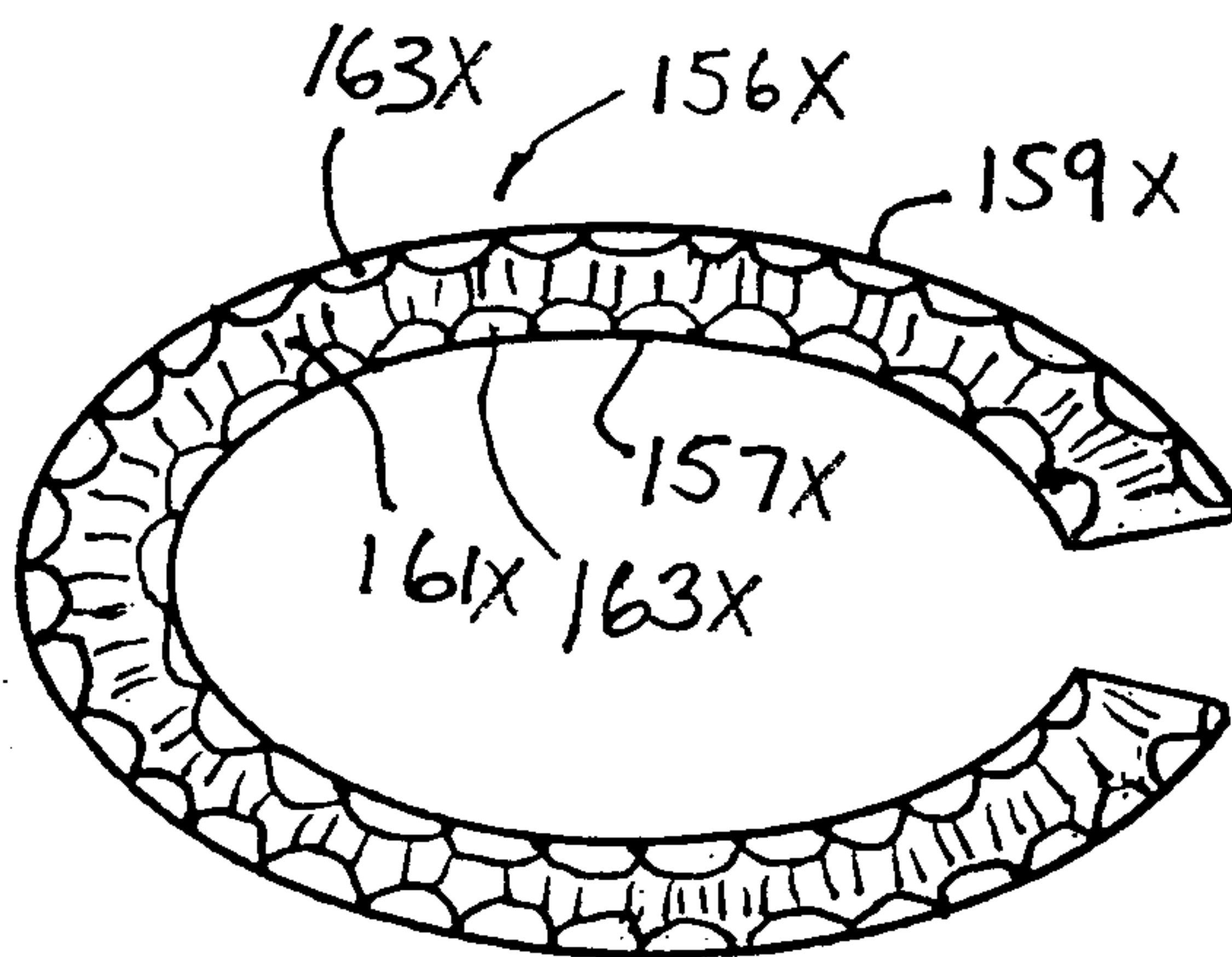


FIG. 26X

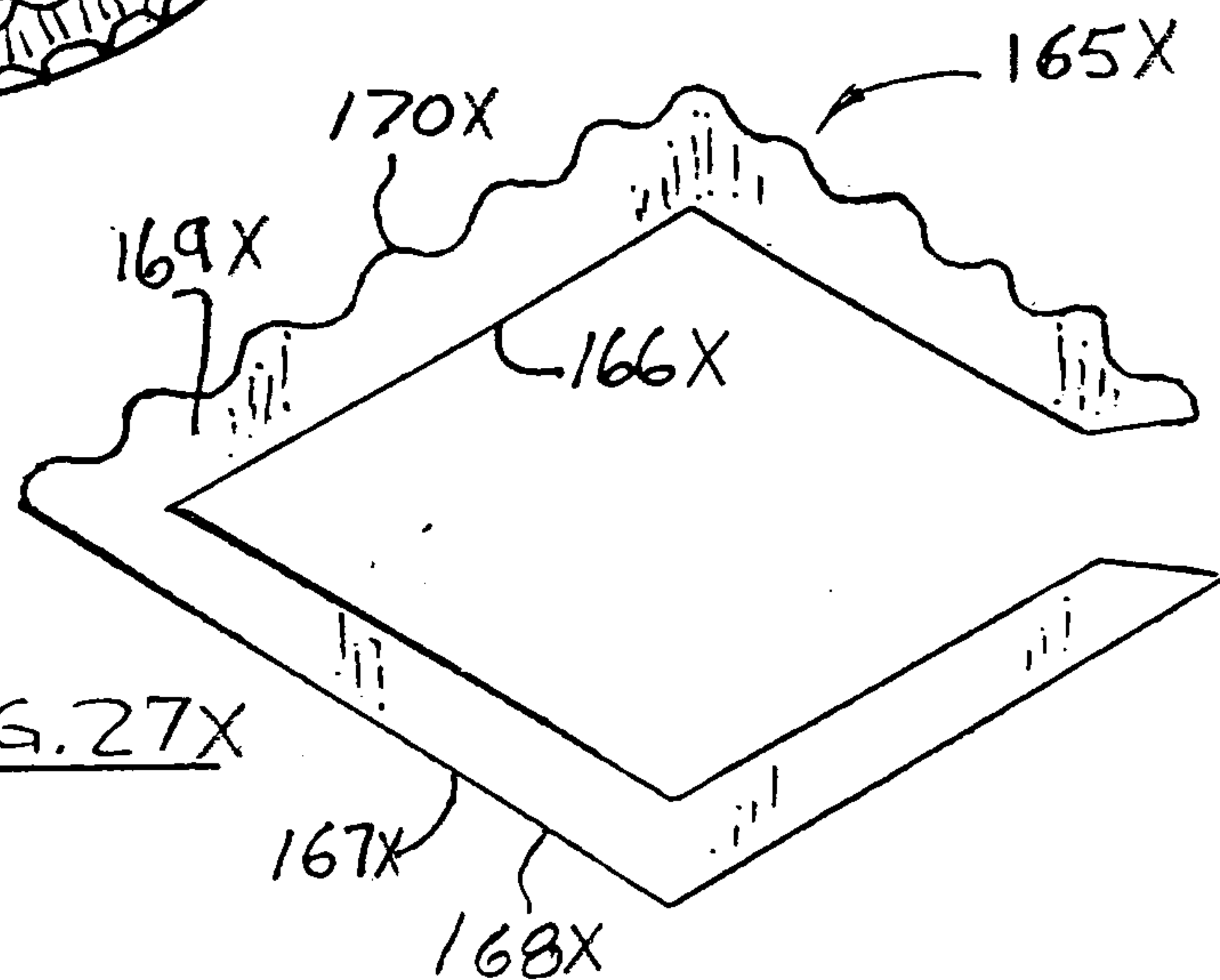


FIG. 27X

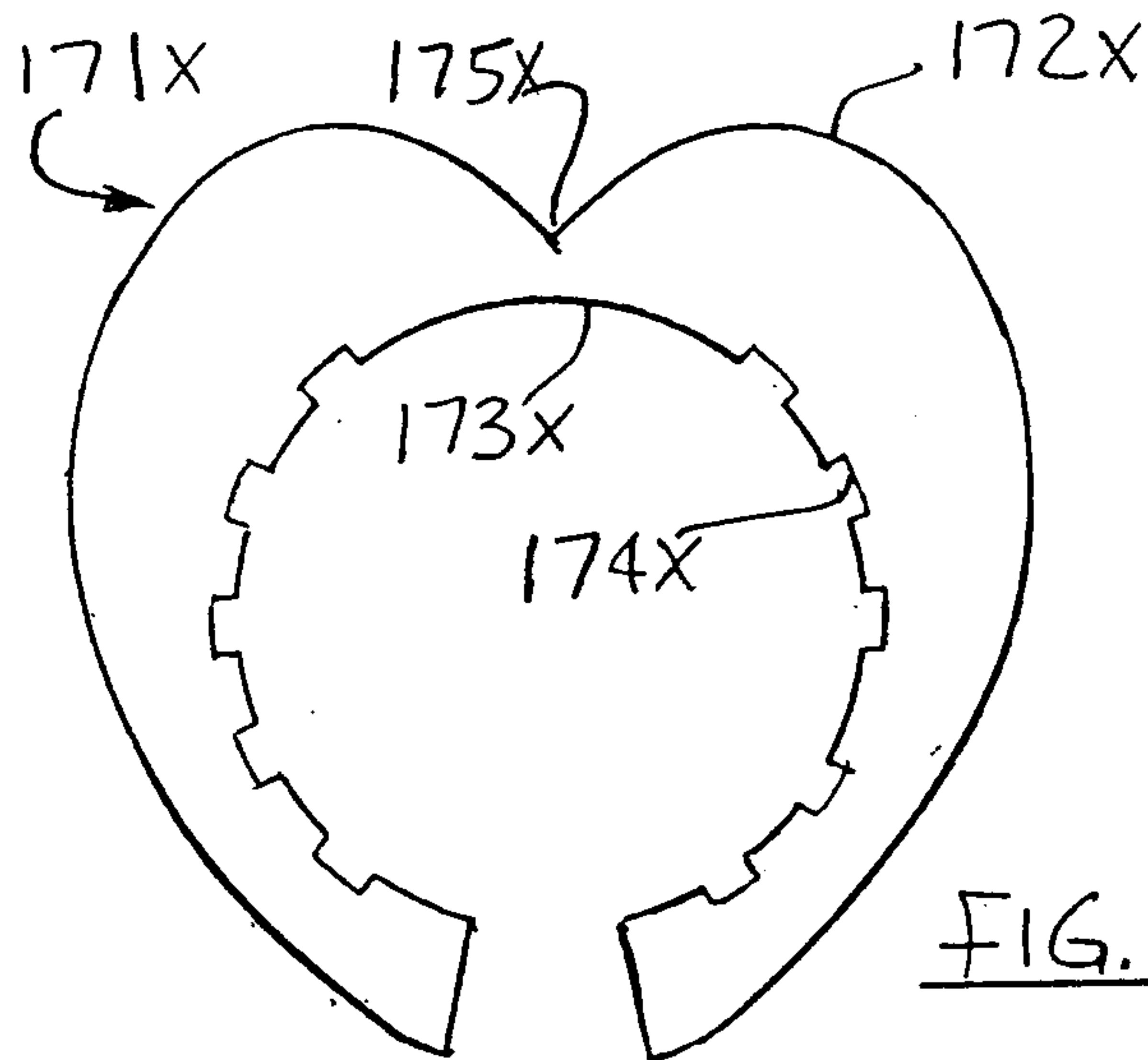


FIG. 27AX

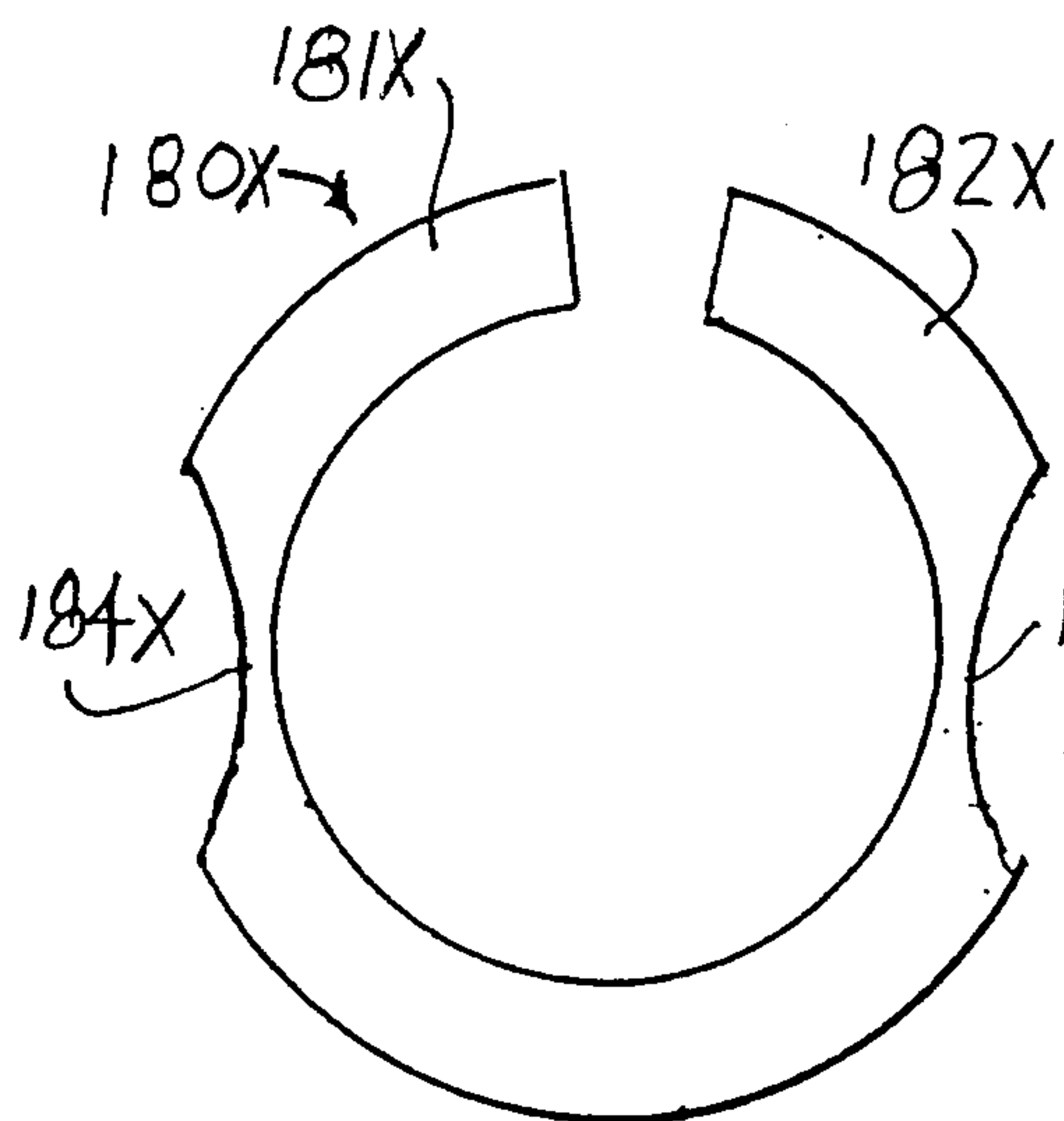


FIG. 28X

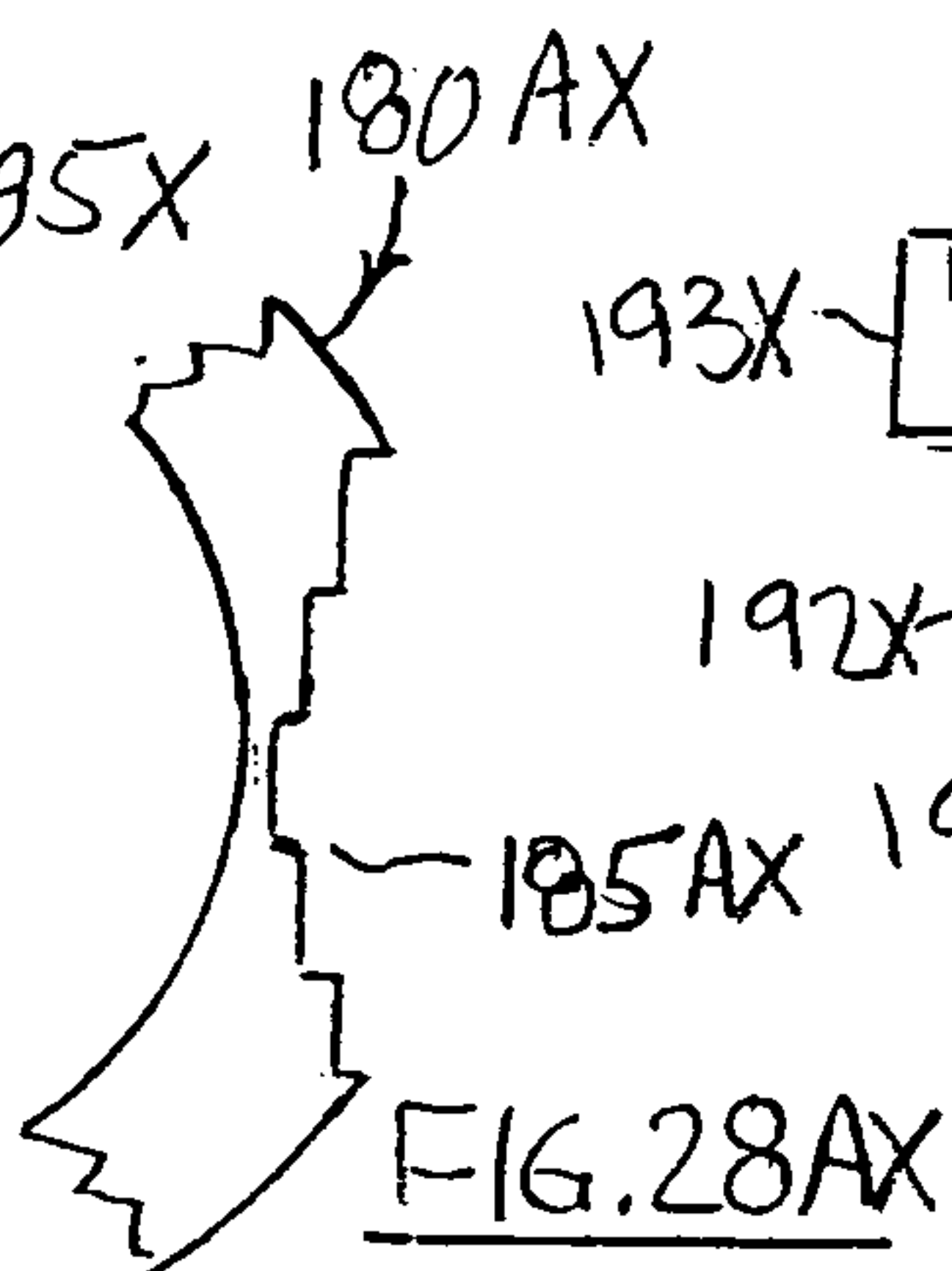


FIG. 28AX

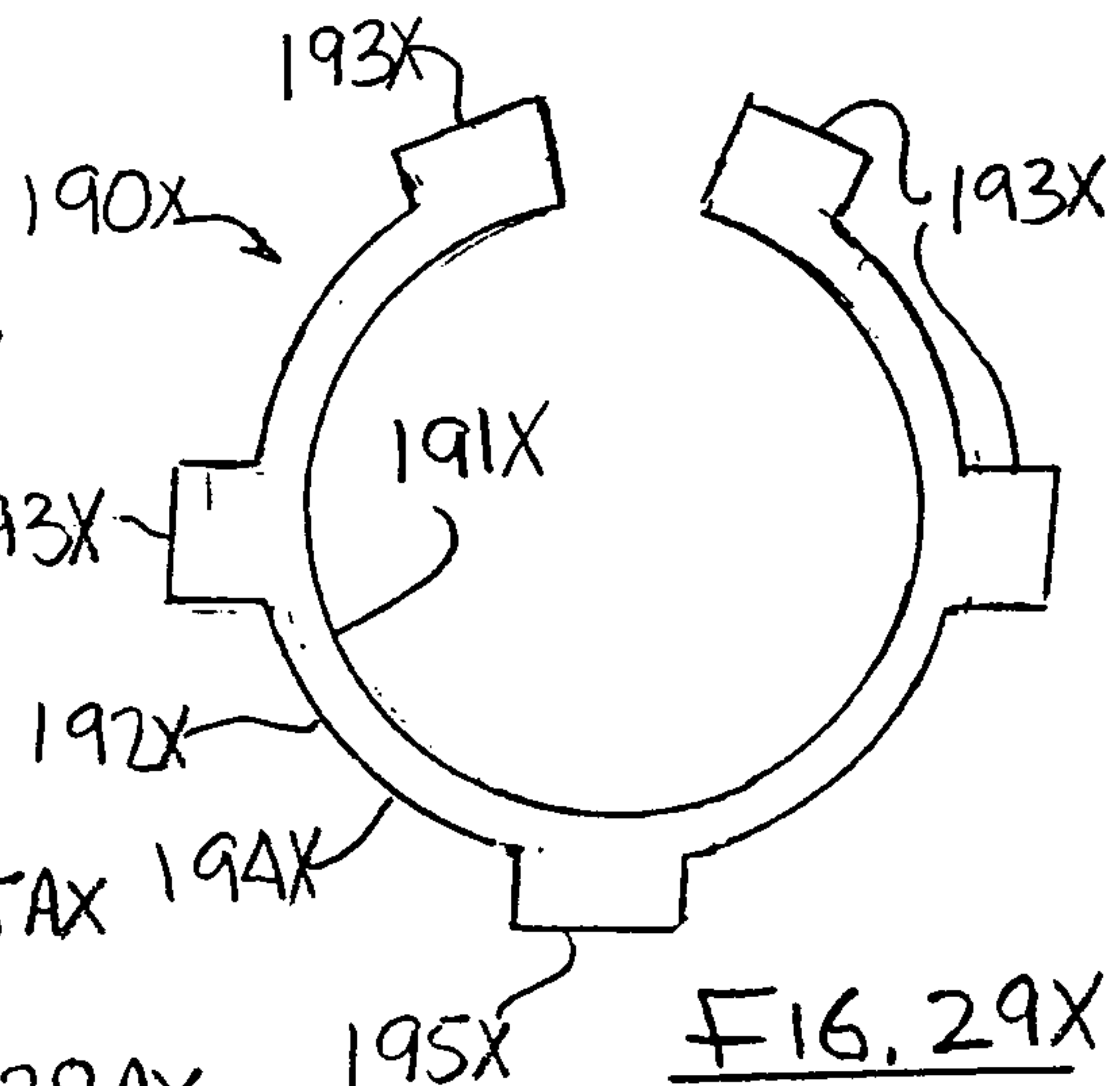


FIG. 29X

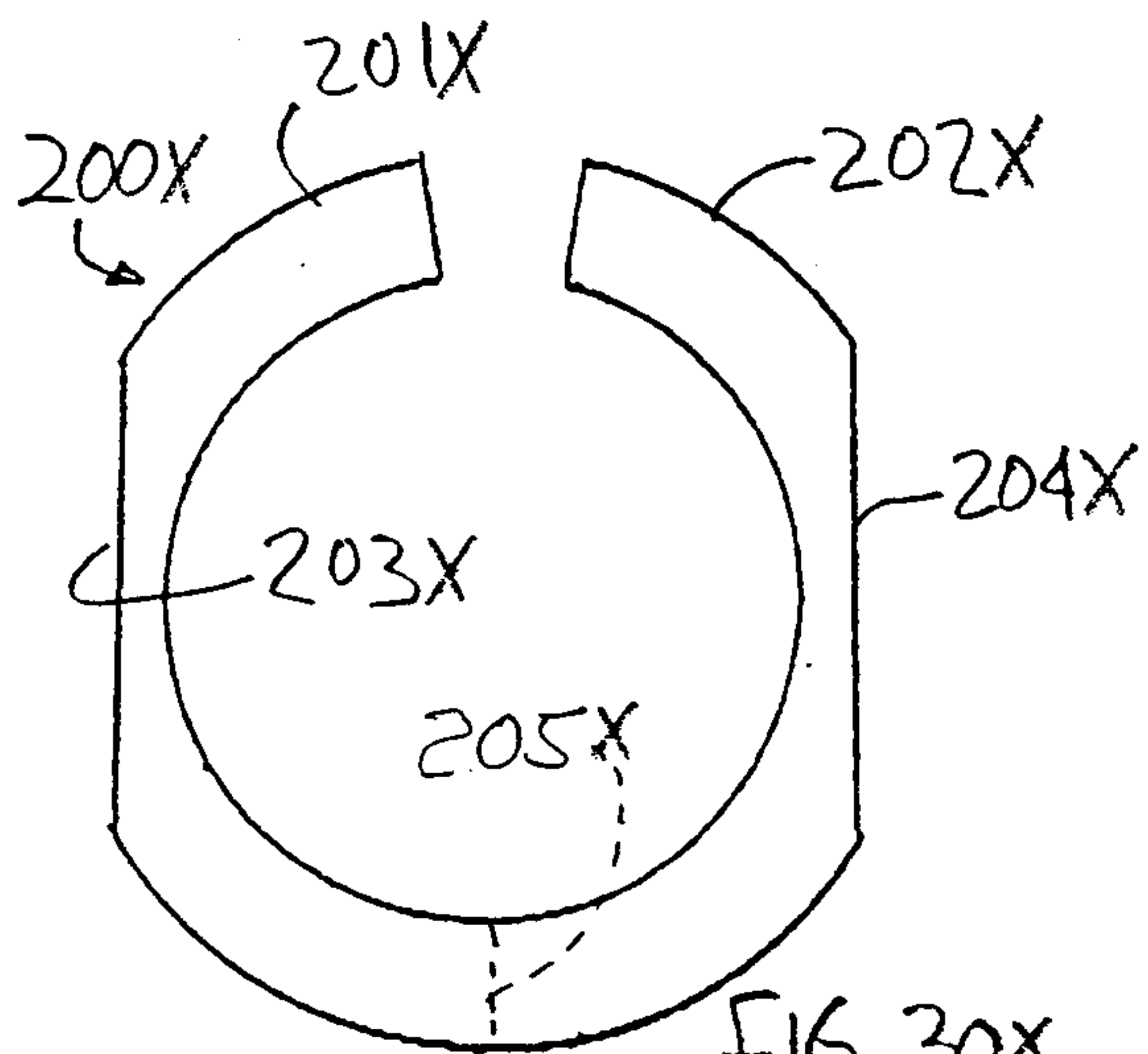


FIG. 30X

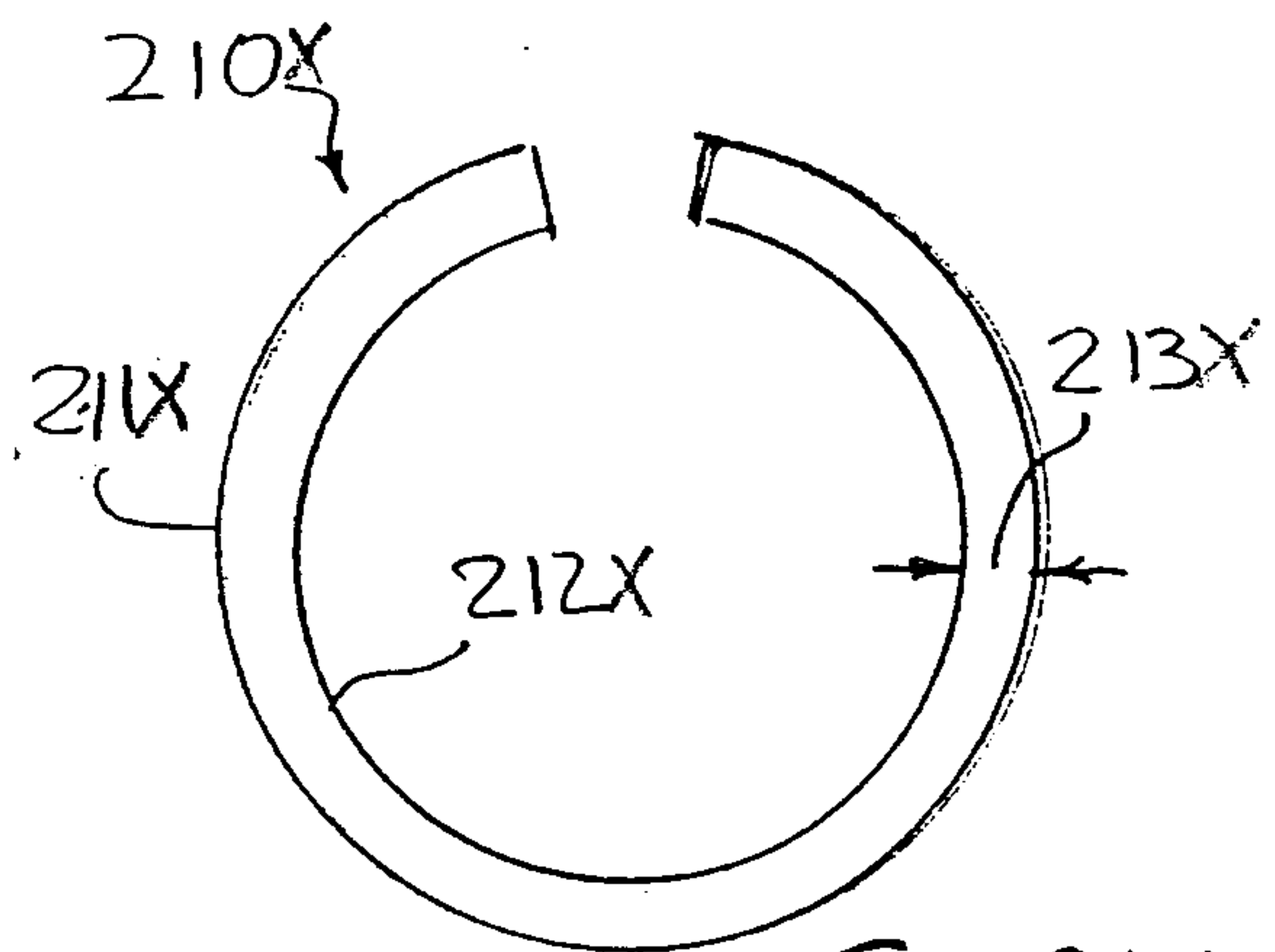


FIG. 31X

FIG. 32X

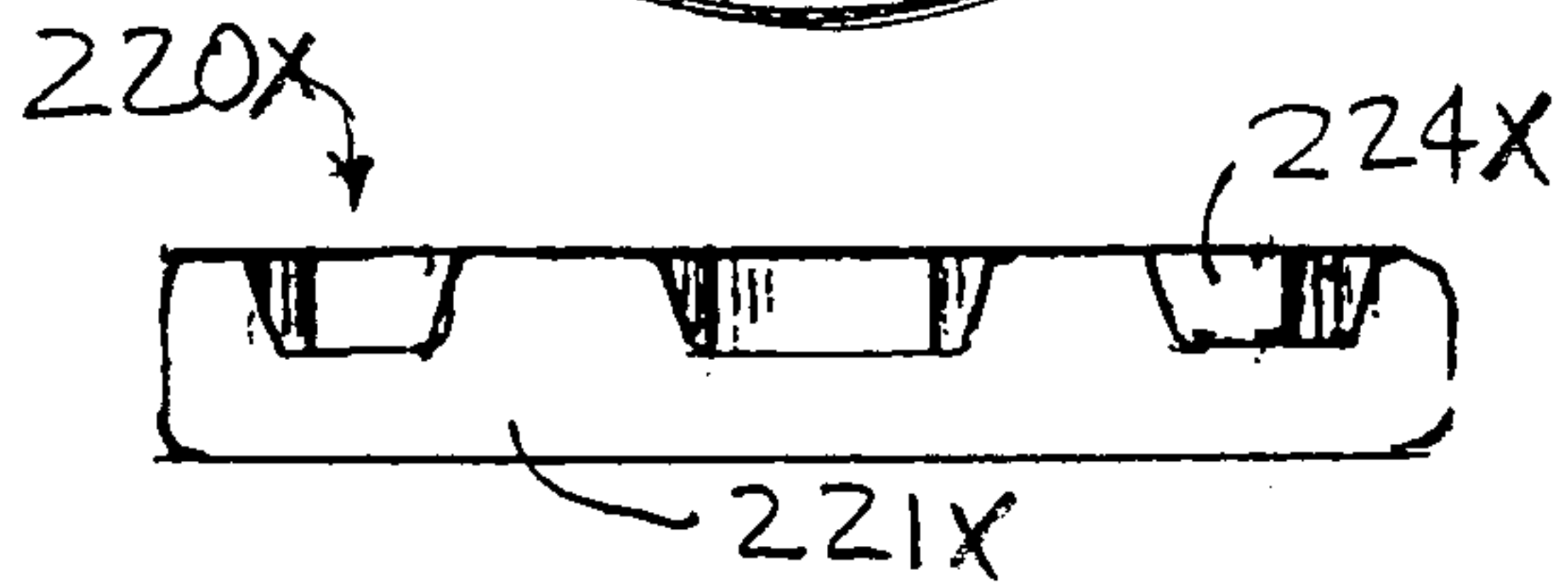
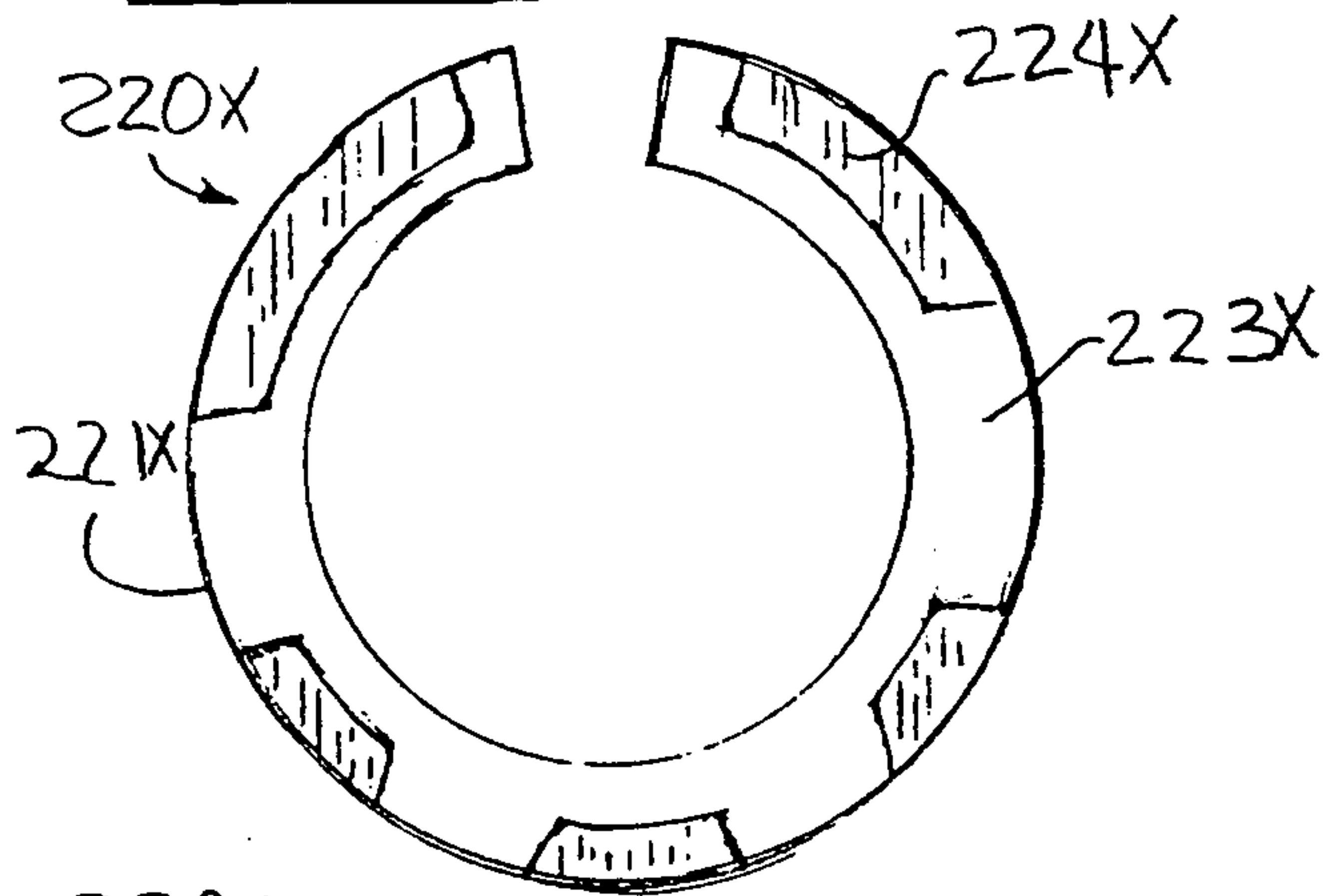


FIG. 33X

FIG. 34X

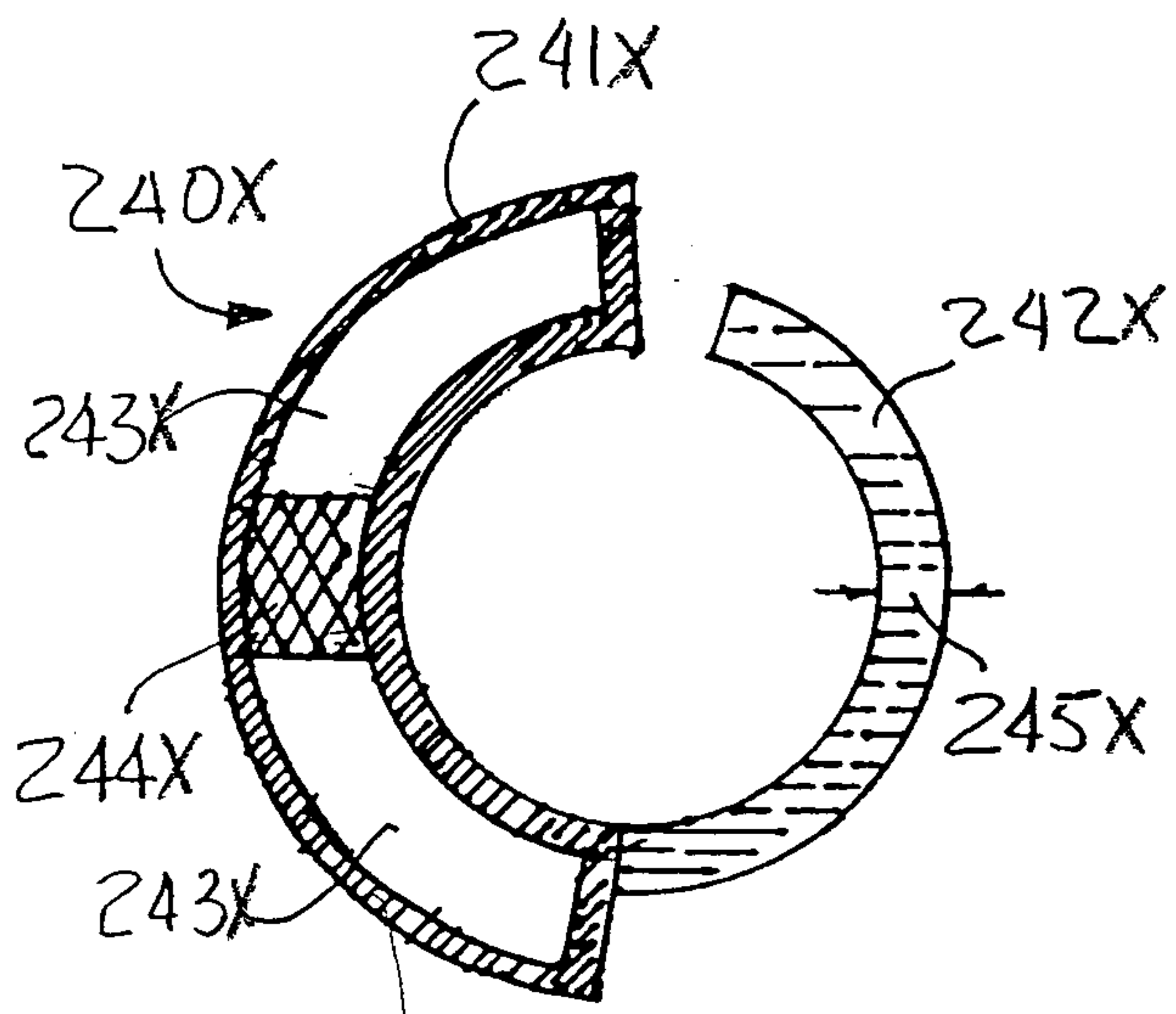
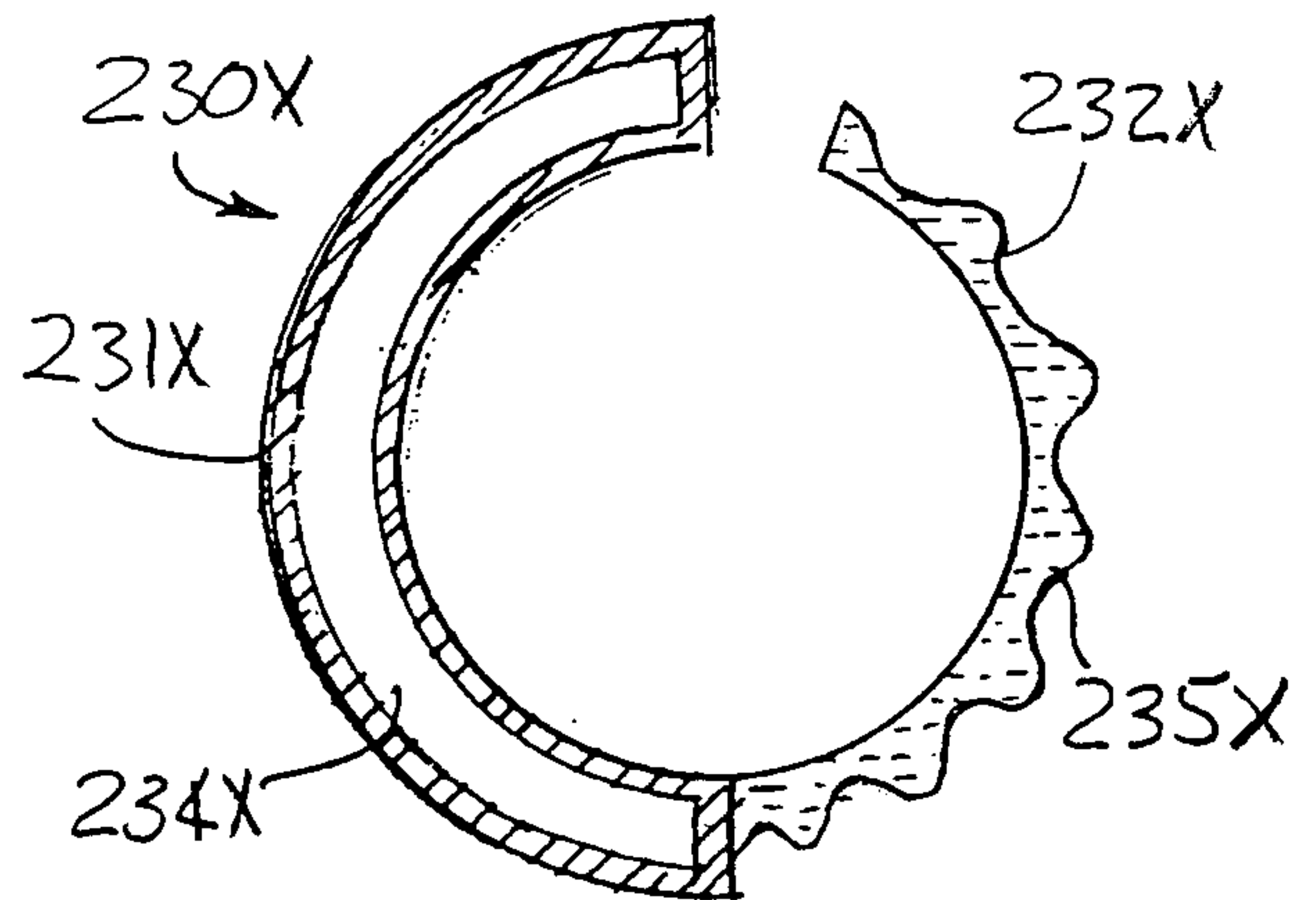


FIG. 35X

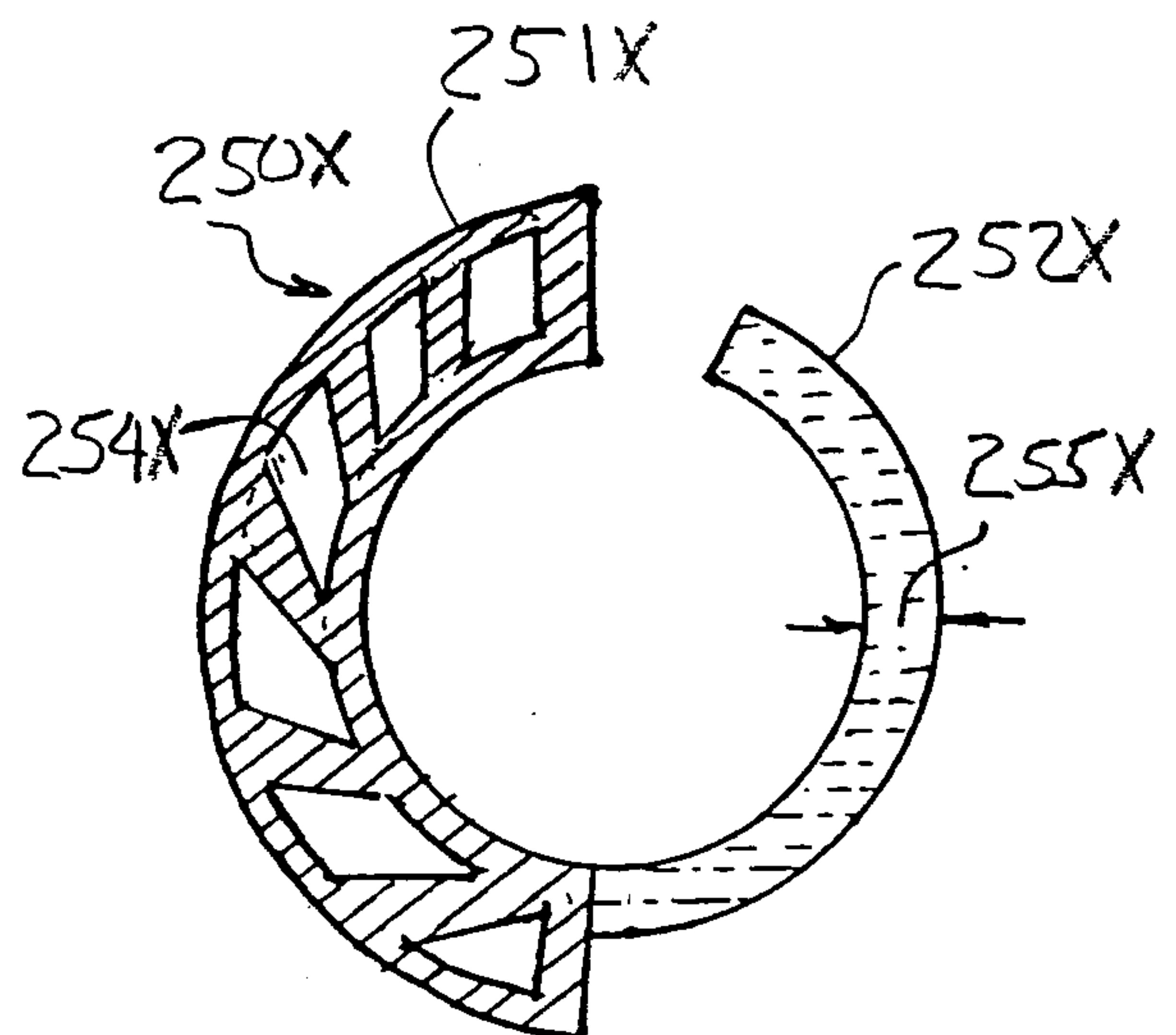
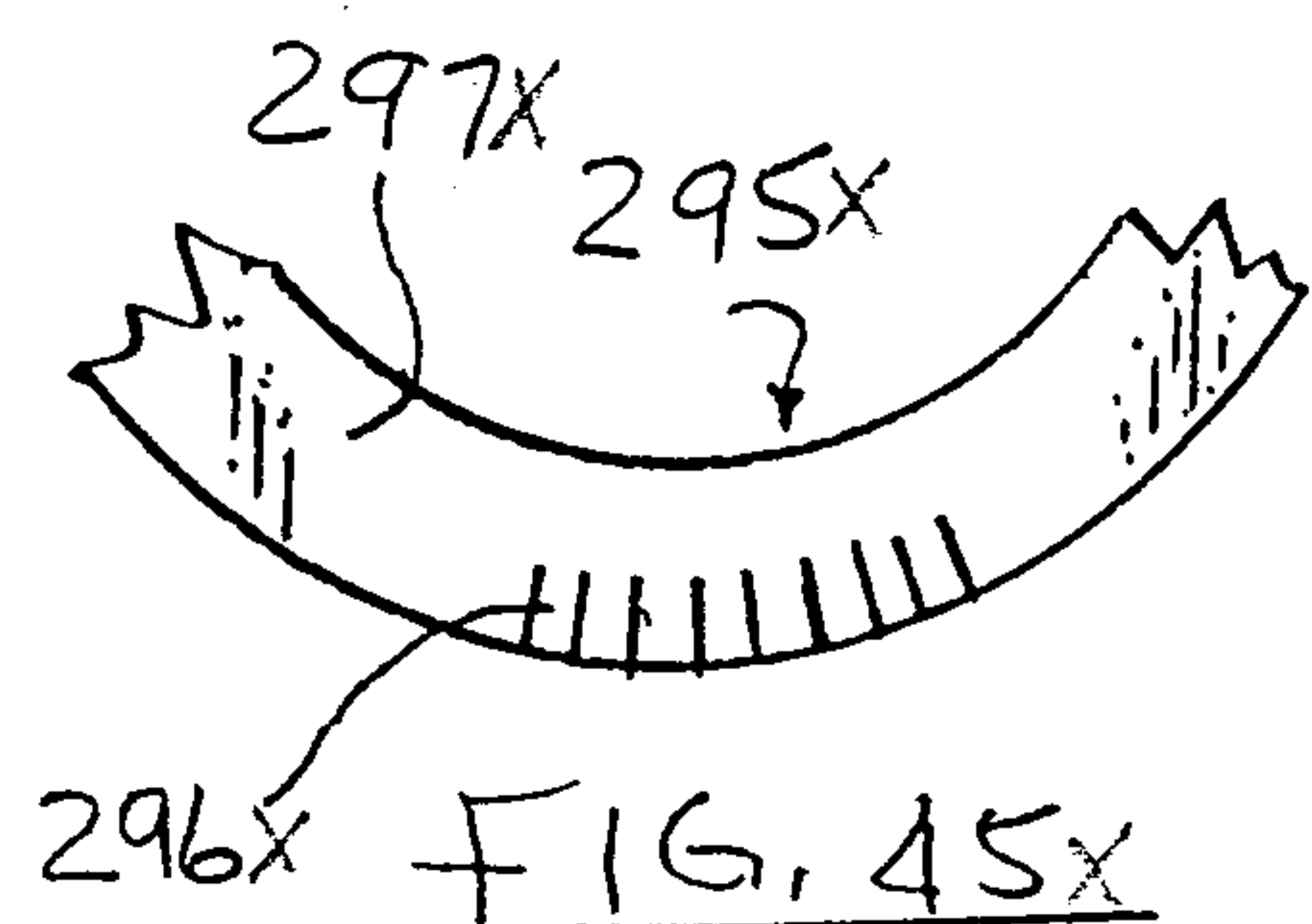
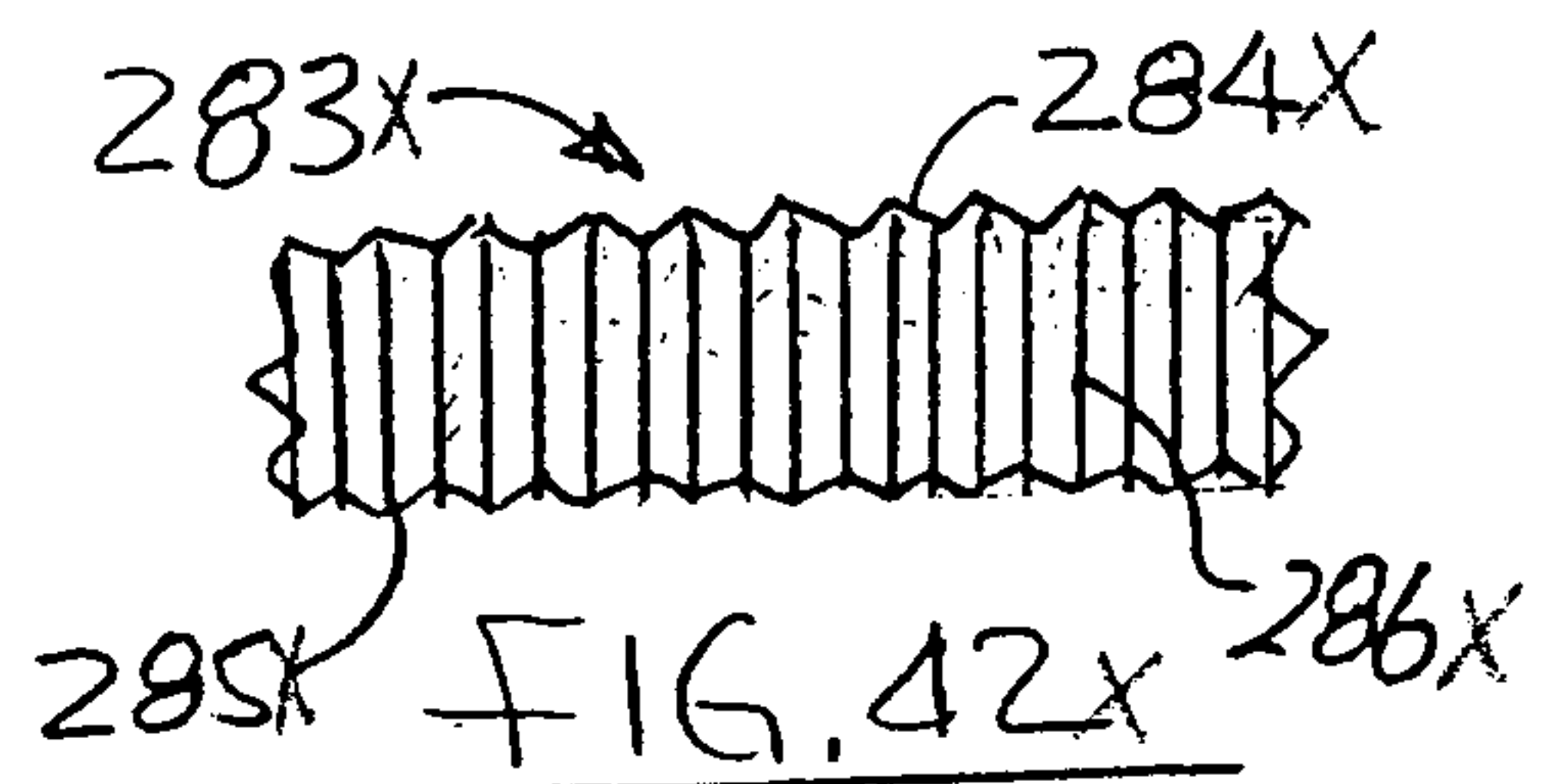
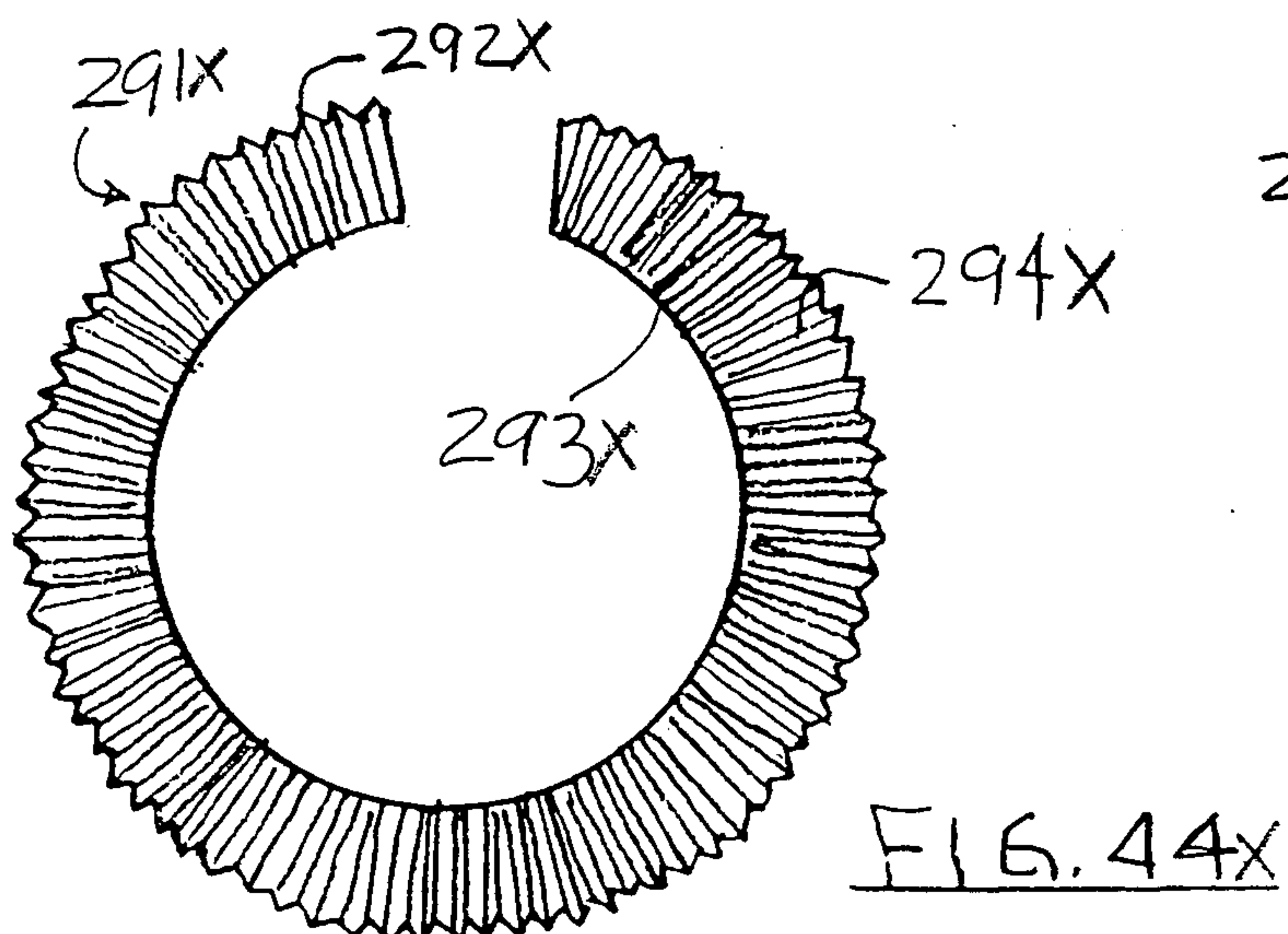
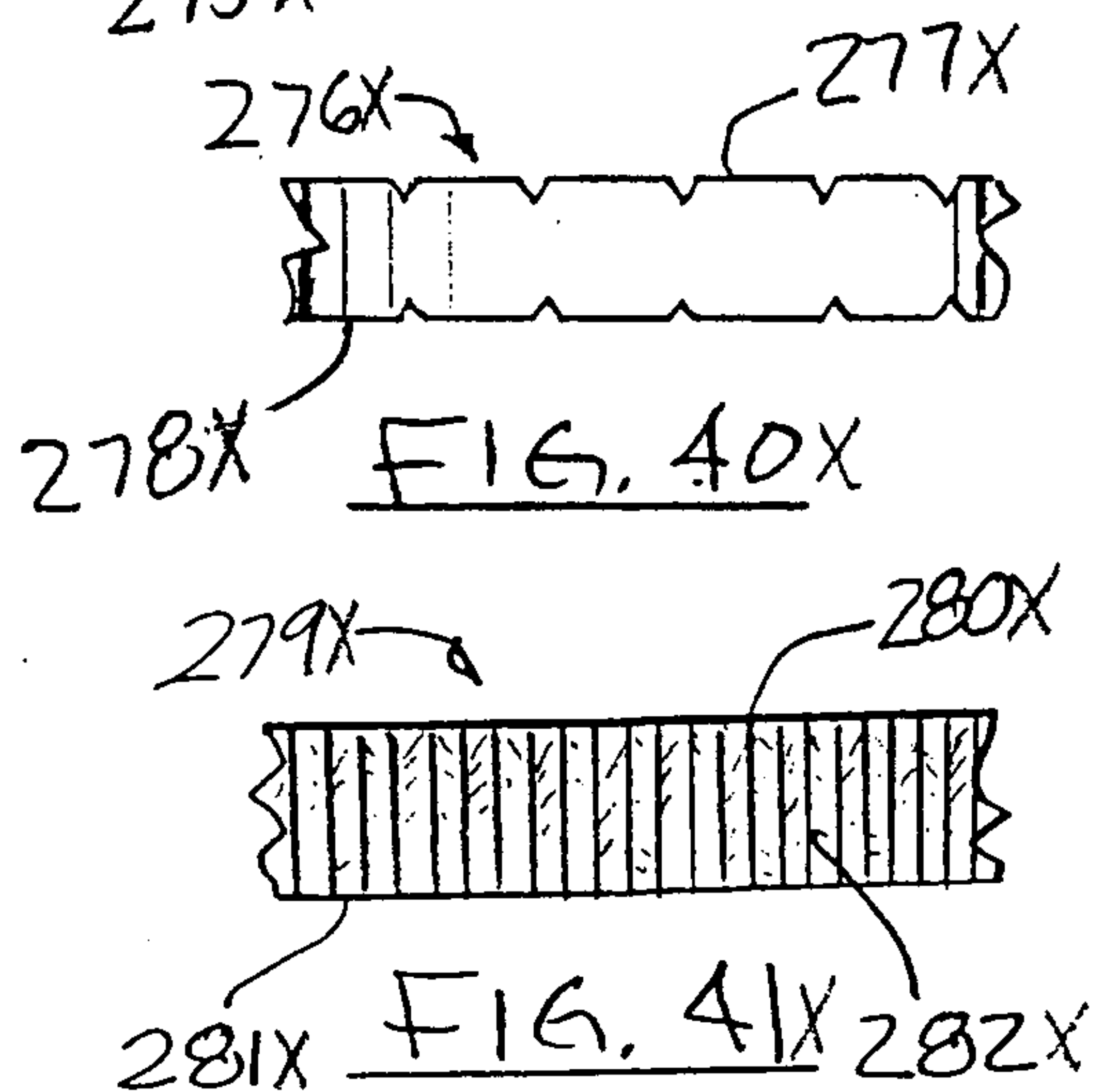
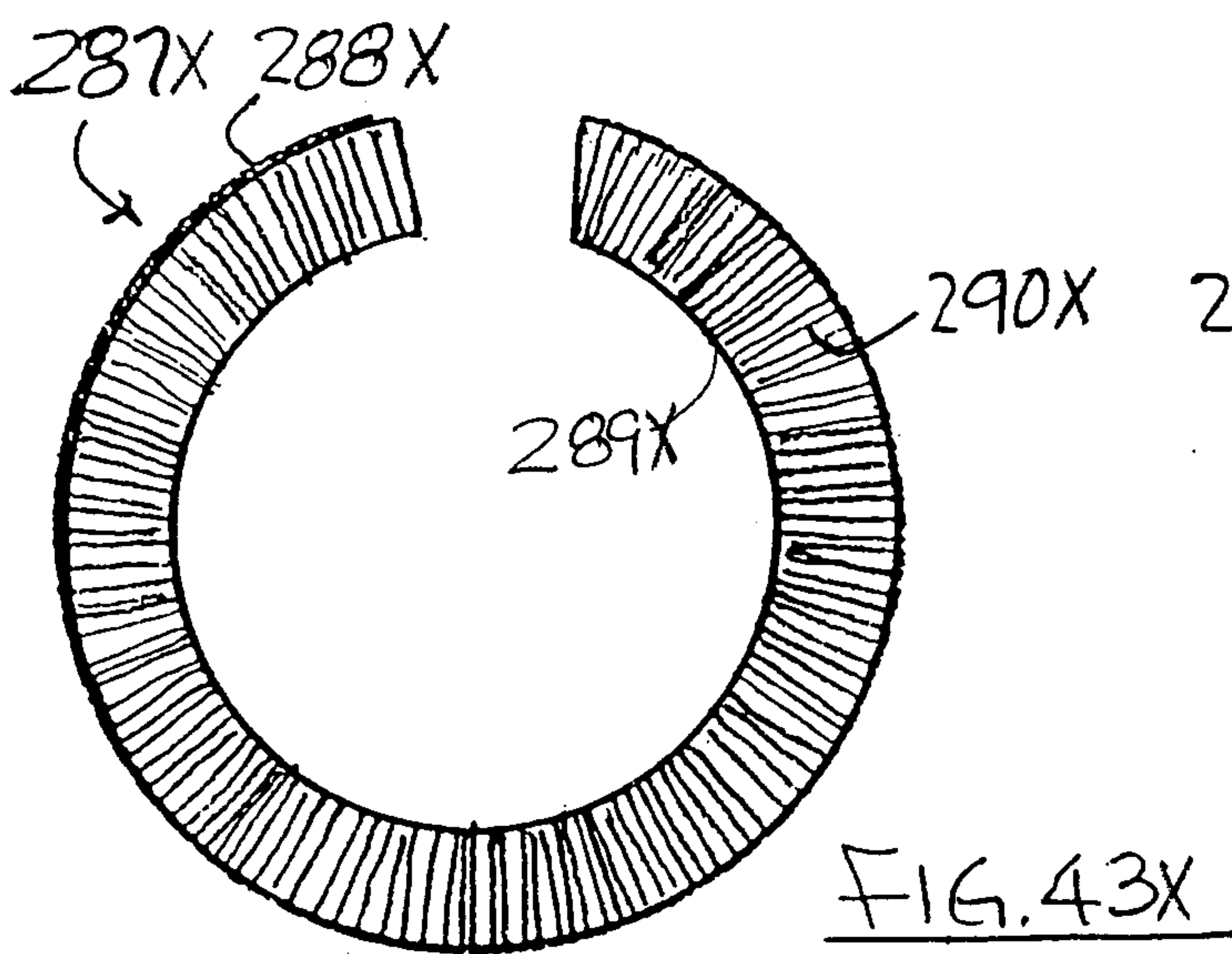
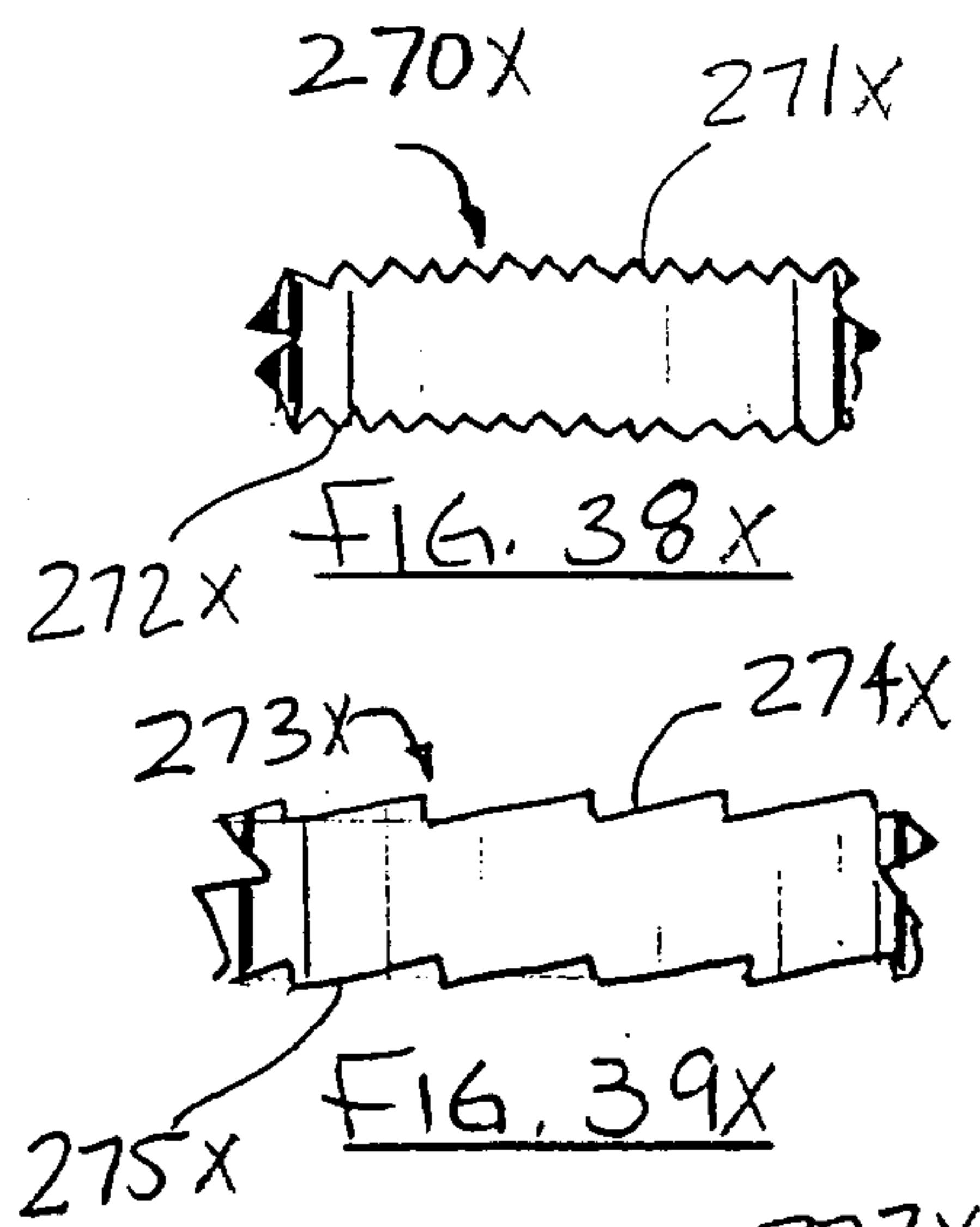
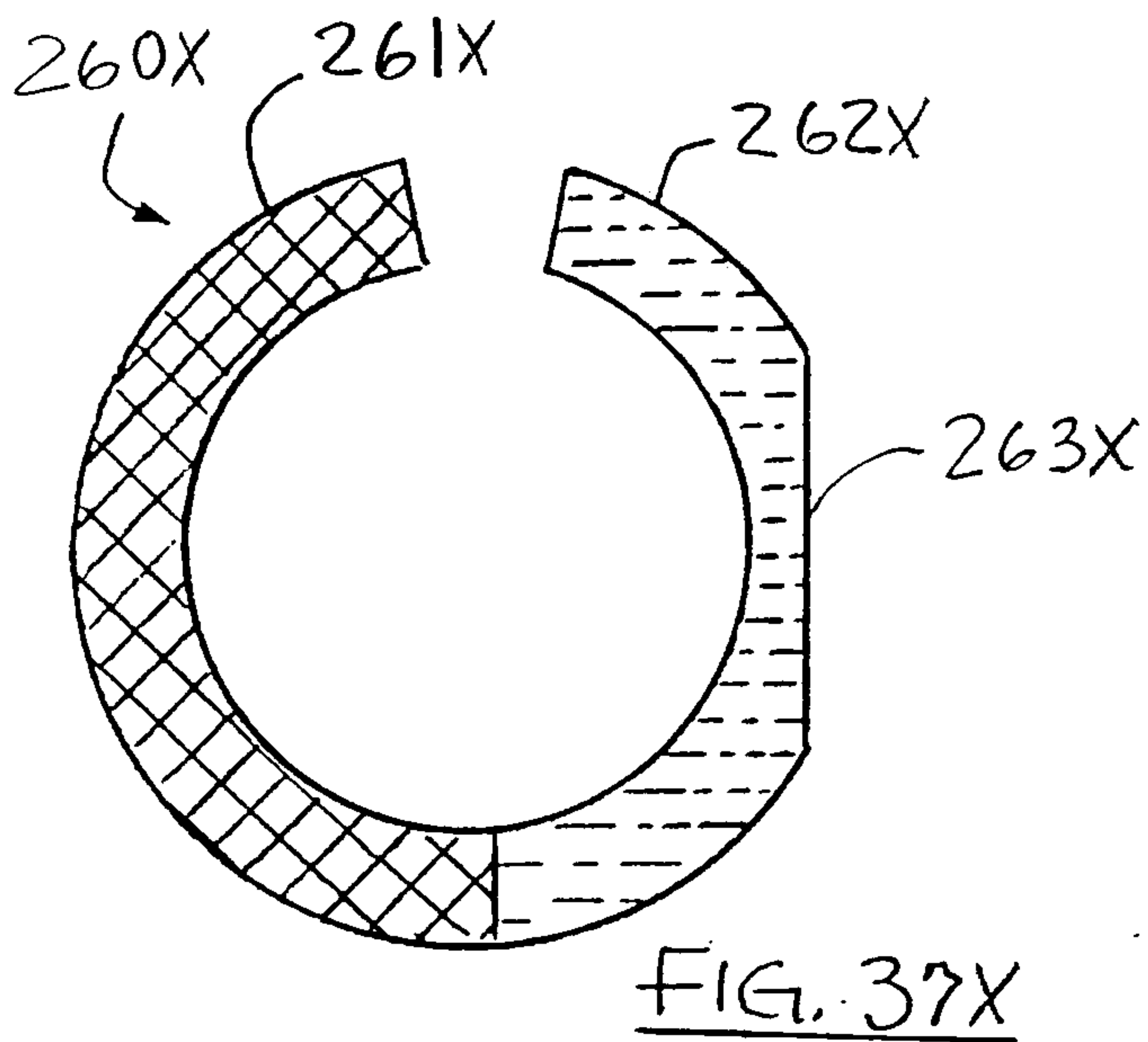


FIG. 36X



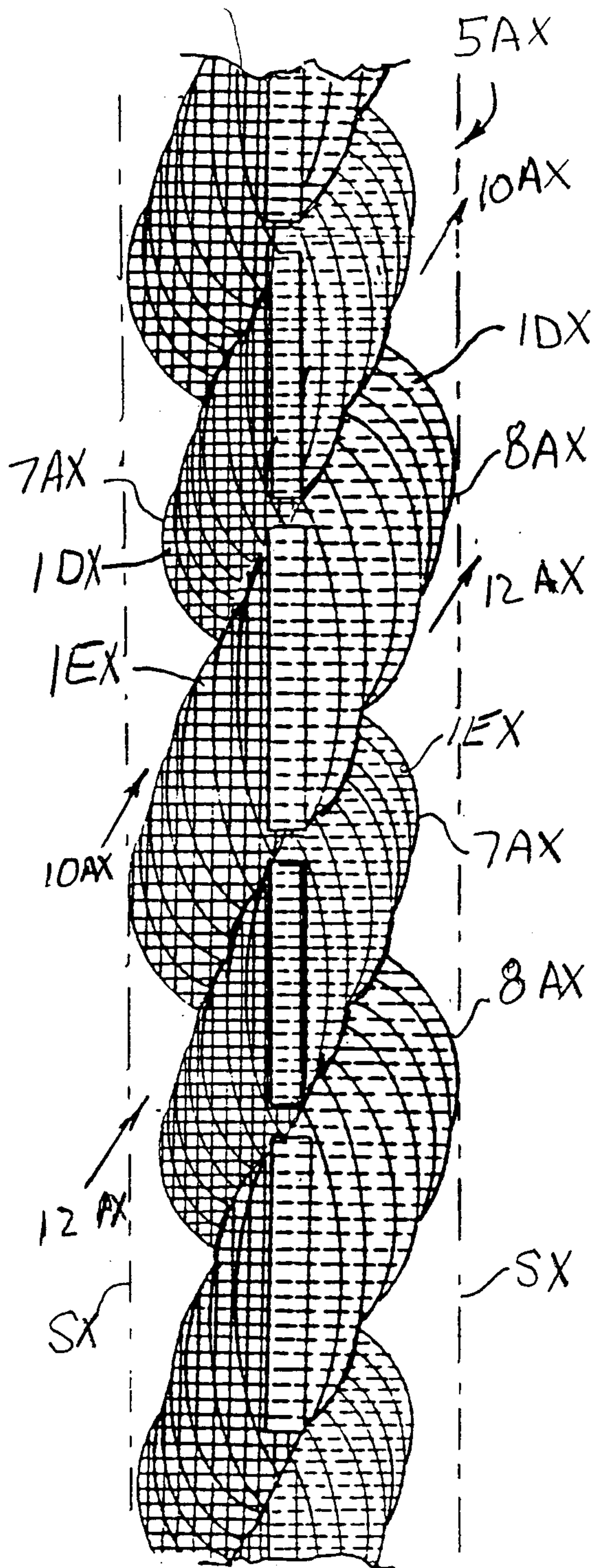


FIG. 46X

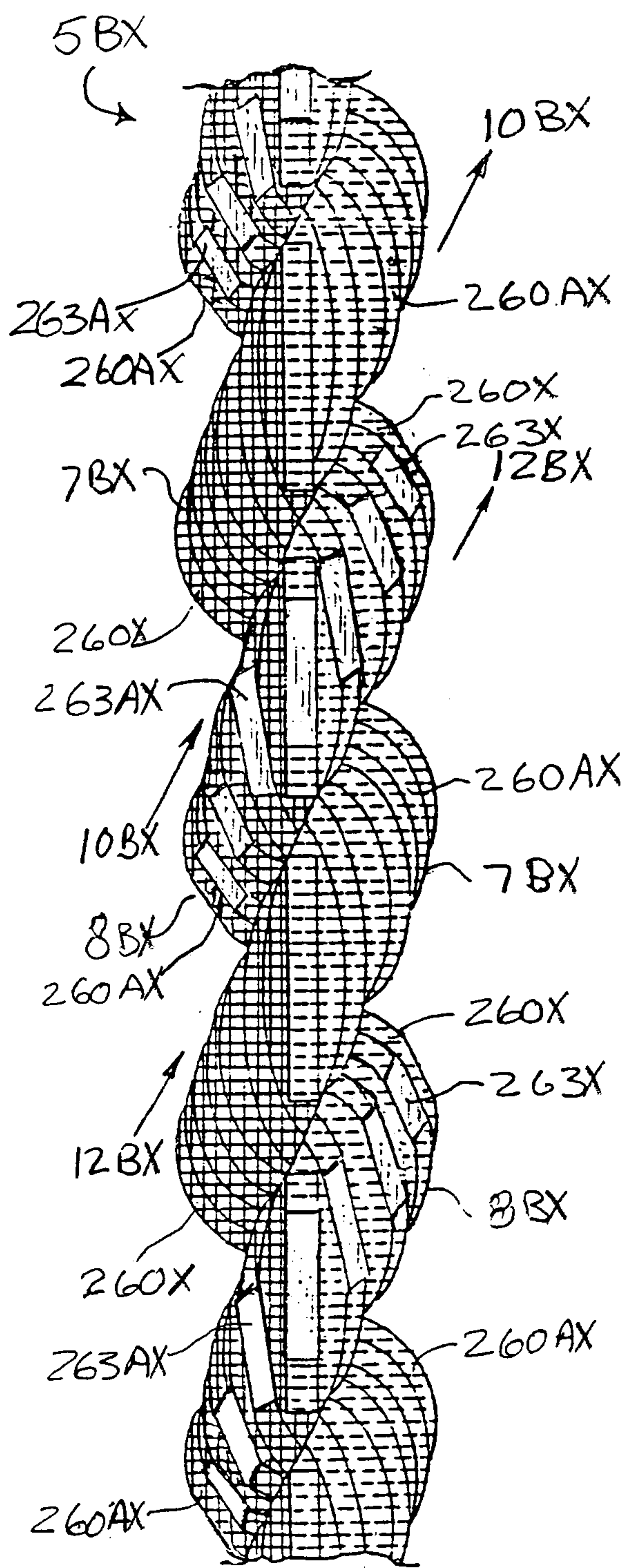
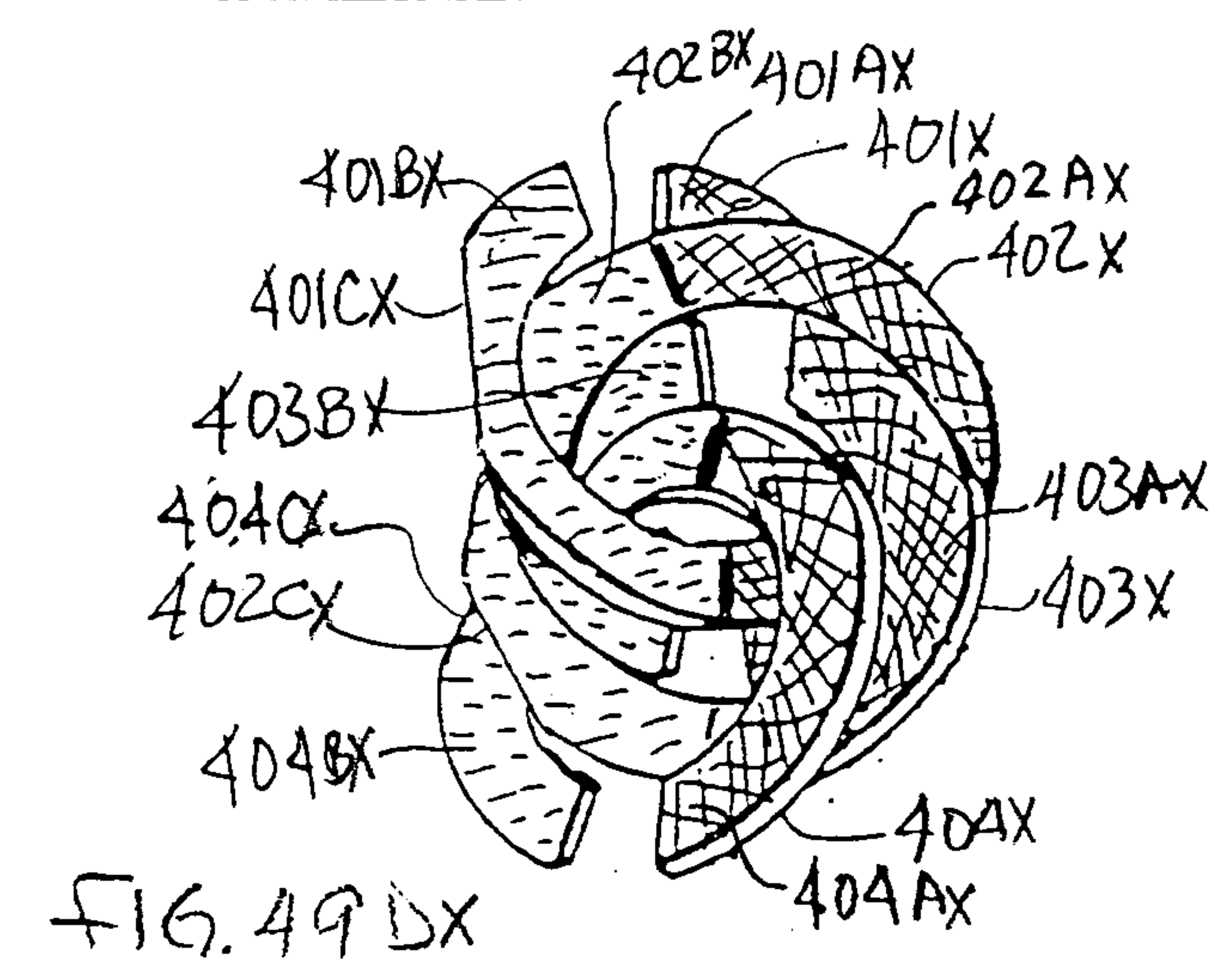
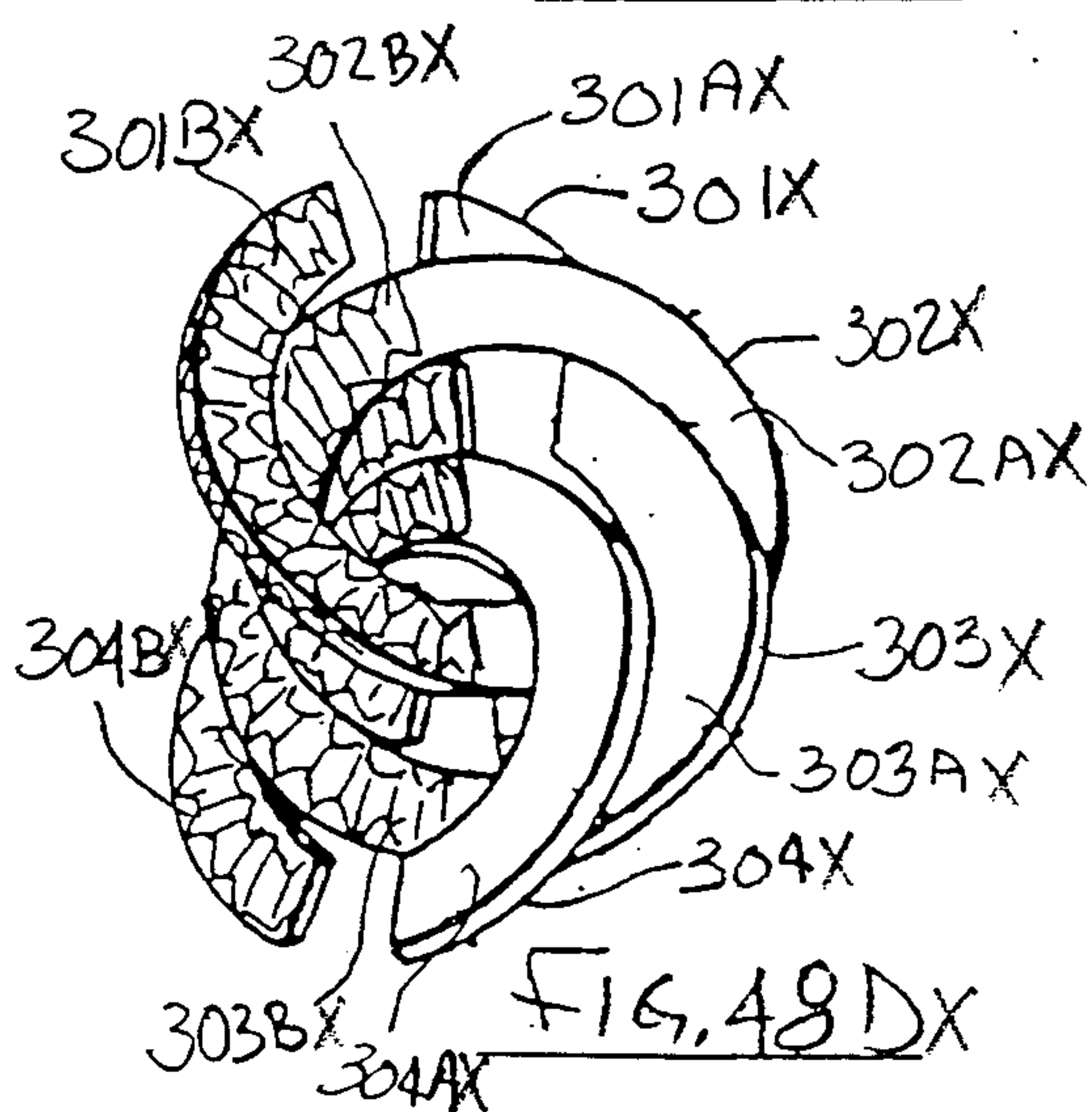
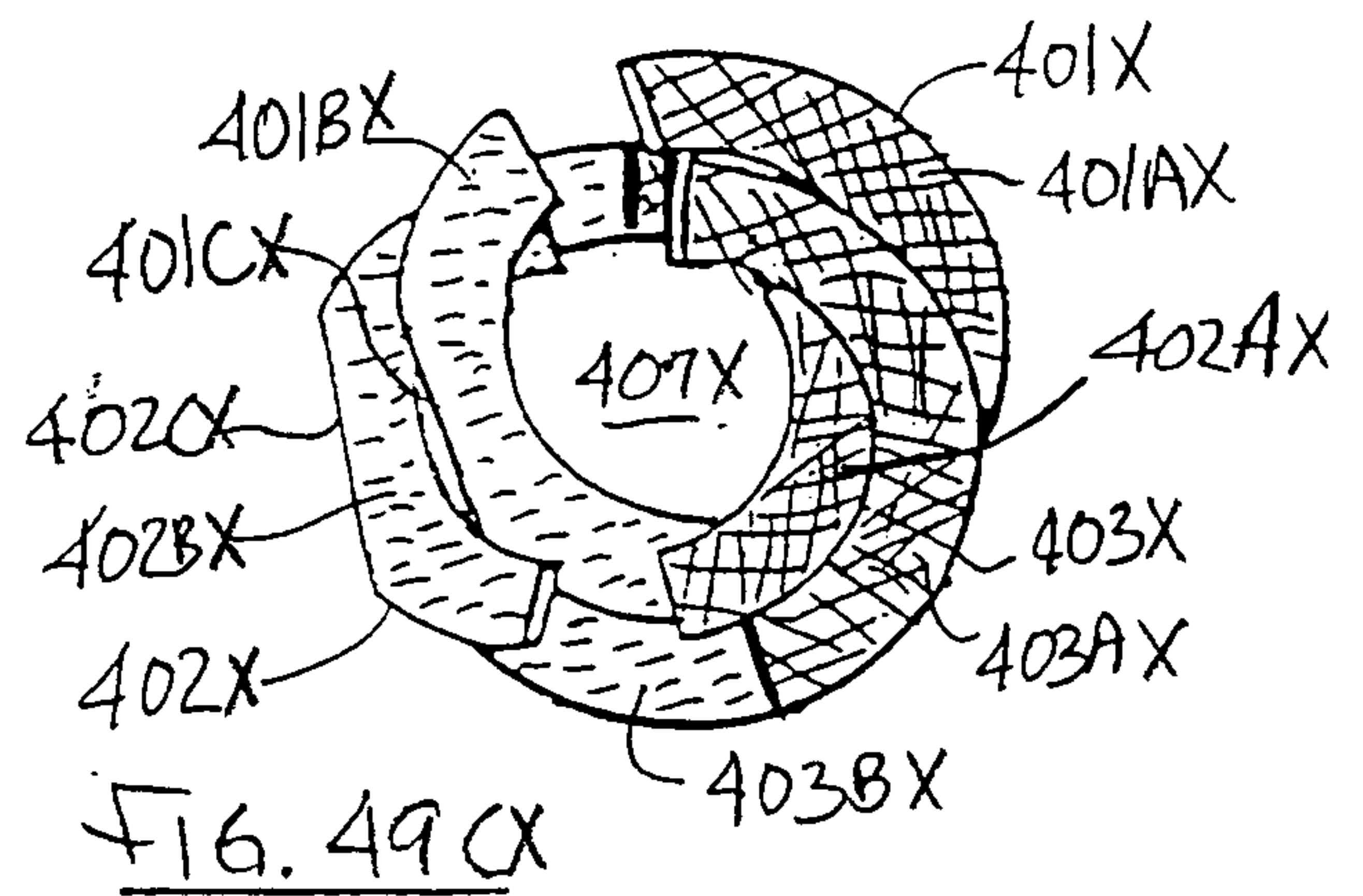
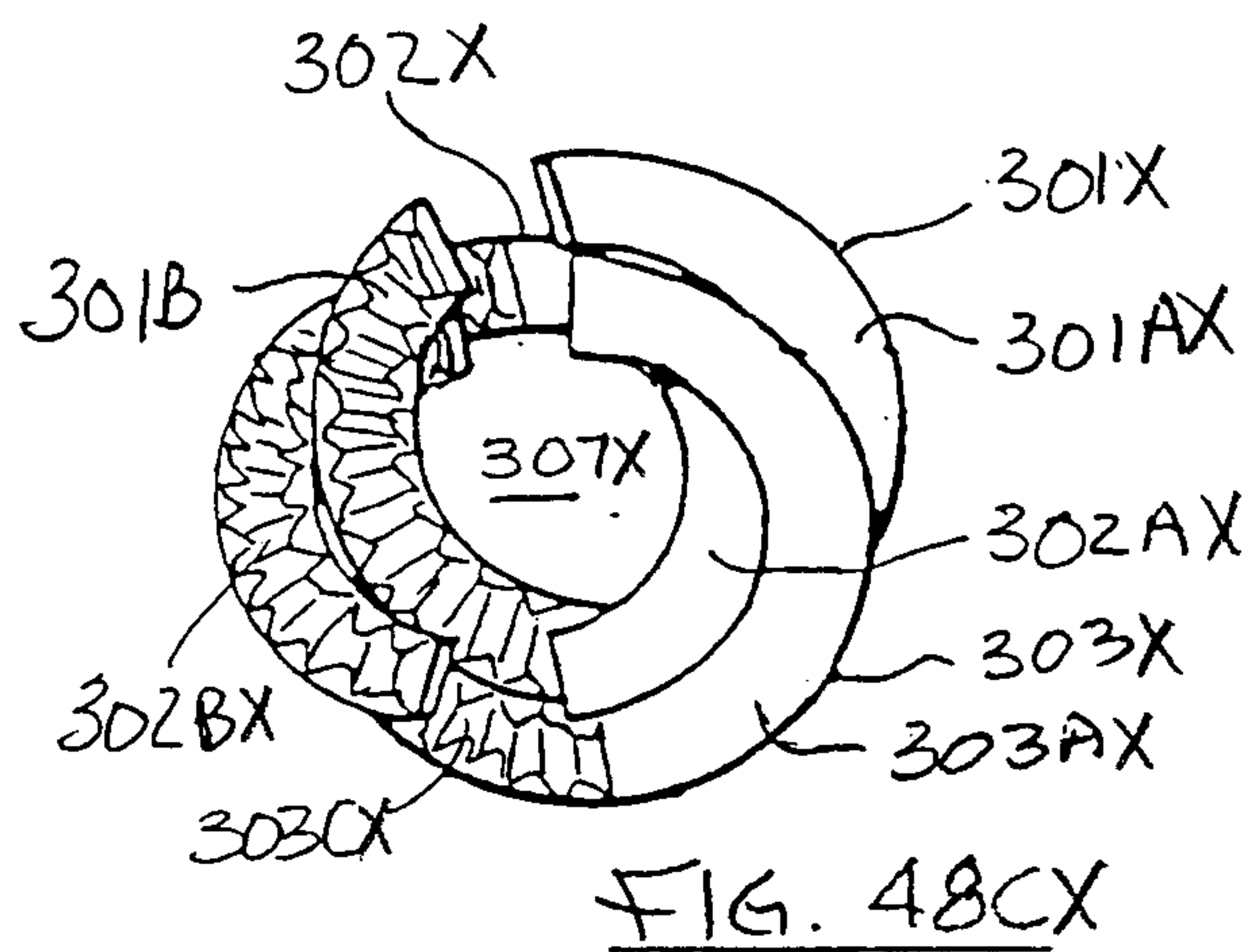
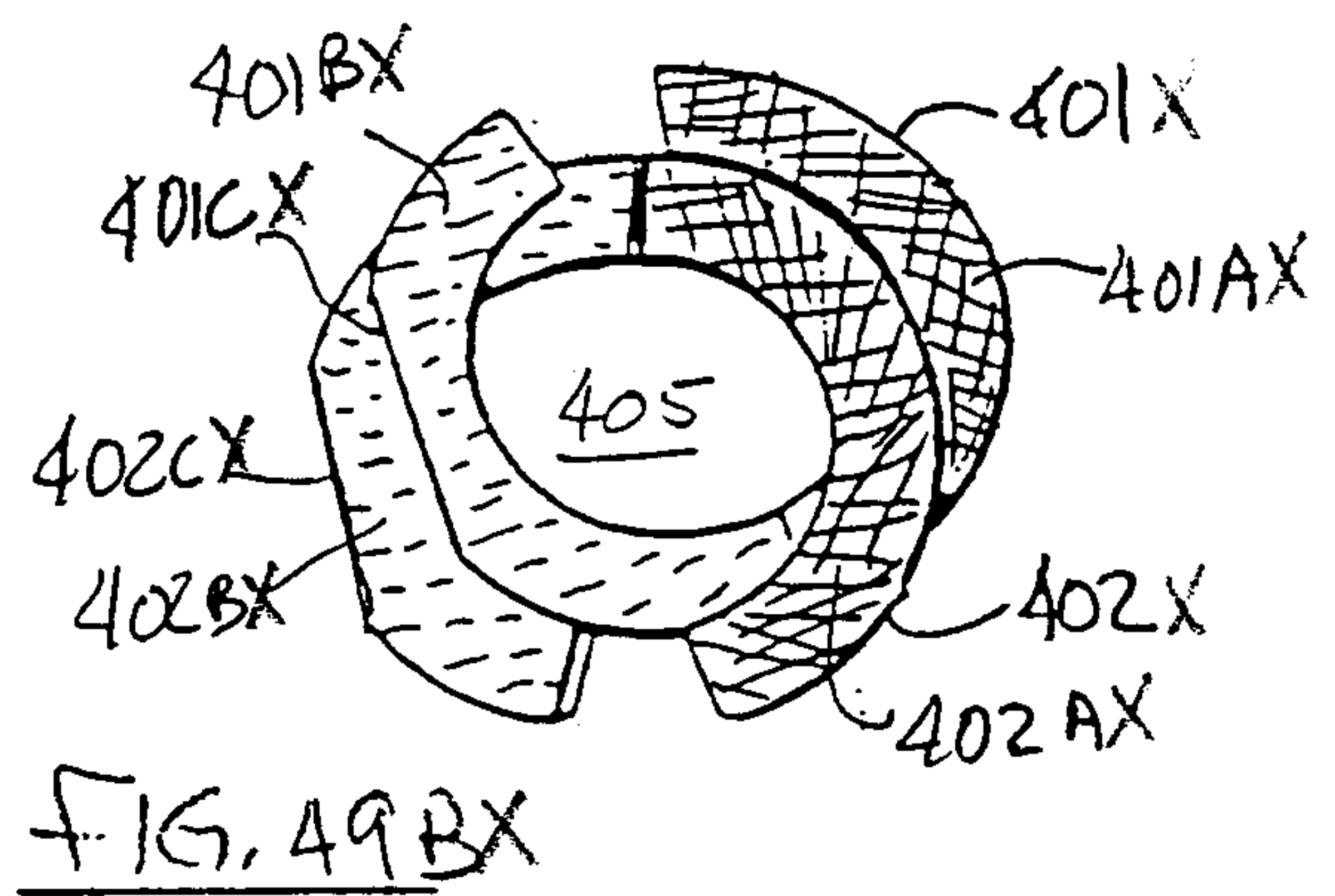
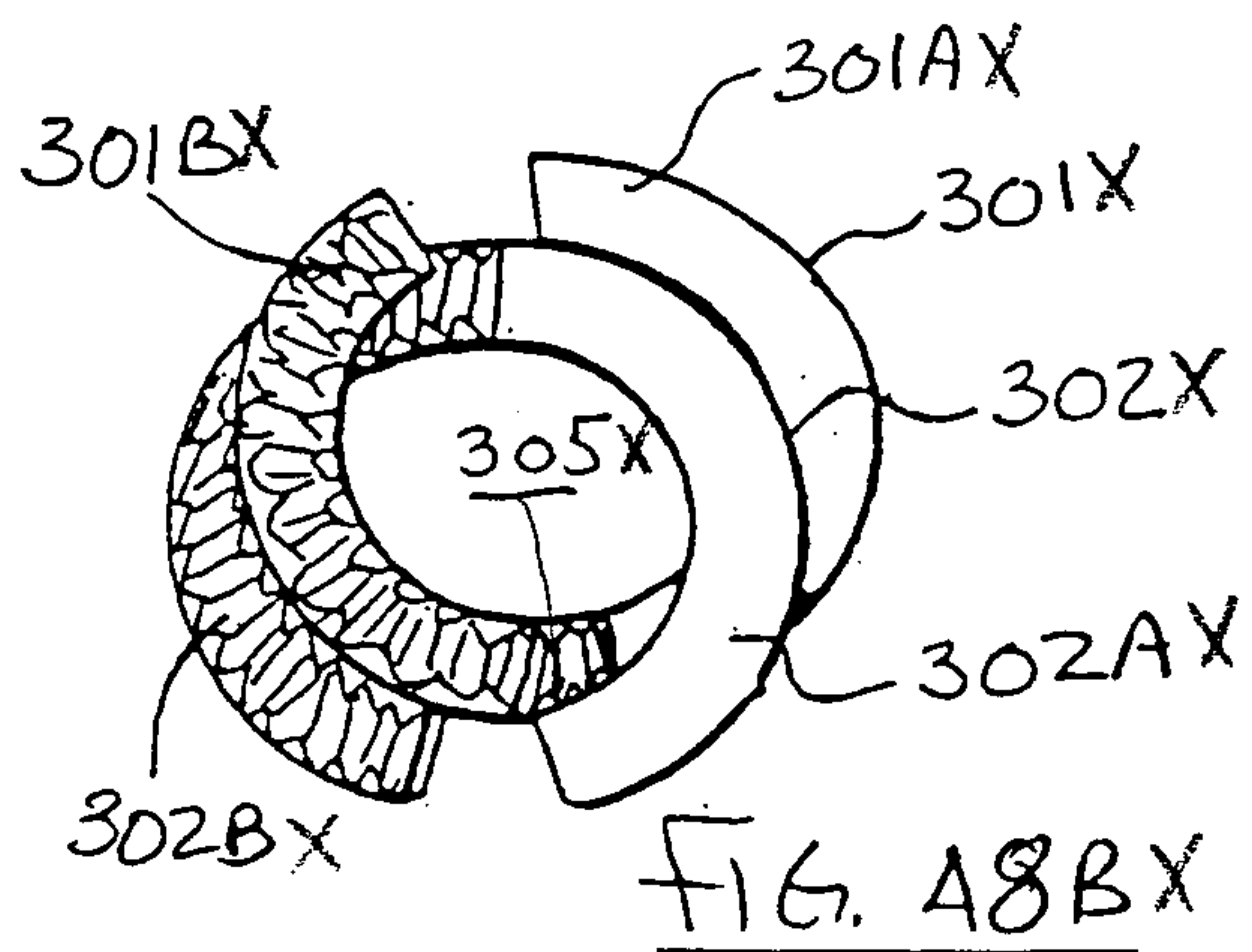
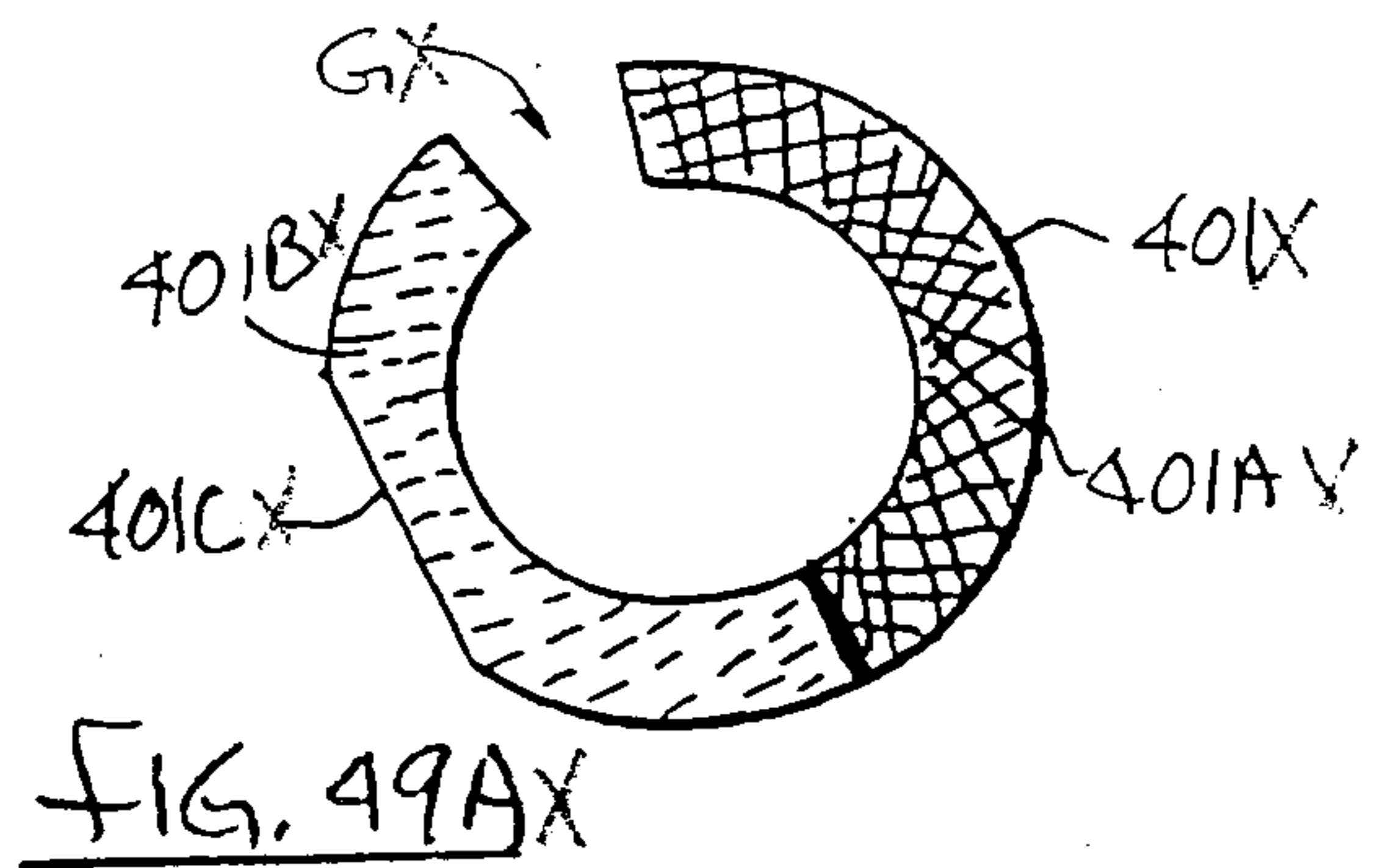
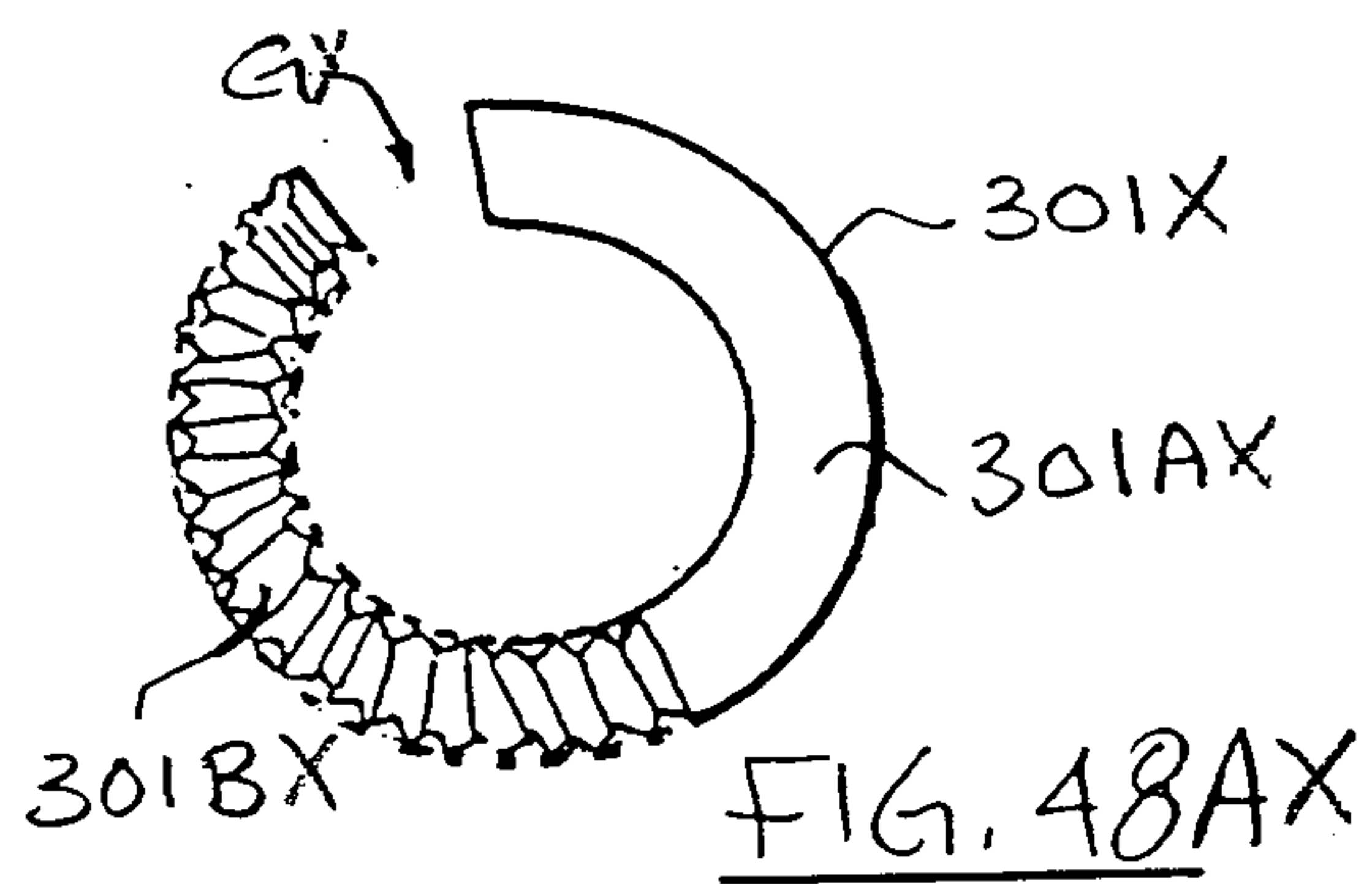


FIG. 47X



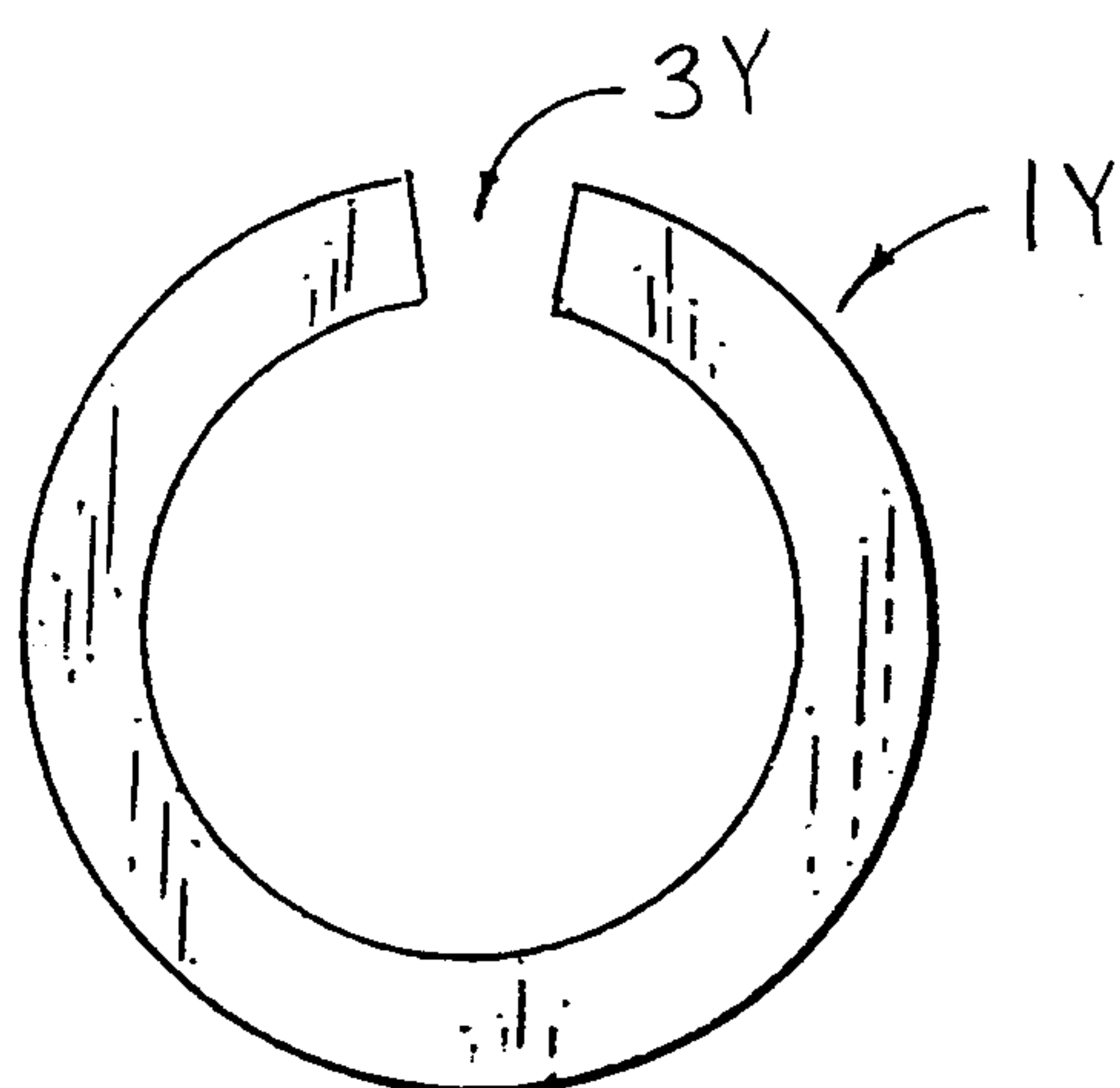


Fig. 1Y
(Prior Art)

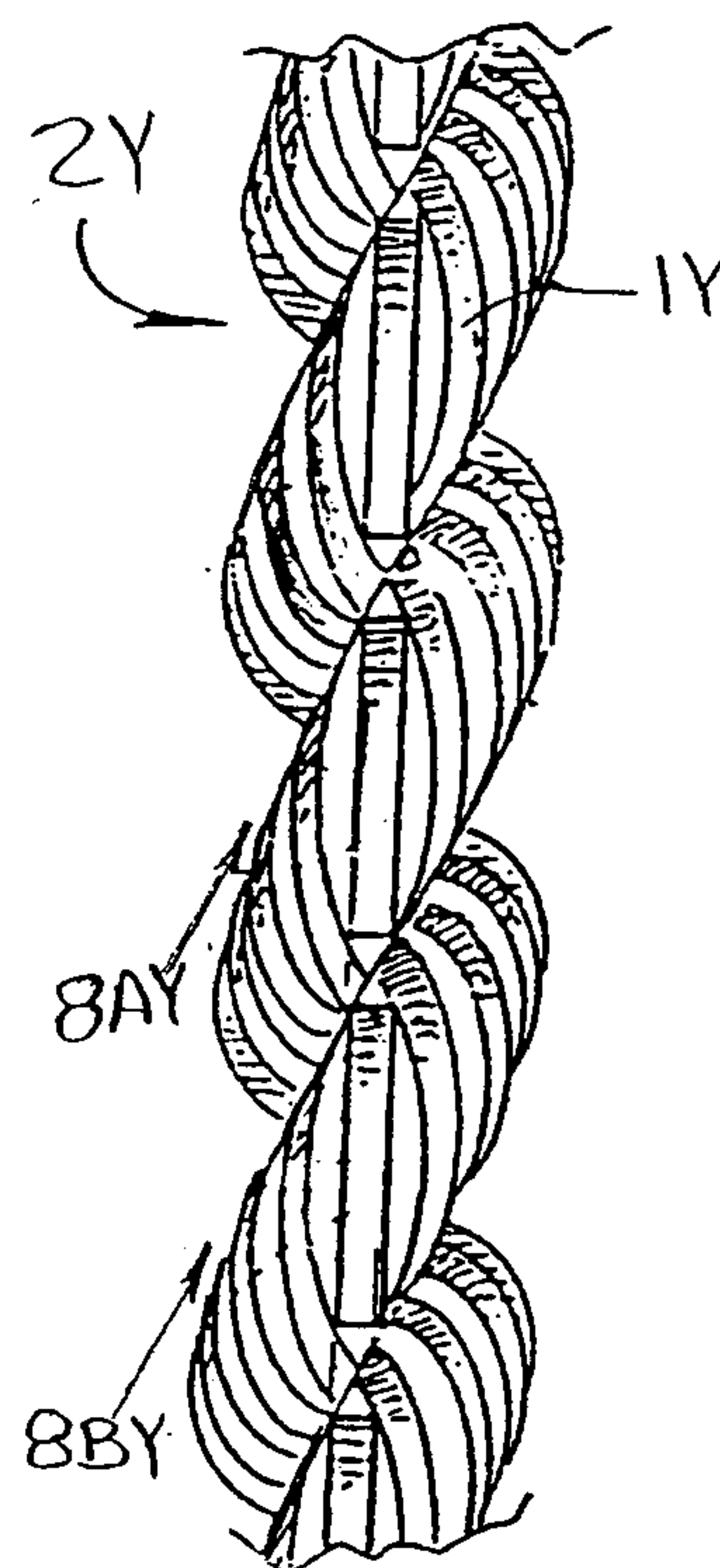


Fig. 2Y

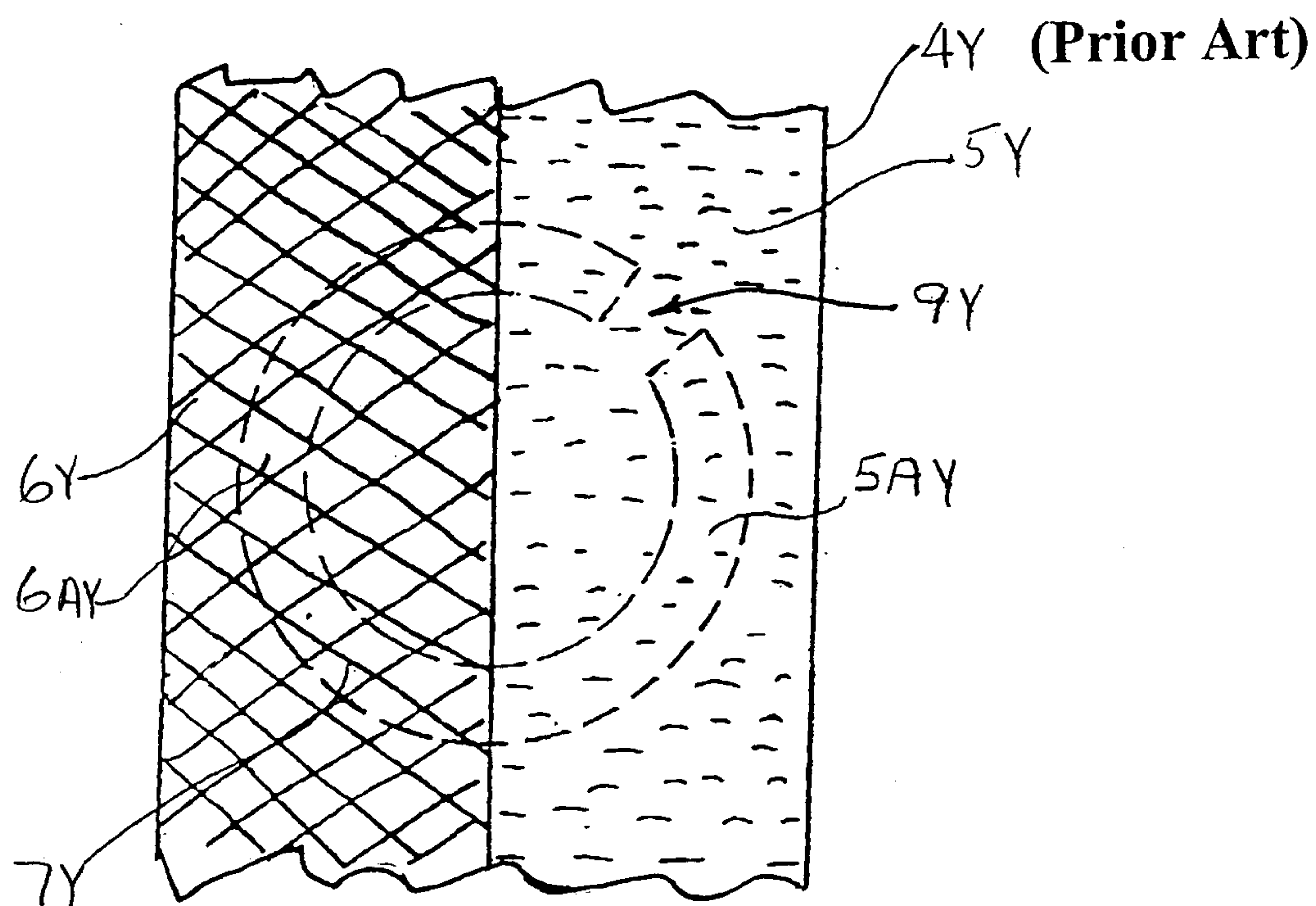


Fig. 3Y

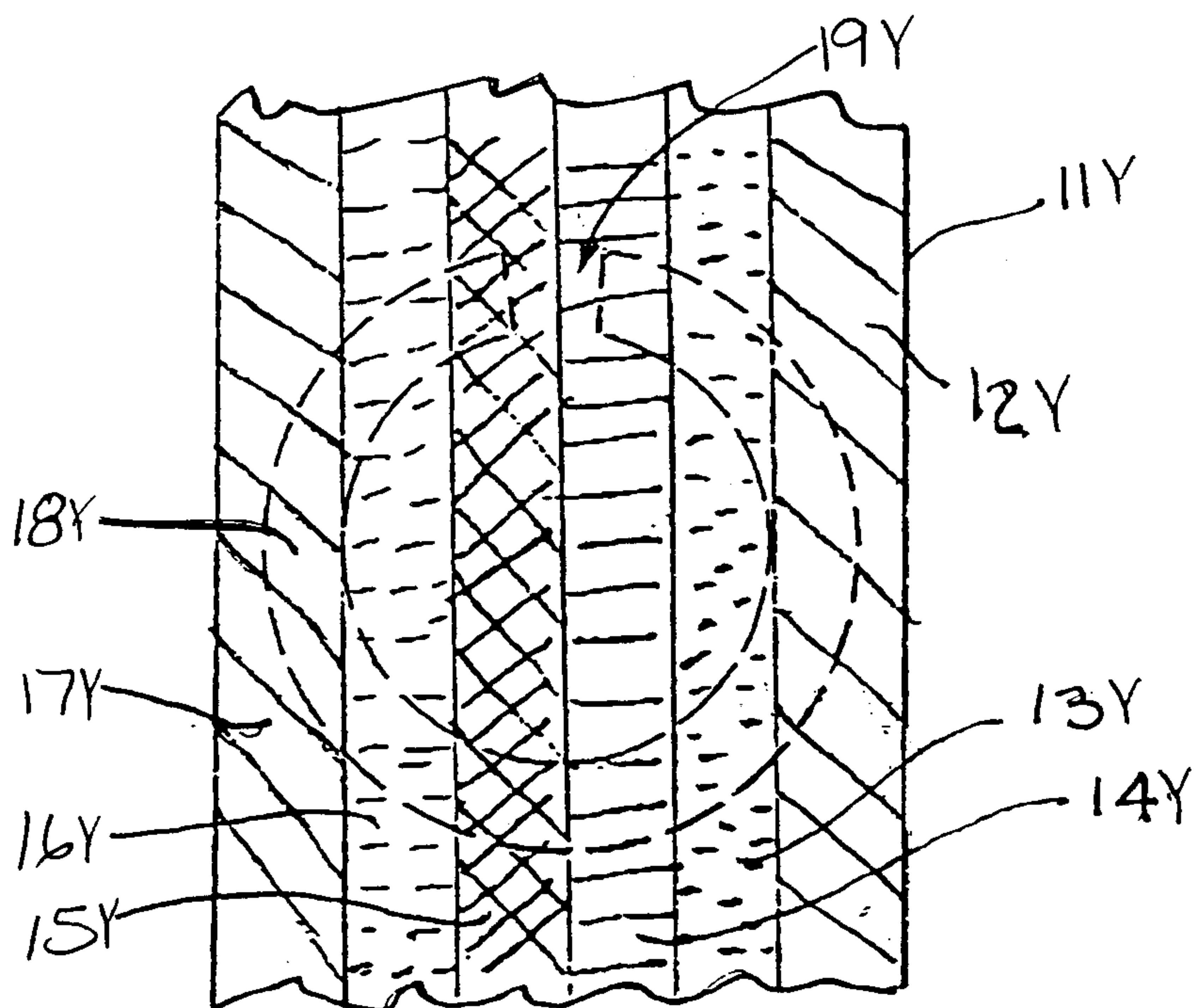


Fig. 4Y

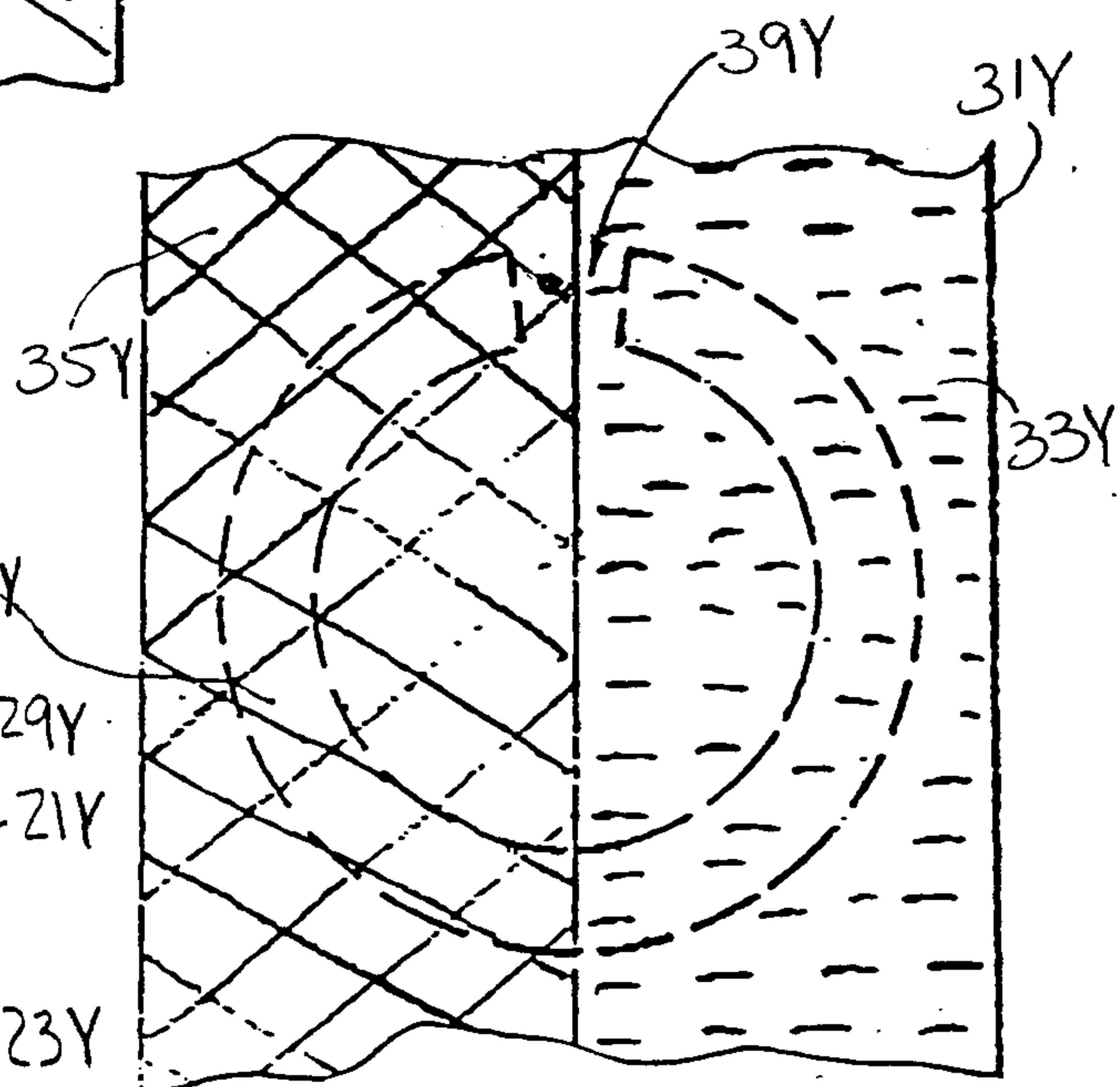


Fig. 5Y

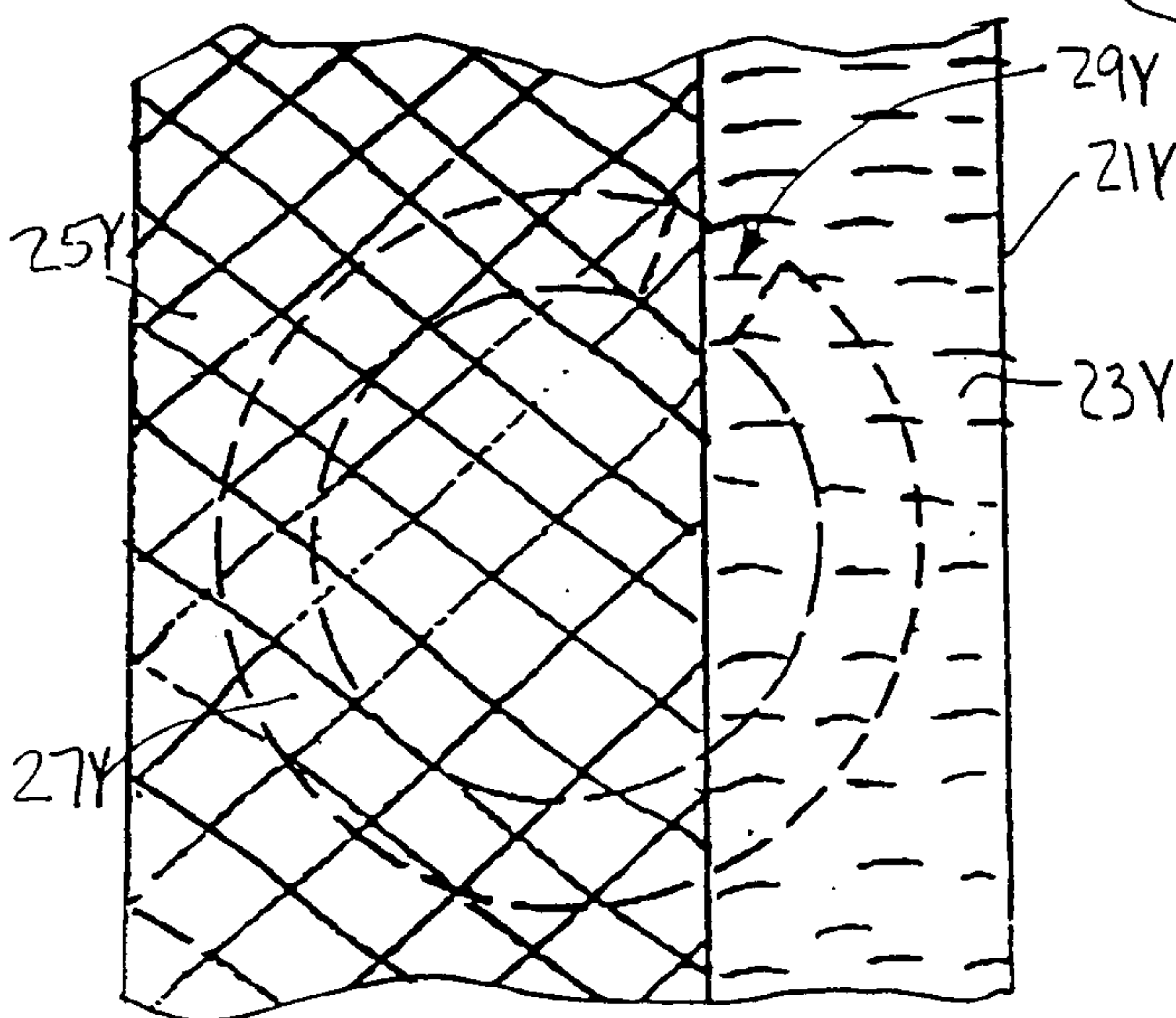
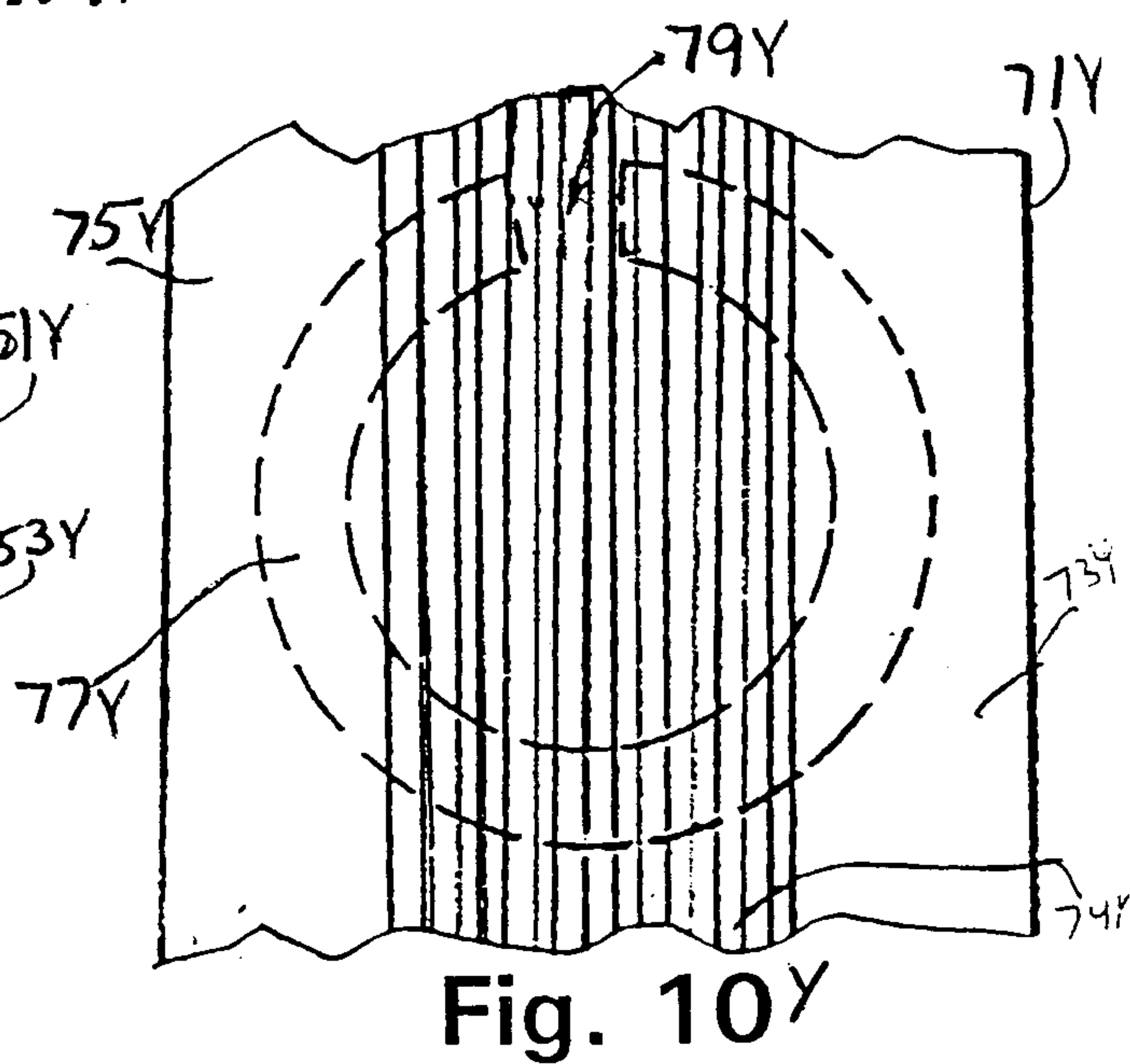
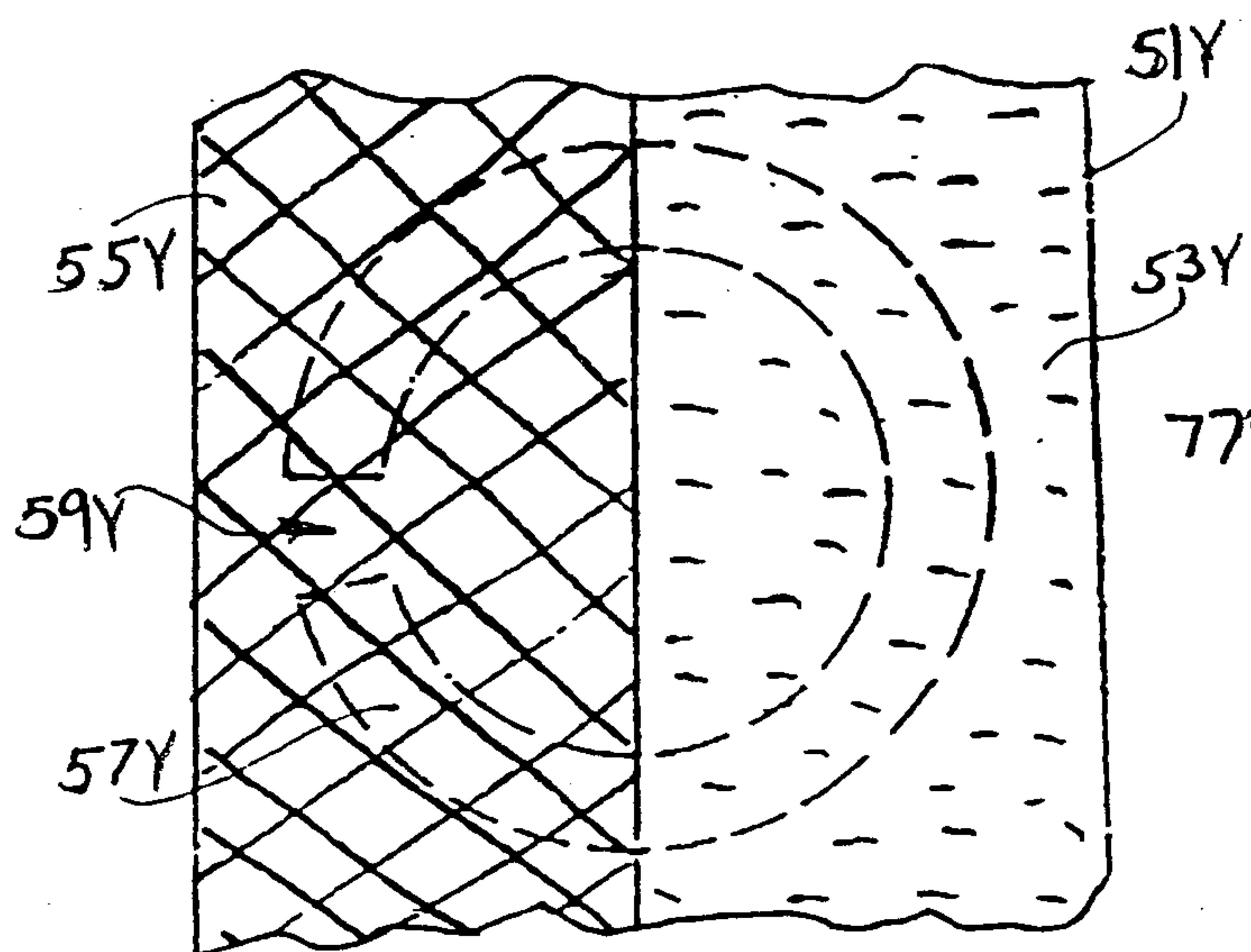
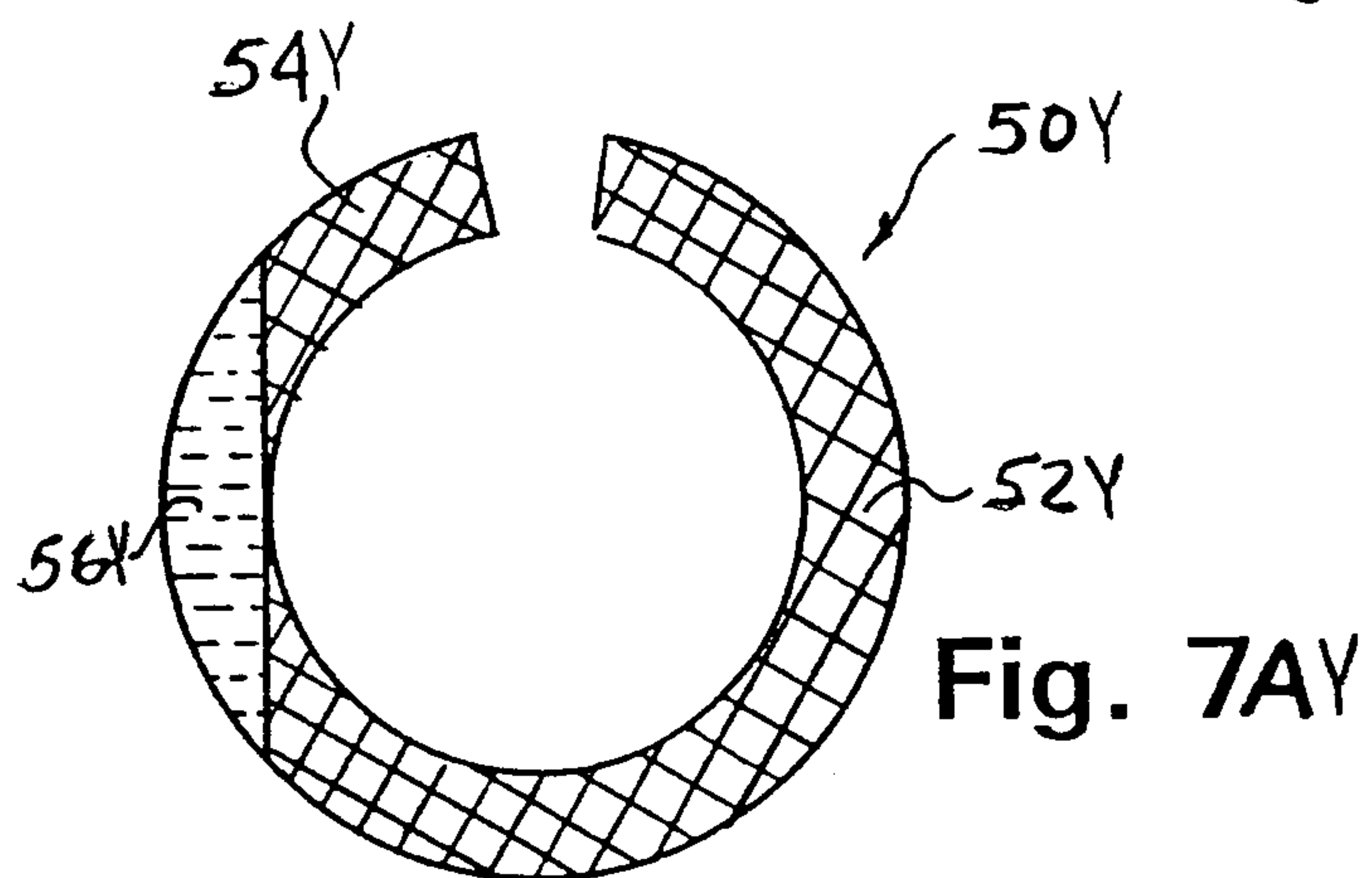
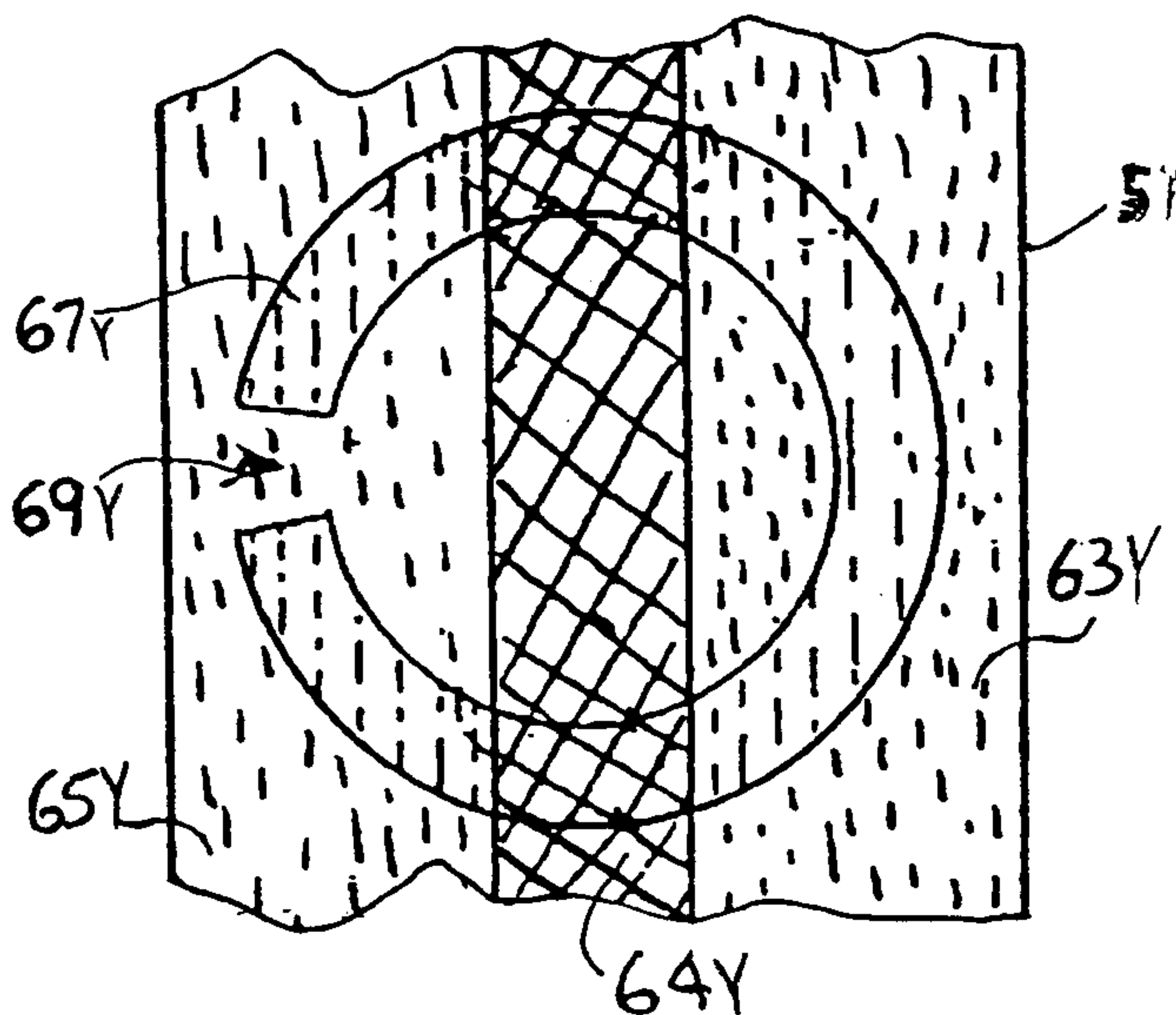
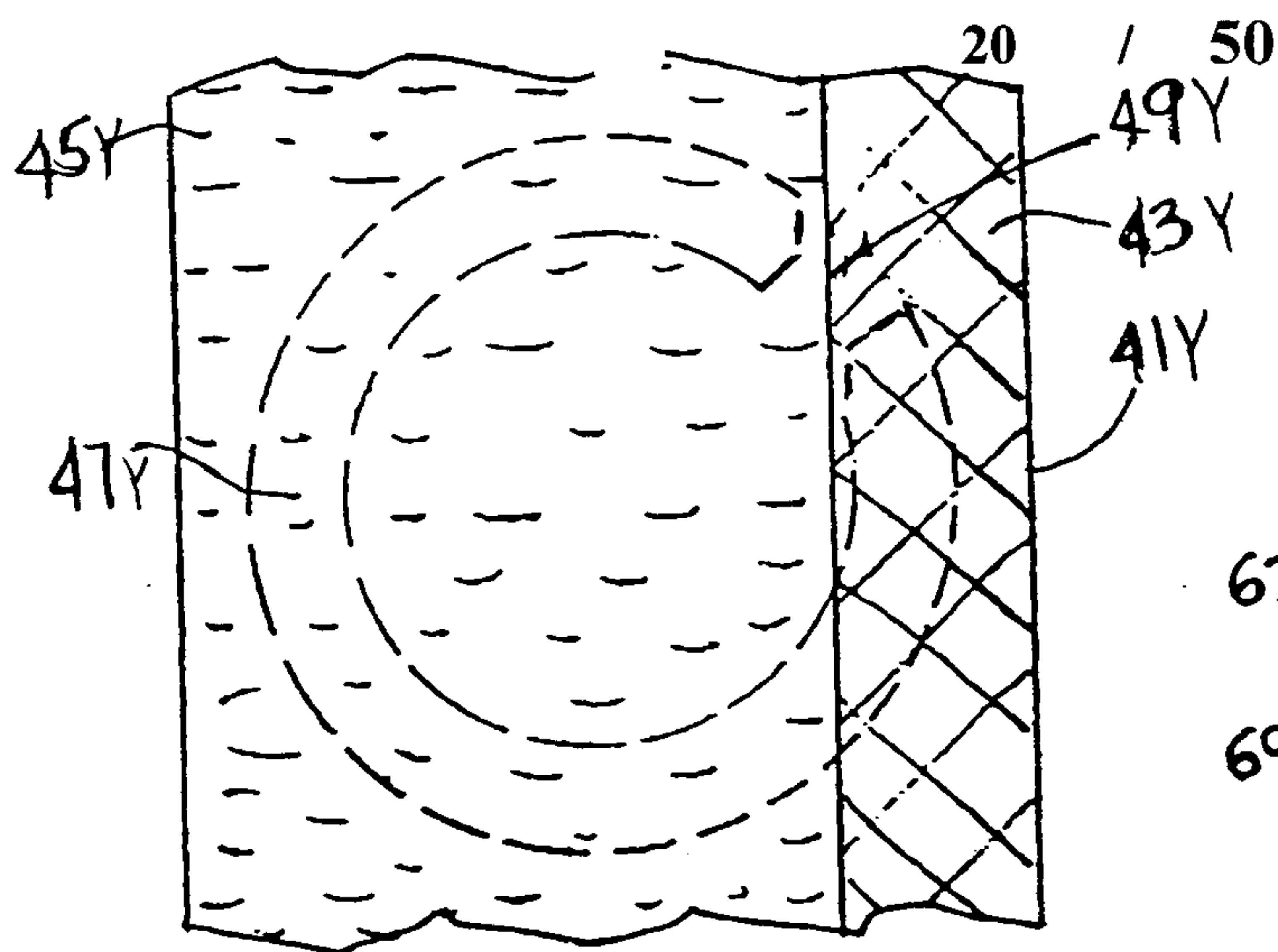


Fig. 6Y



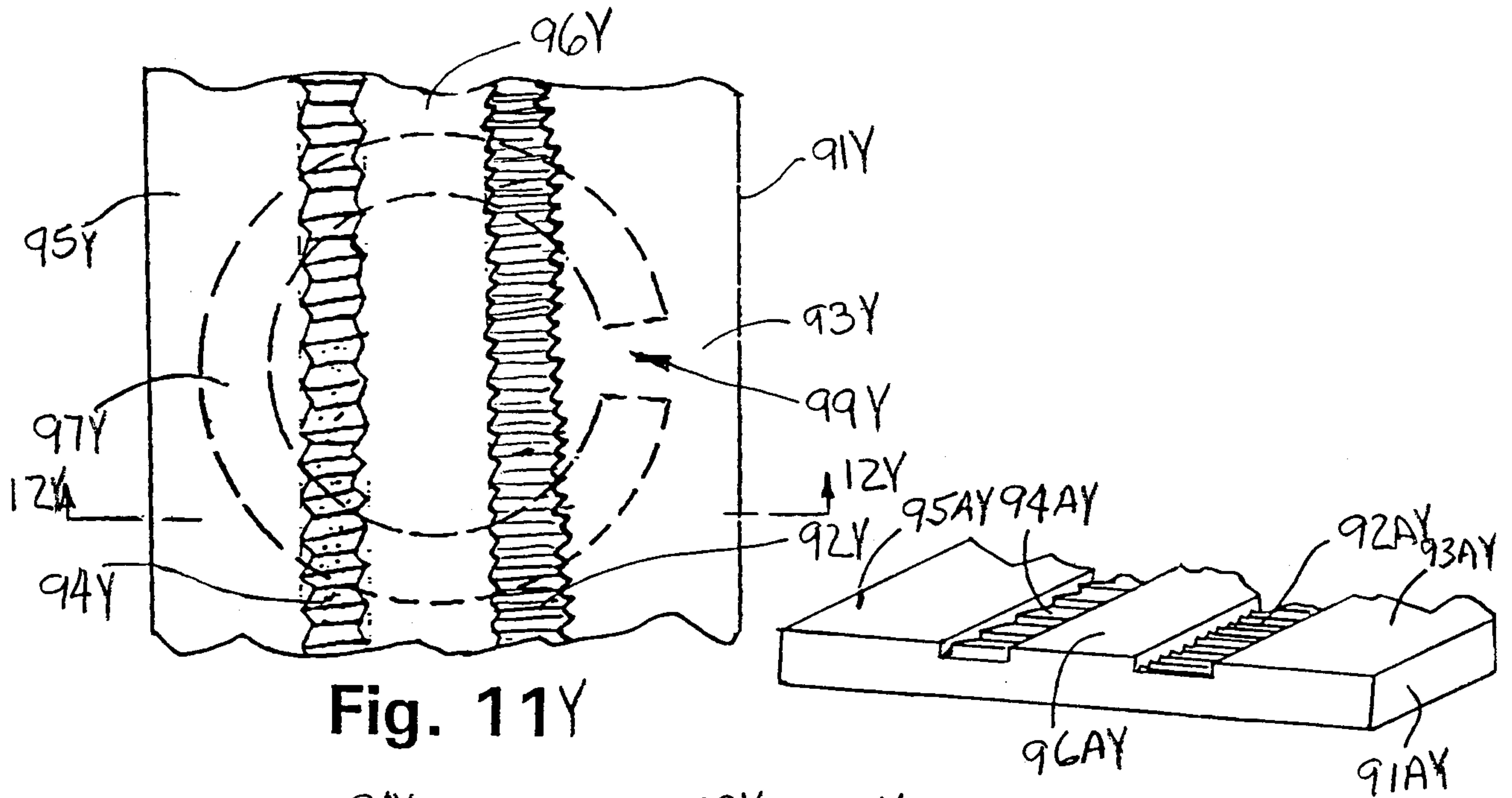


Fig. 11Y

Fig. 12AY

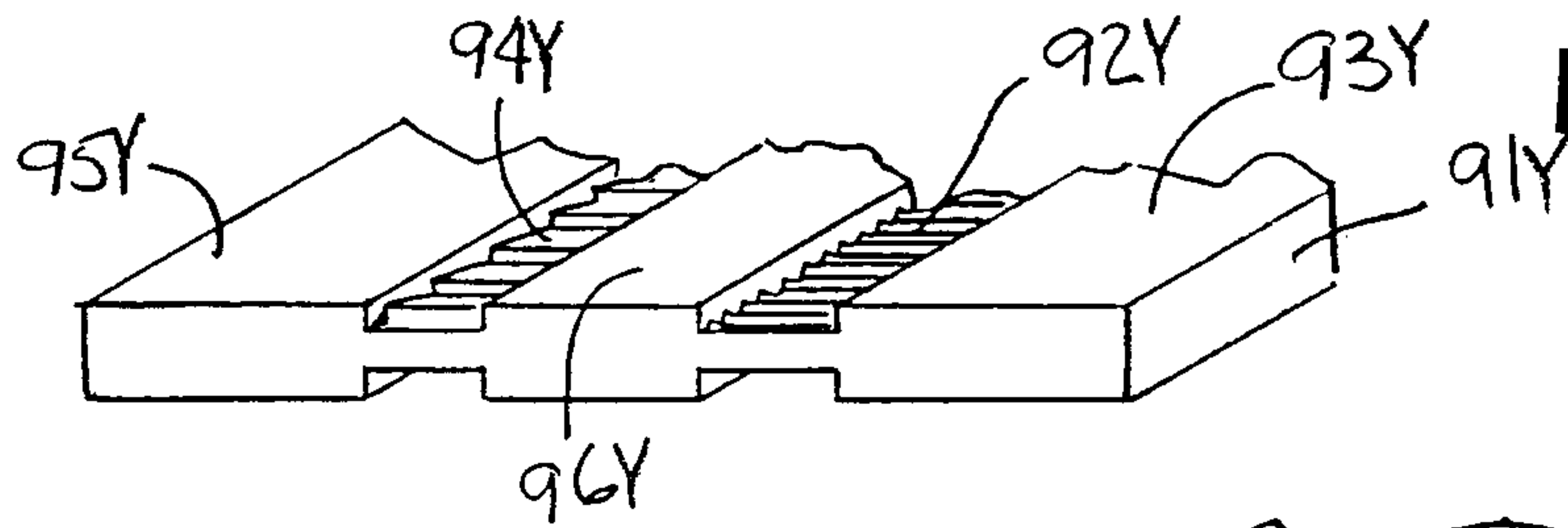


Fig. 12Y

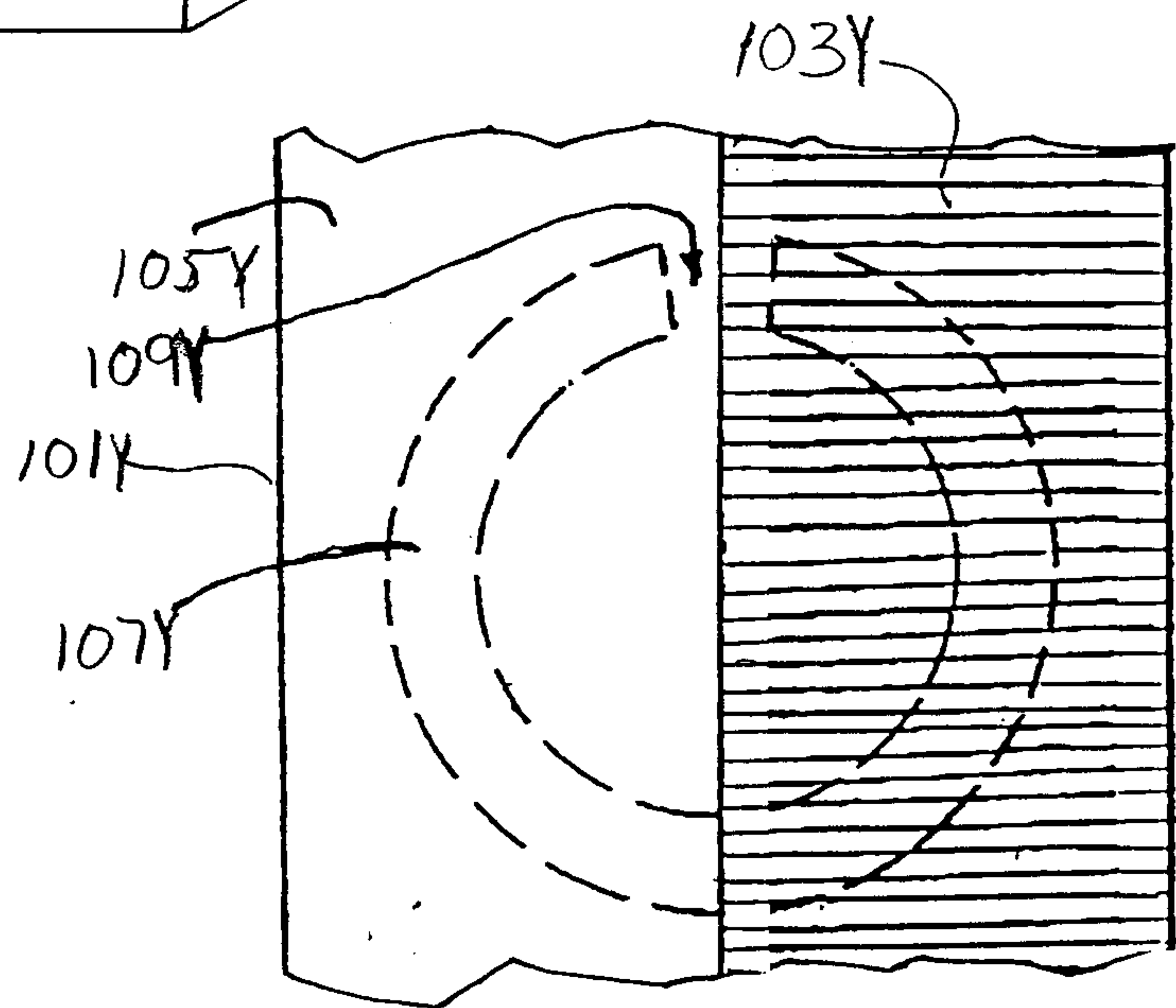


Fig. 13Y

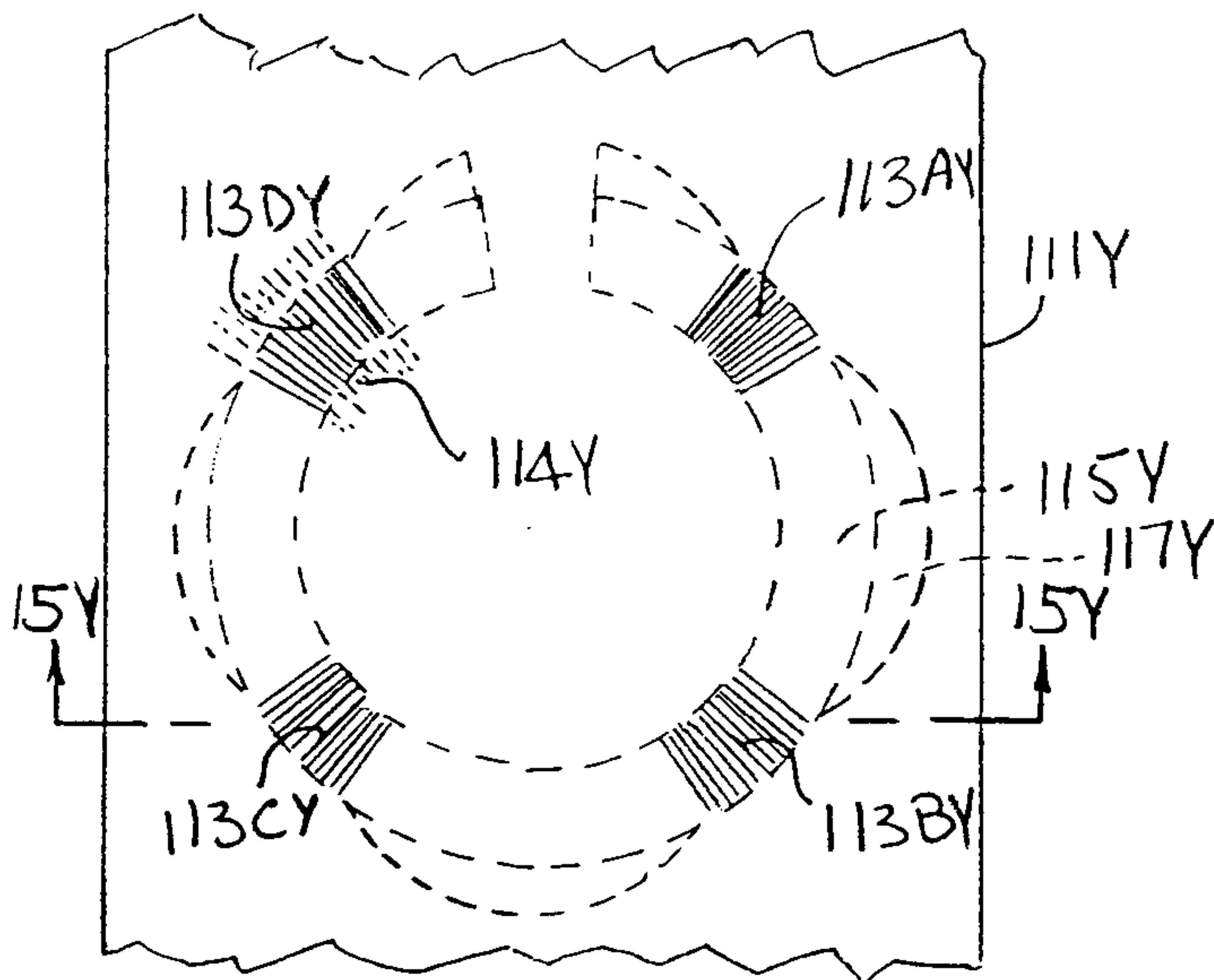


Fig. 14Y

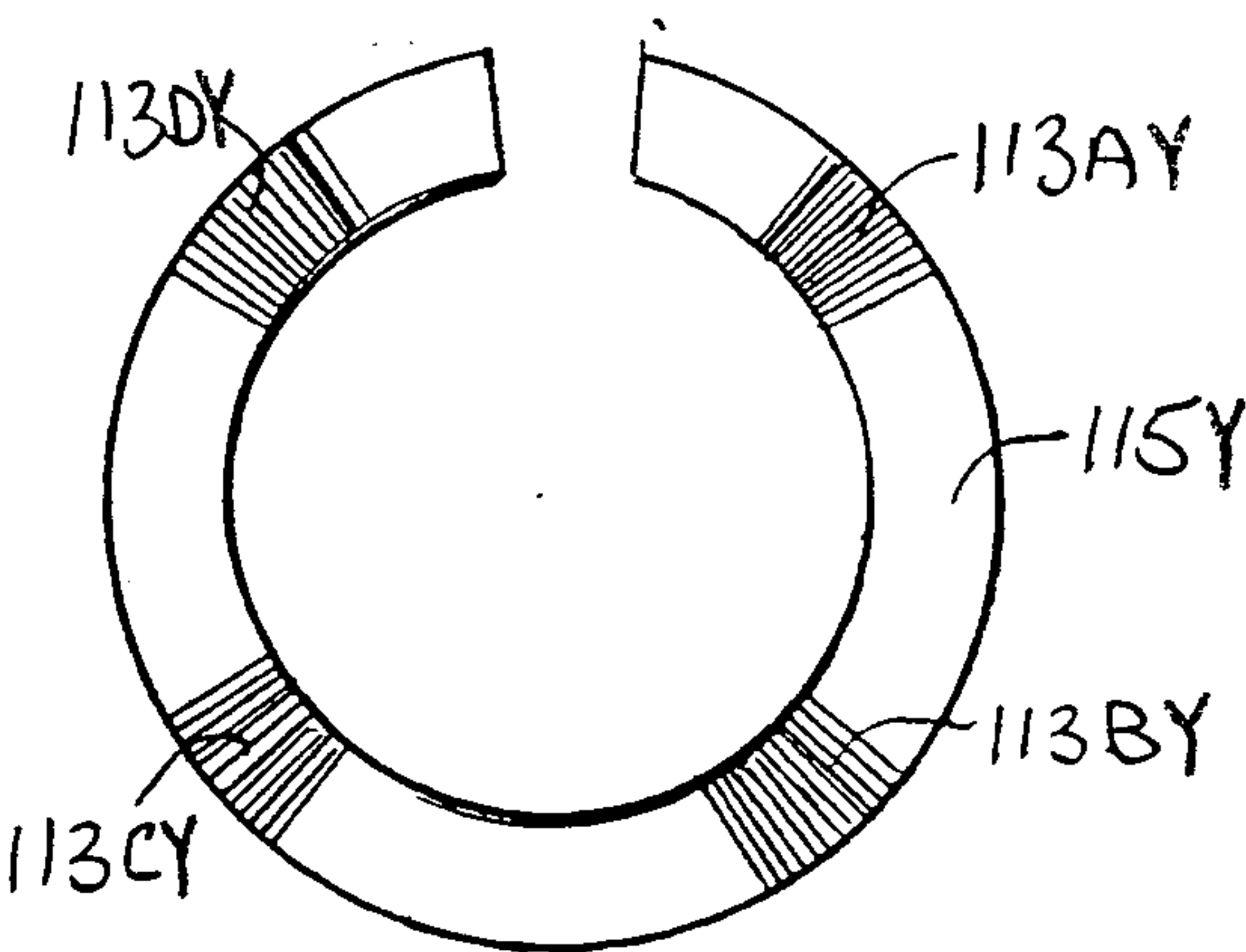


Fig. 16Y

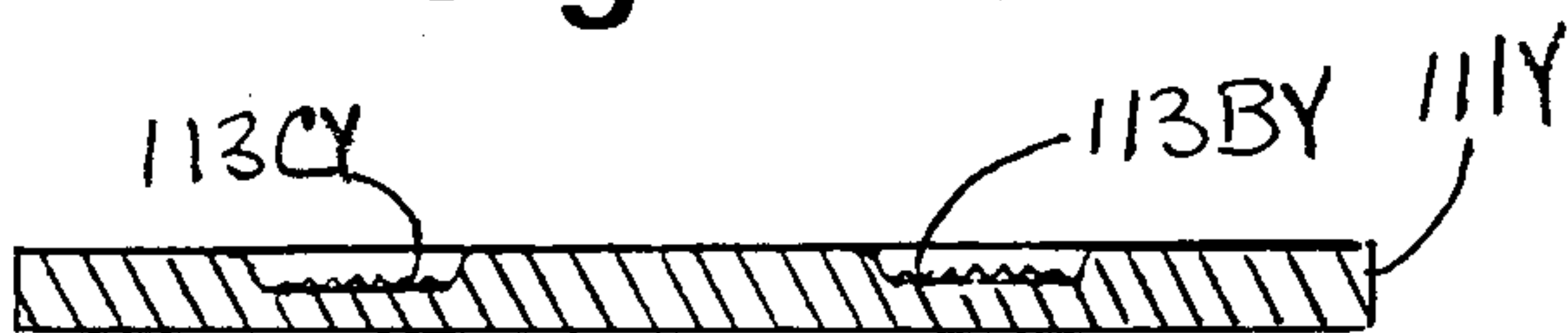


Fig. 15Y

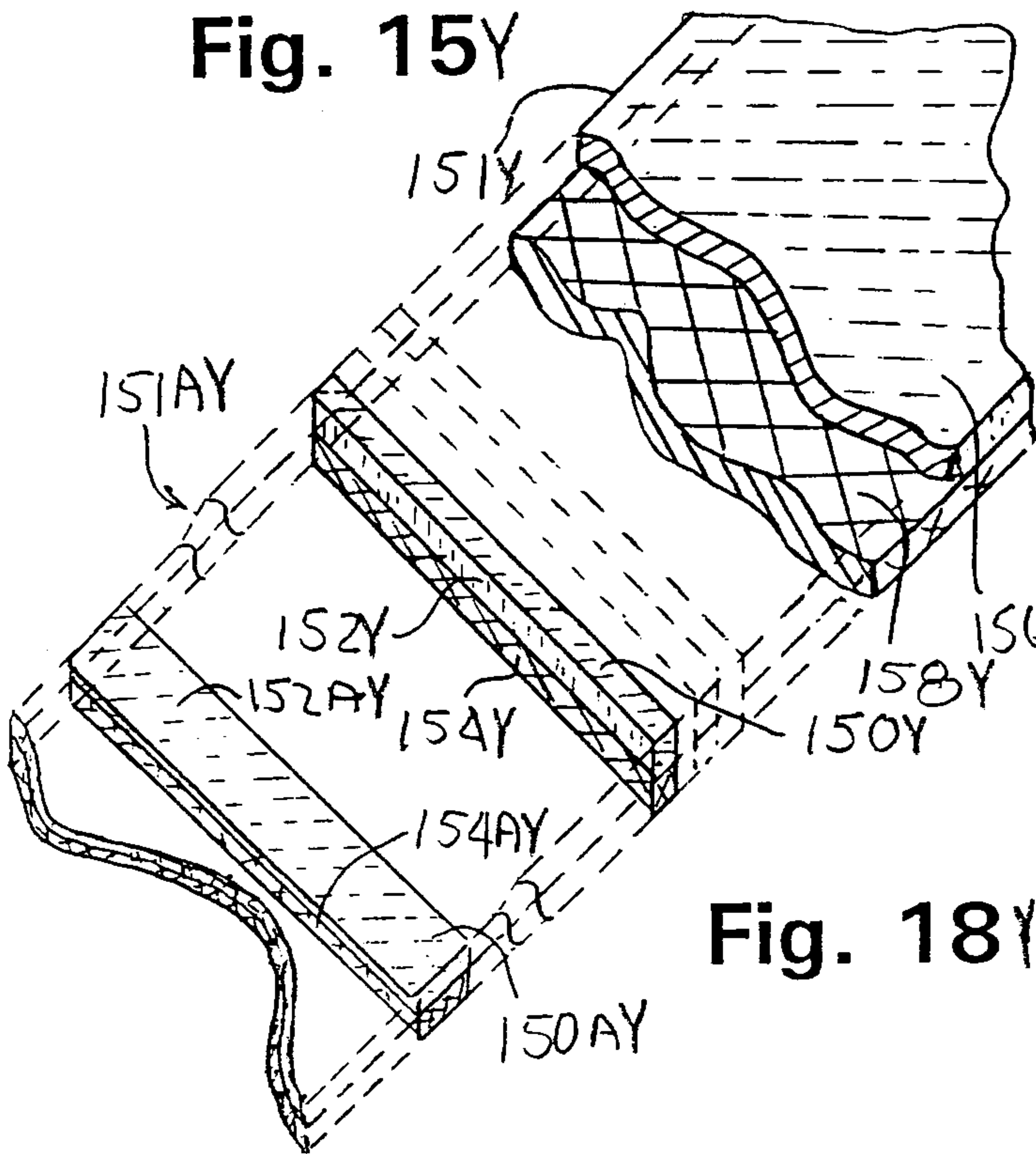


Fig. 18Y

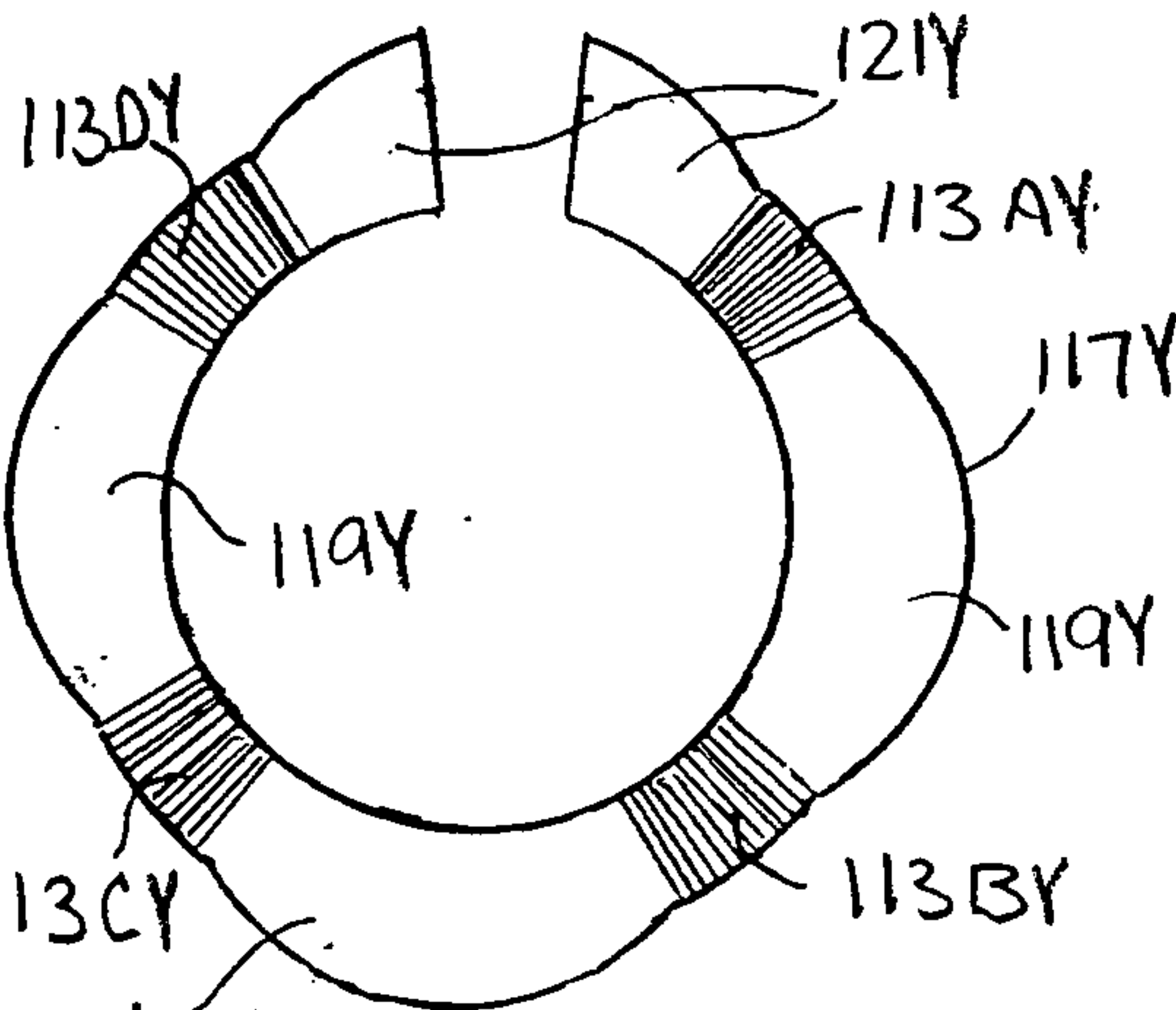


Fig. 17Y

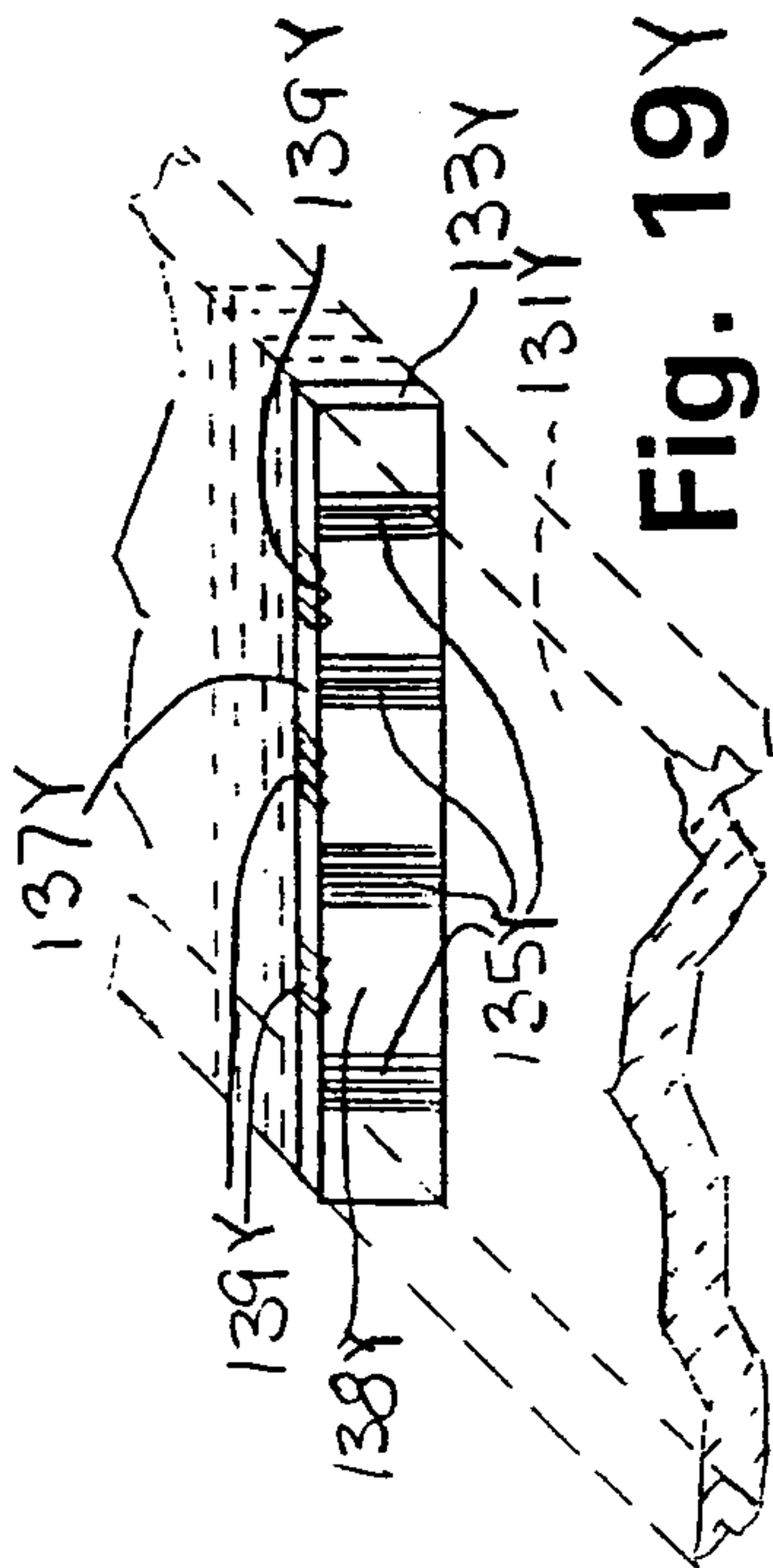


Fig. 19Y

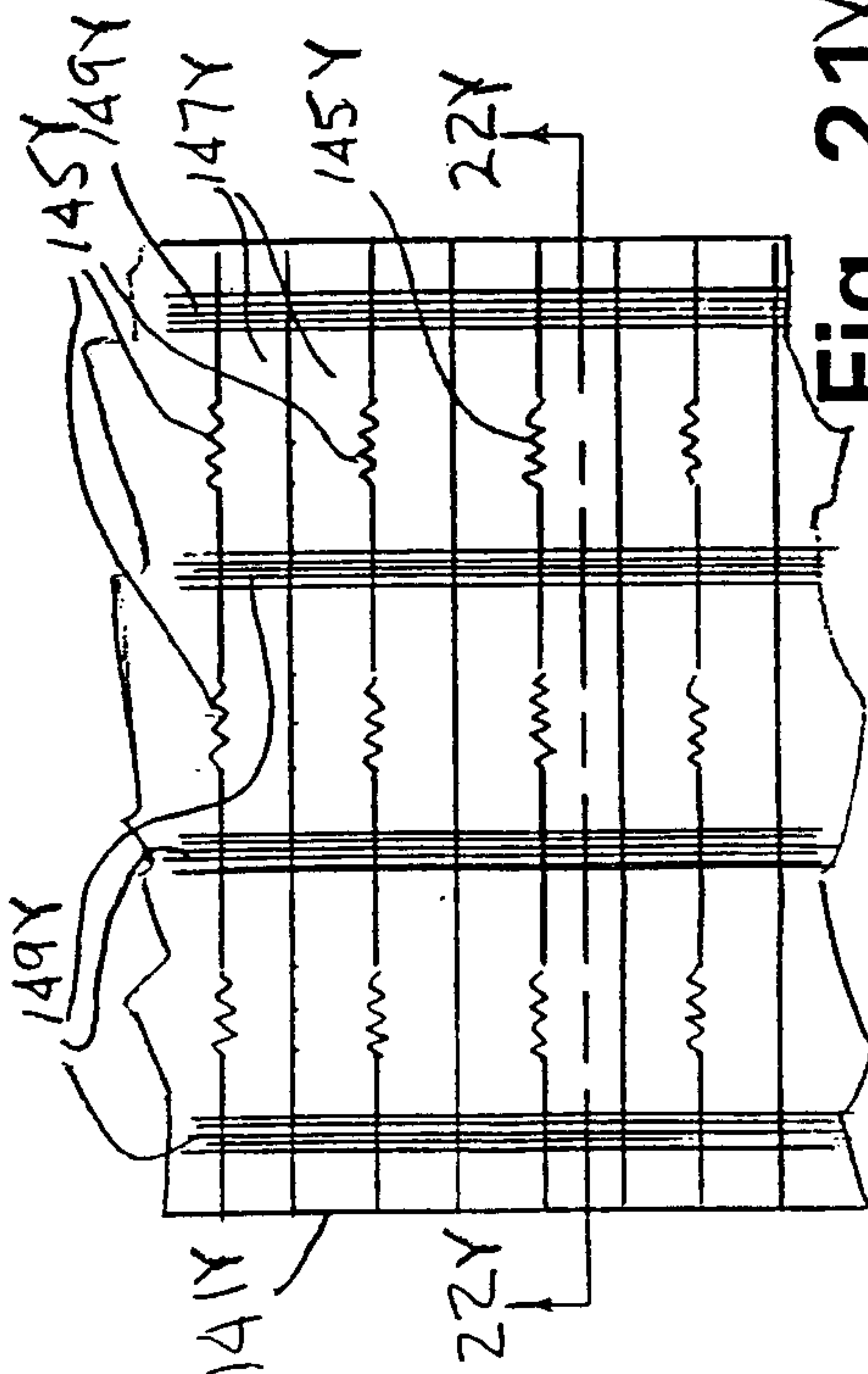


Fig. 21Y

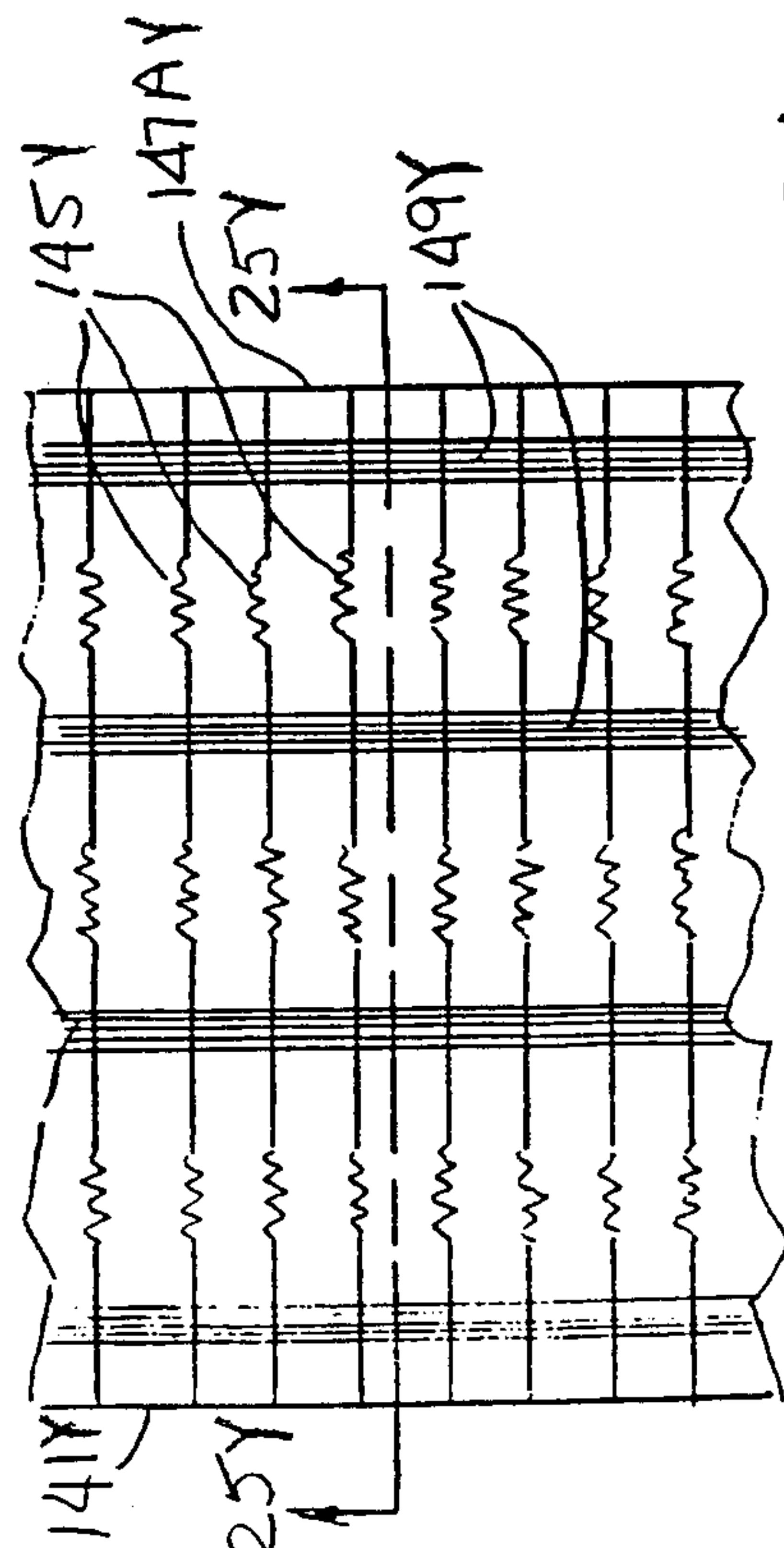


Fig. 24Y

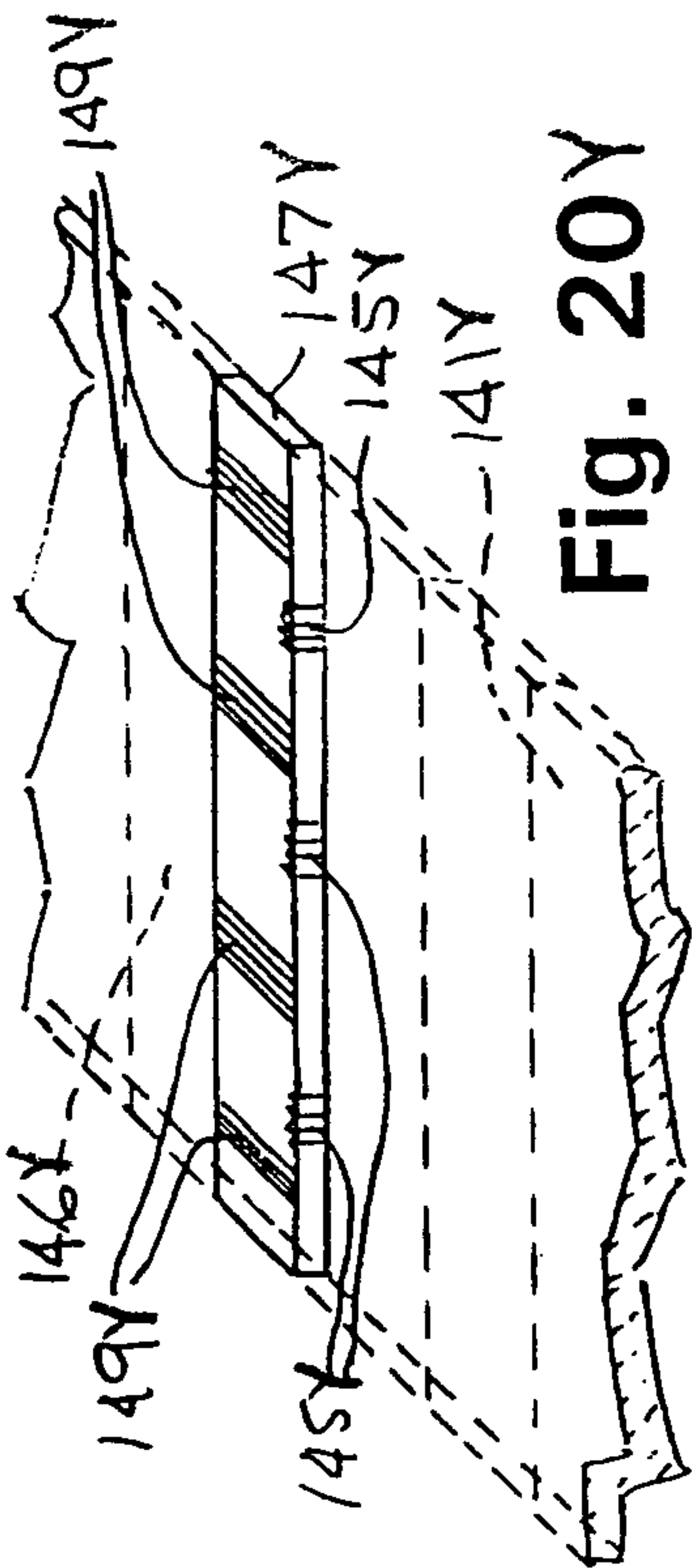


Fig. 20Y

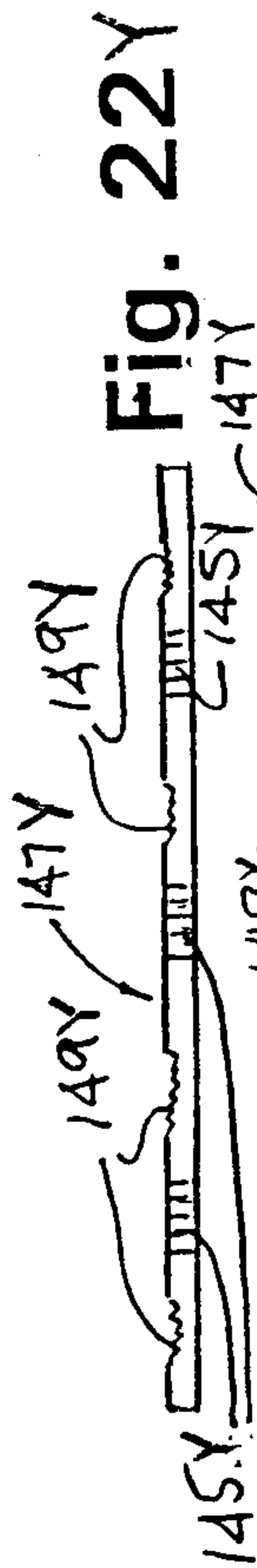


Fig. 22Y



Fig. 23Y



Fig. 25Y



Fig. 26Y

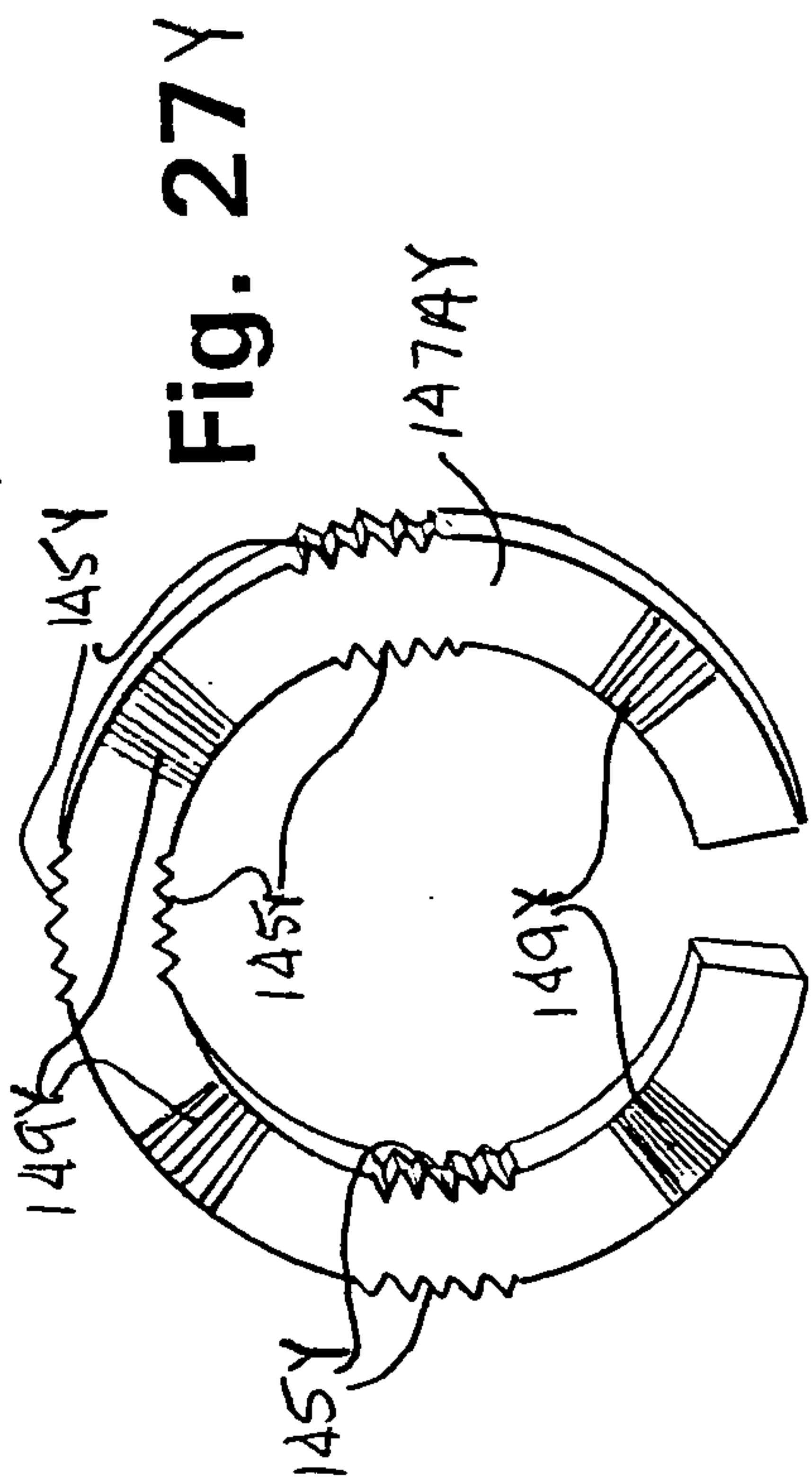


Fig. 27Y

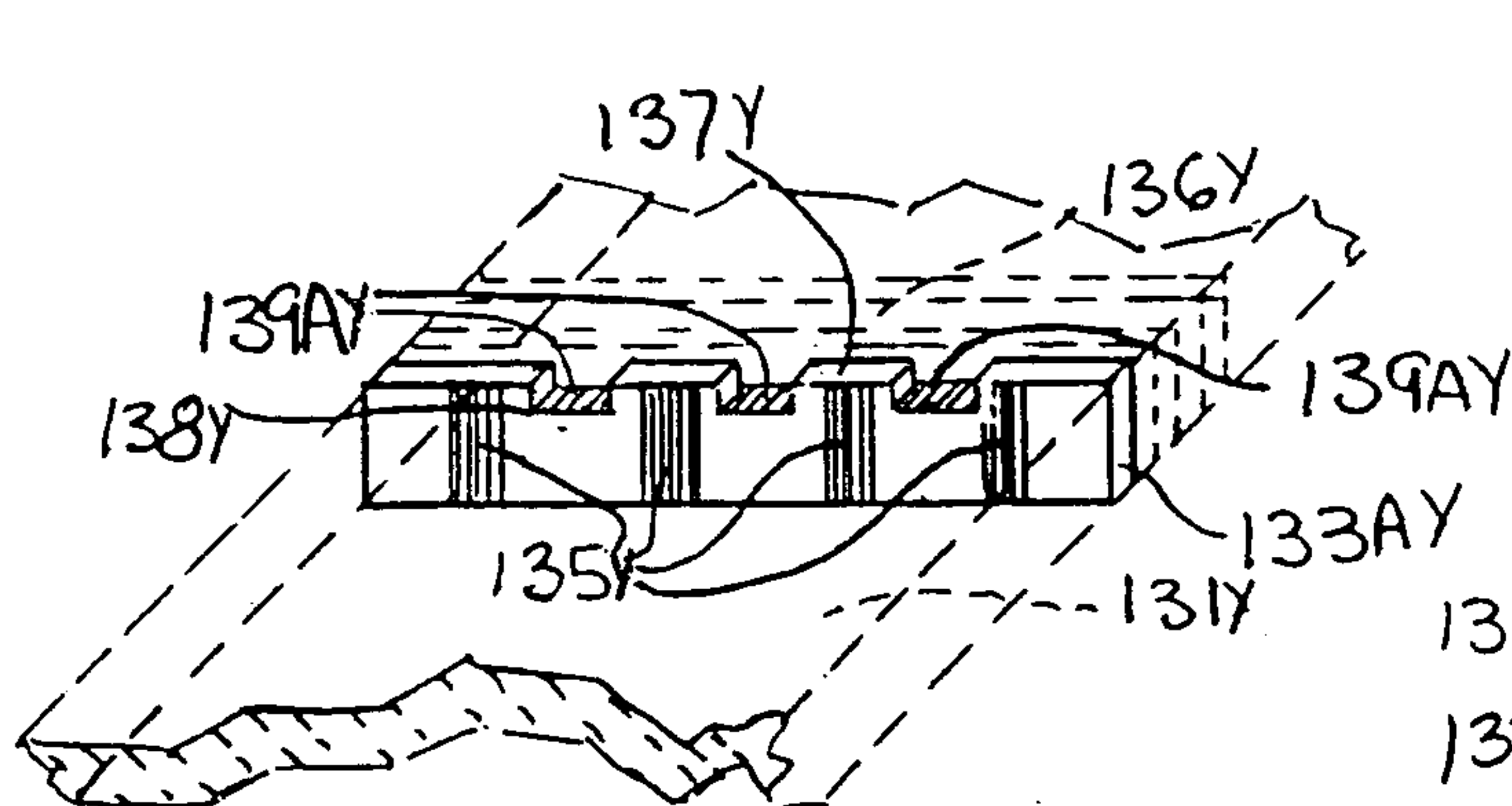


Fig. 28Y

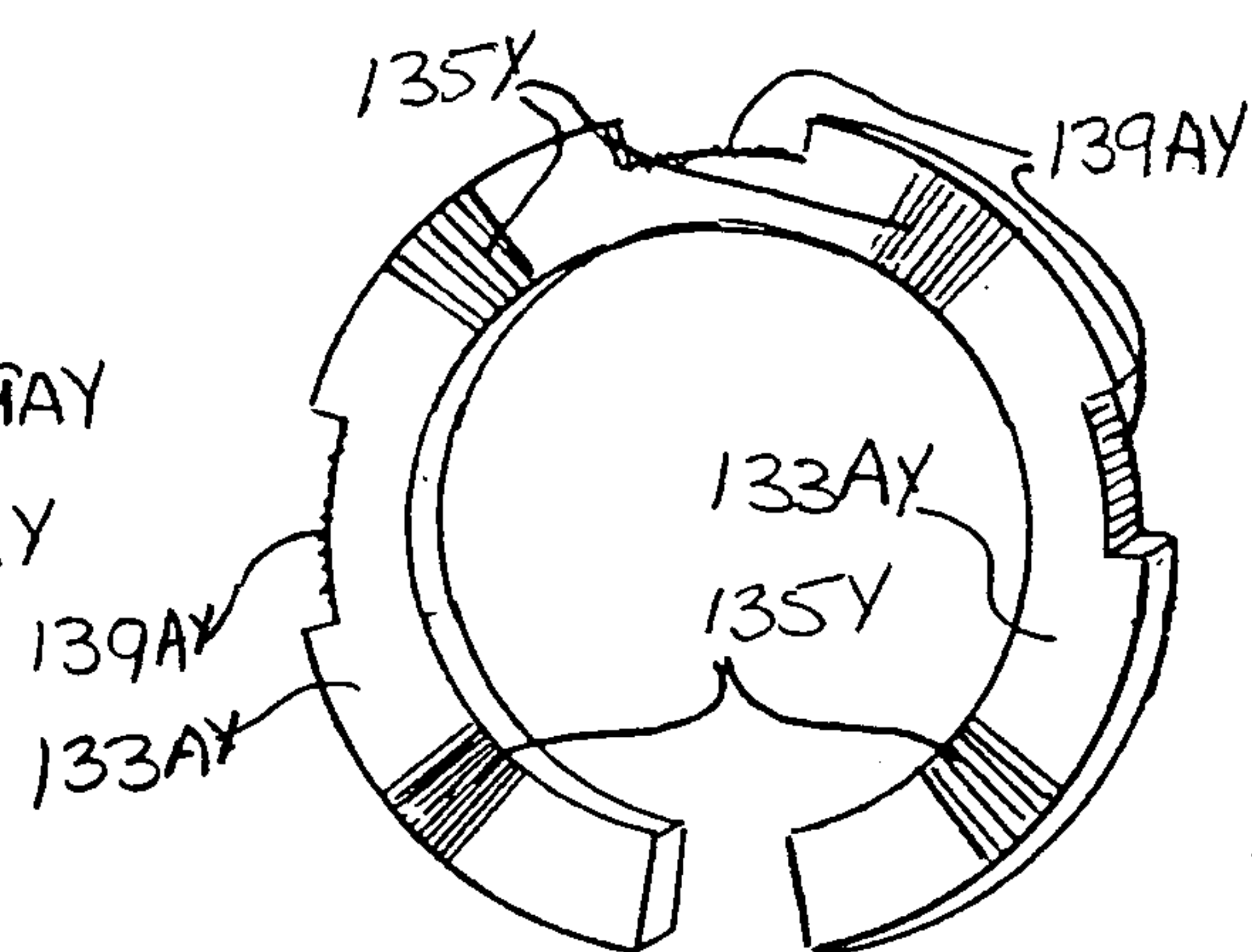


Fig. 29Y

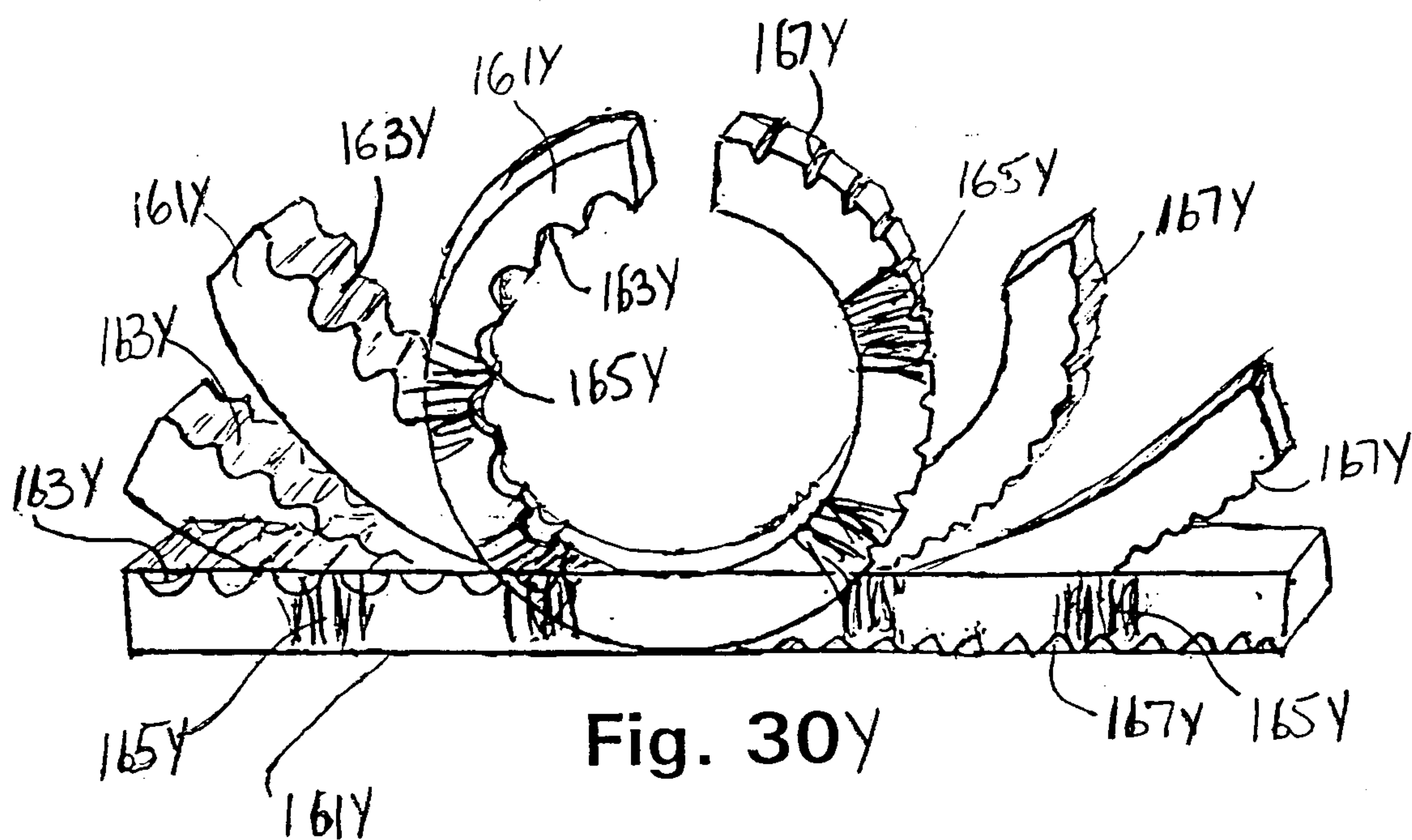


Fig. 30Y

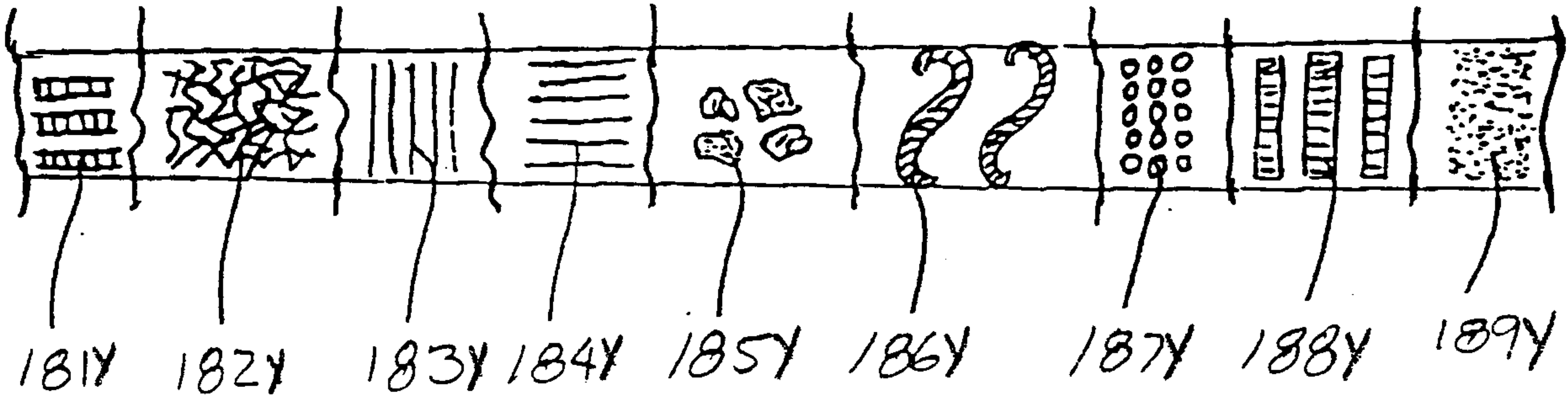
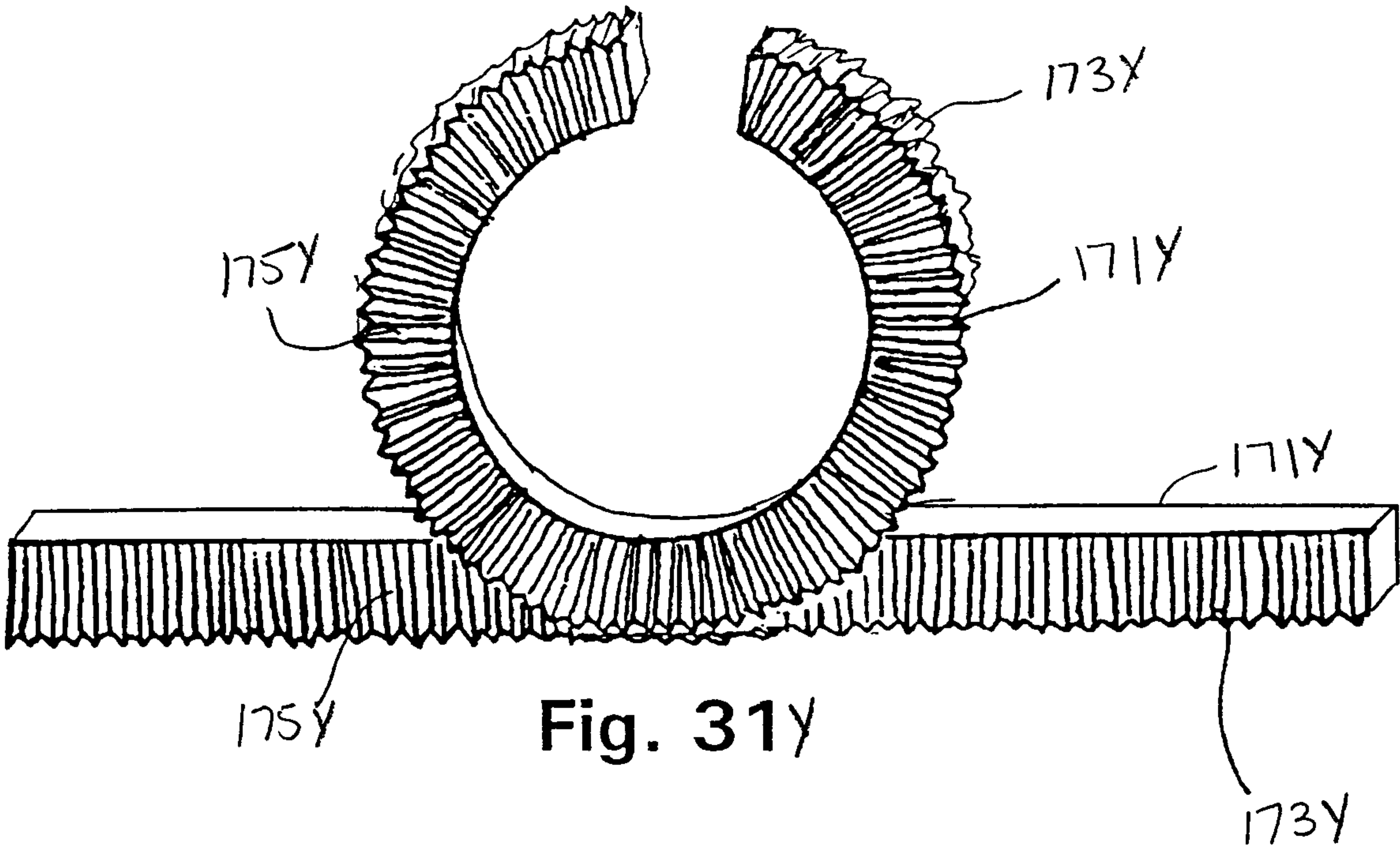


Fig. 32Y

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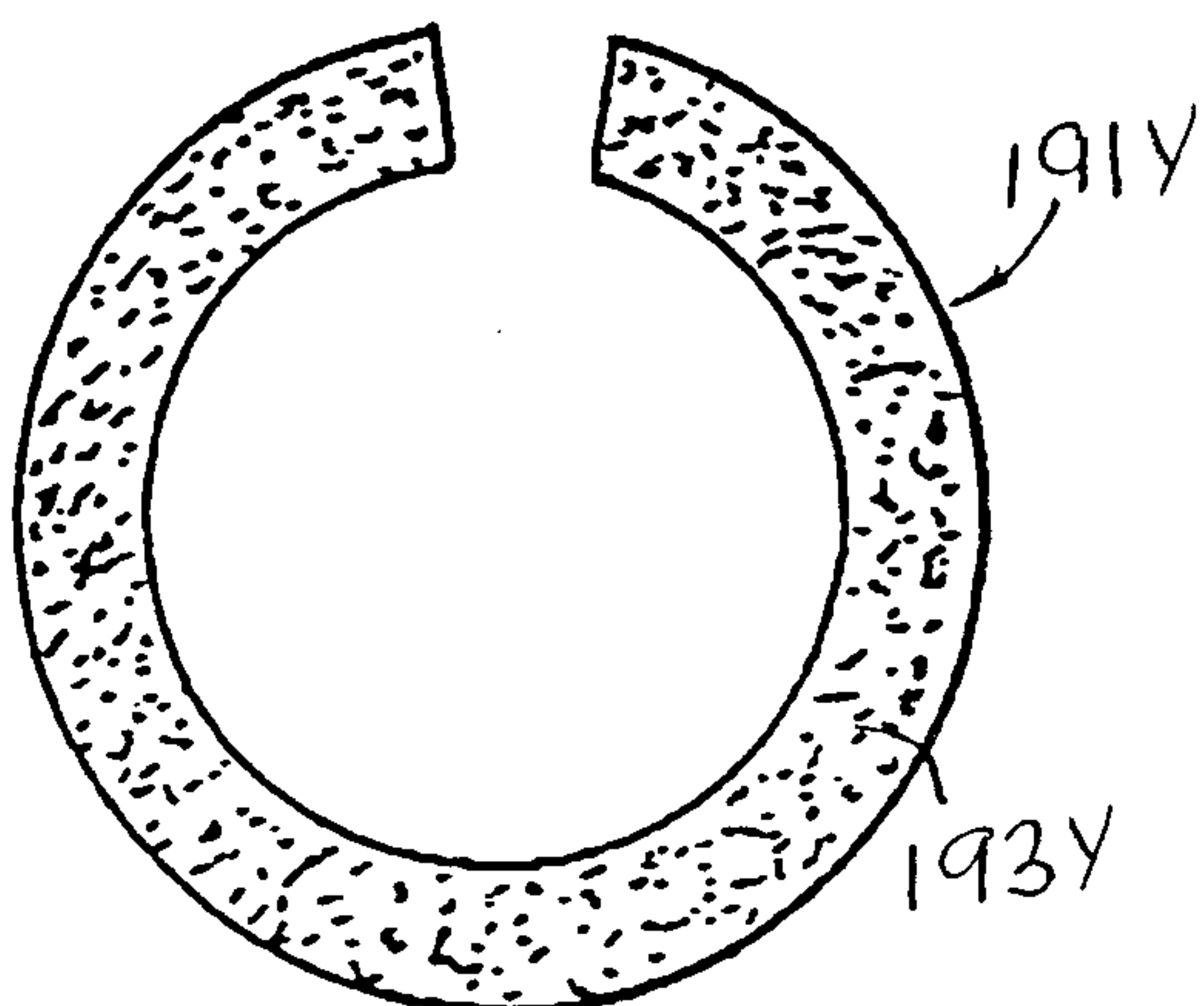


Fig. 33Y

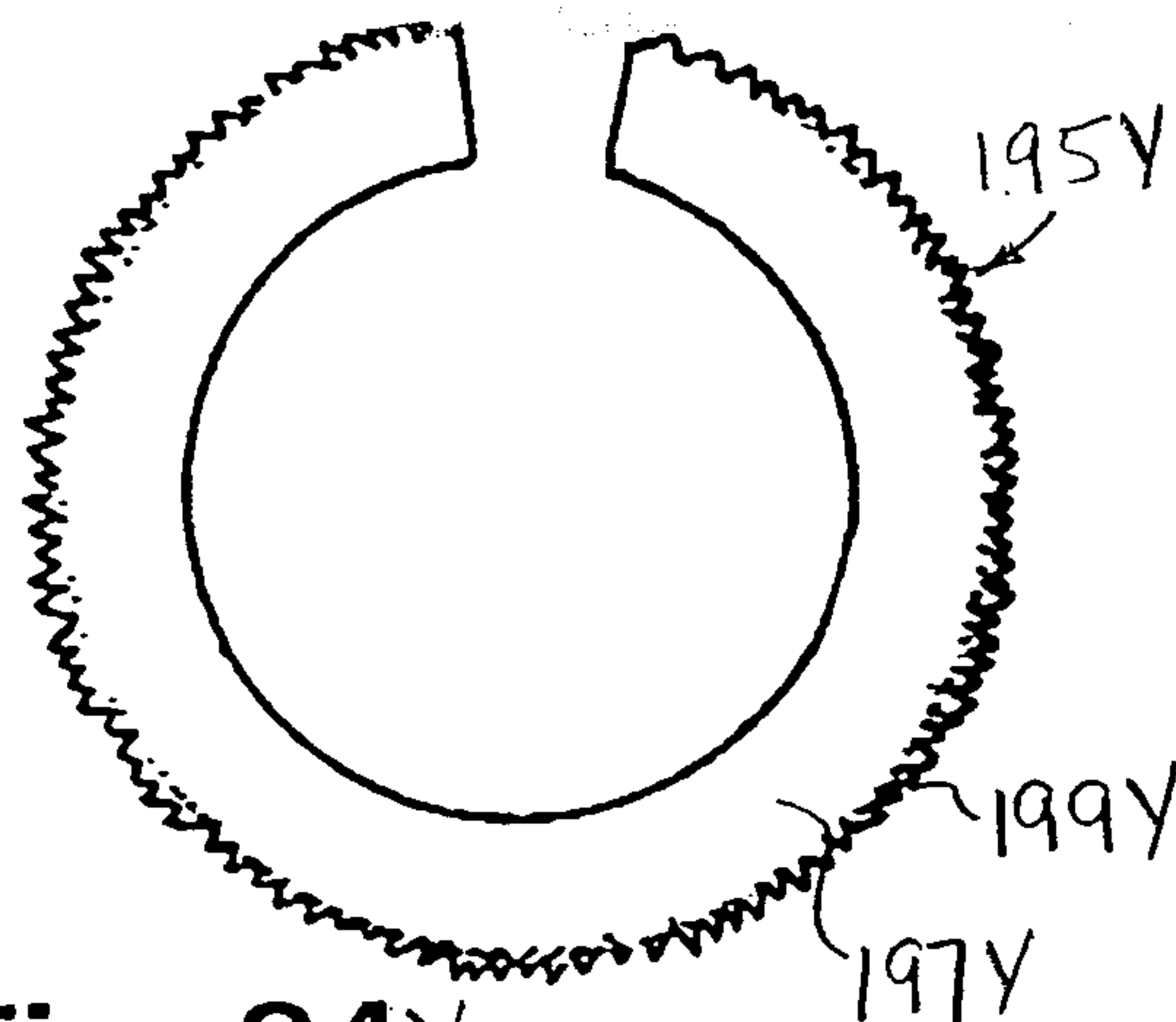


Fig. 34Y

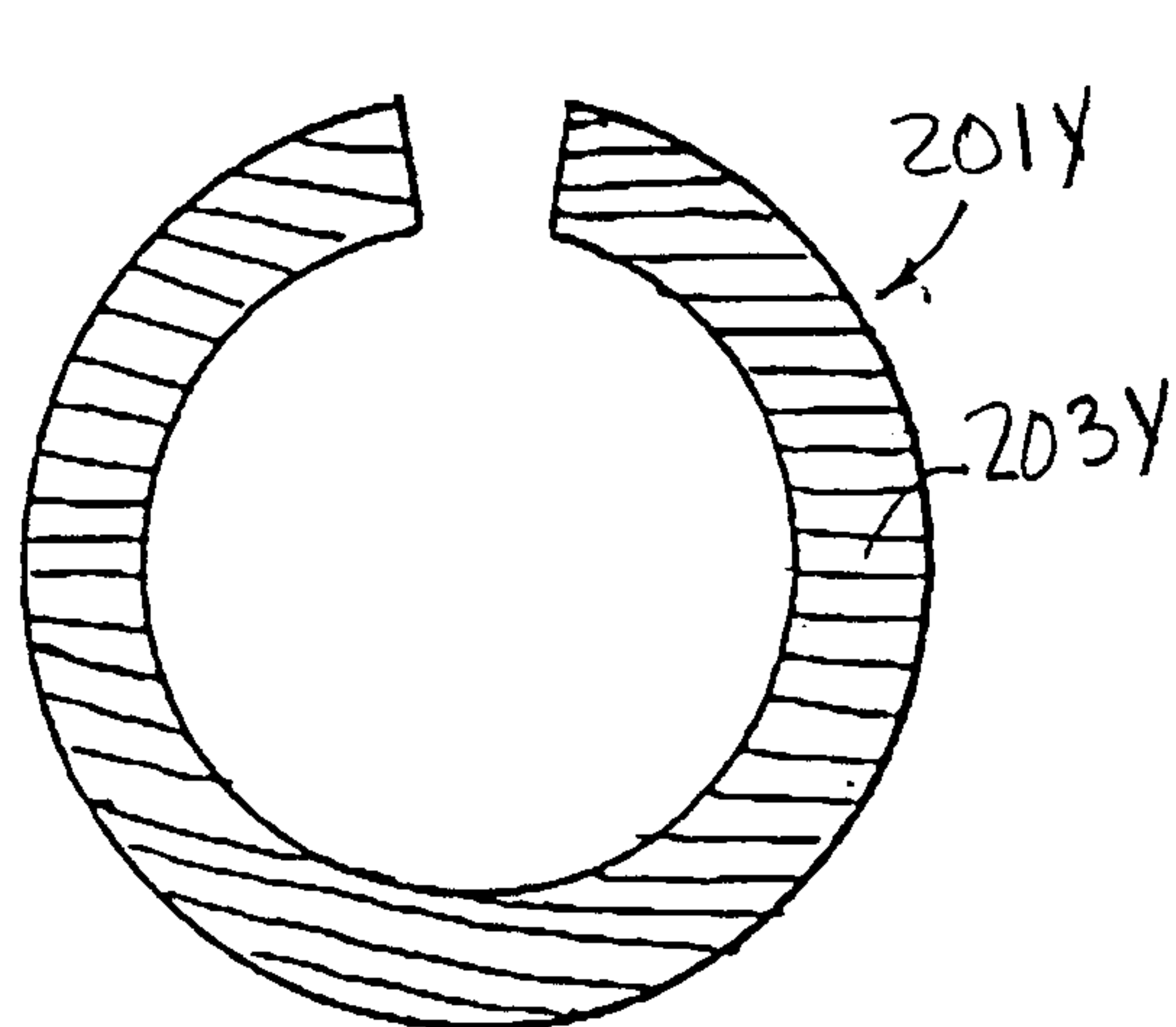


Fig. 35Y

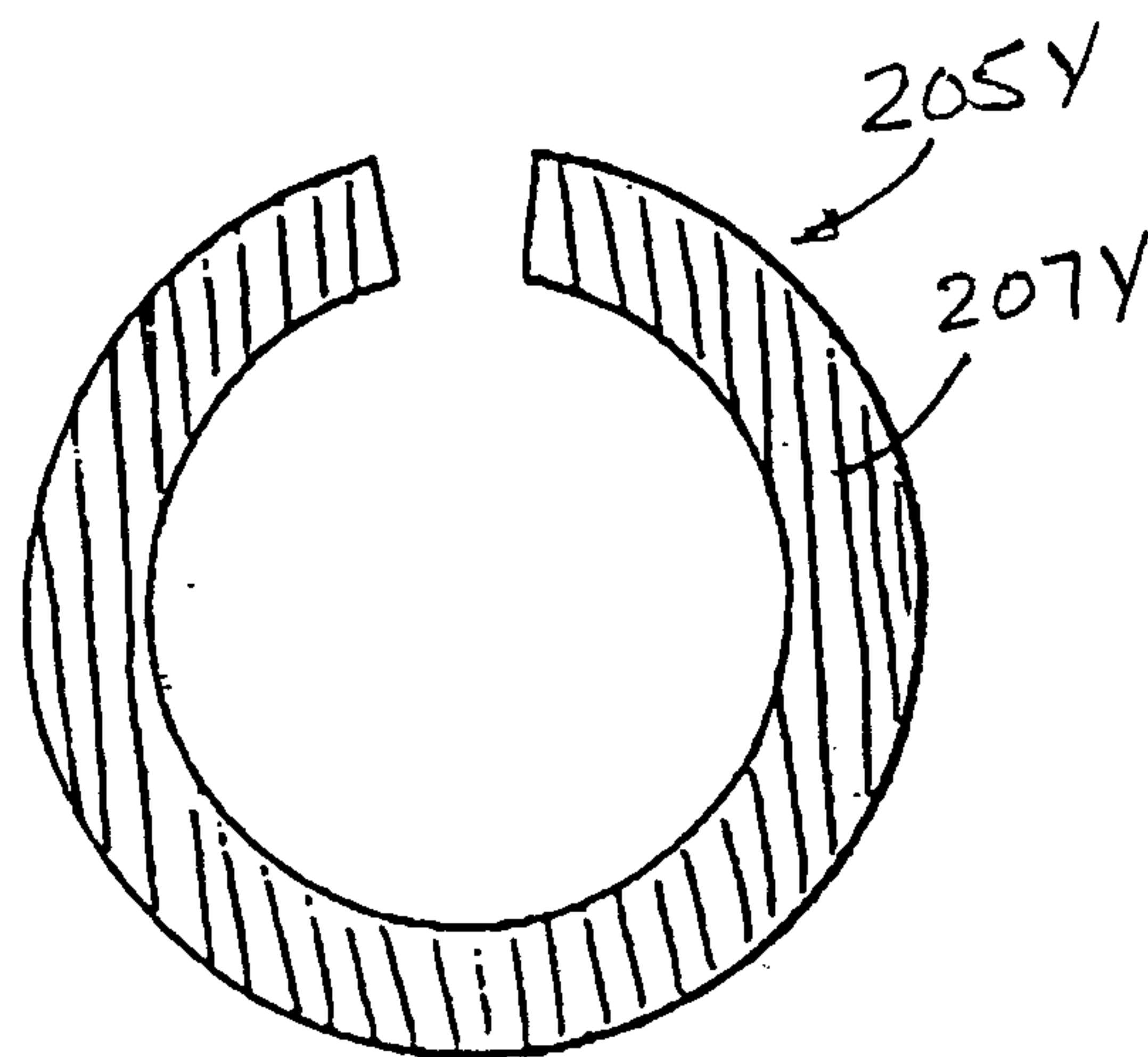


Fig. 36Y

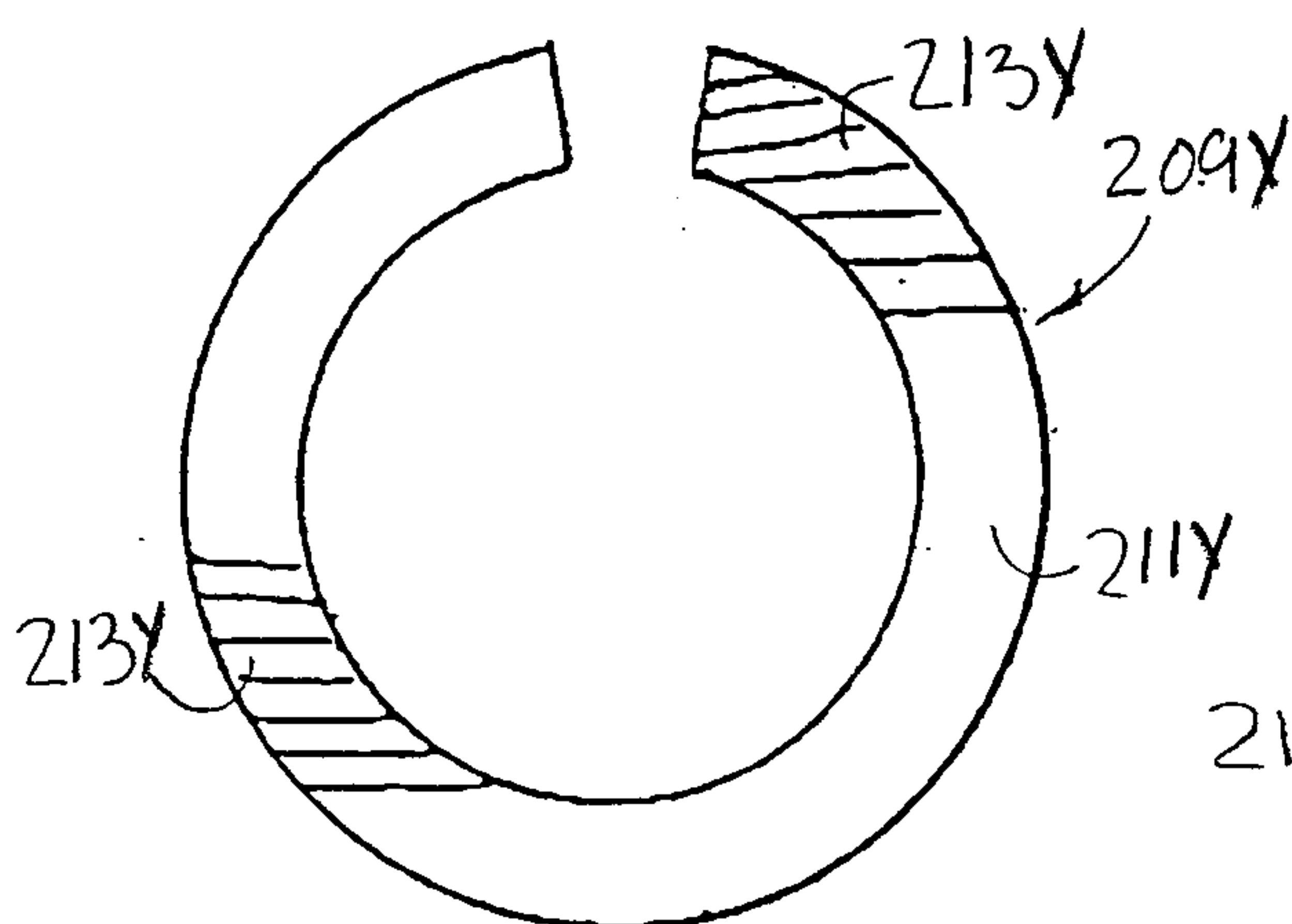


Fig. 37Y

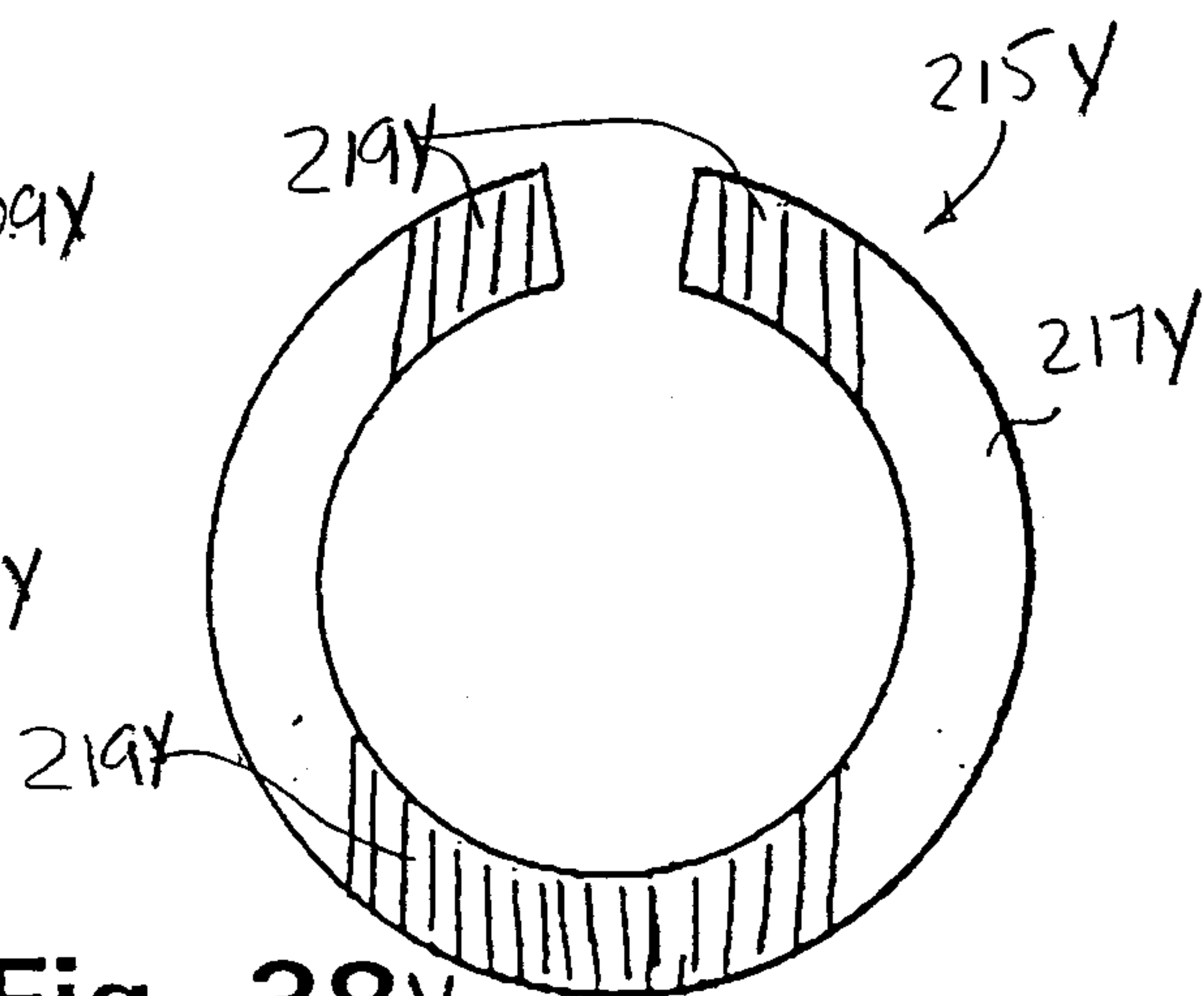


Fig. 38Y

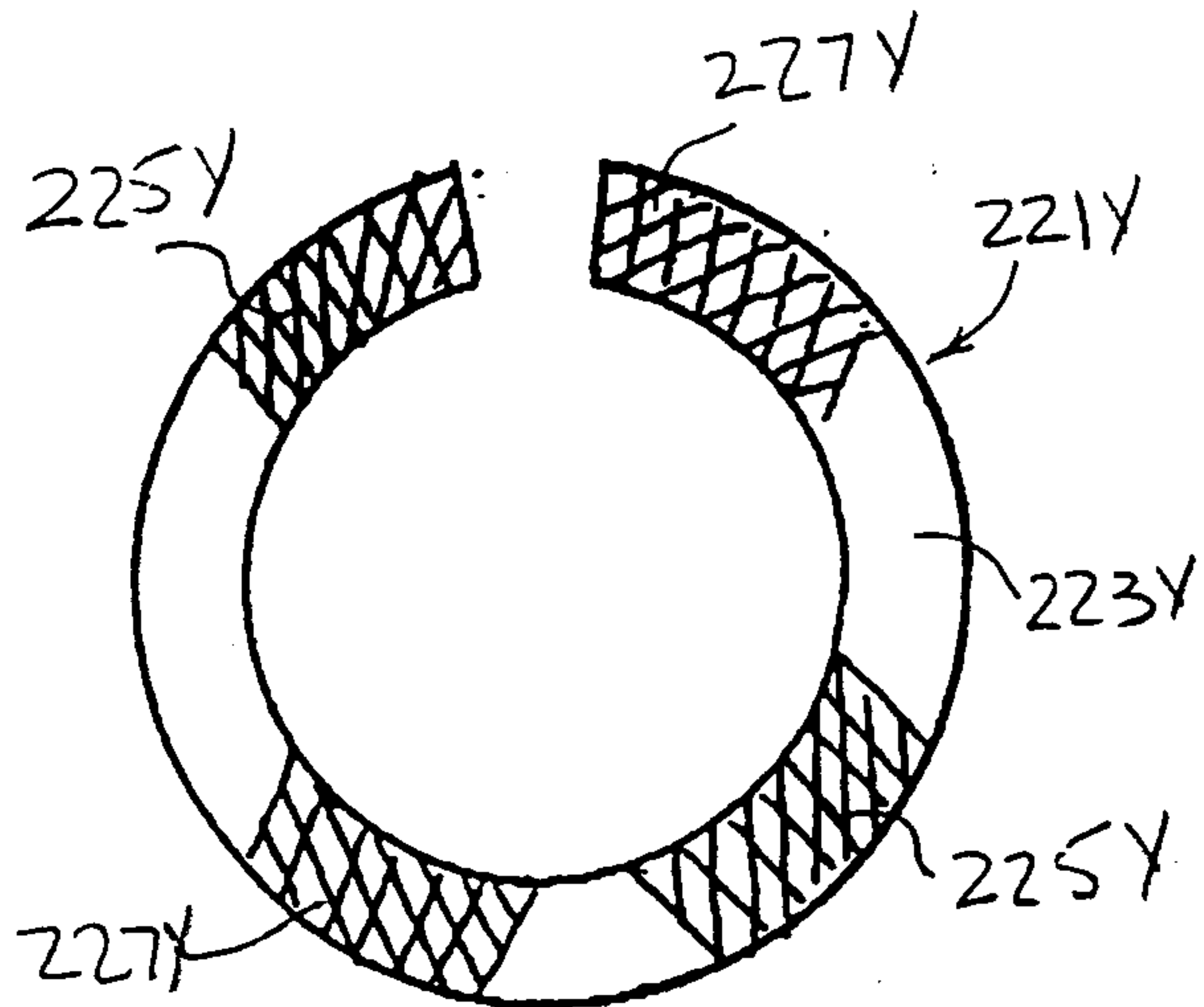


Fig. 39Y

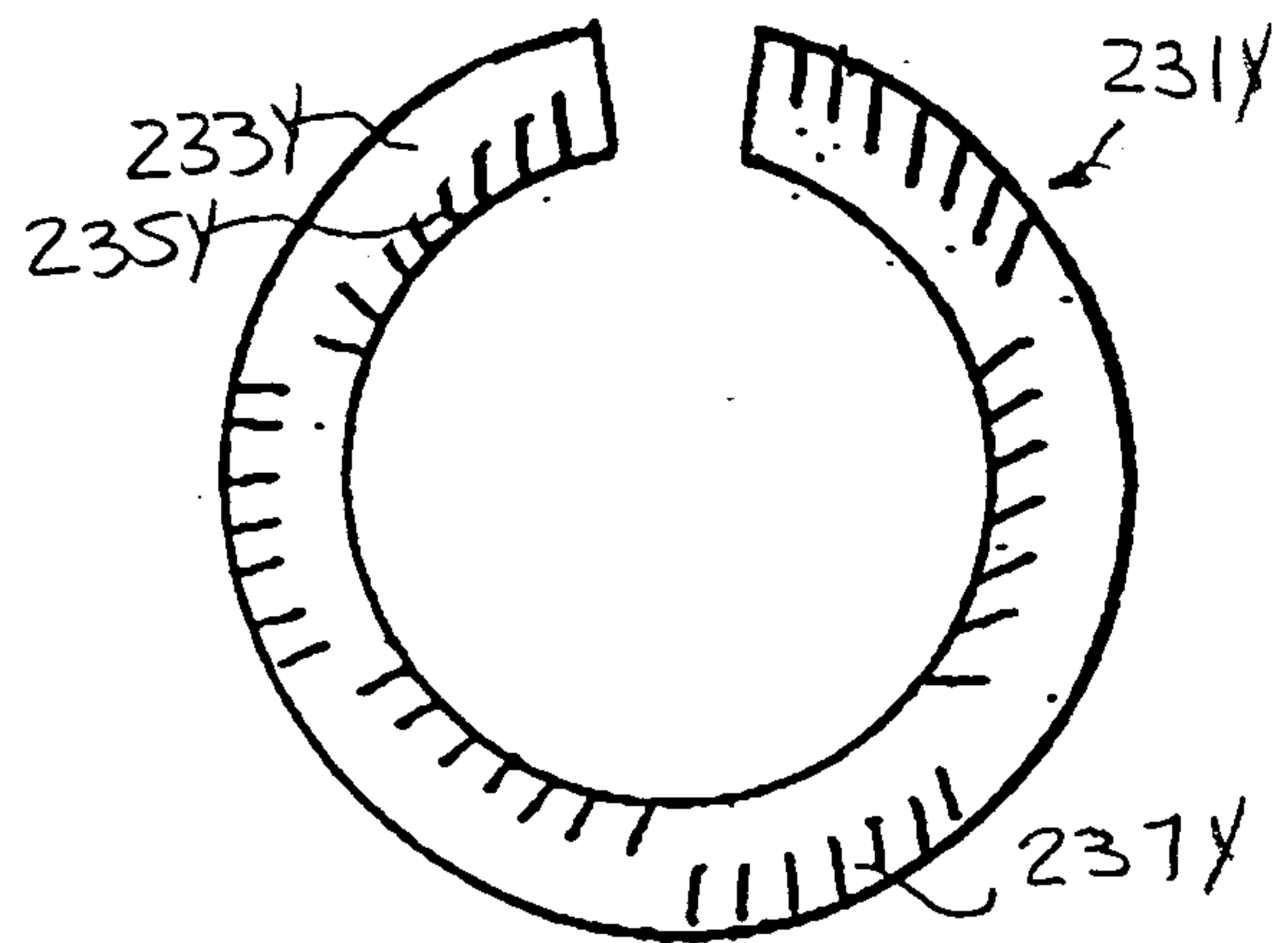


Fig. 40Y

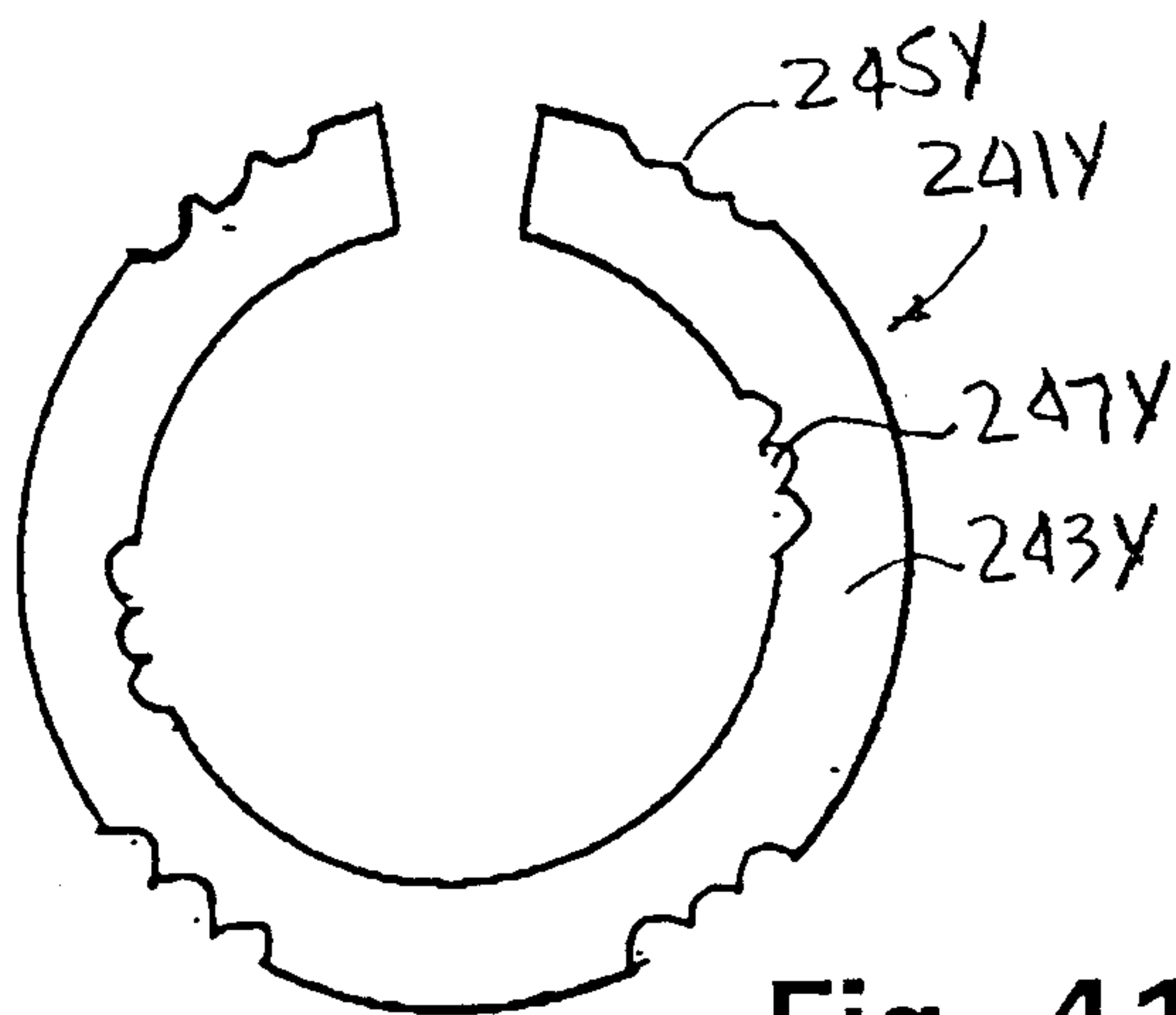


Fig. 41Y

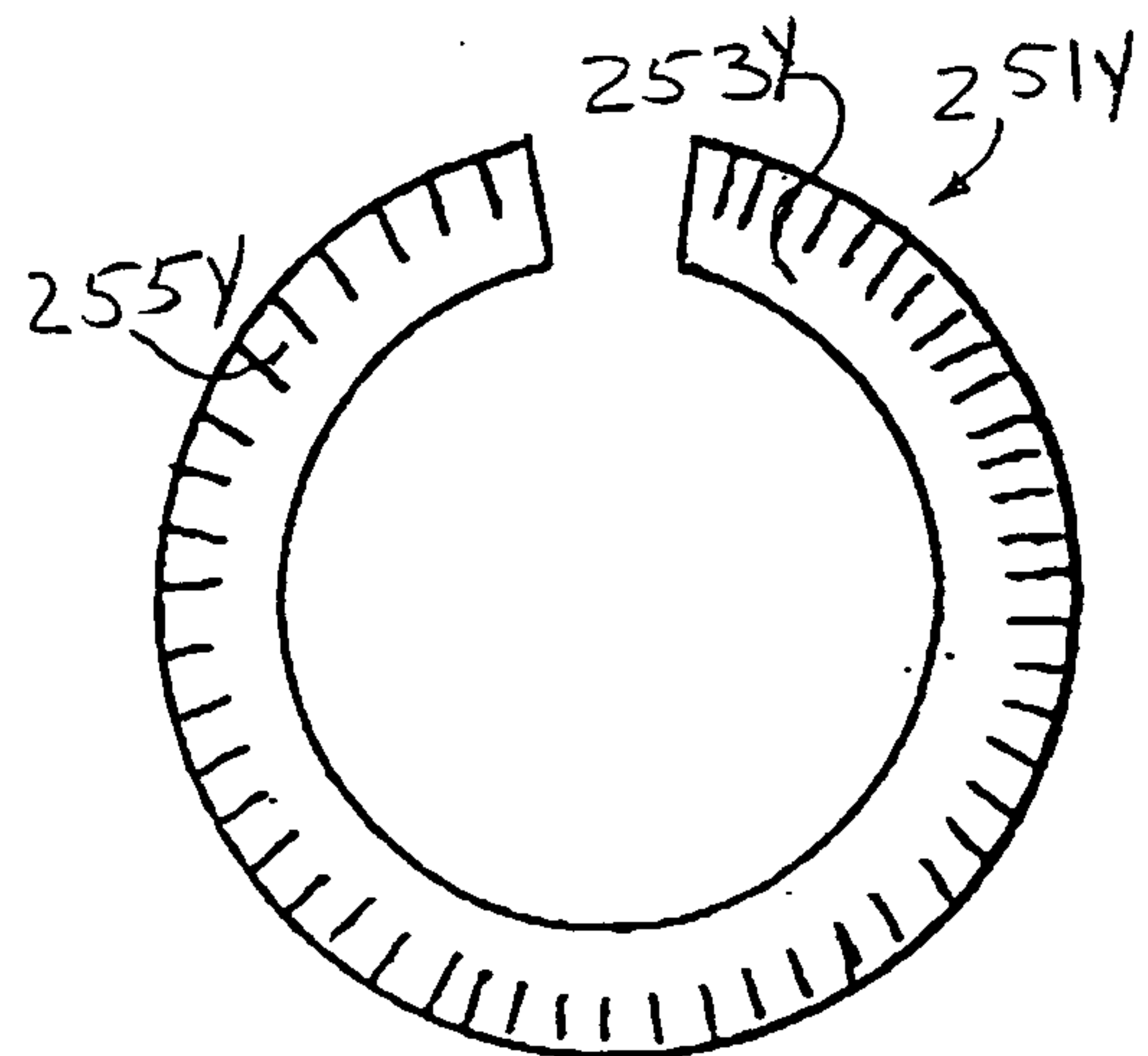


Fig. 42Y

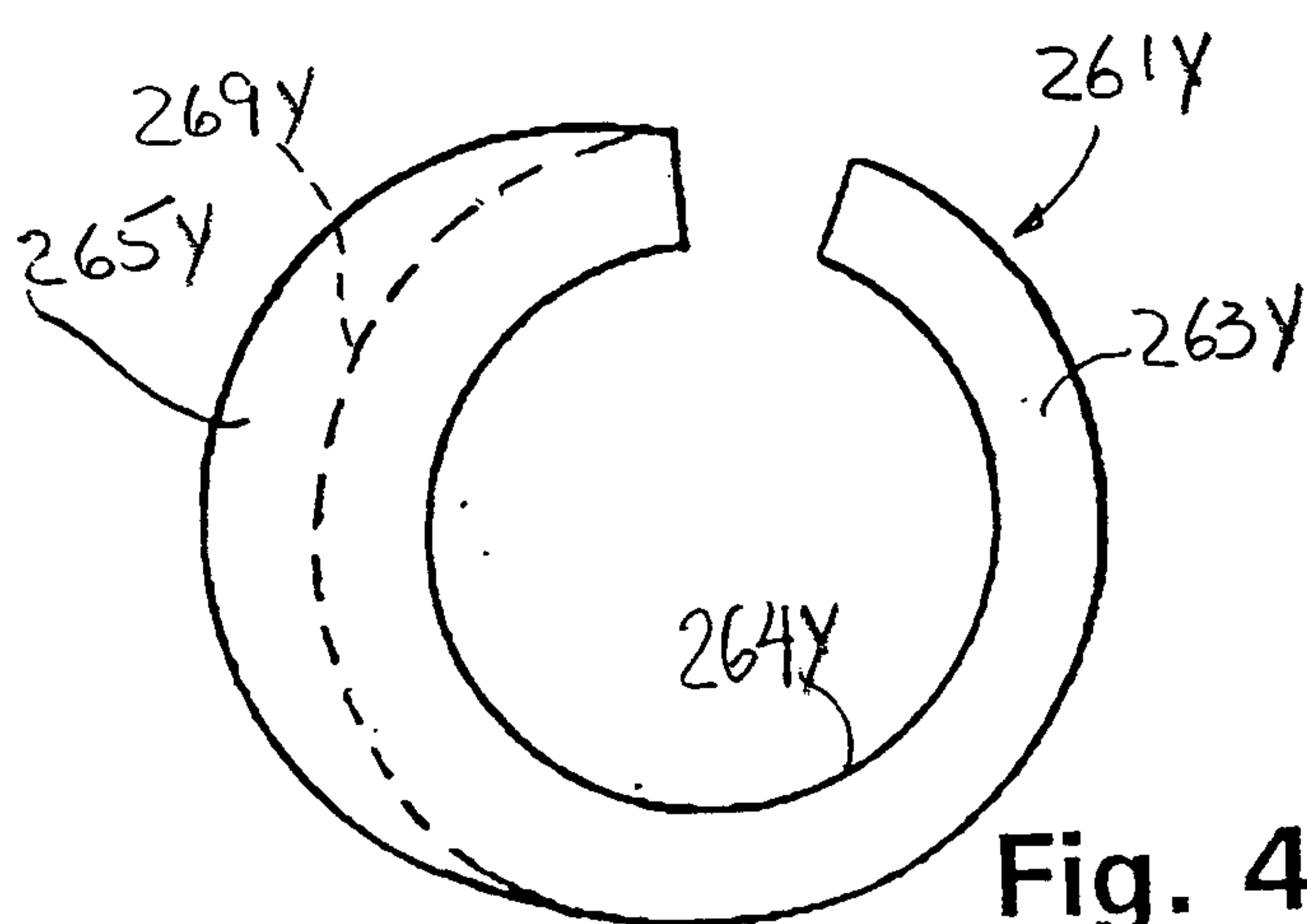


Fig. 43Y

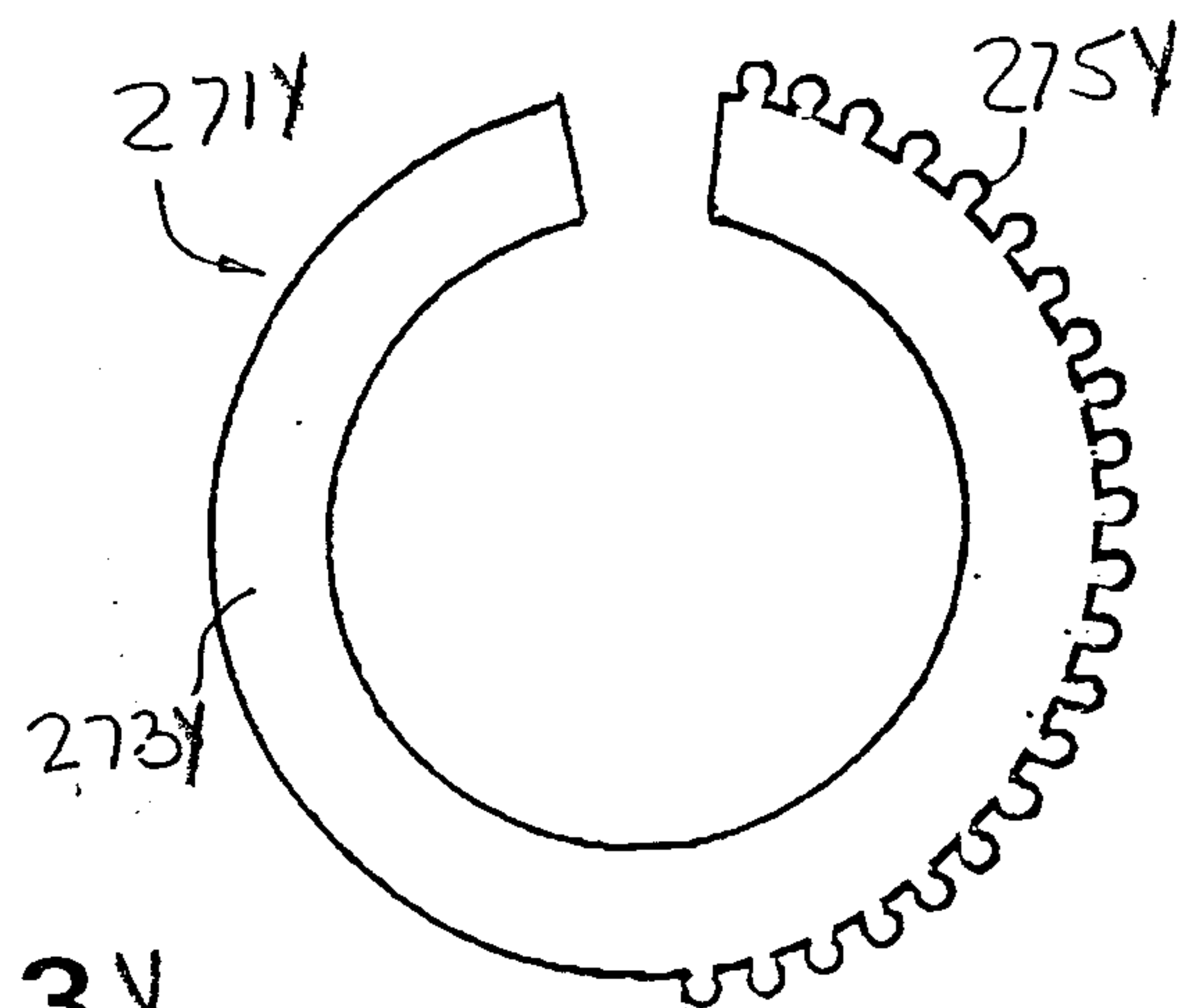


Fig. 44Y

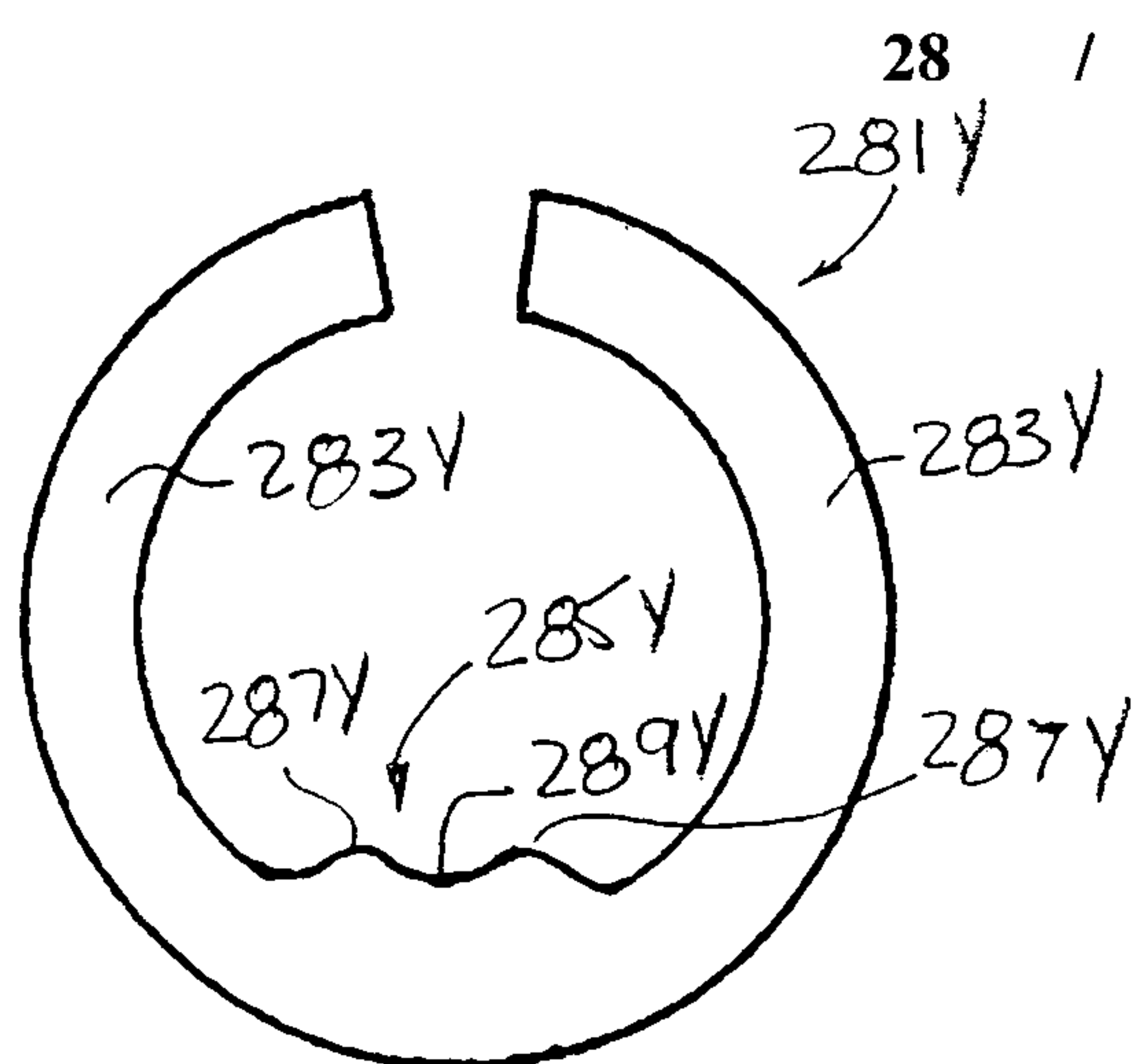


Fig. 45Y

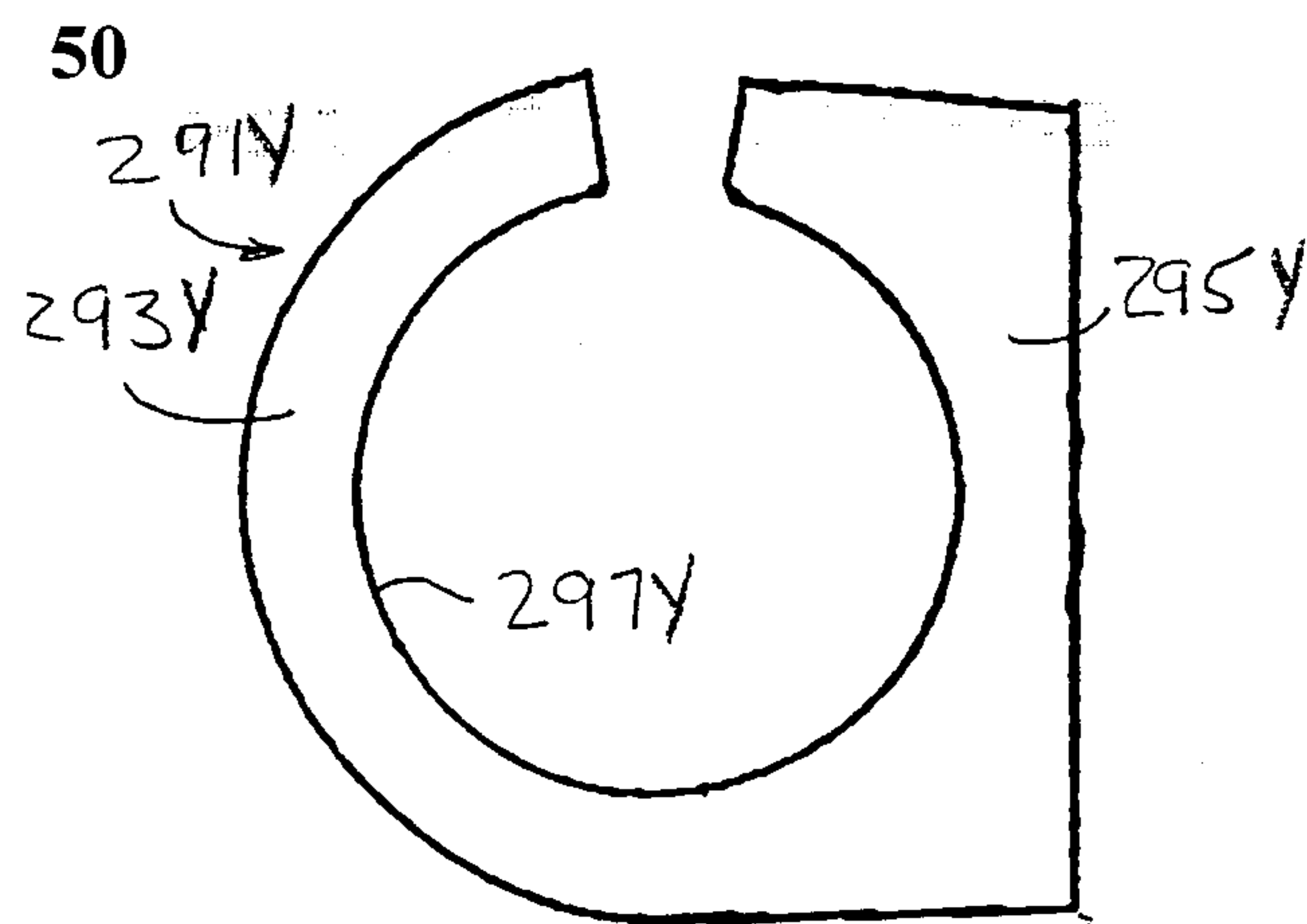


Fig. 46Y

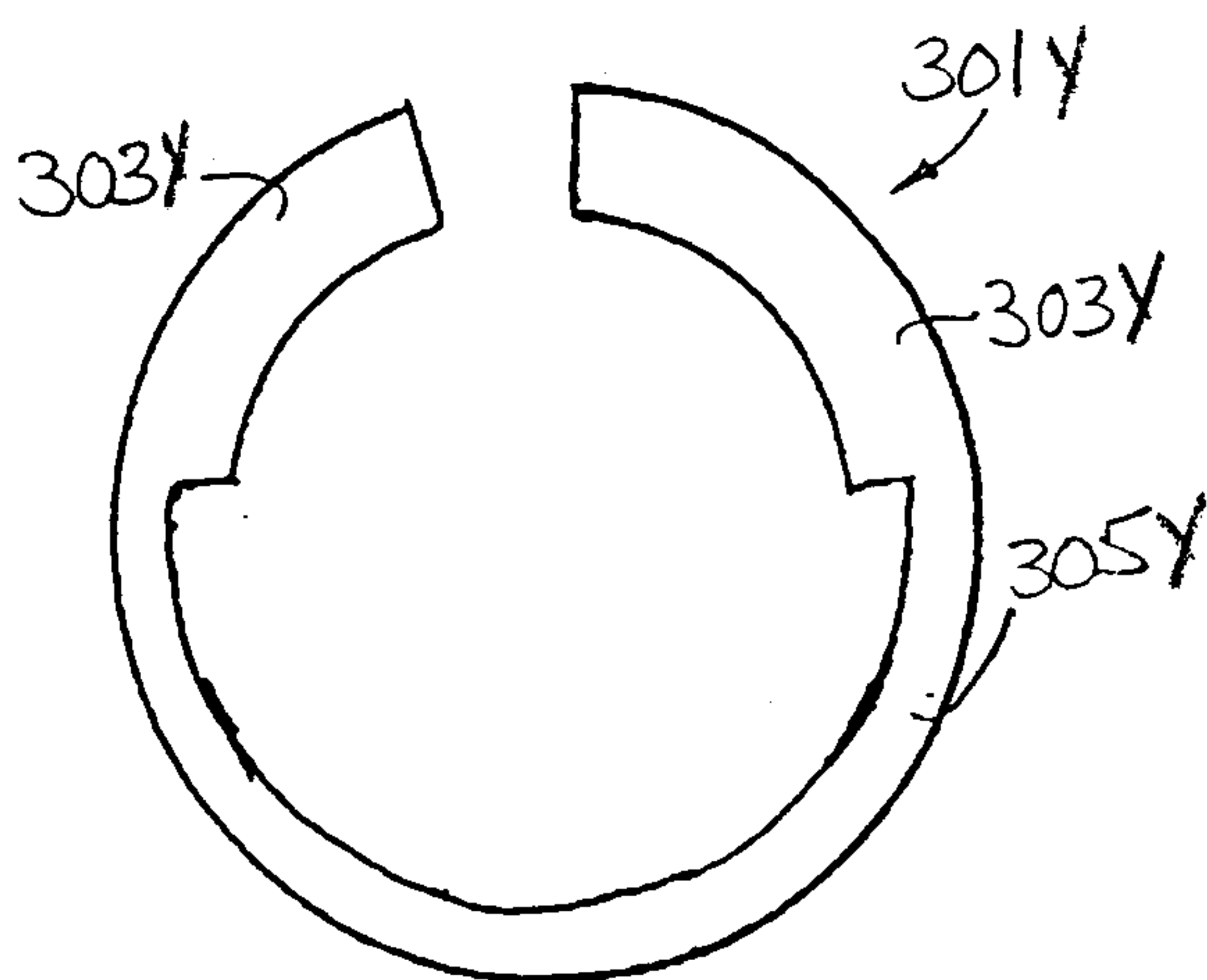


Fig. 47Y

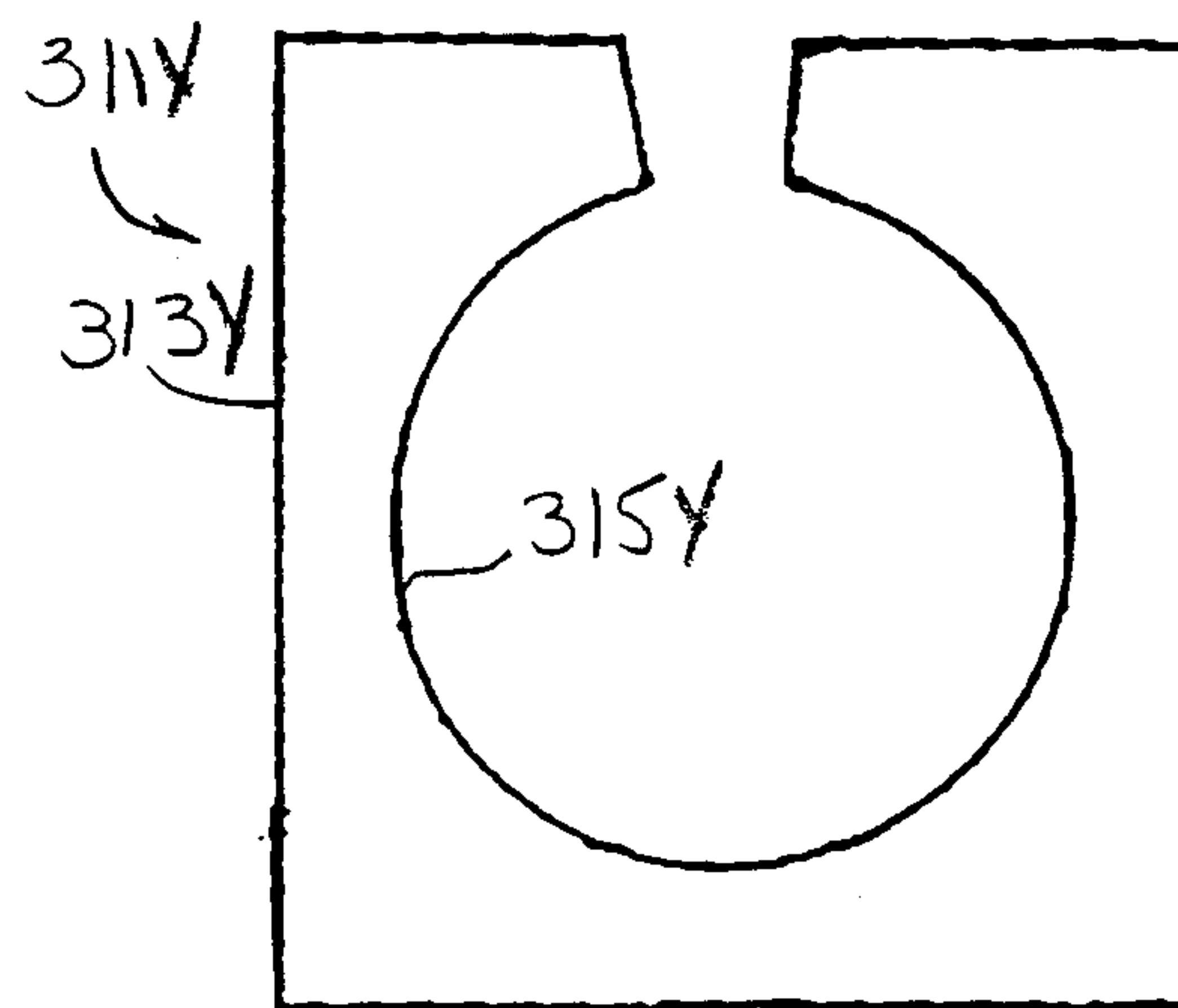


Fig. 48Y

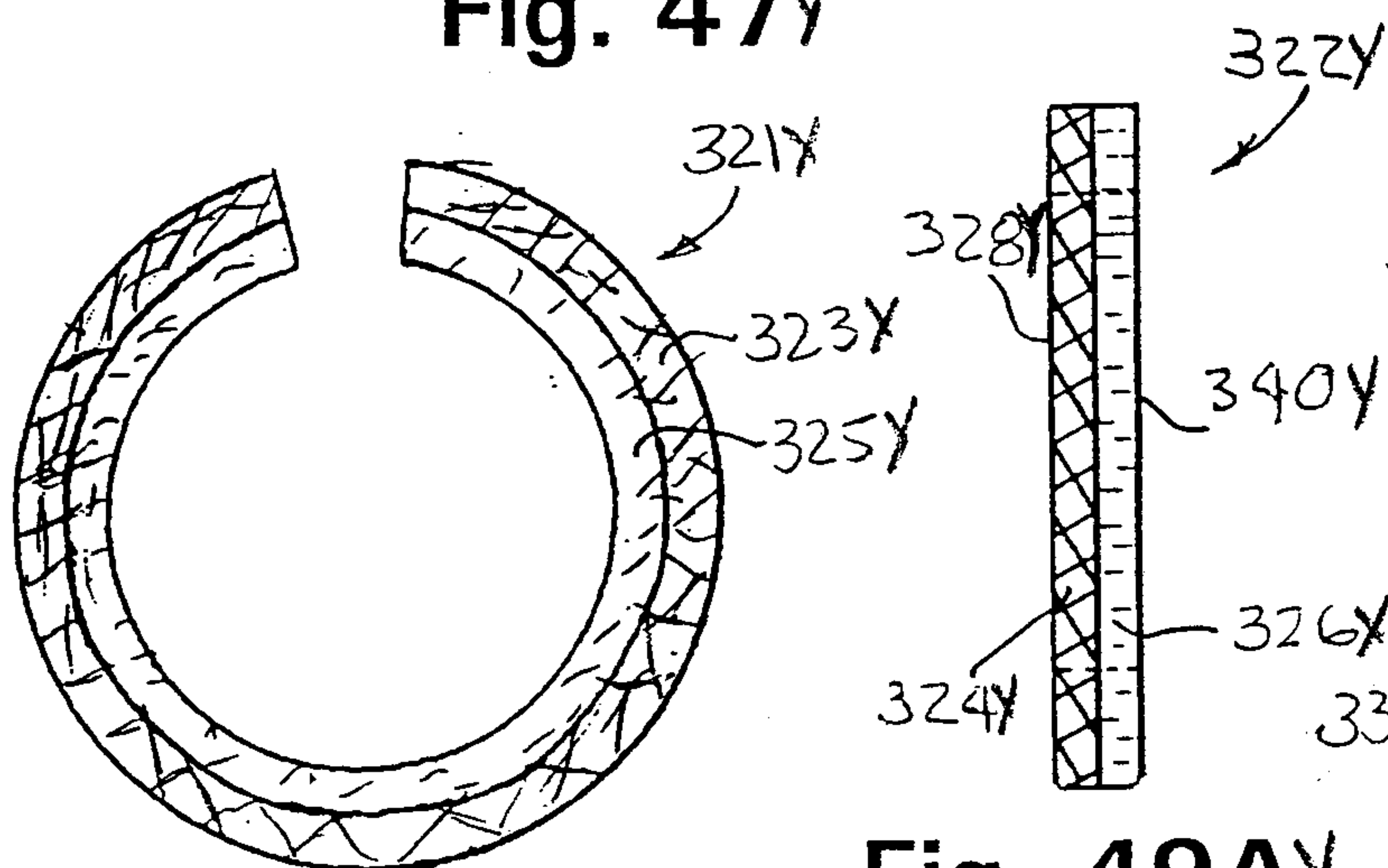


Fig. 49Y

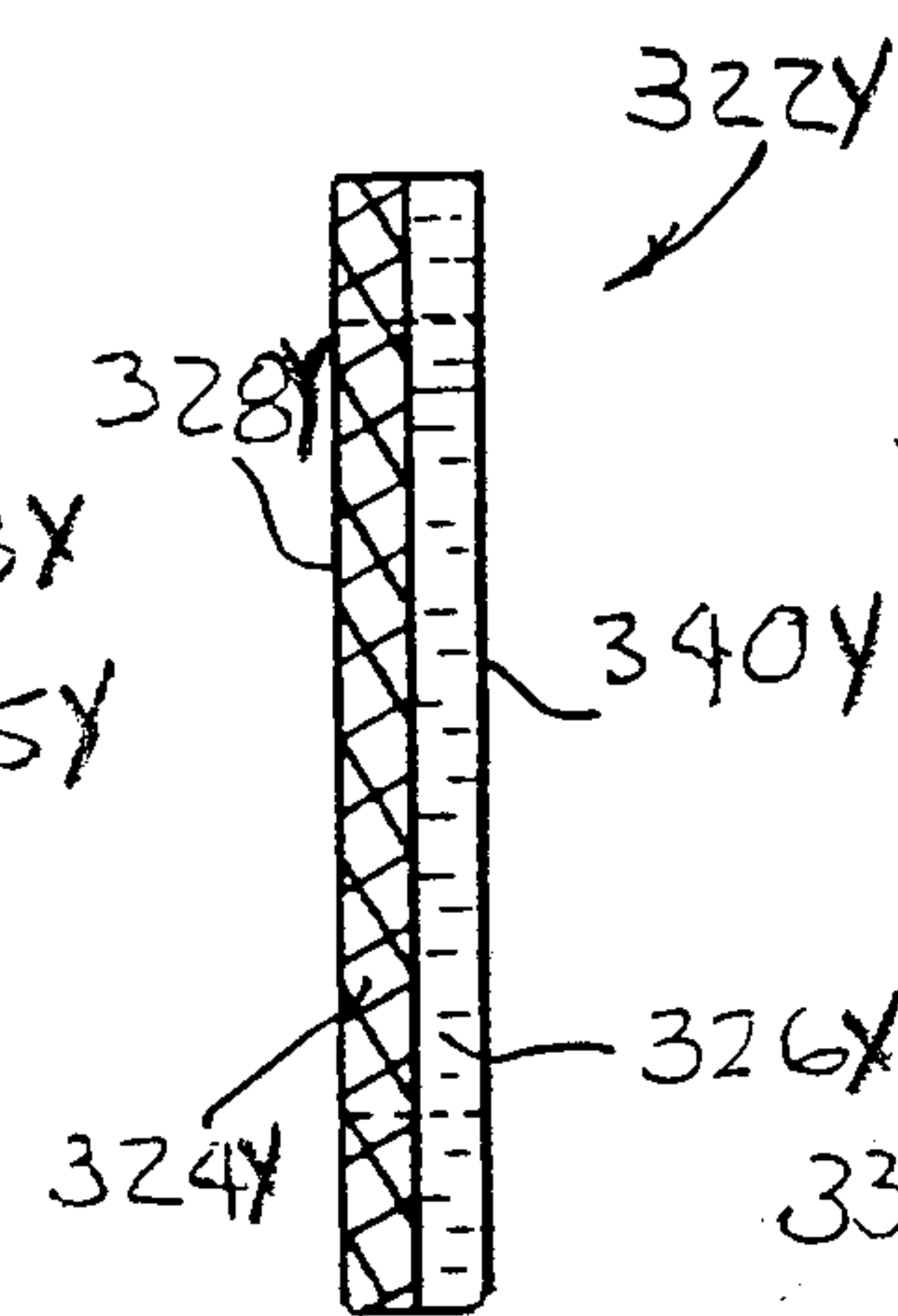


Fig. 49AY

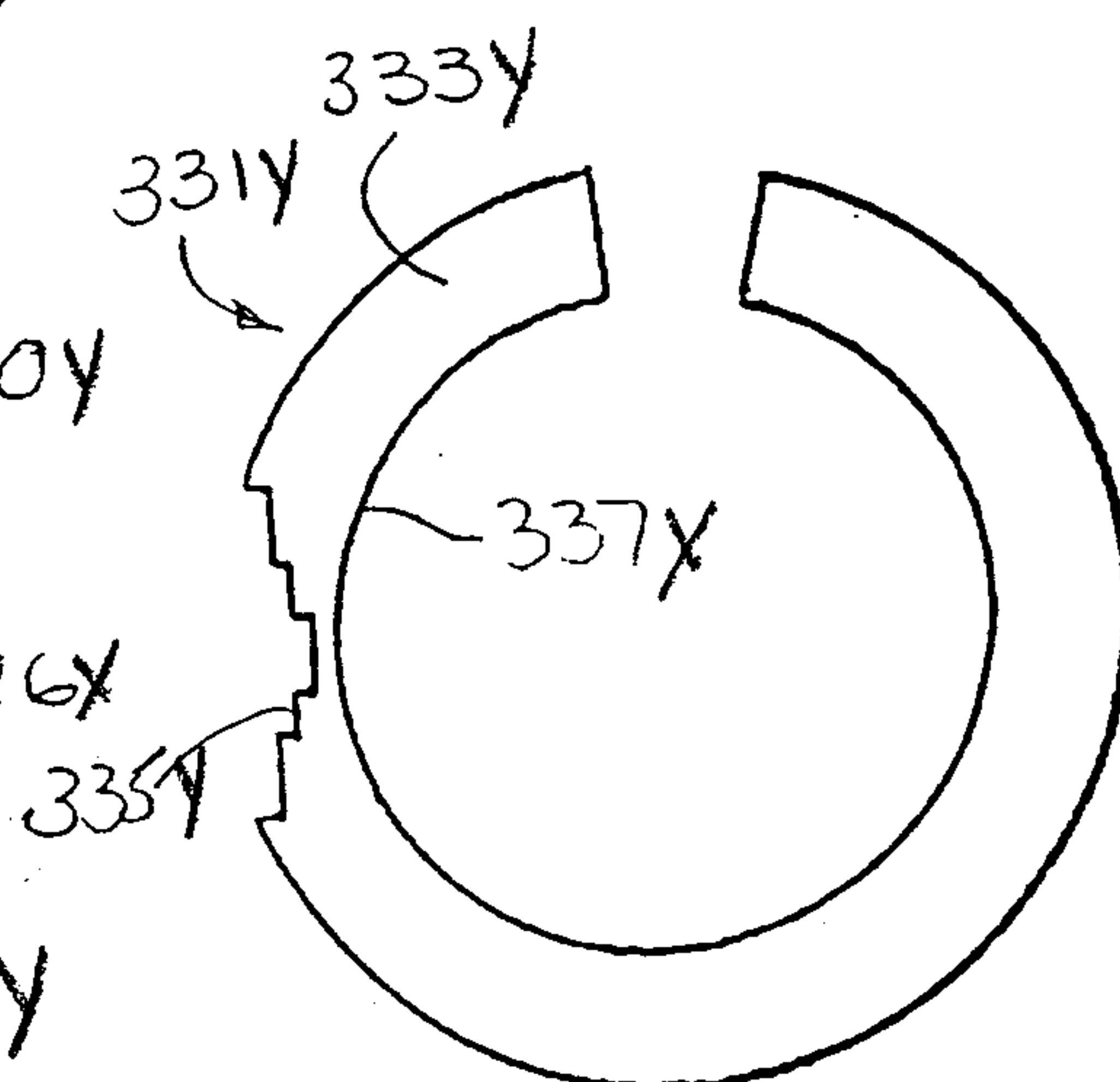


Fig. 50Y

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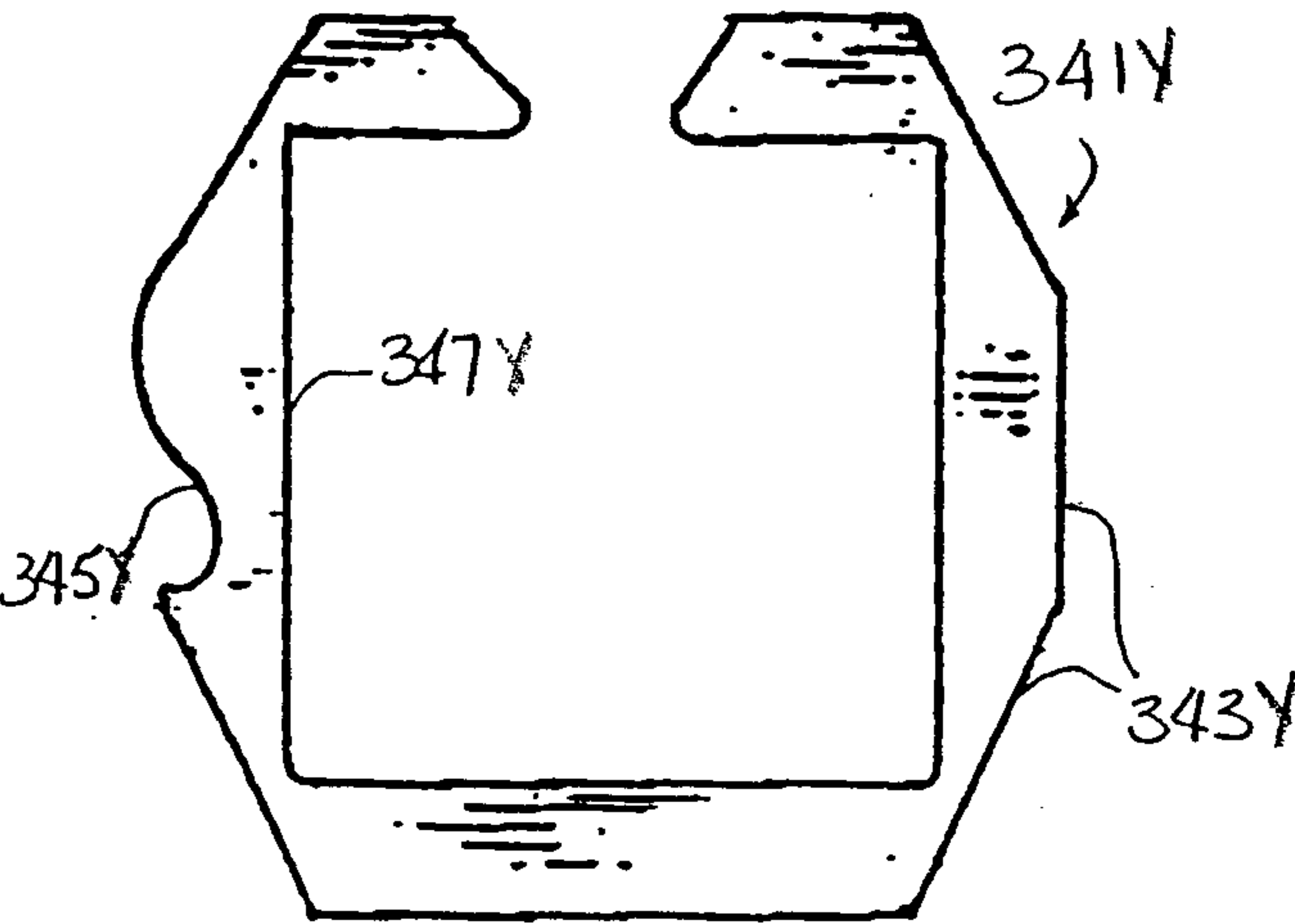


Fig. 51Y

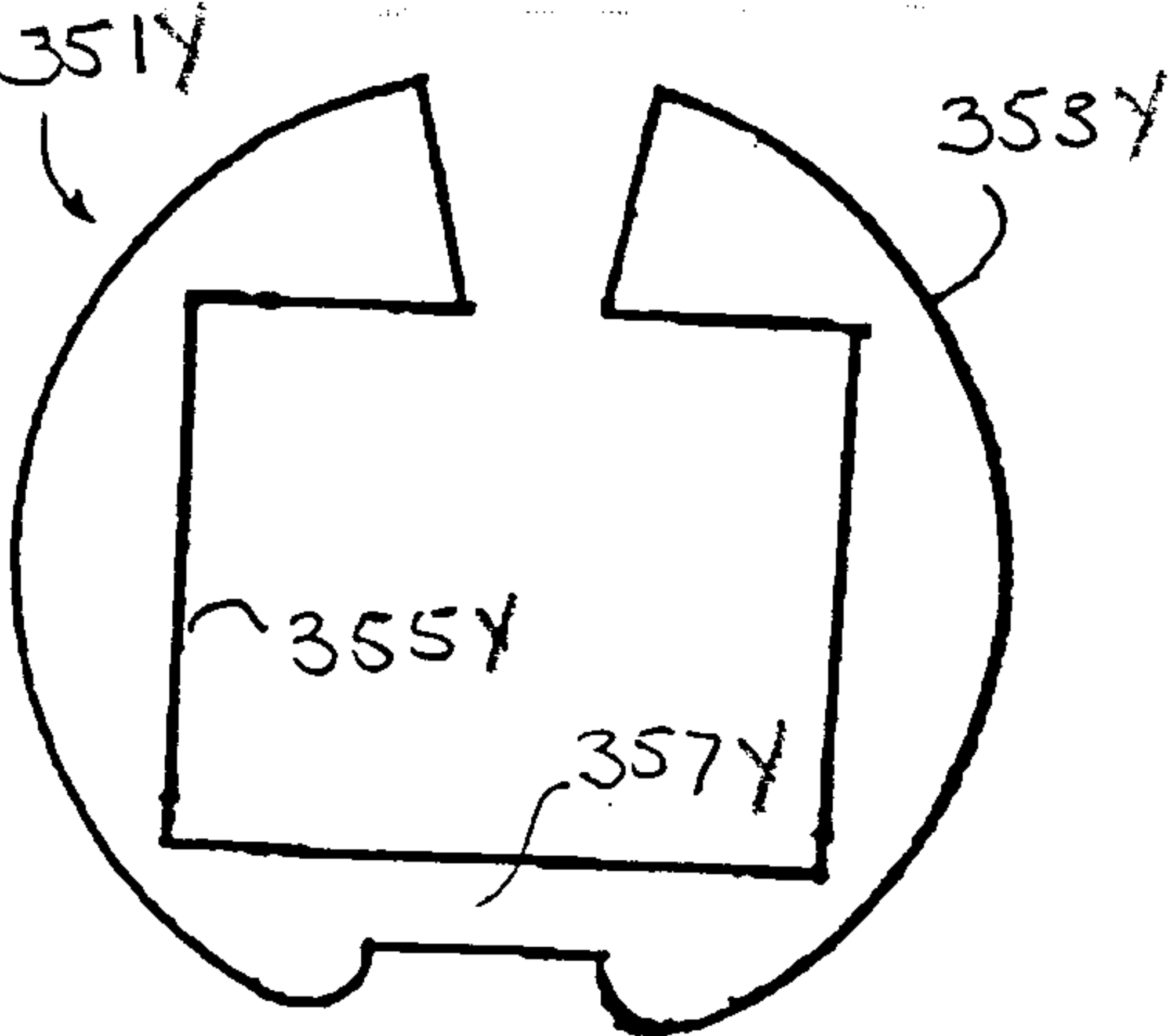


Fig. 52Y

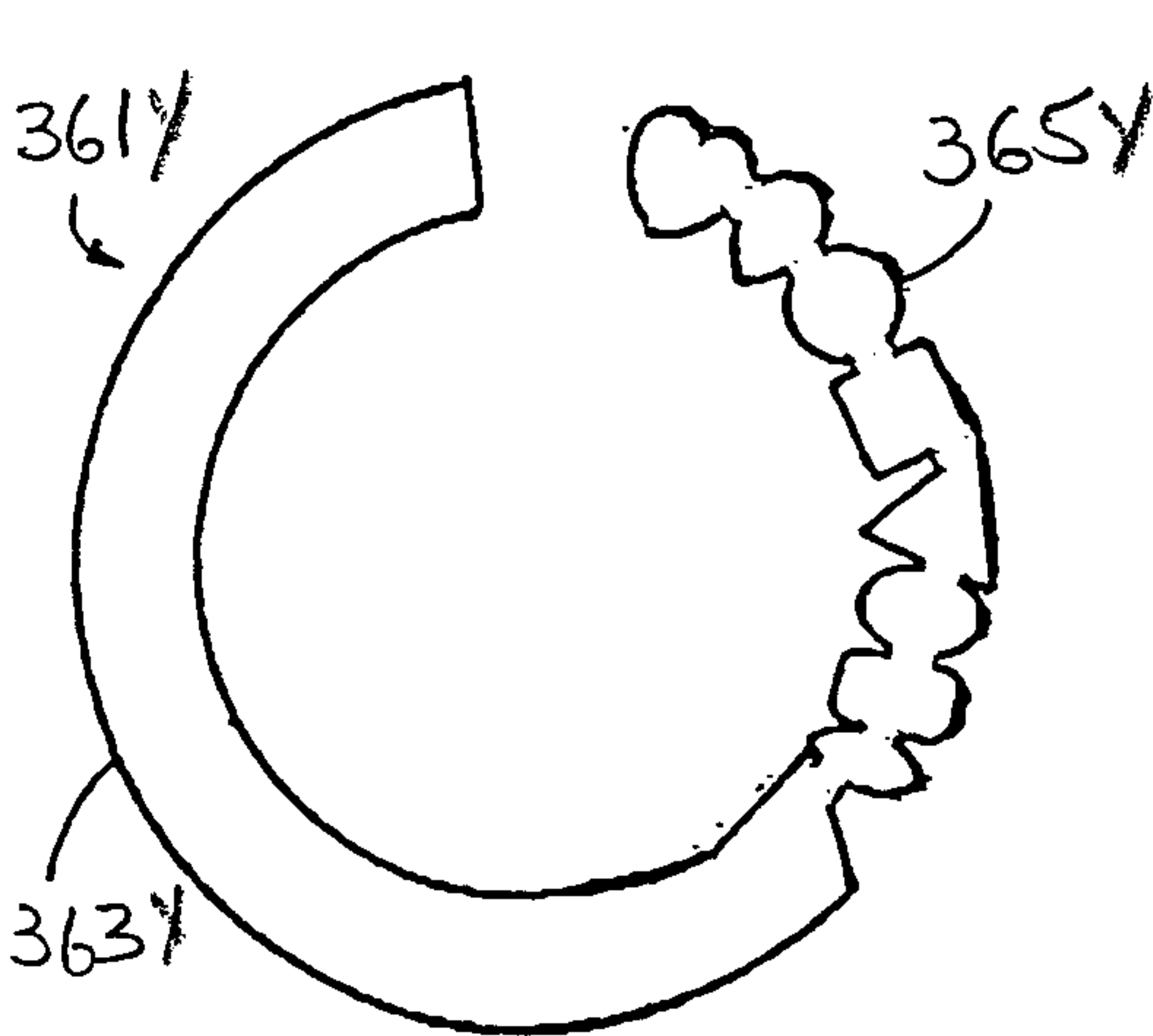


Fig. 53Y

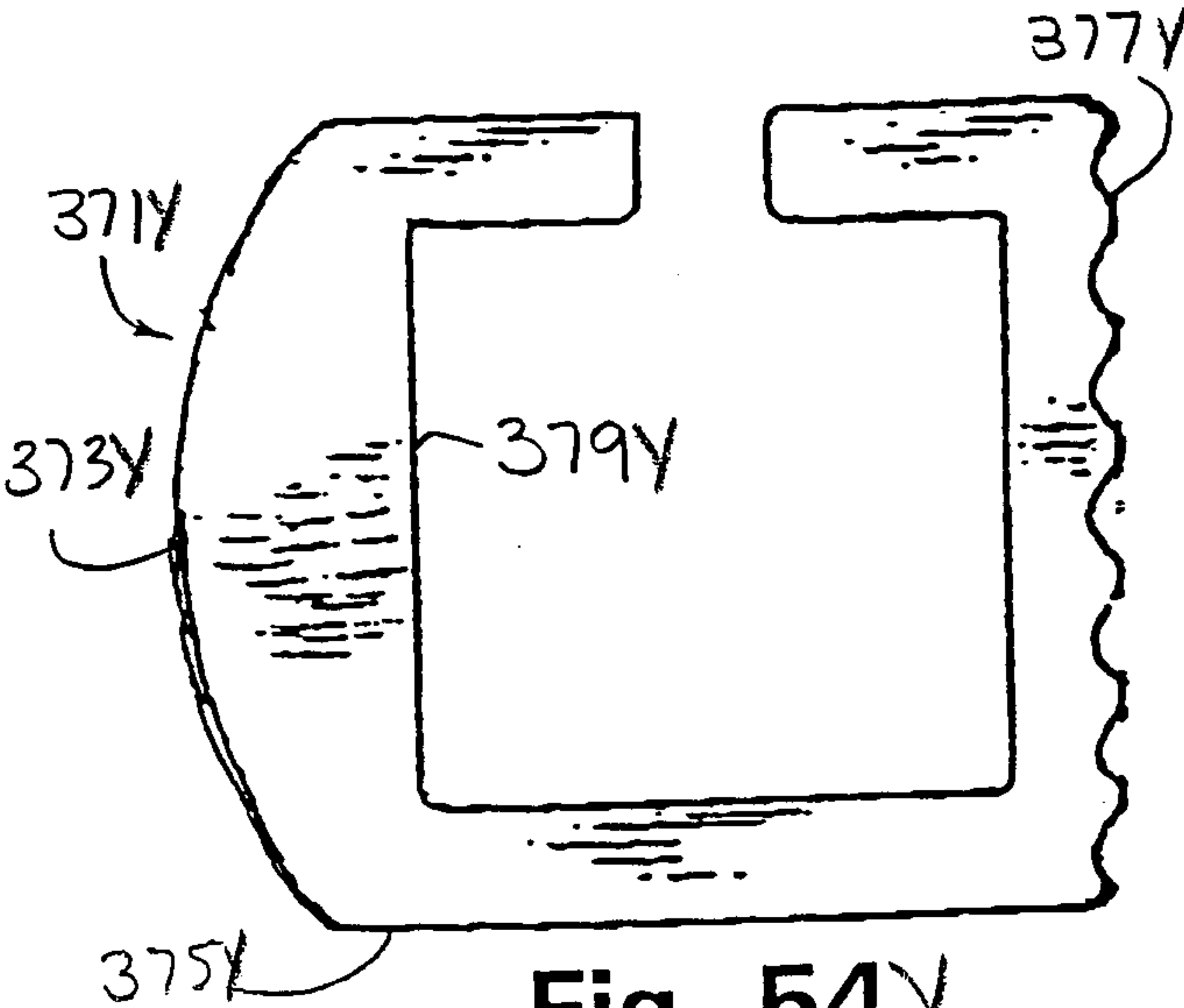


Fig. 54Y

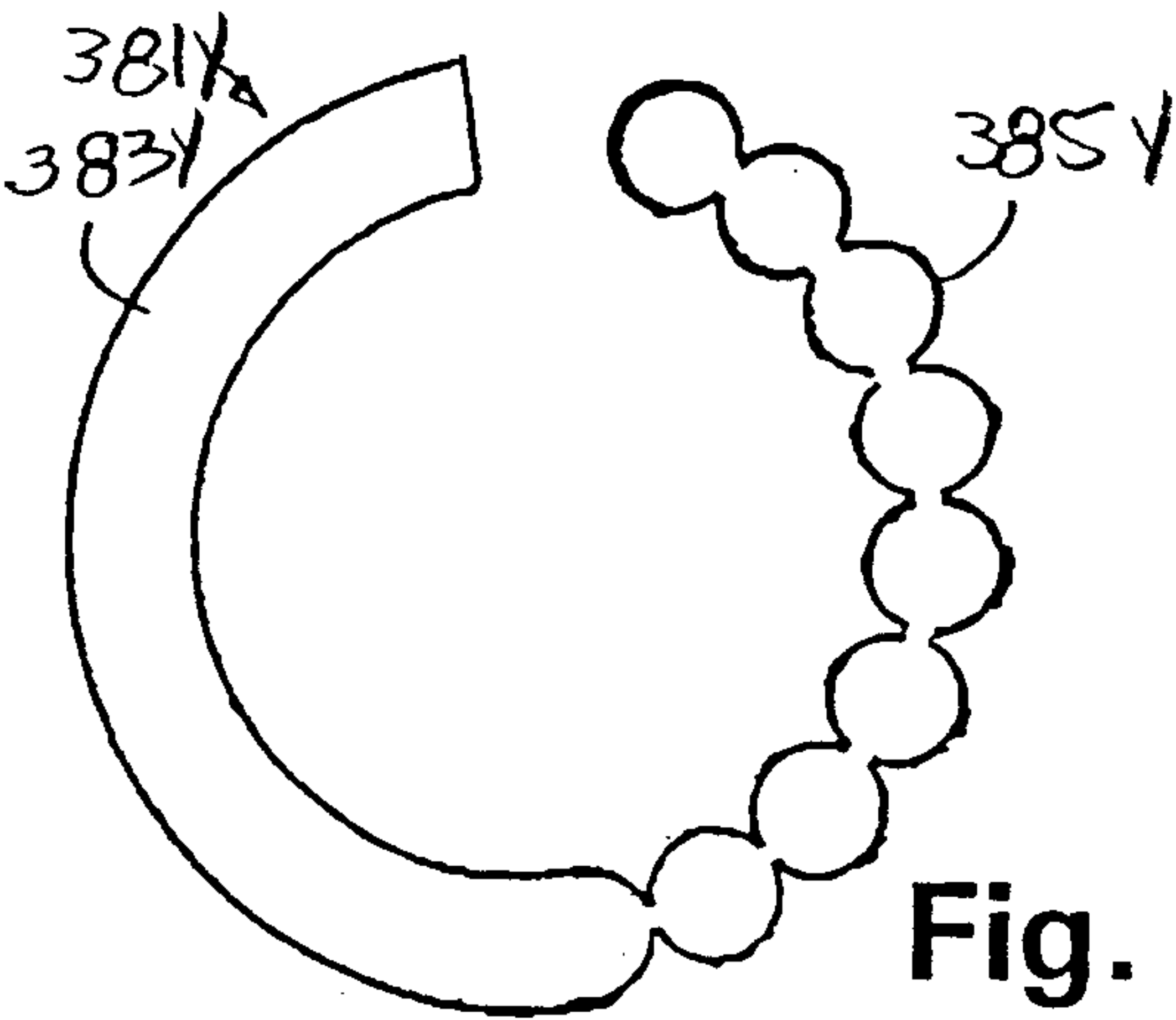


Fig. 55Y

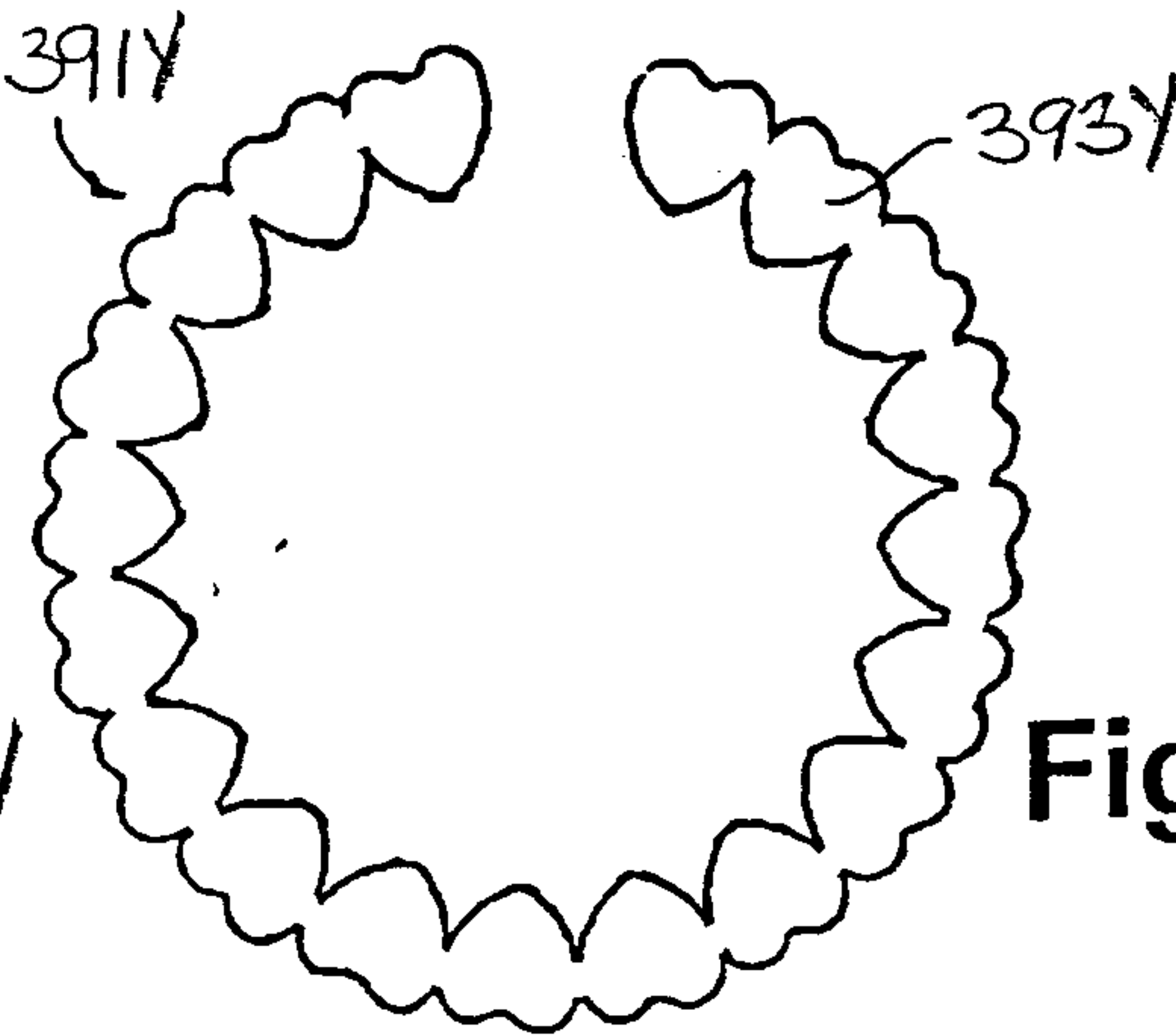


Fig. 56Y

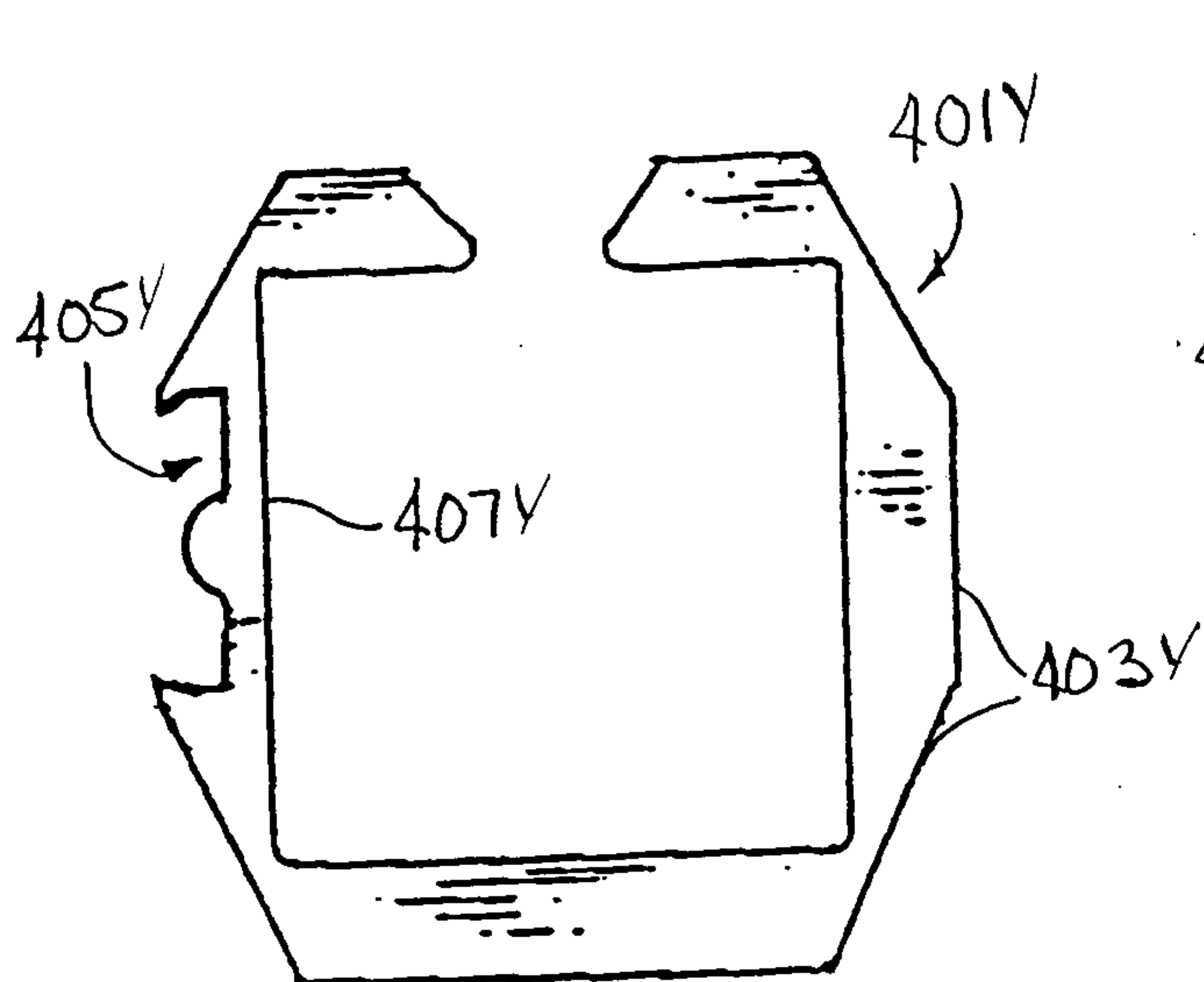


Fig. 57Y

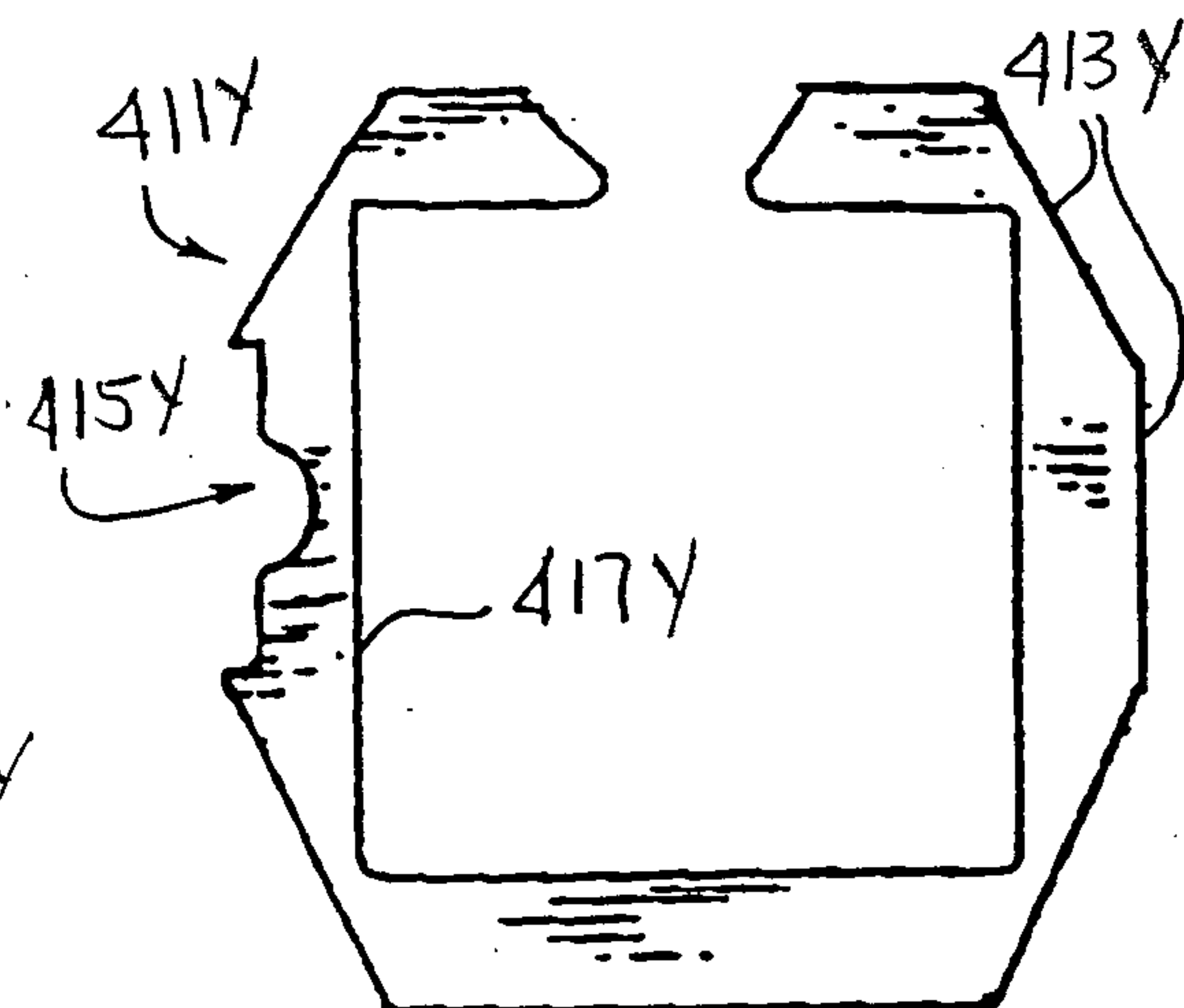


Fig. 58Y

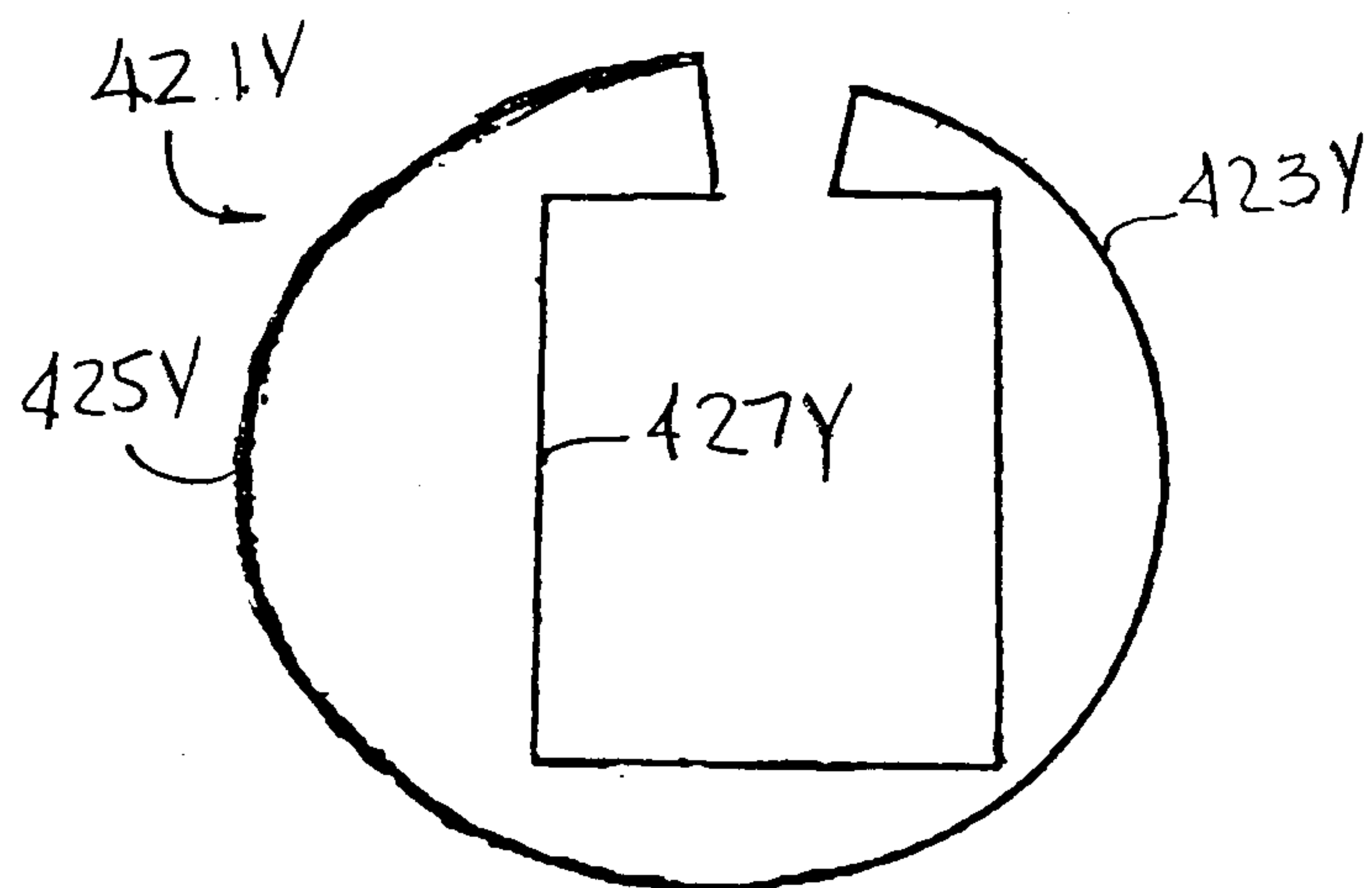


Fig. 59Y

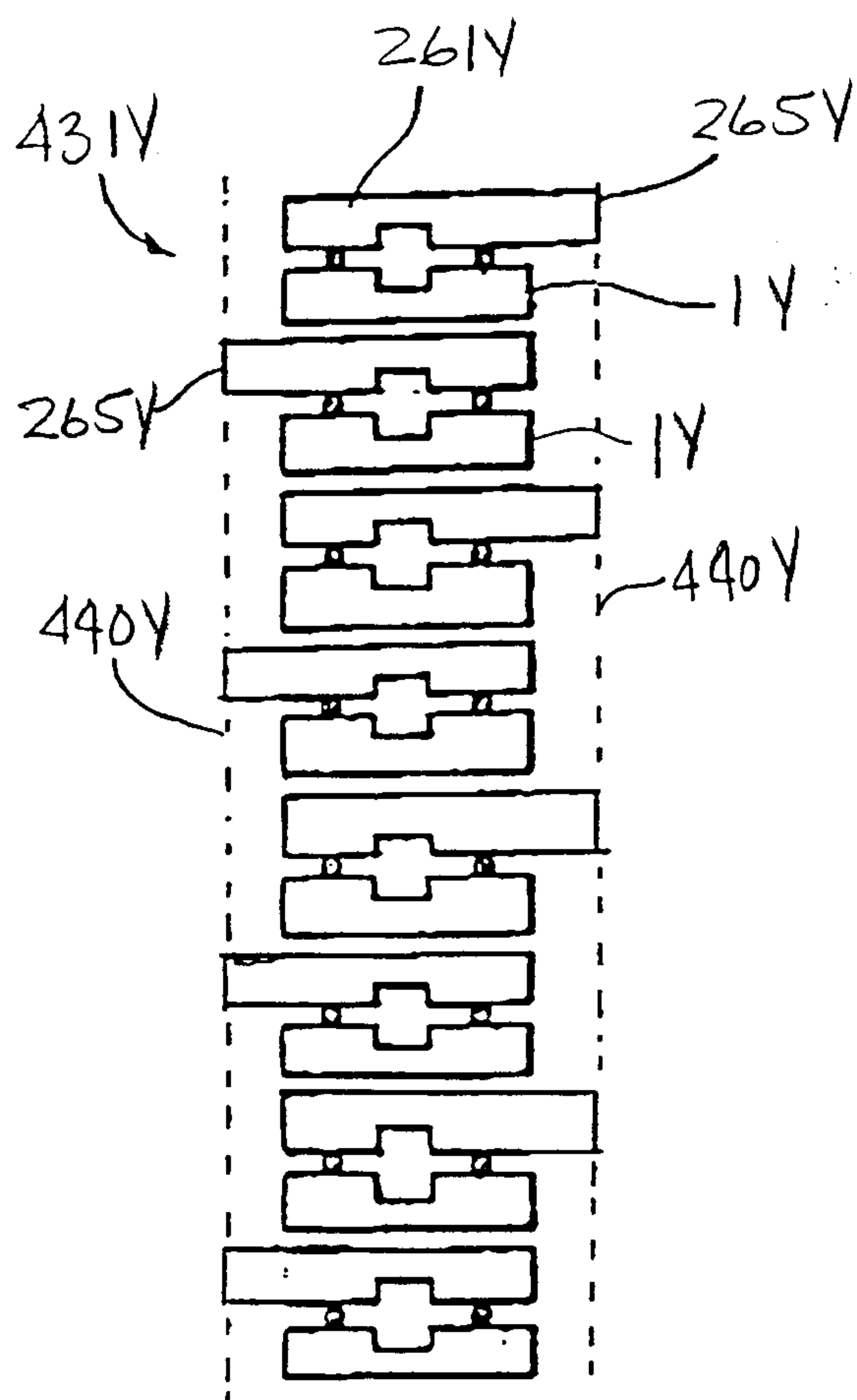


Fig. 60Y

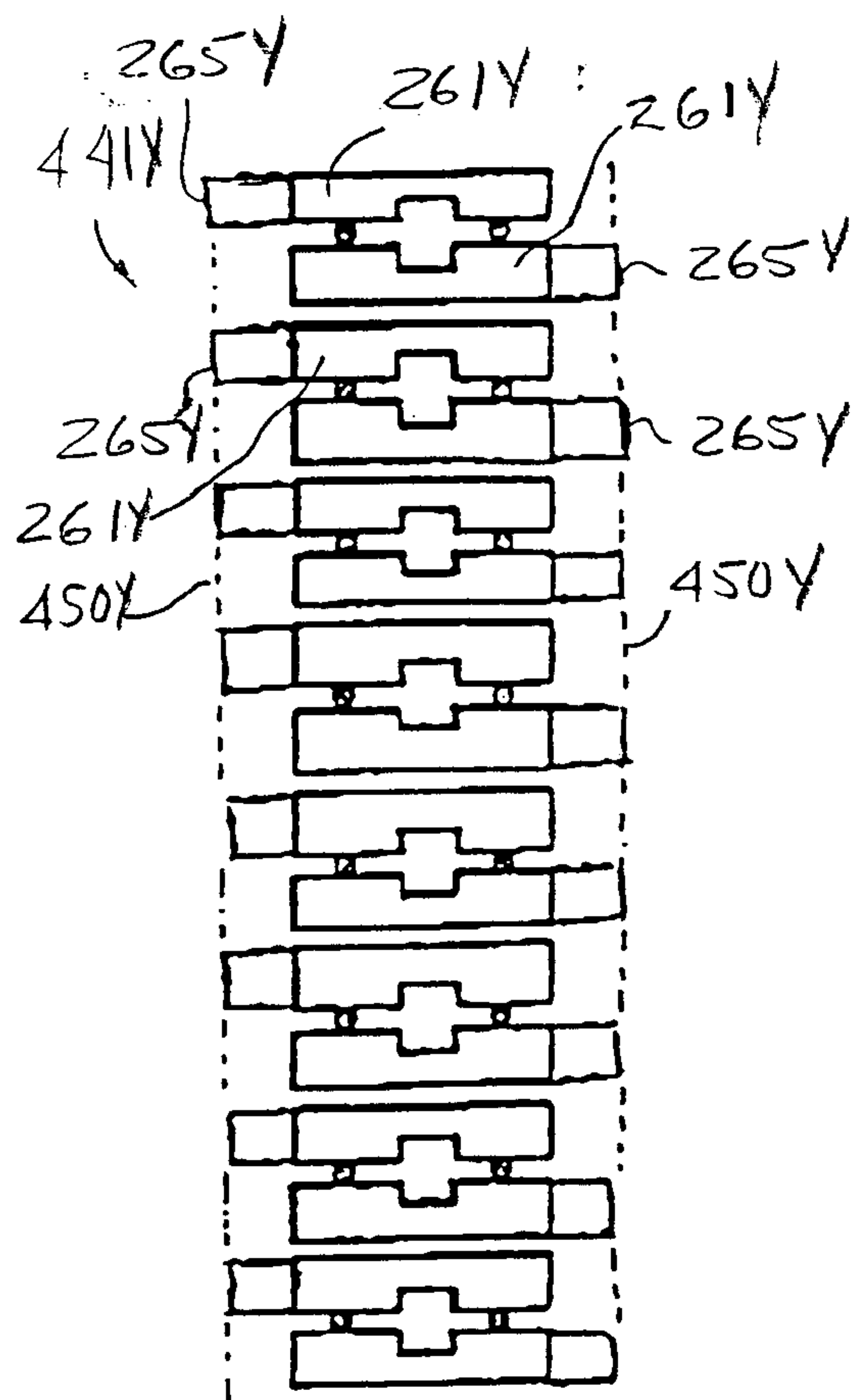


Fig. 61Y

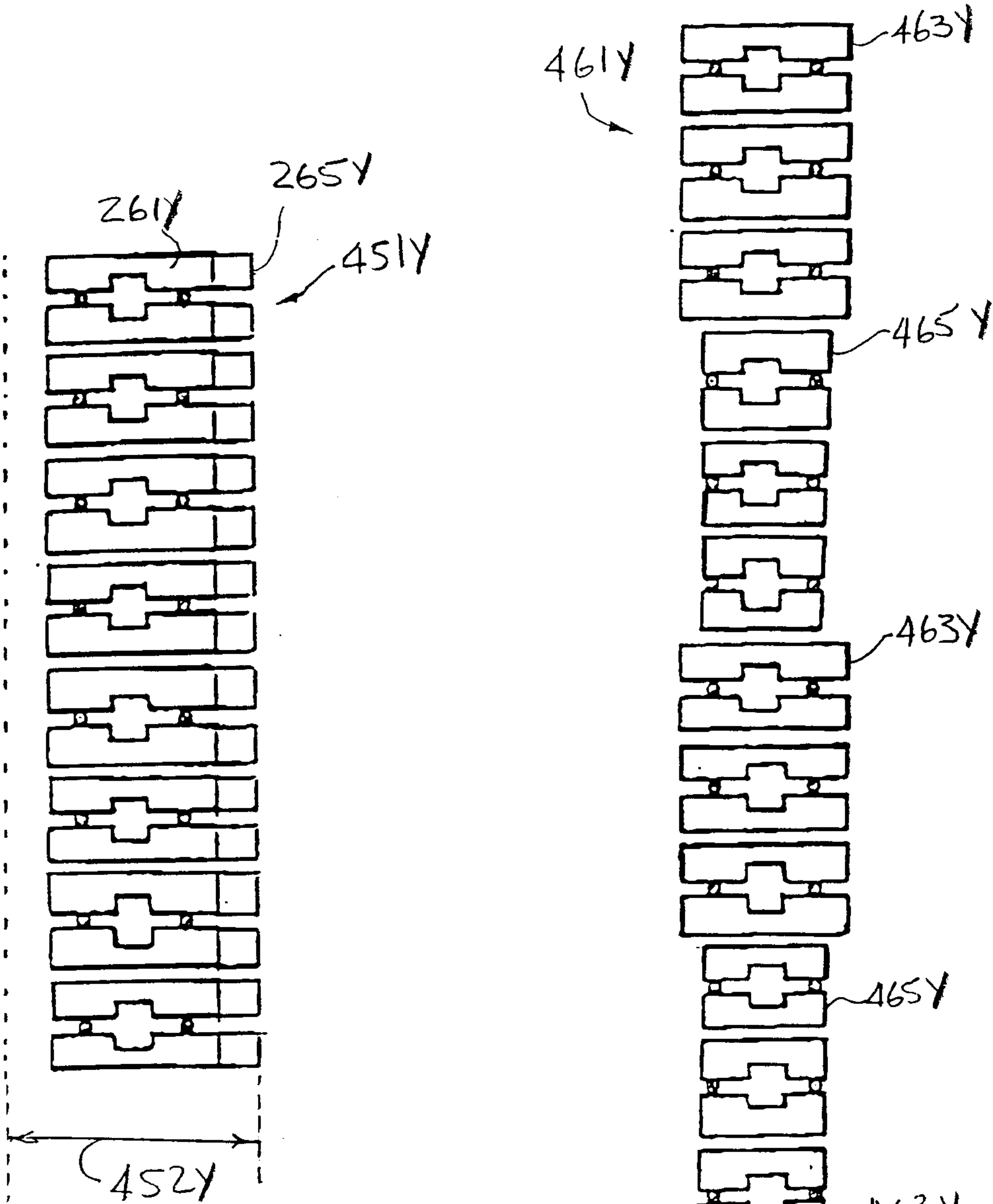


Fig. 62Y

Fig. 63Y

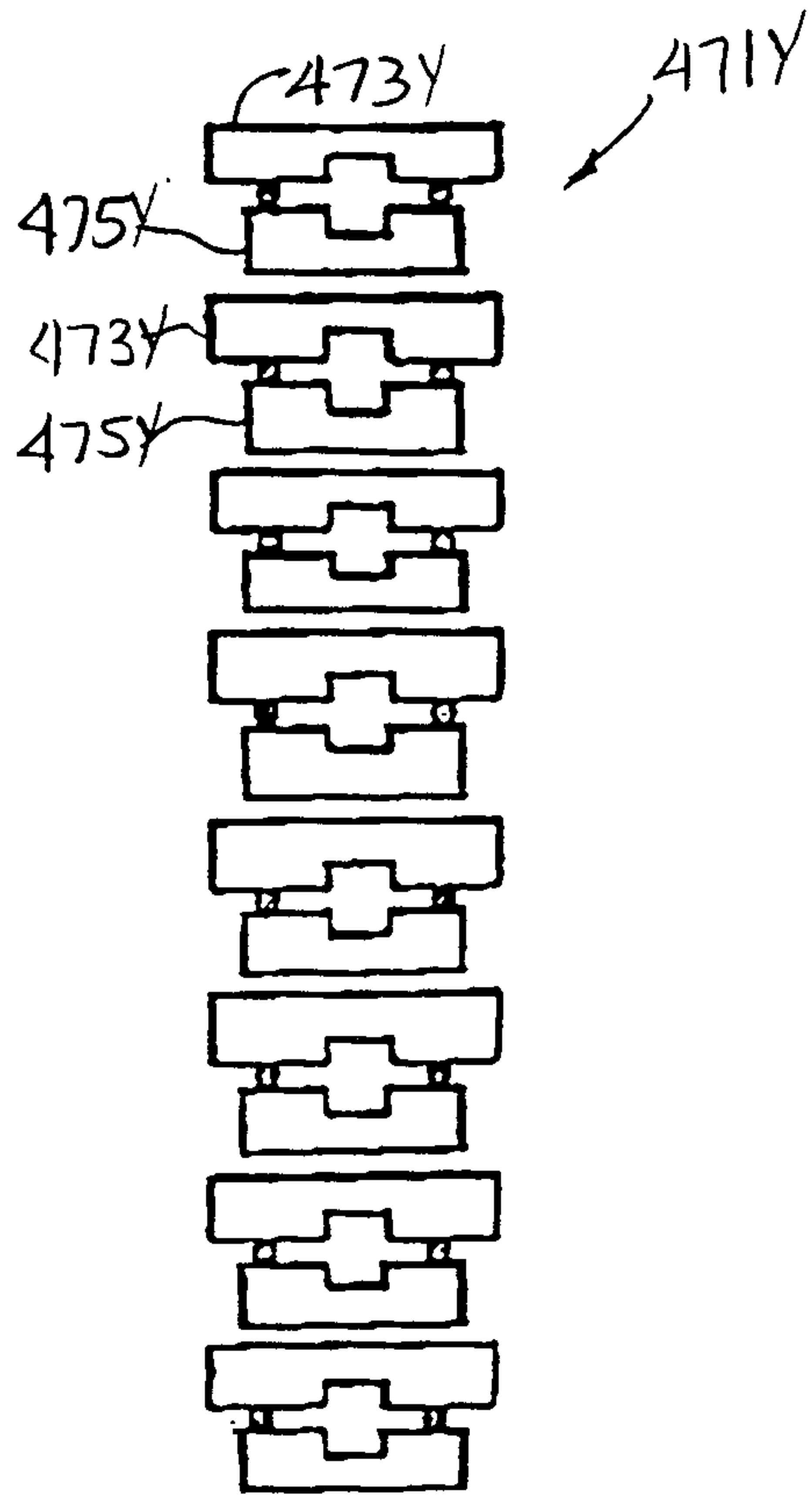


Fig. 64Y

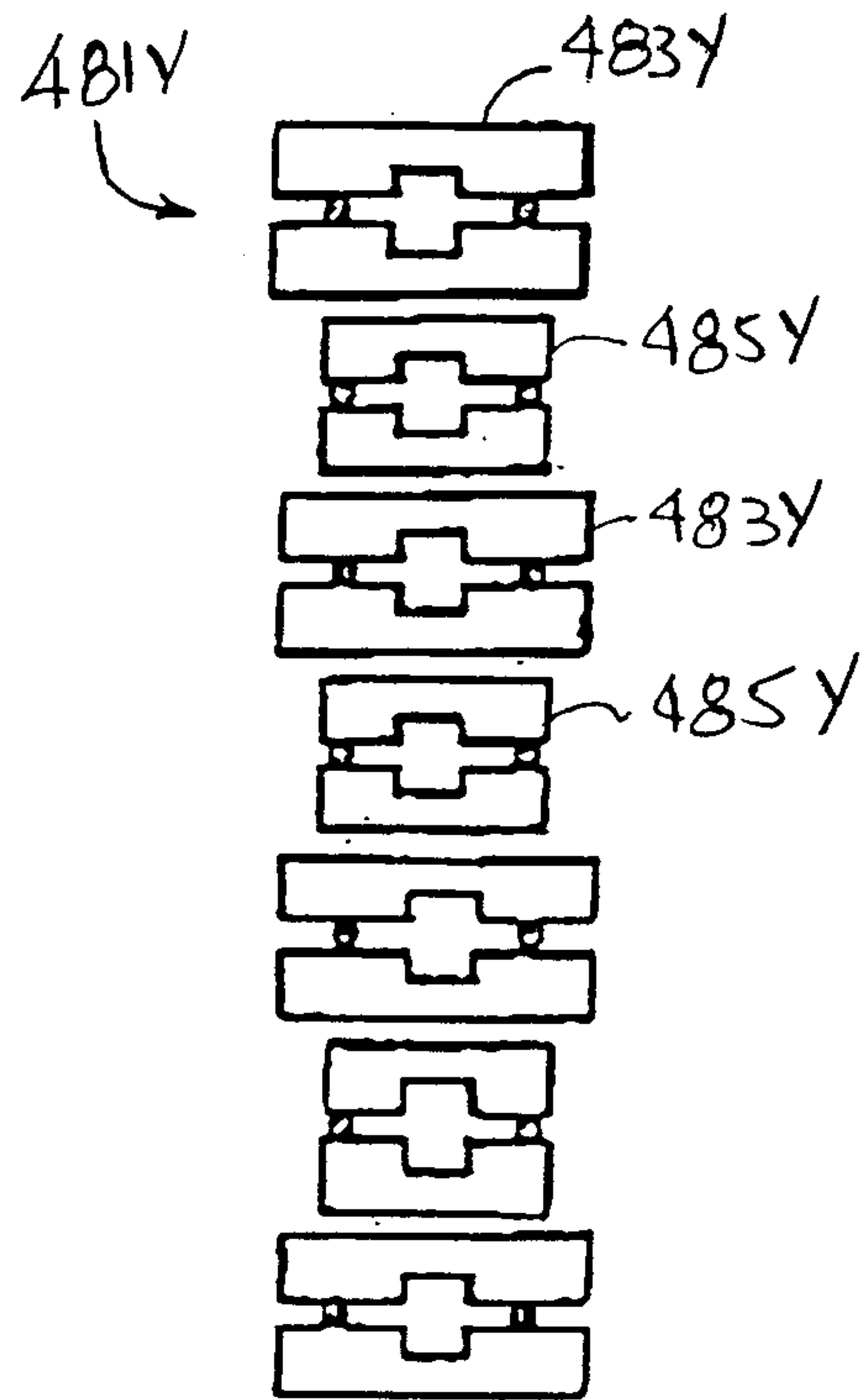


Fig. 65Y

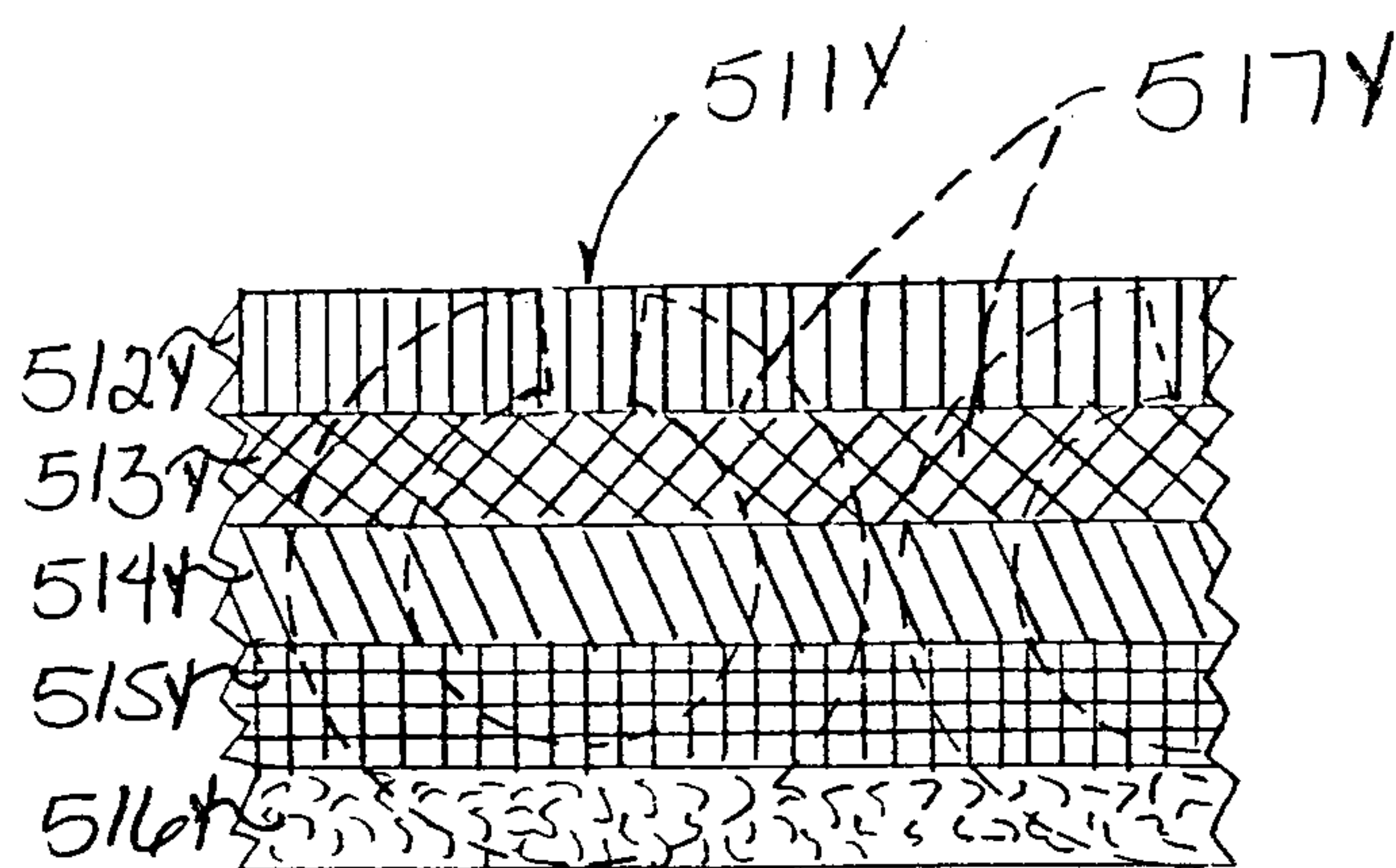


Fig. 66Y

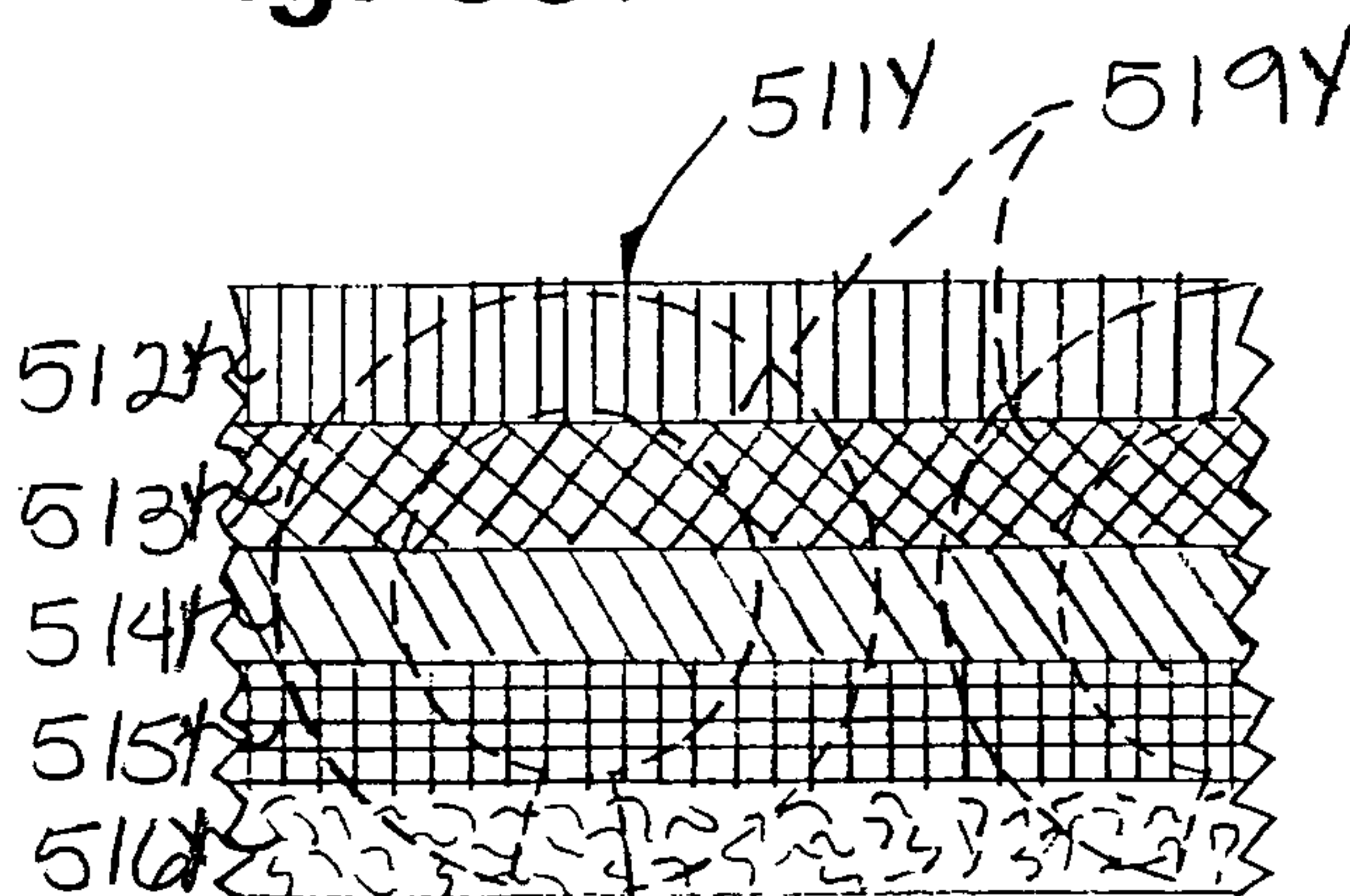


Fig. 67Y

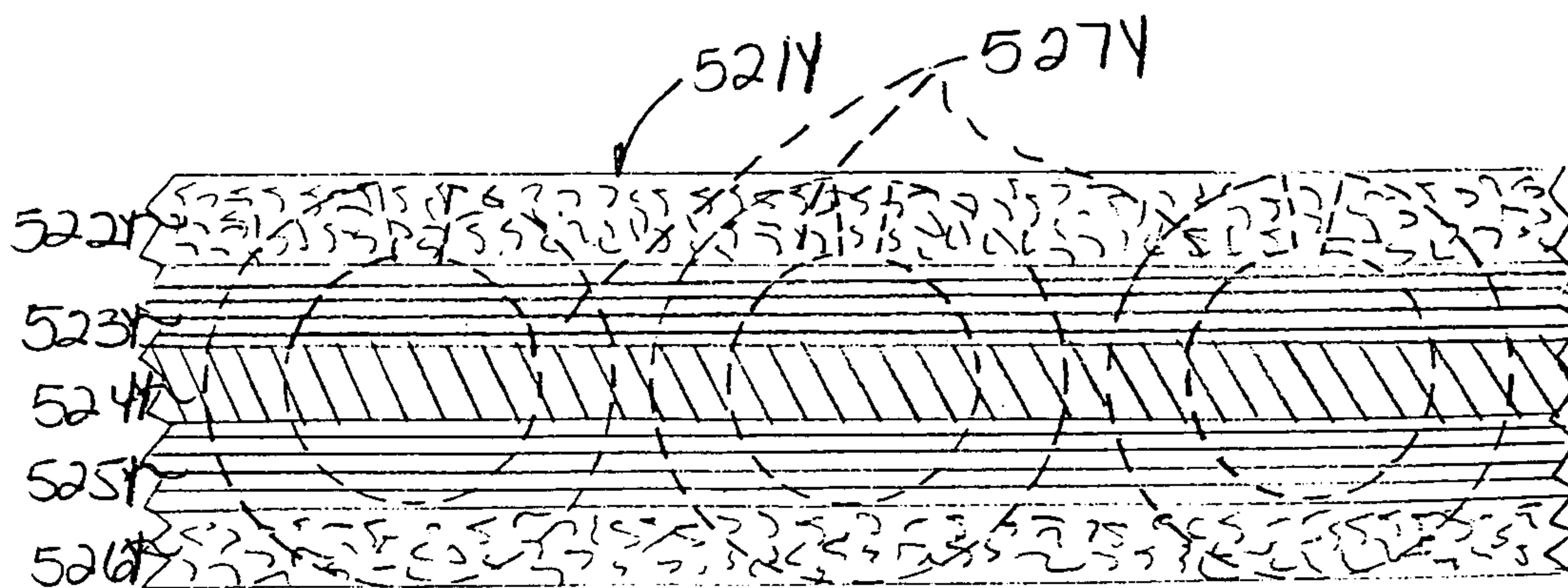
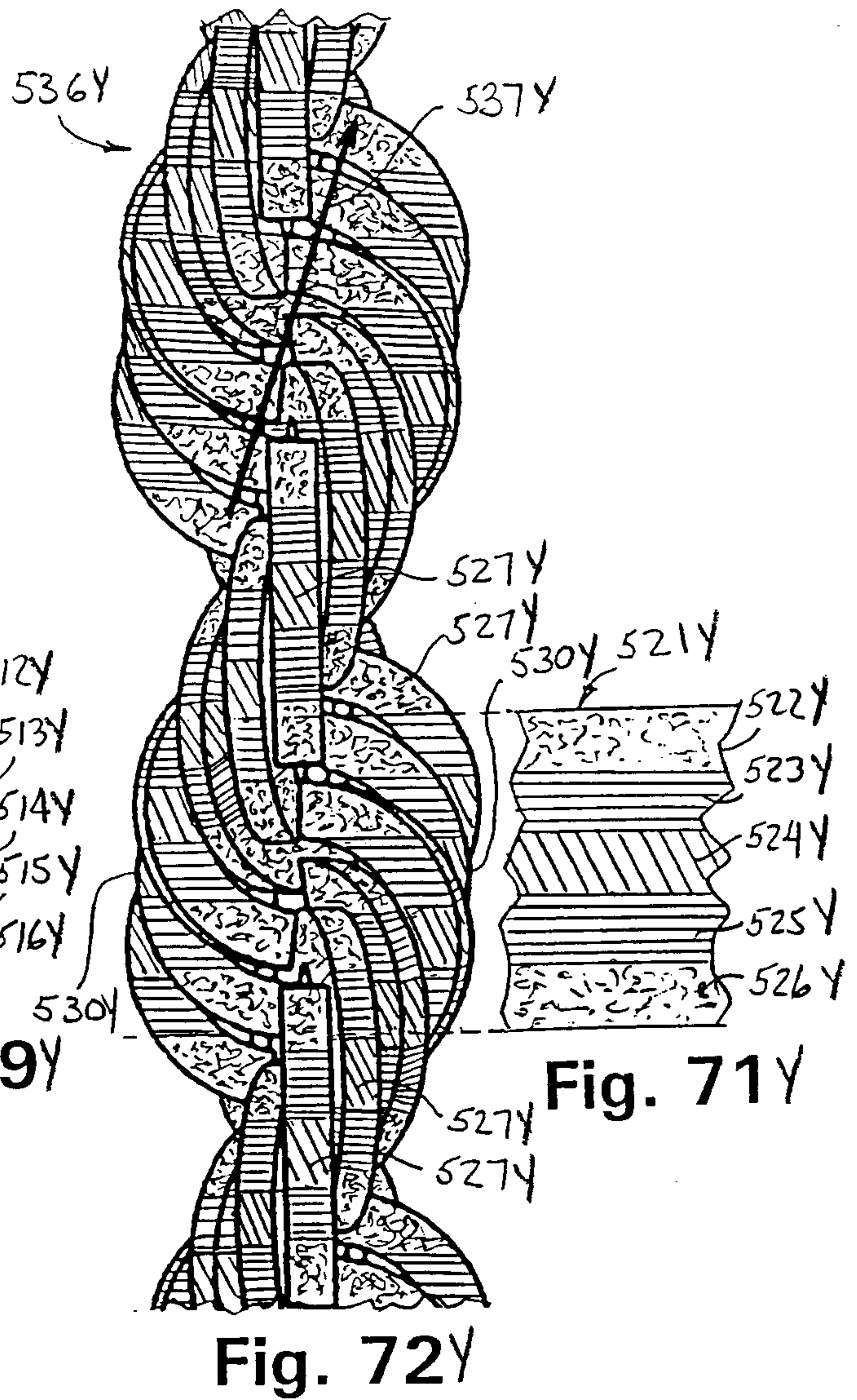
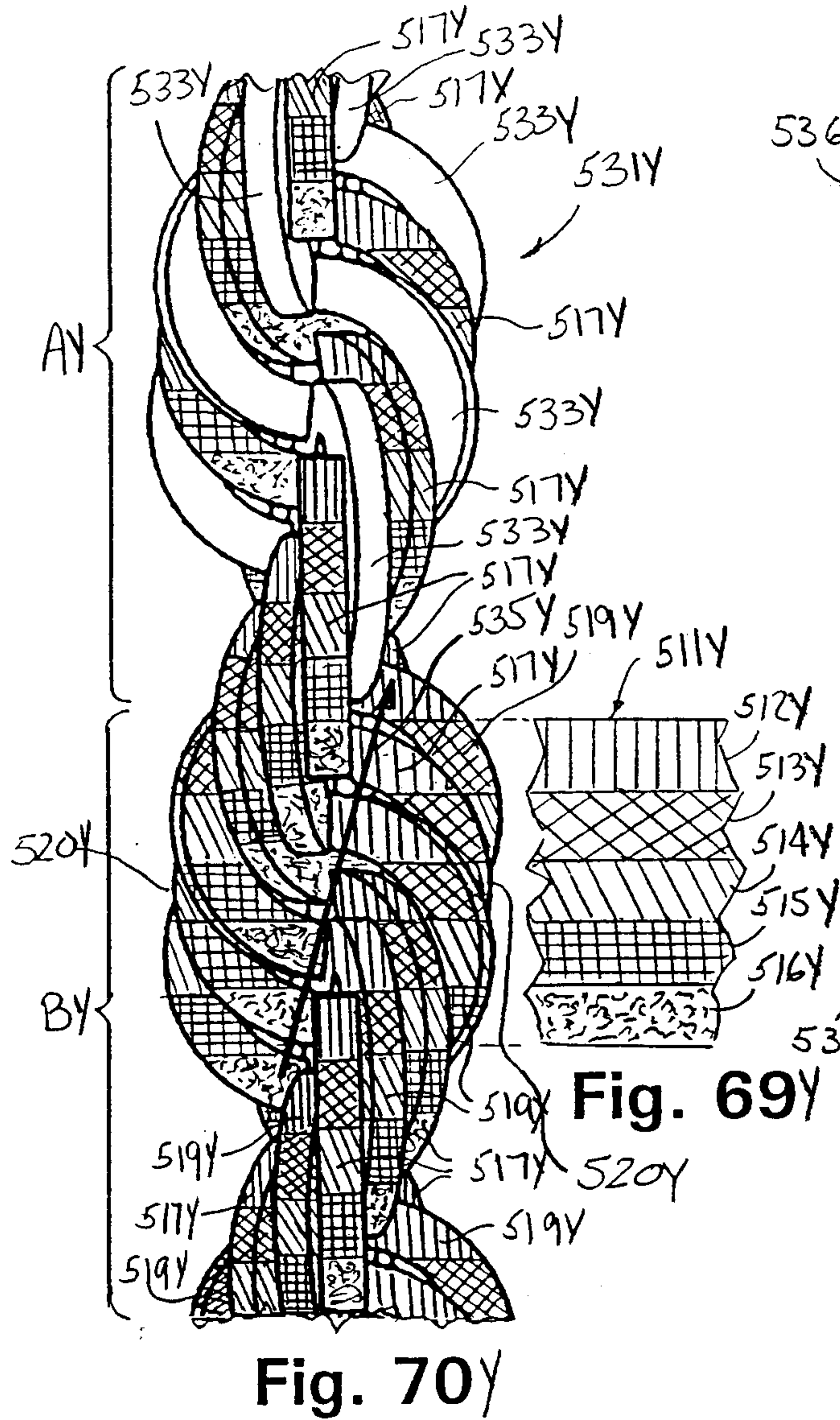
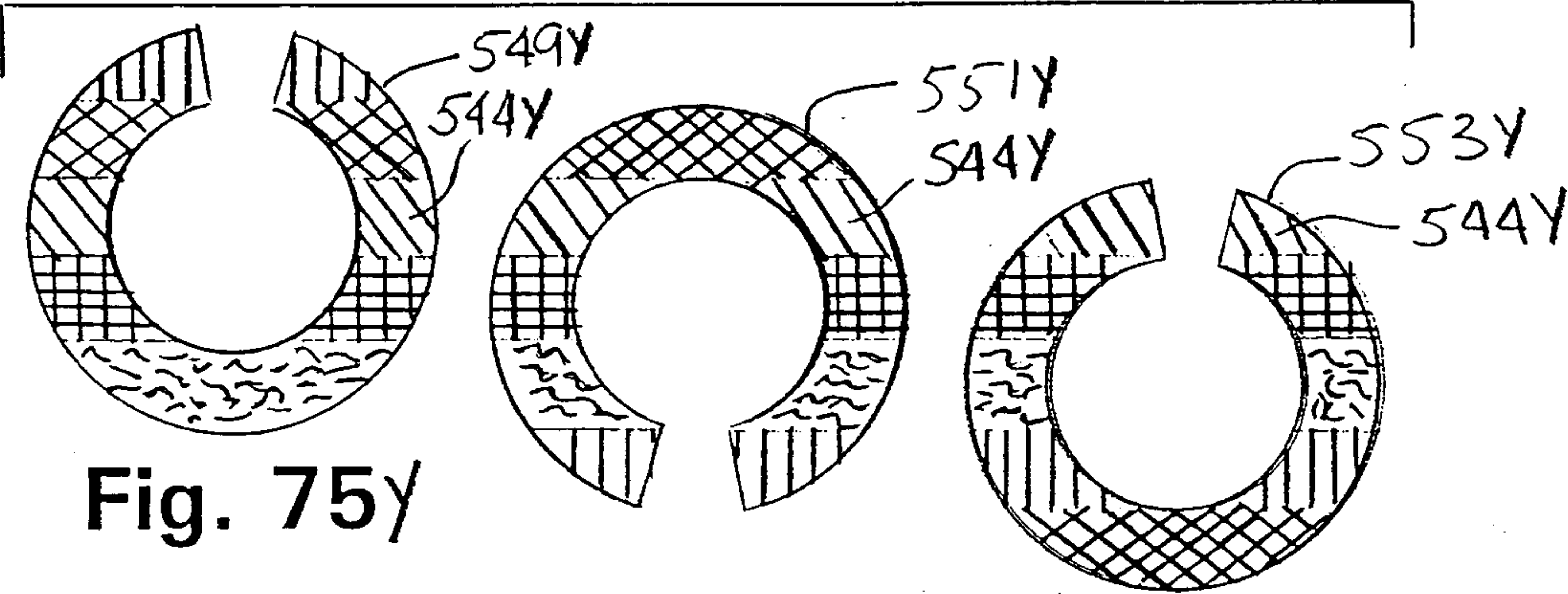
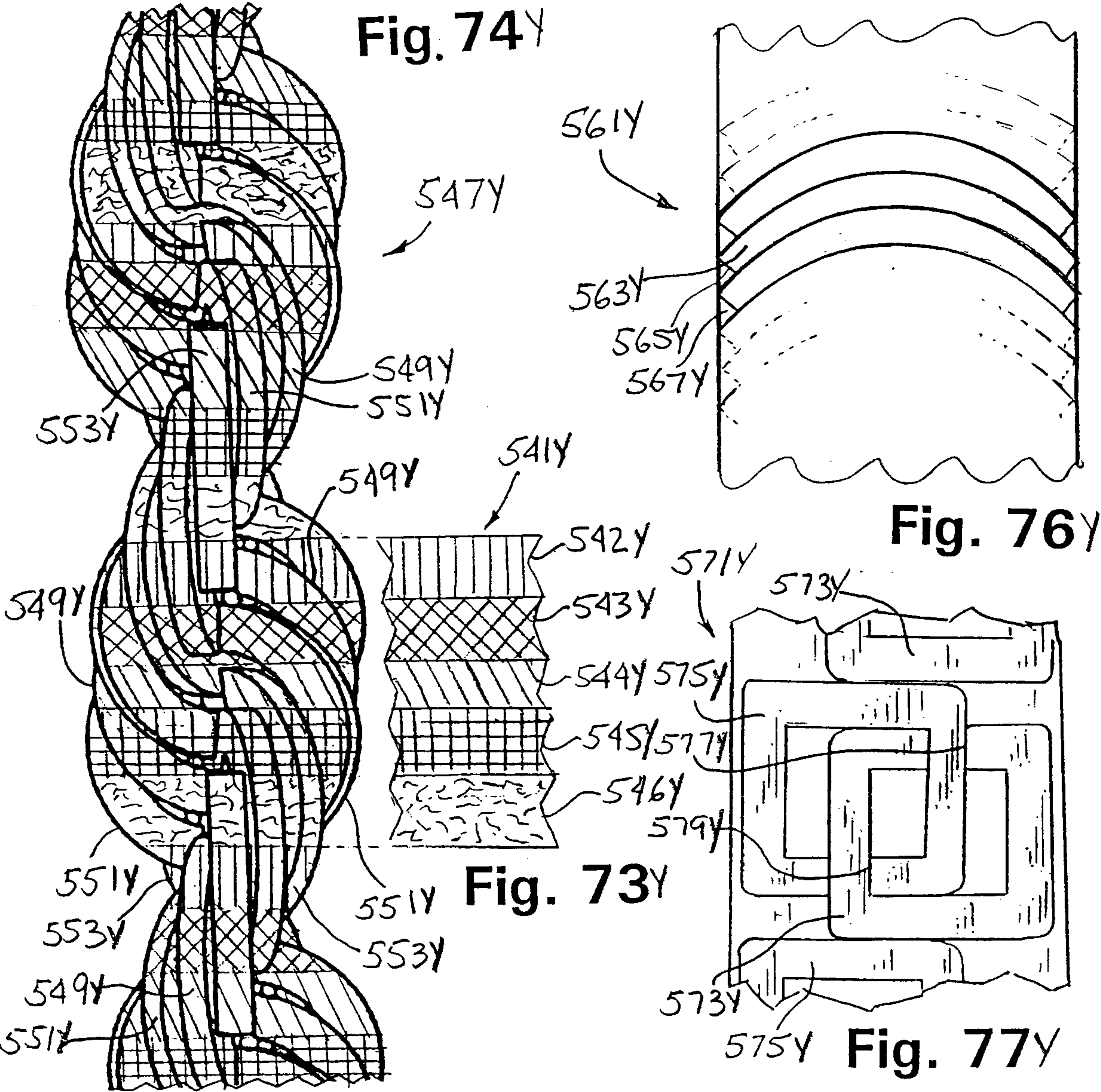


Fig. 68Y





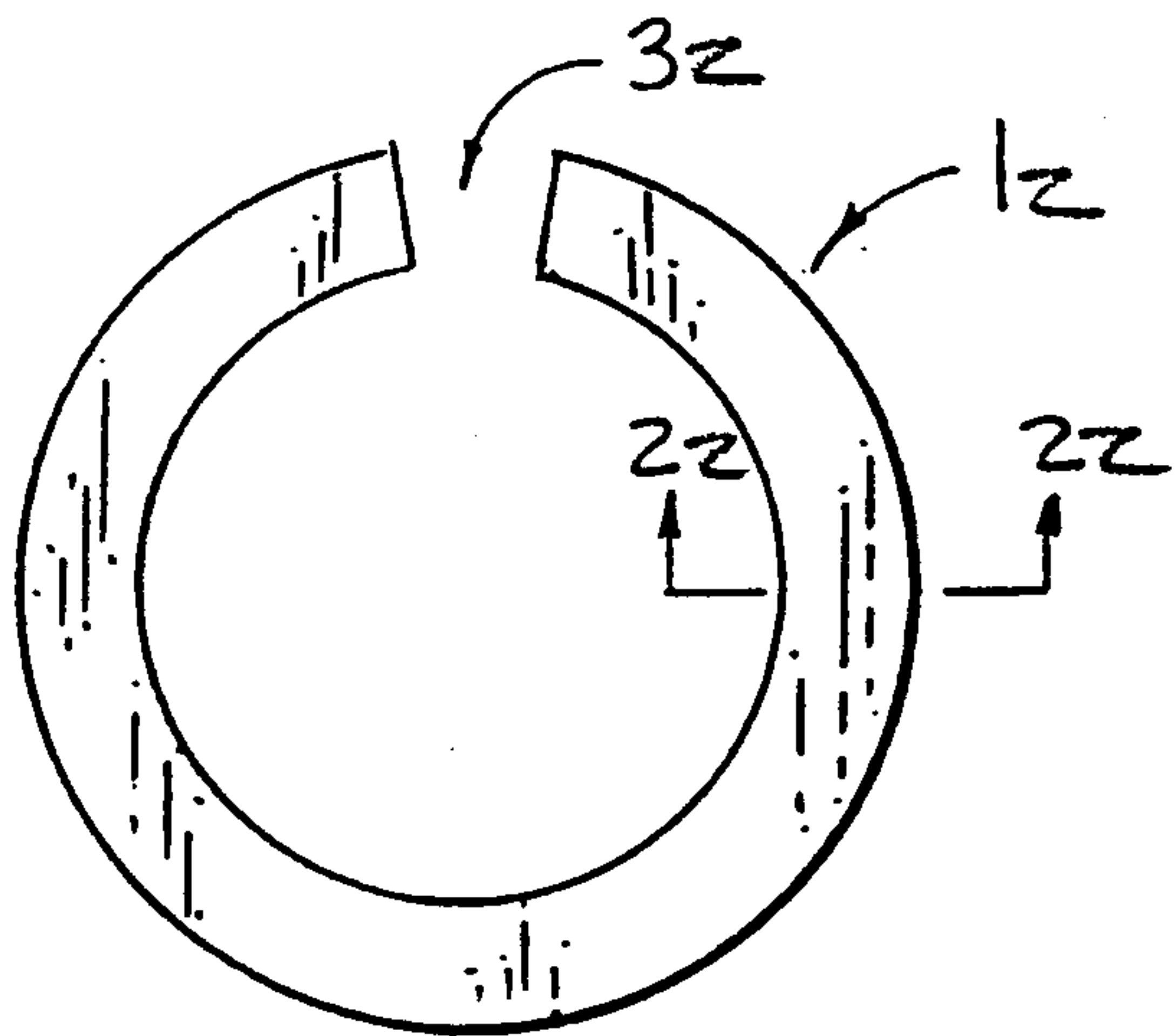


Fig. 1Z
(Prior Art)

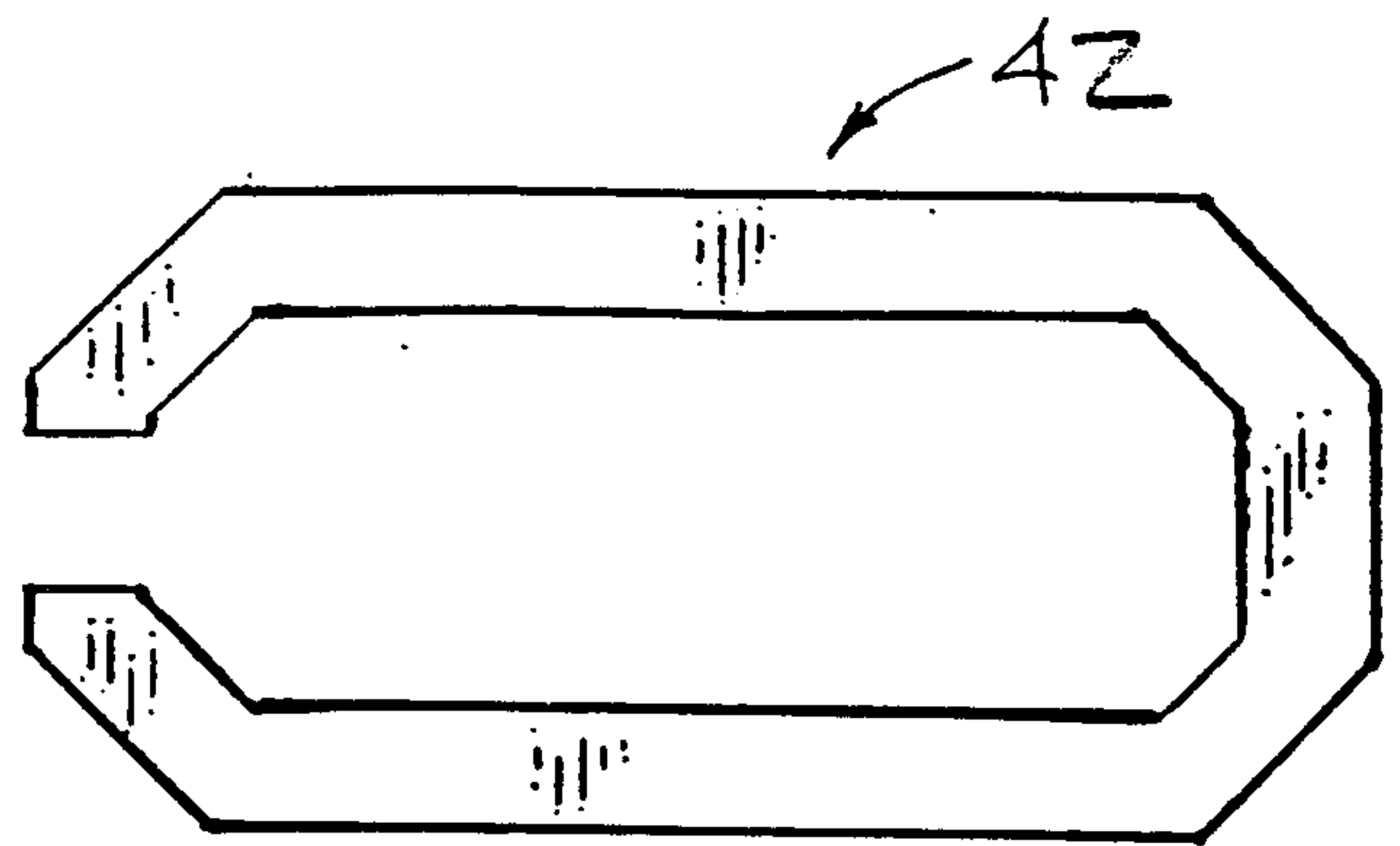


Fig. 1AZ
(Prior Art)

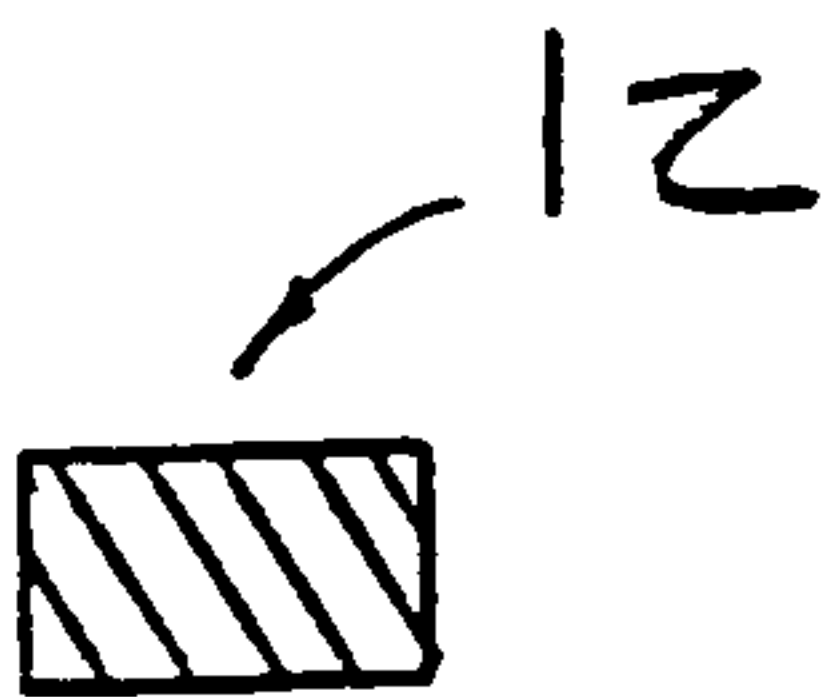


Fig. 2Z
(Prior Art)

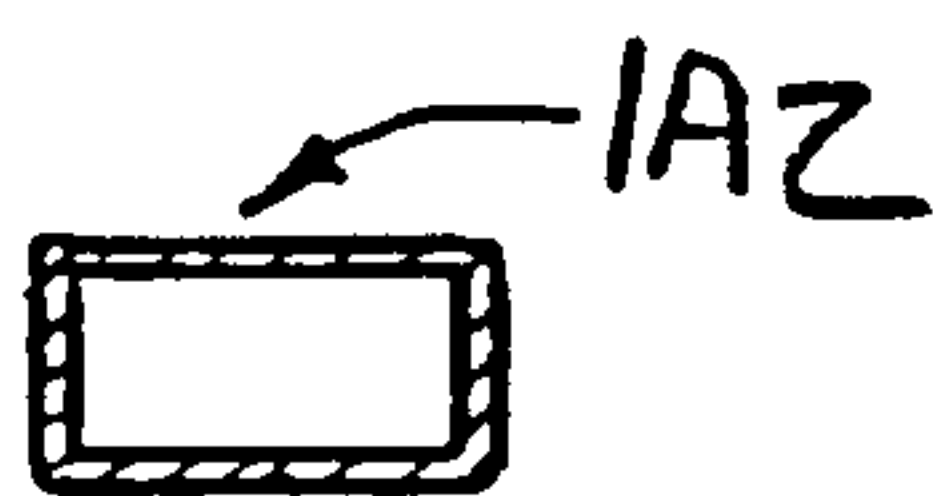


Fig. 2AZ
(Prior Art)

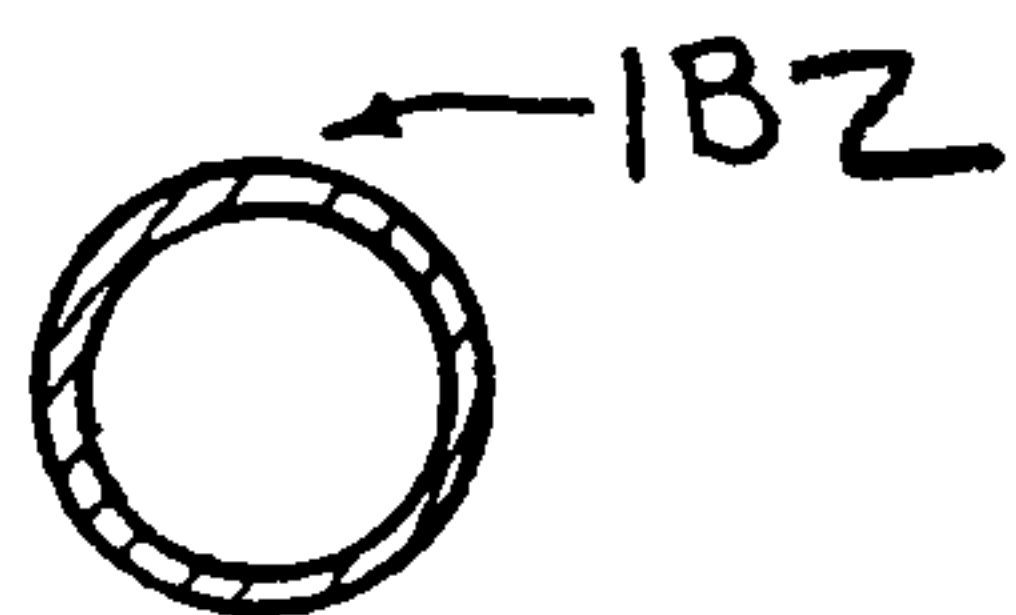


Fig. 2BZ
(Prior Art)

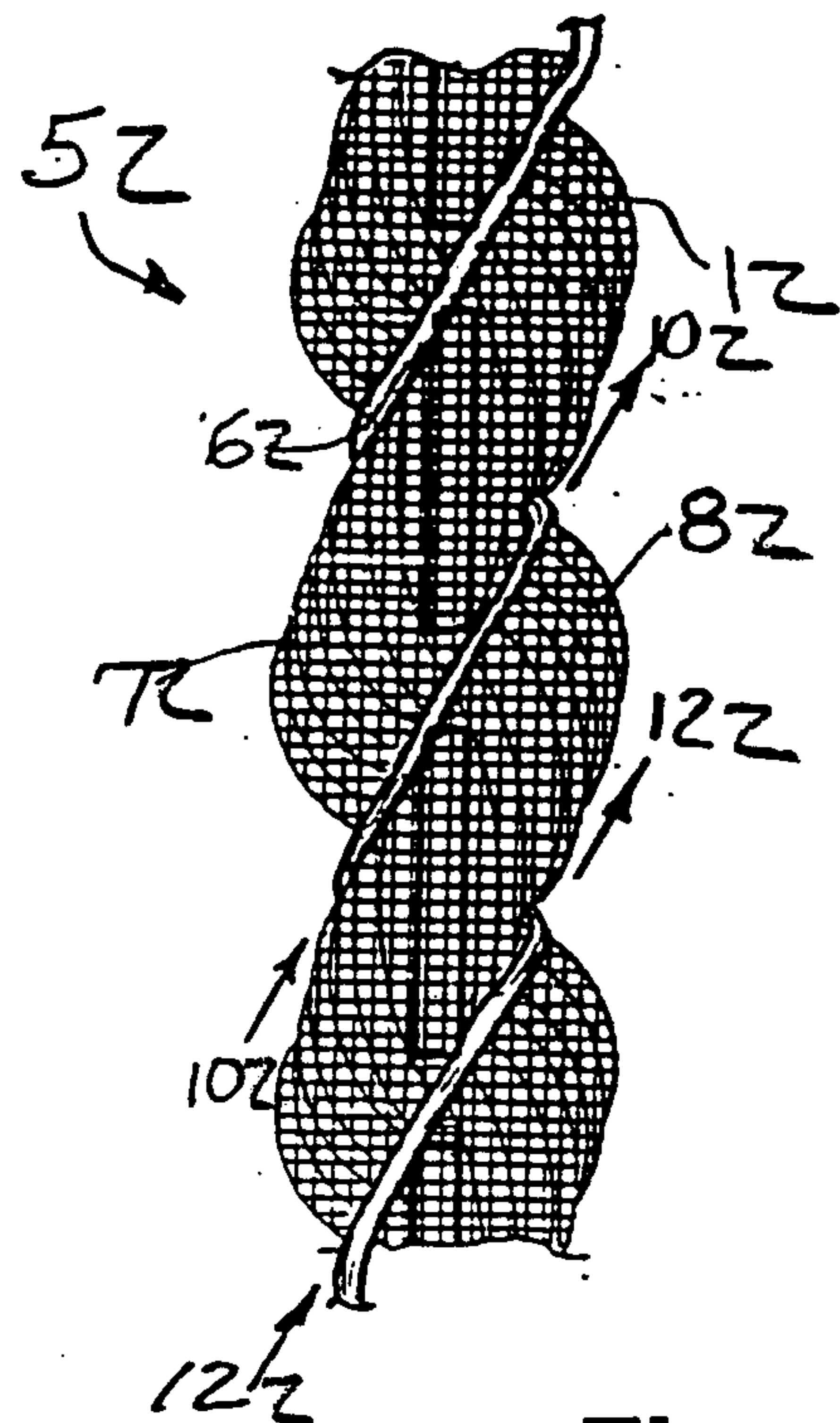


Fig. 3Z
(Prior Art)

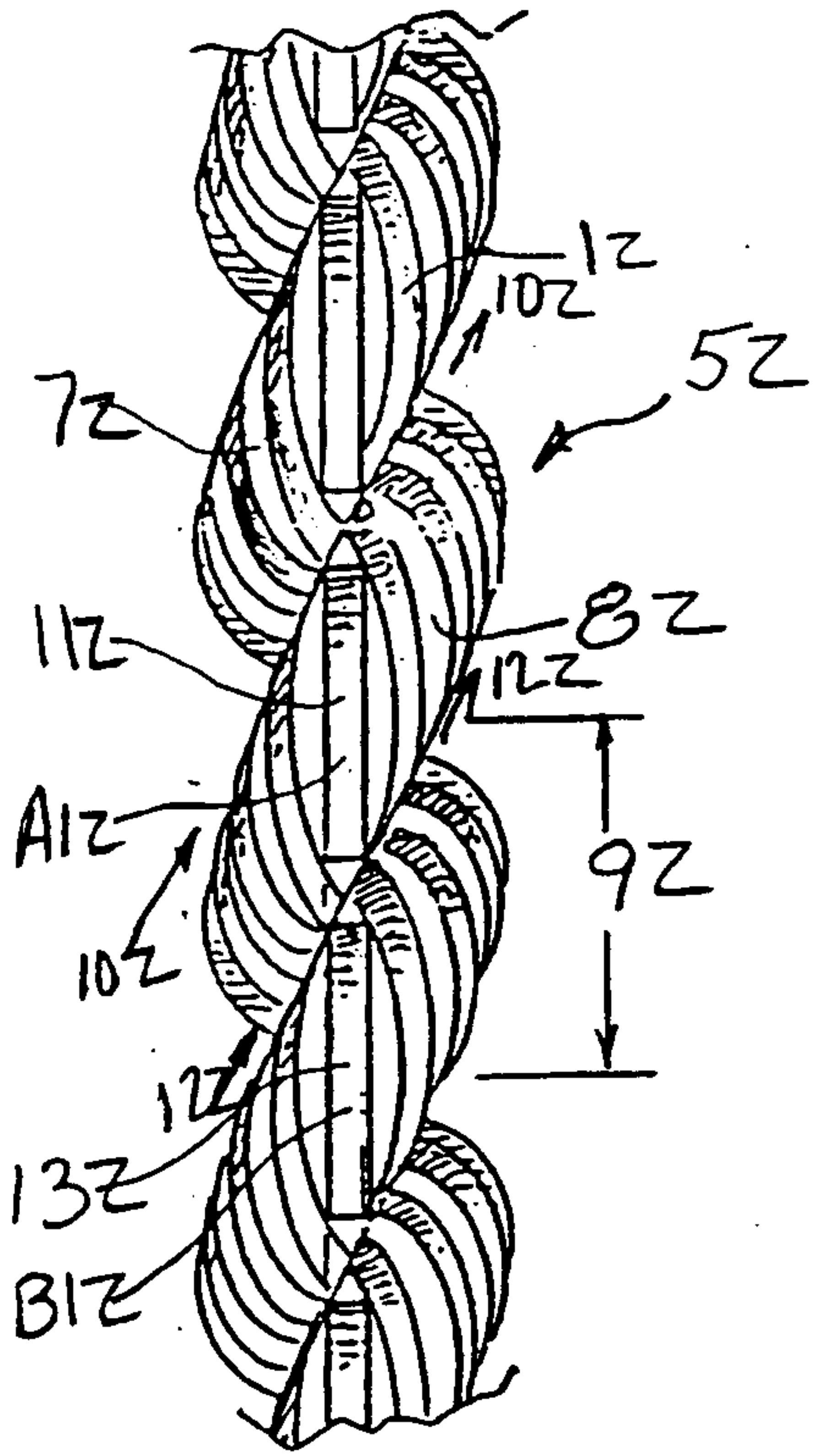


Fig. 4Z
(Prior Art)

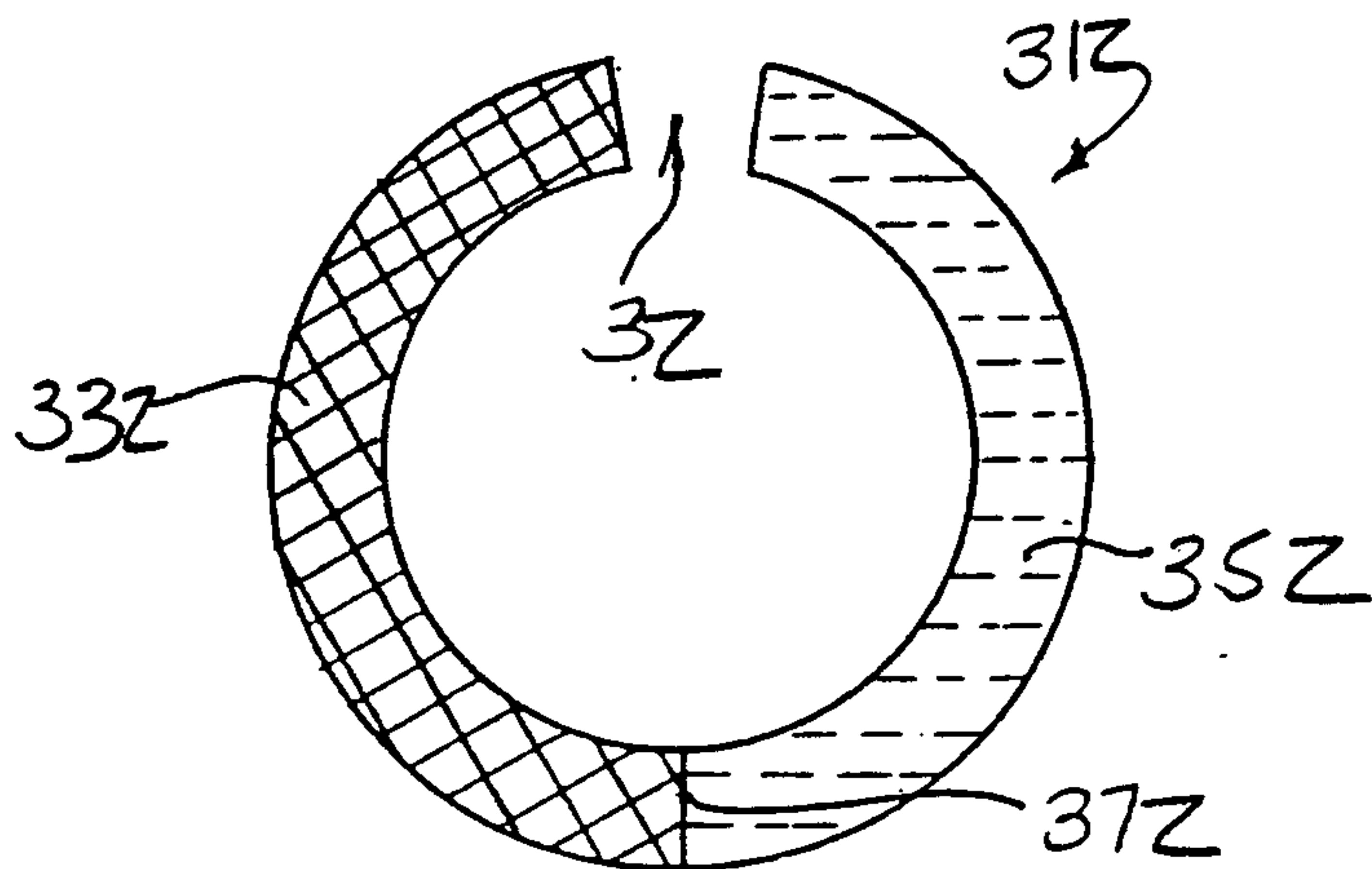


Fig. 5Z

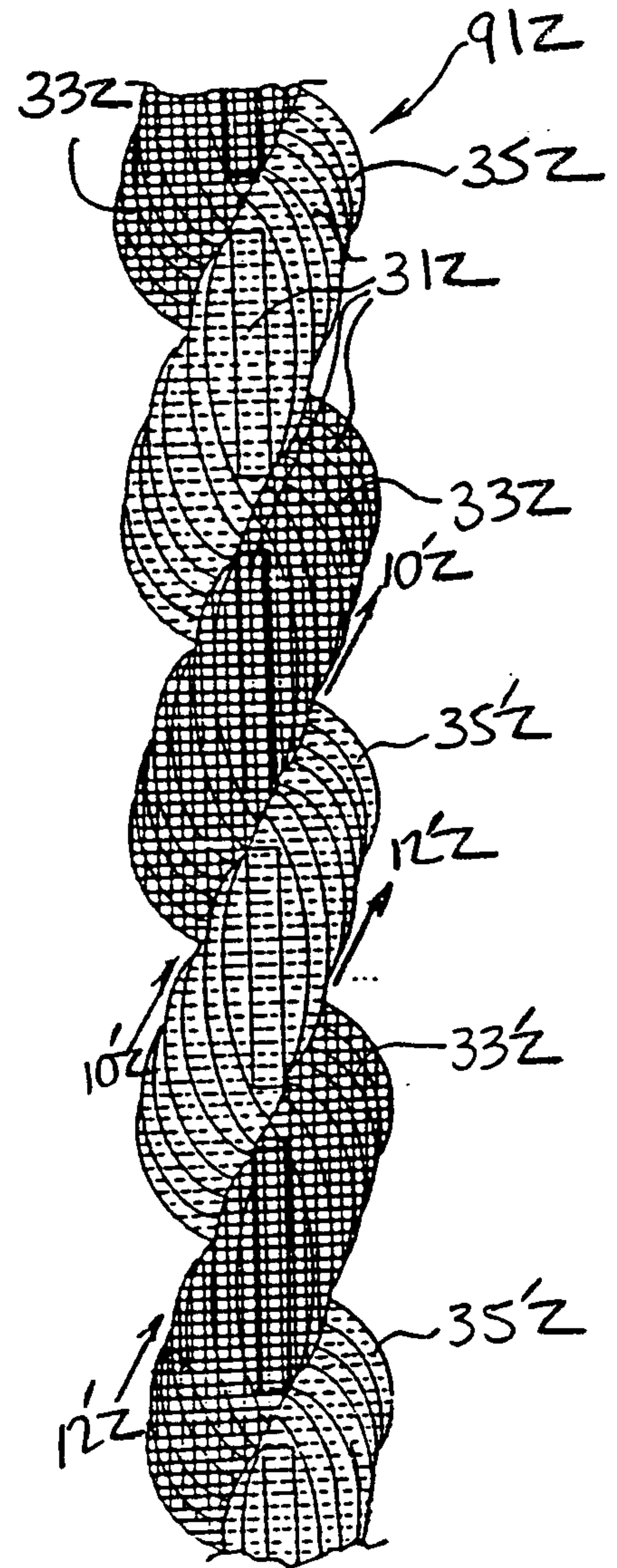


Fig. 6Z

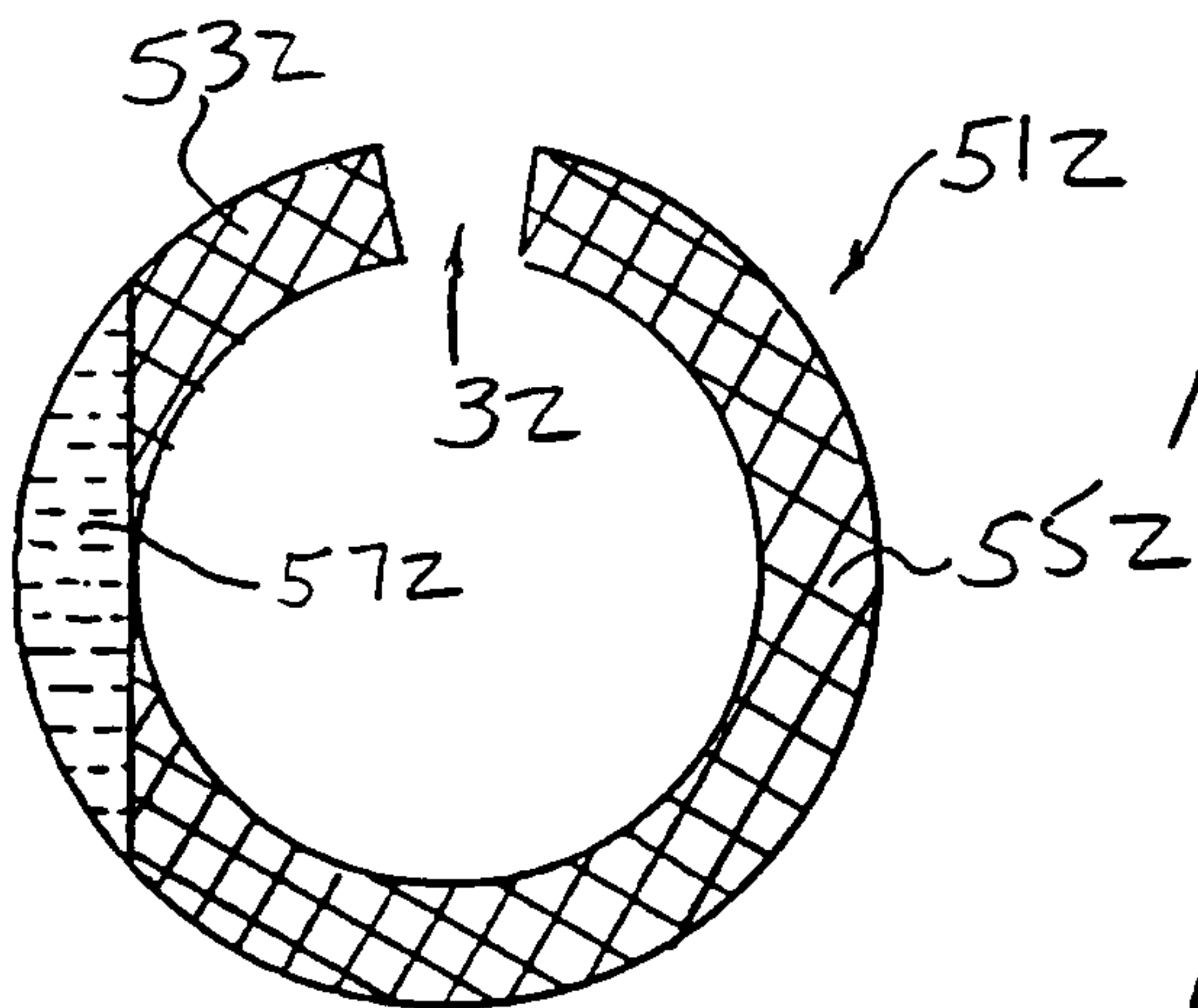


Fig. 7Z

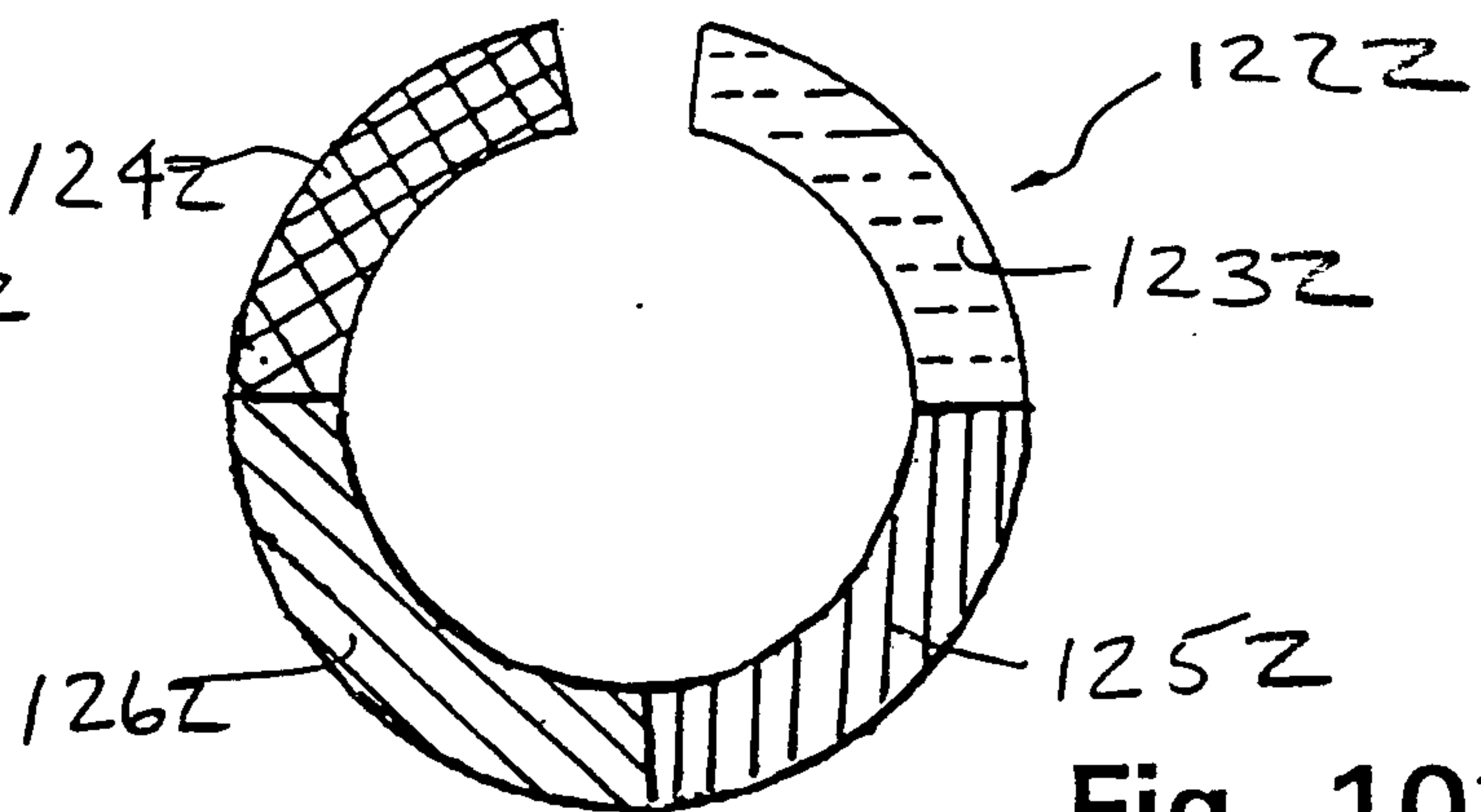


Fig. 10Z

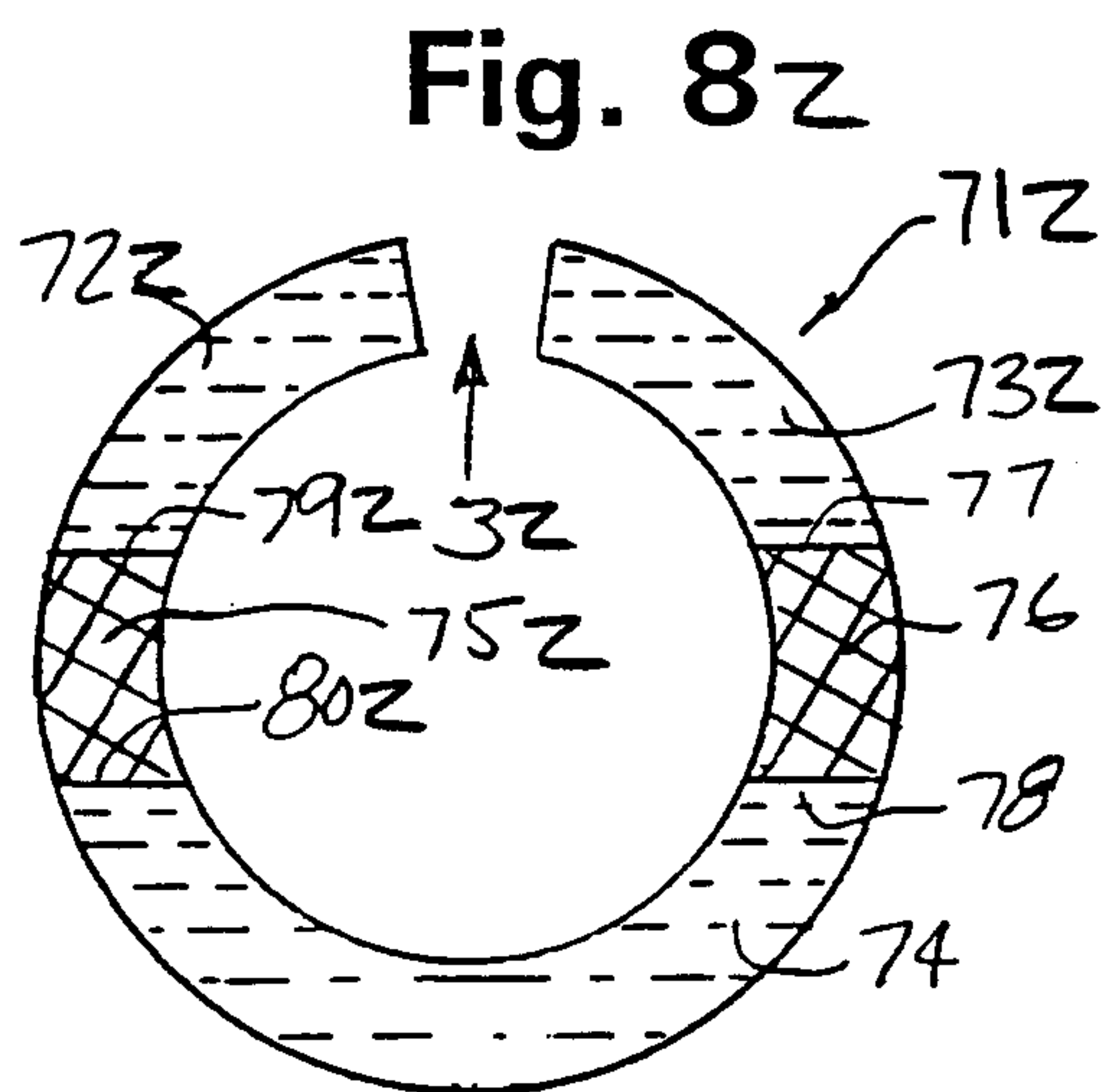


Fig. 8Z

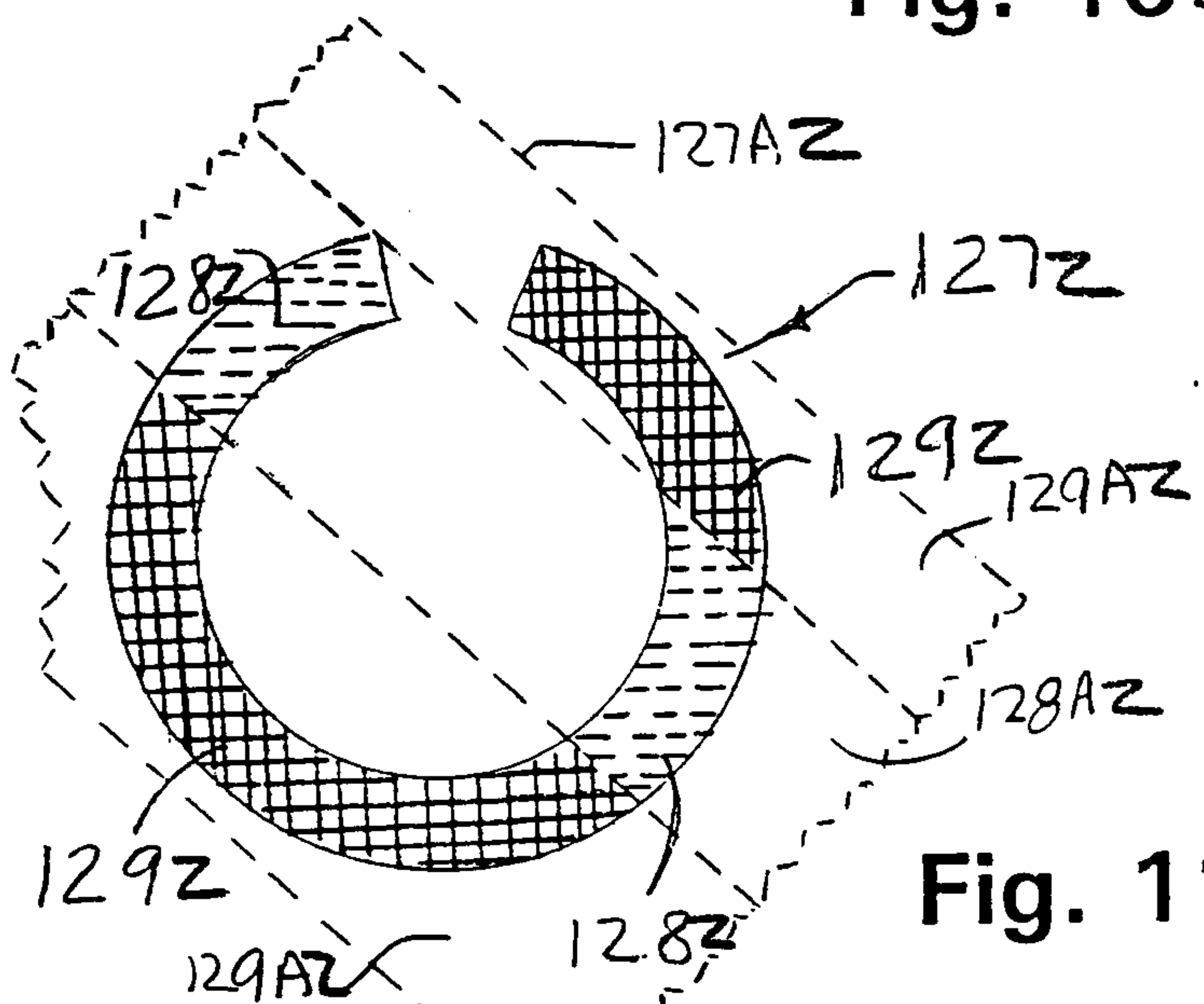


Fig. 11Z

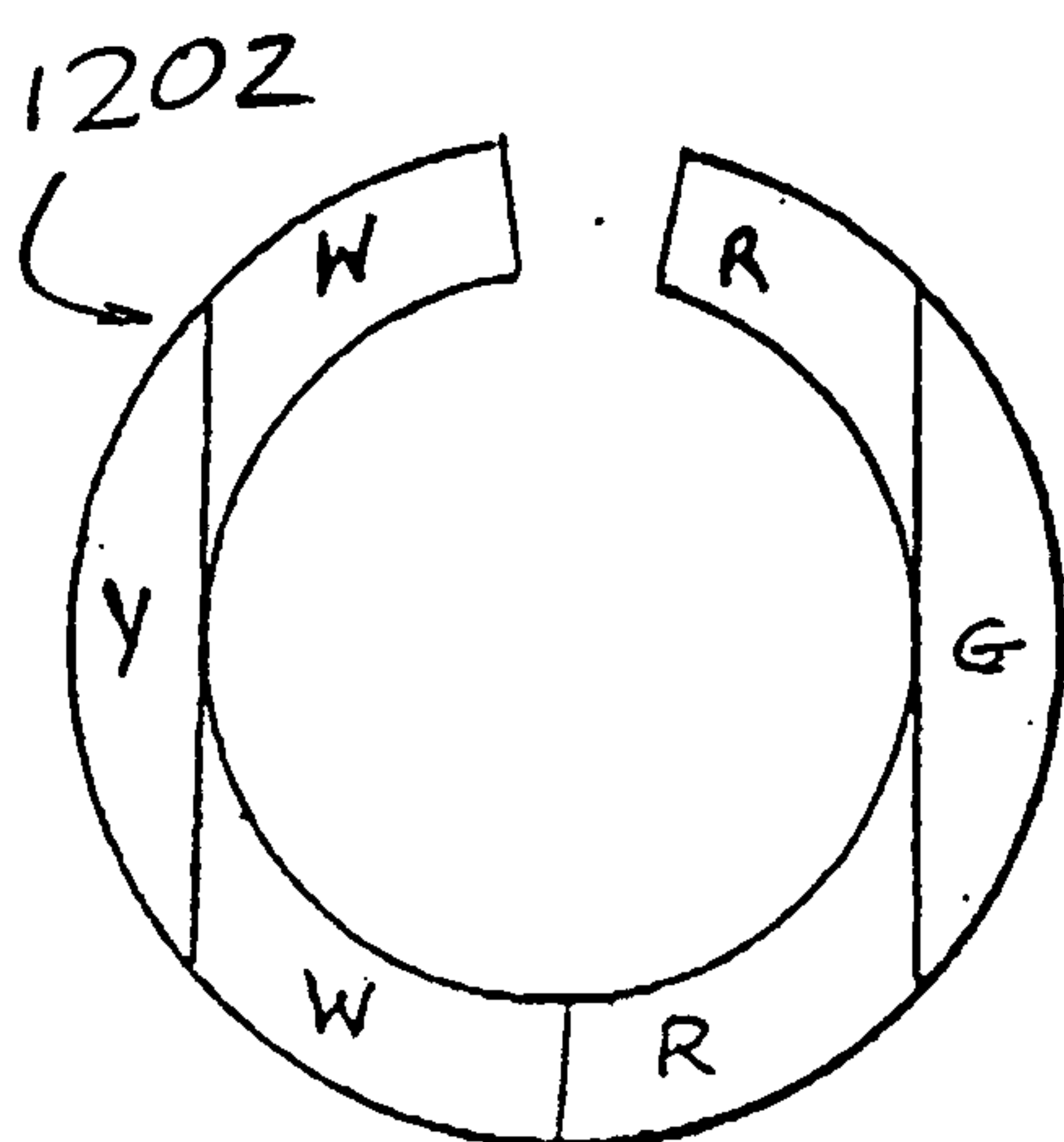


Fig. 9Z

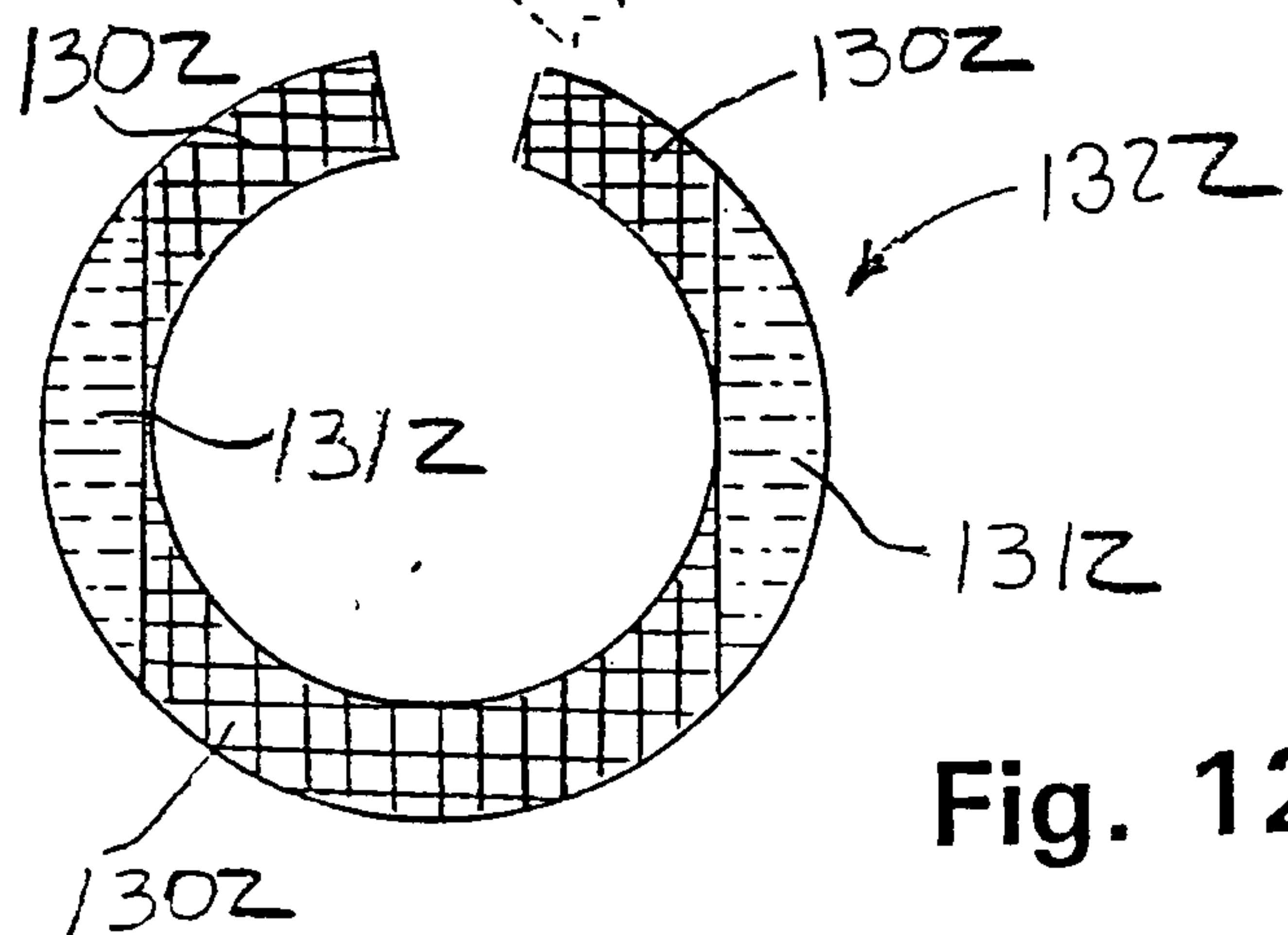


Fig. 12Z

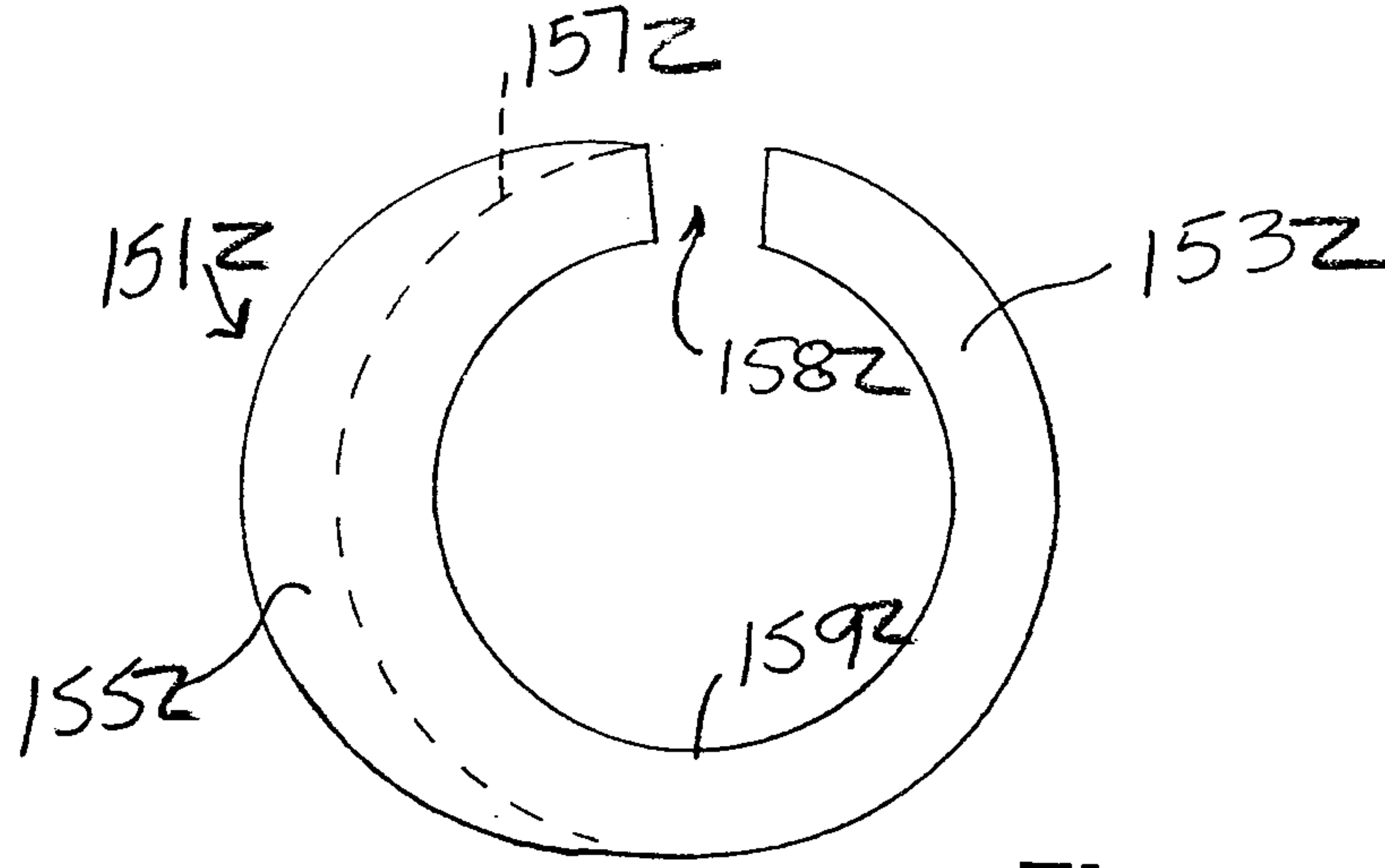


Fig. 13Z

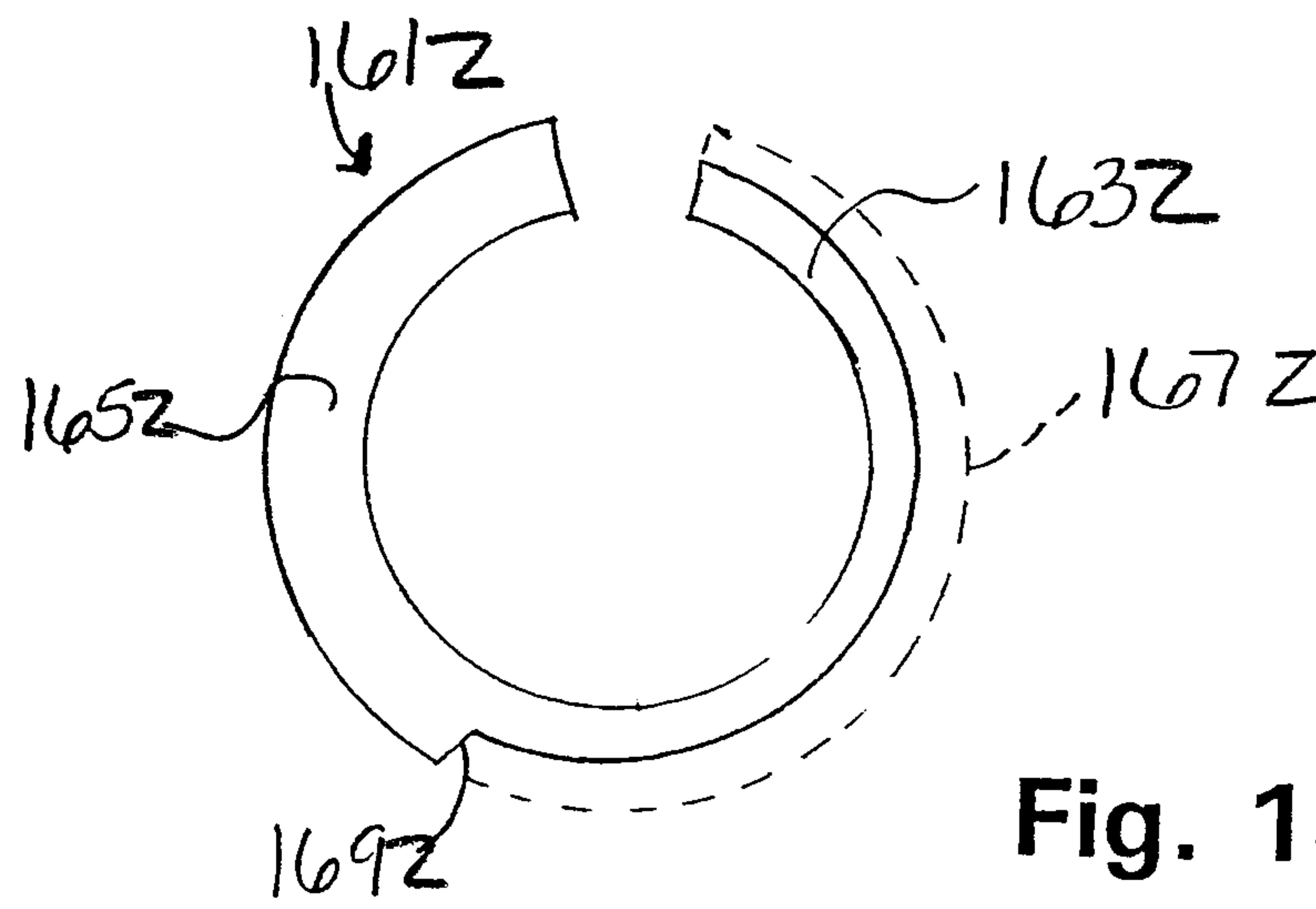


Fig. 14Z

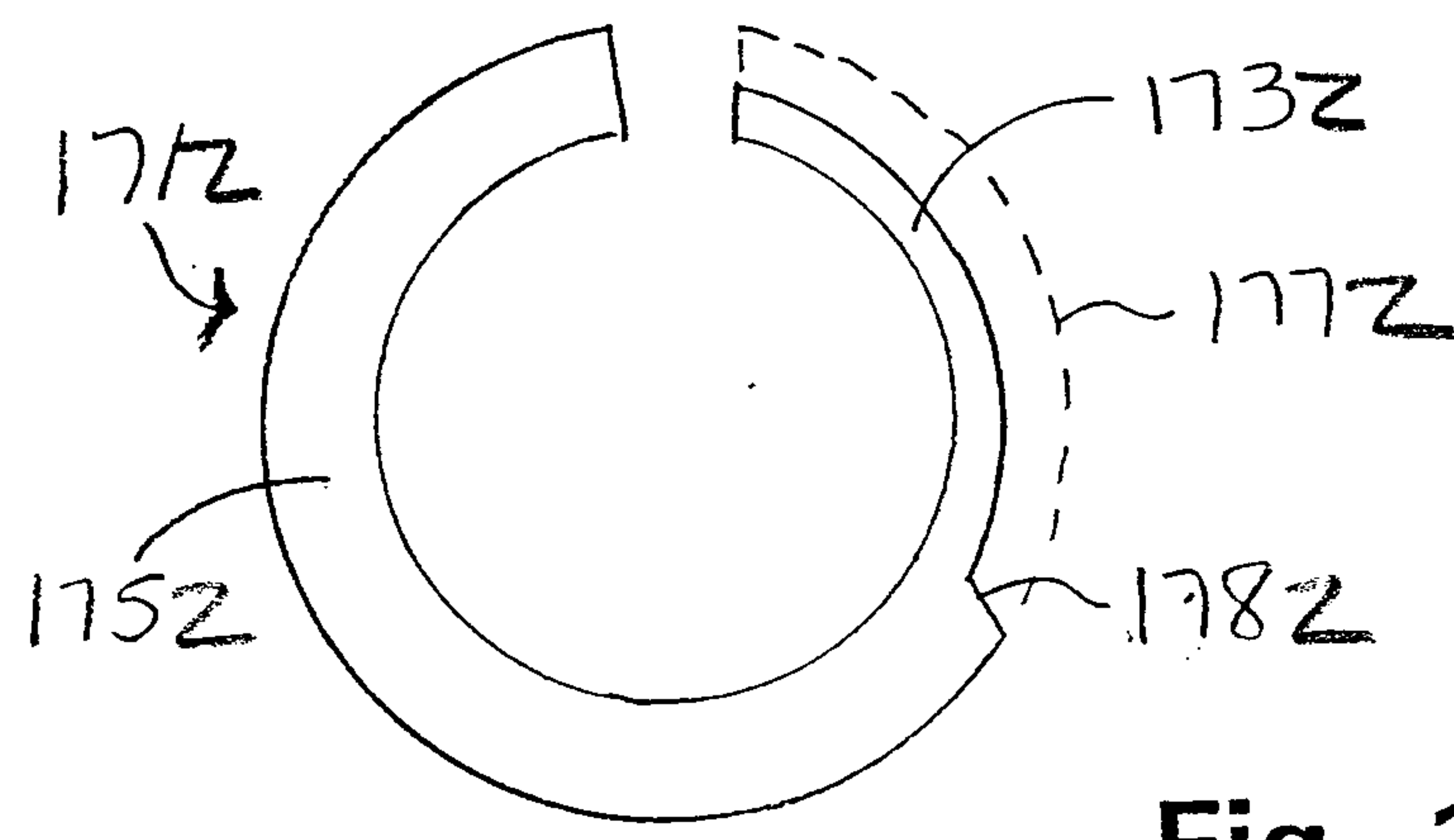


Fig. 15Z

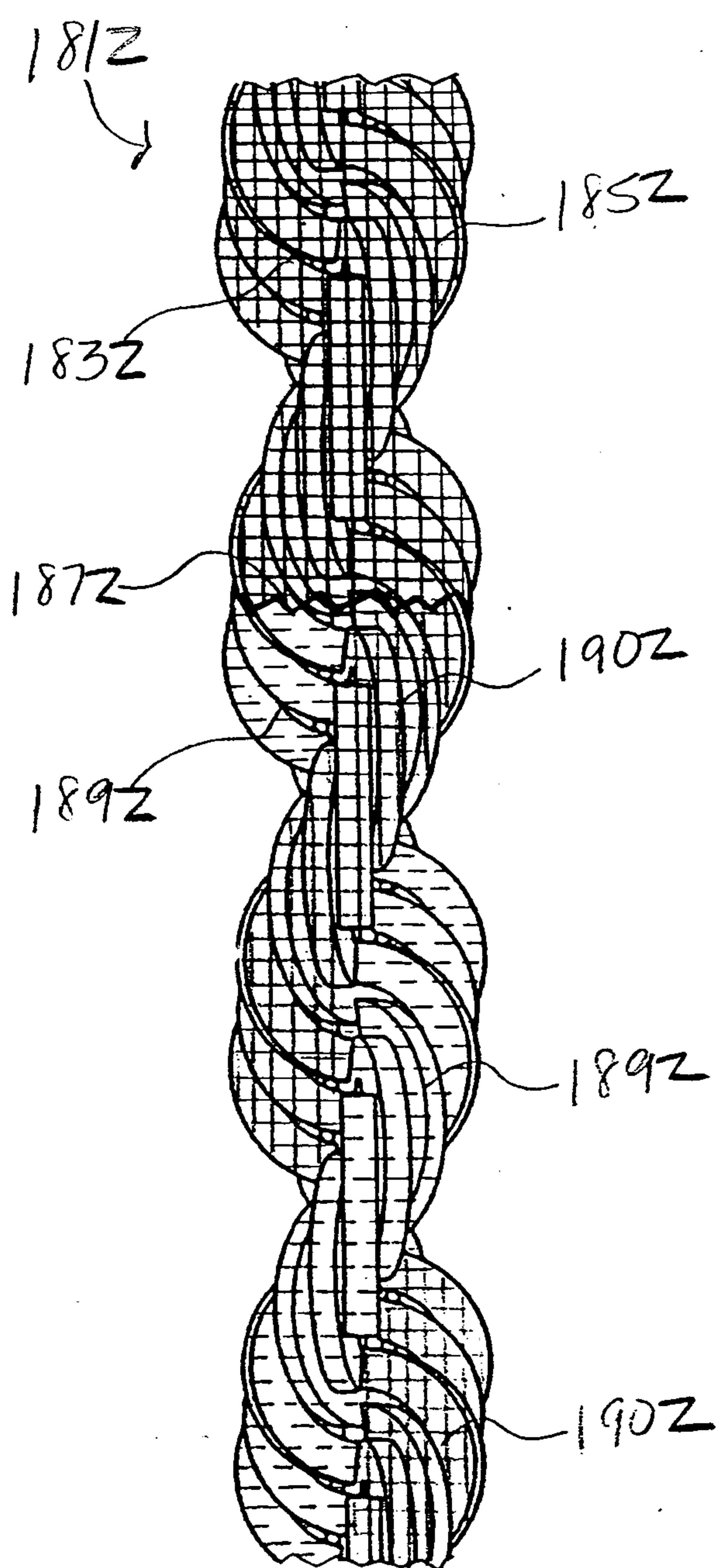


Fig. 16Z

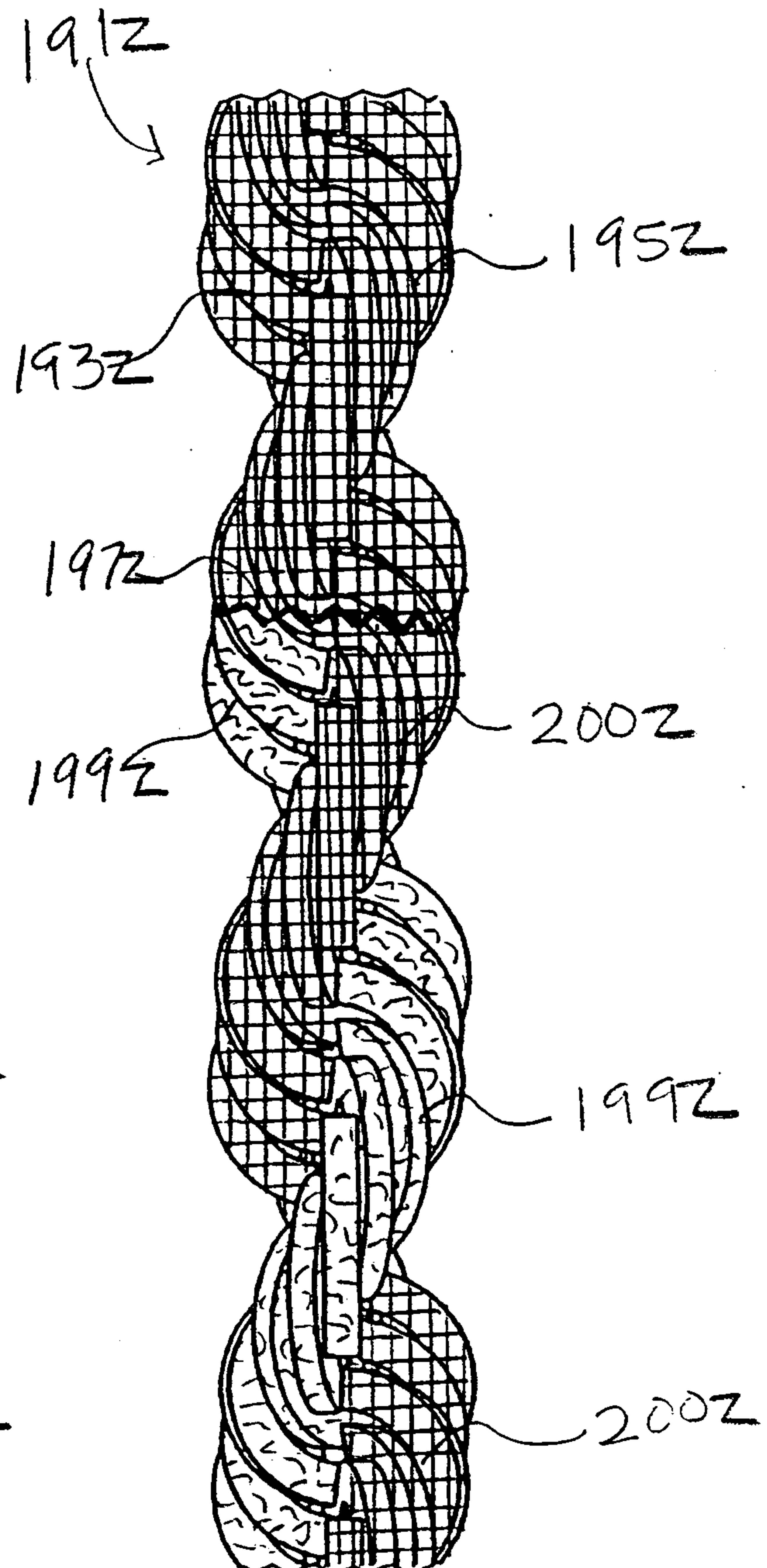


Fig. 17Z

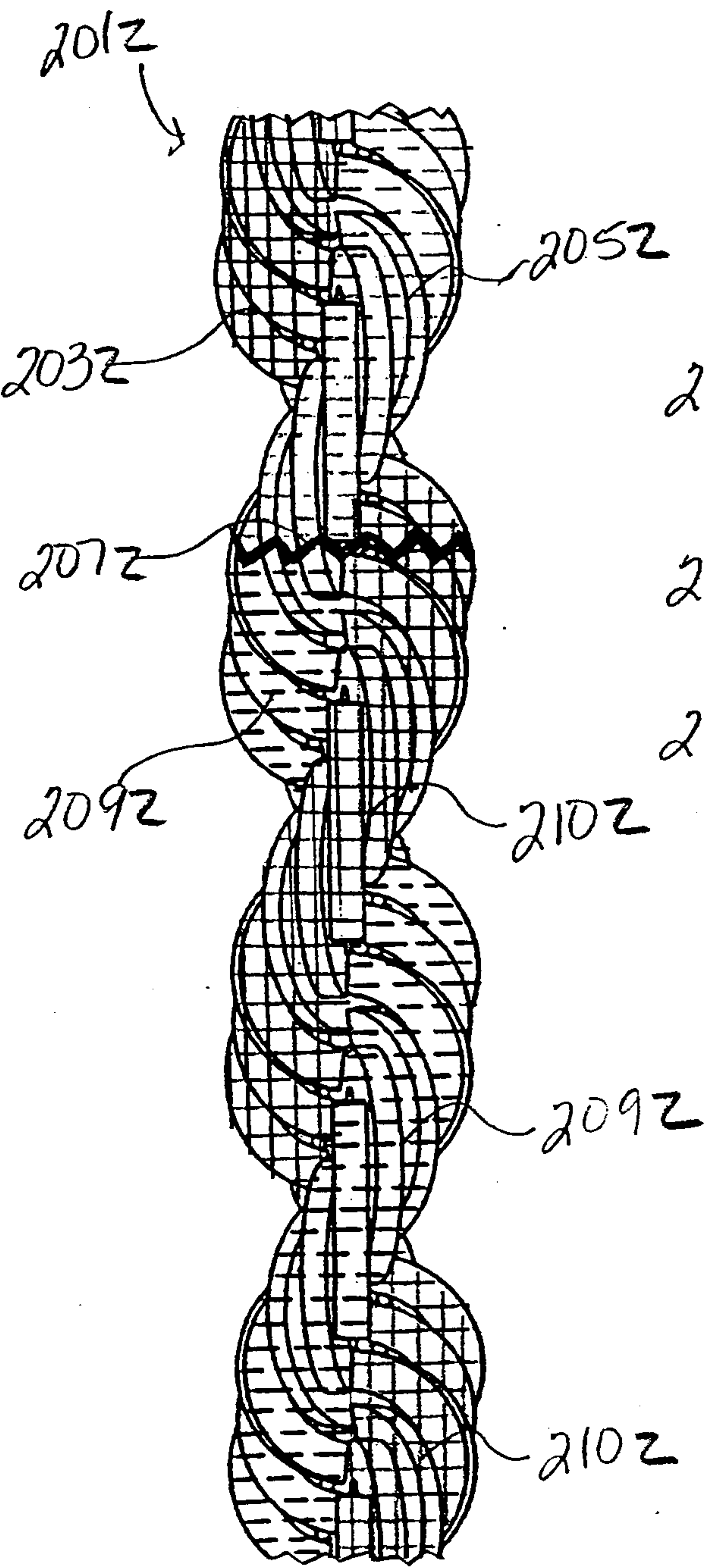


Fig. 18Z

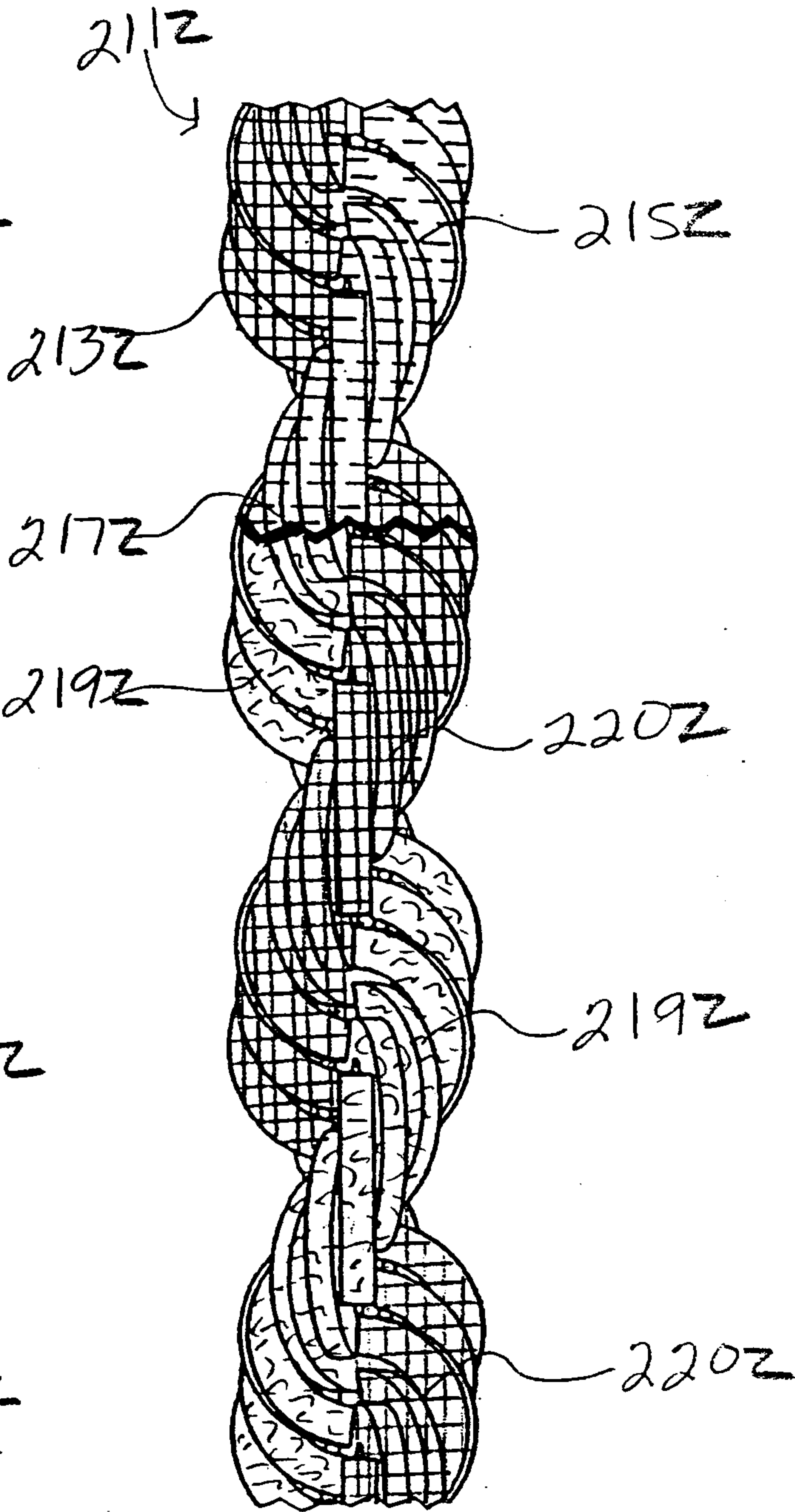


Fig. 19Z

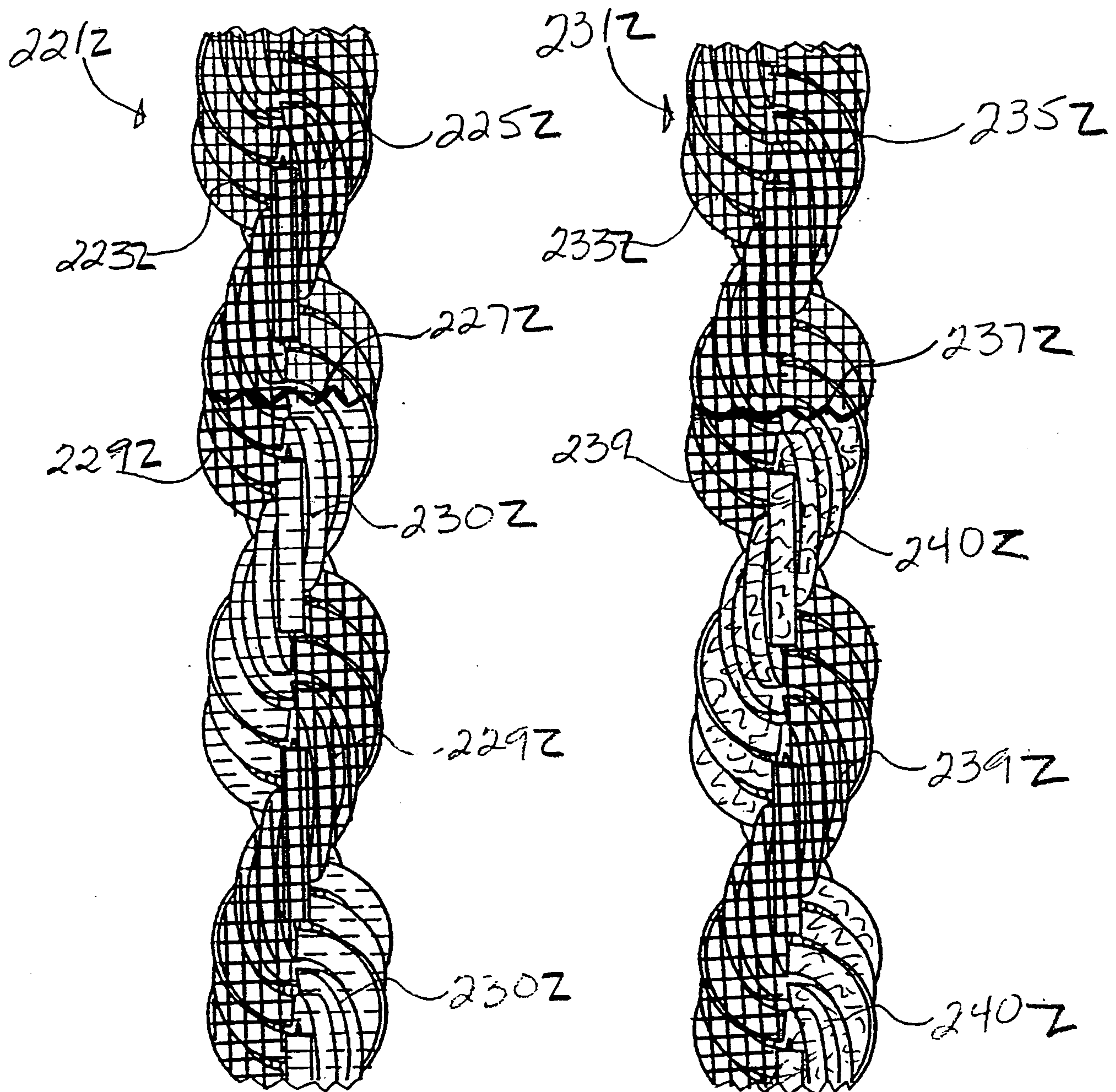


Fig. 20Z

Fig. 21Z

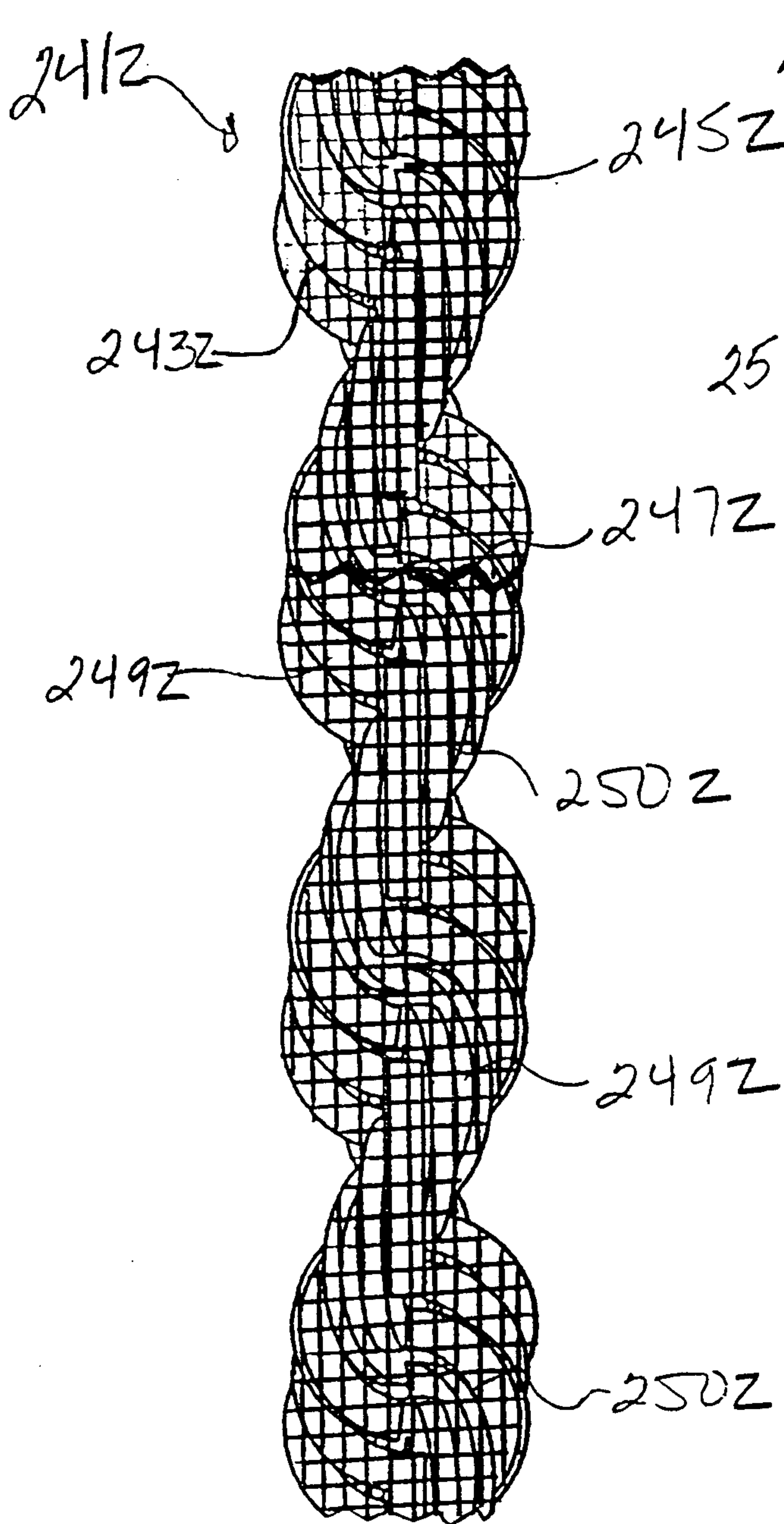


Fig. 22Z

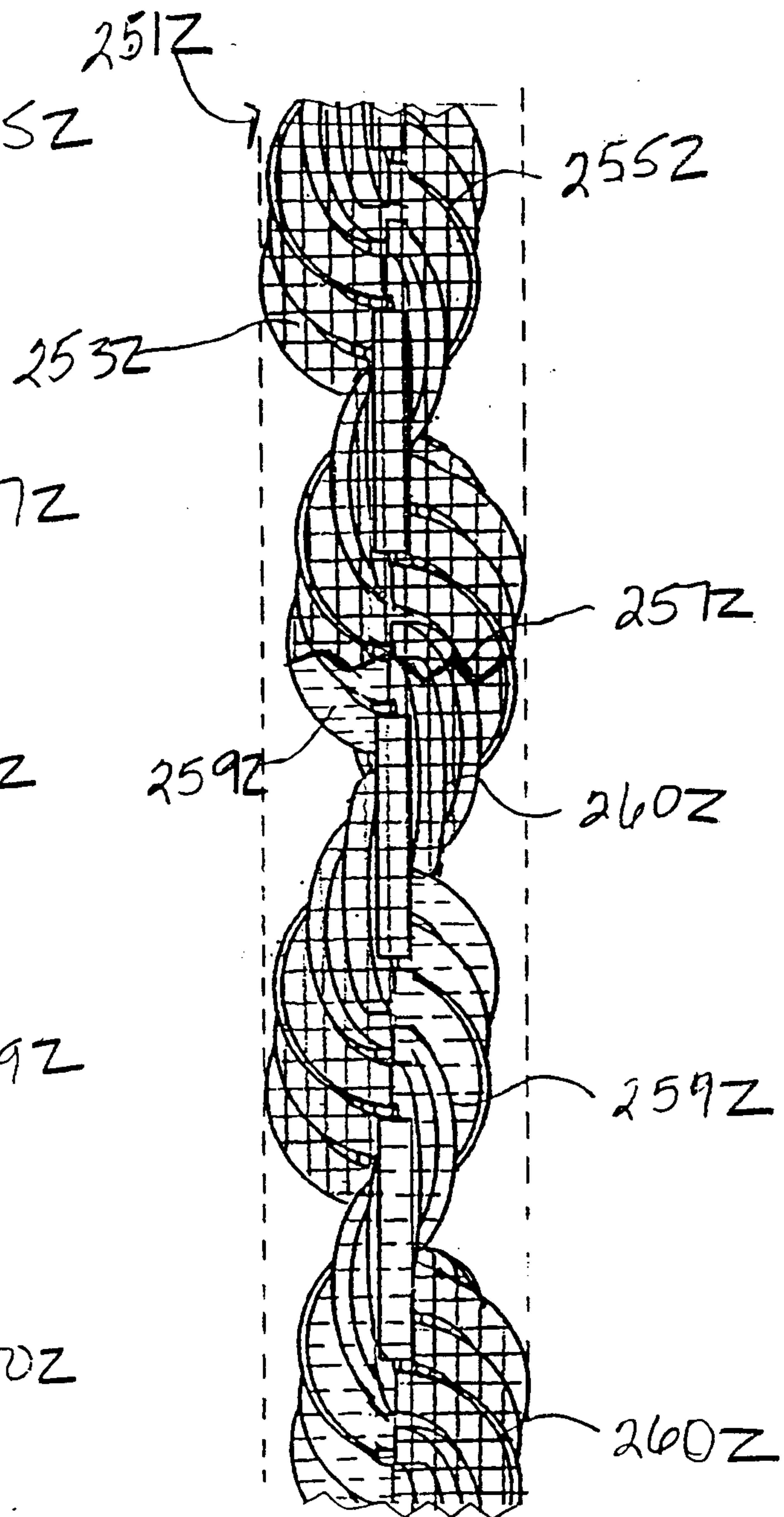


Fig. 23Z

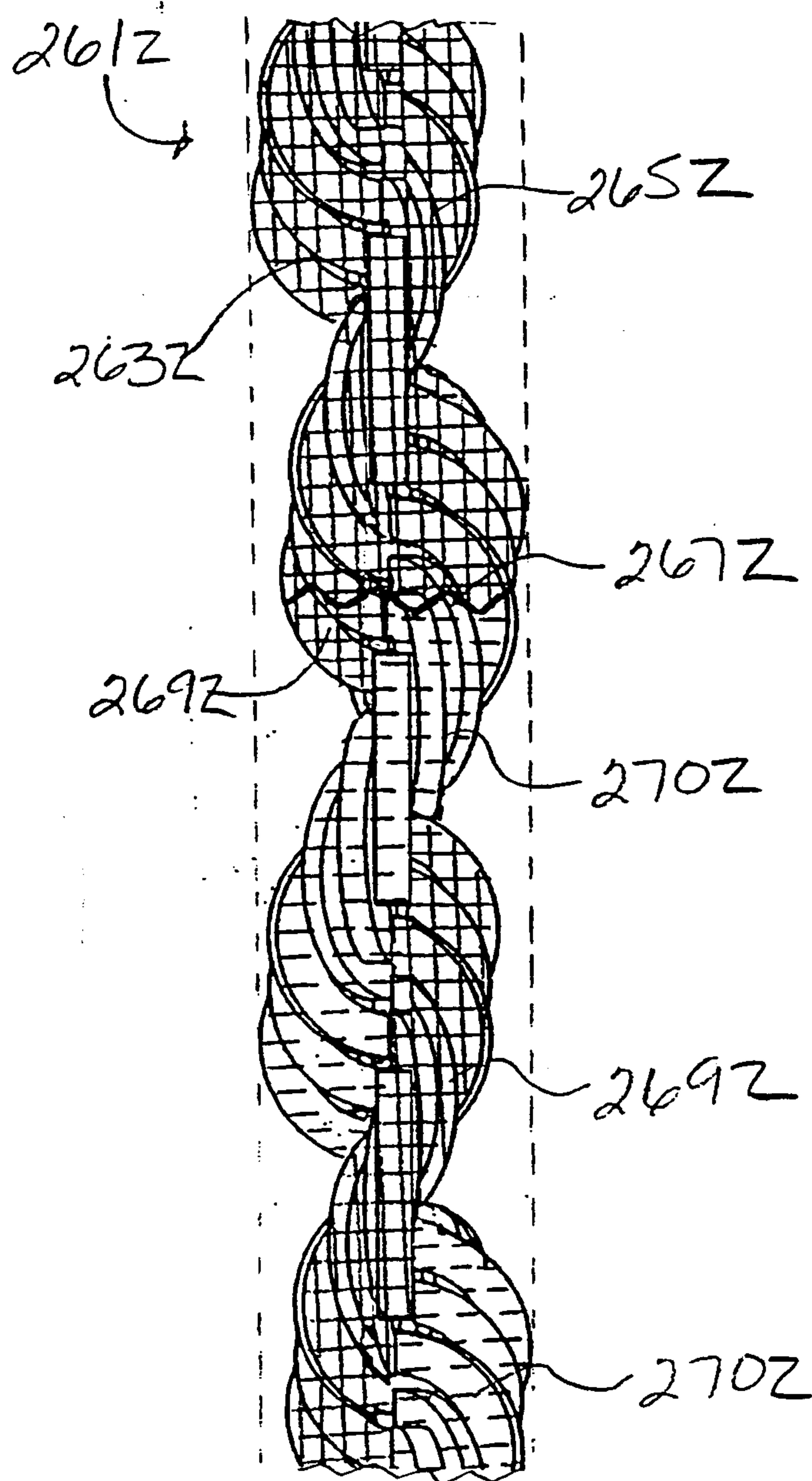


Fig. 24Z

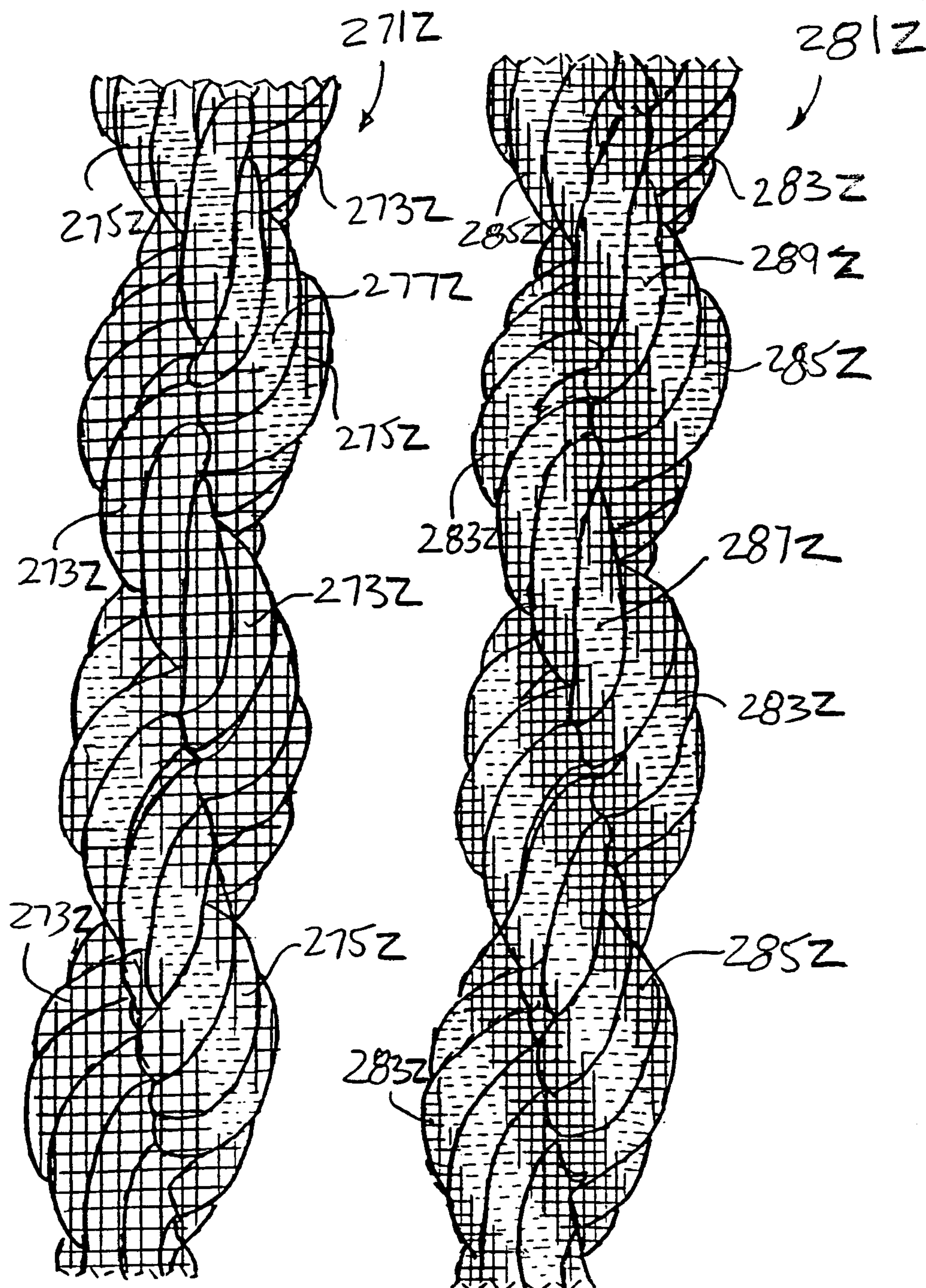
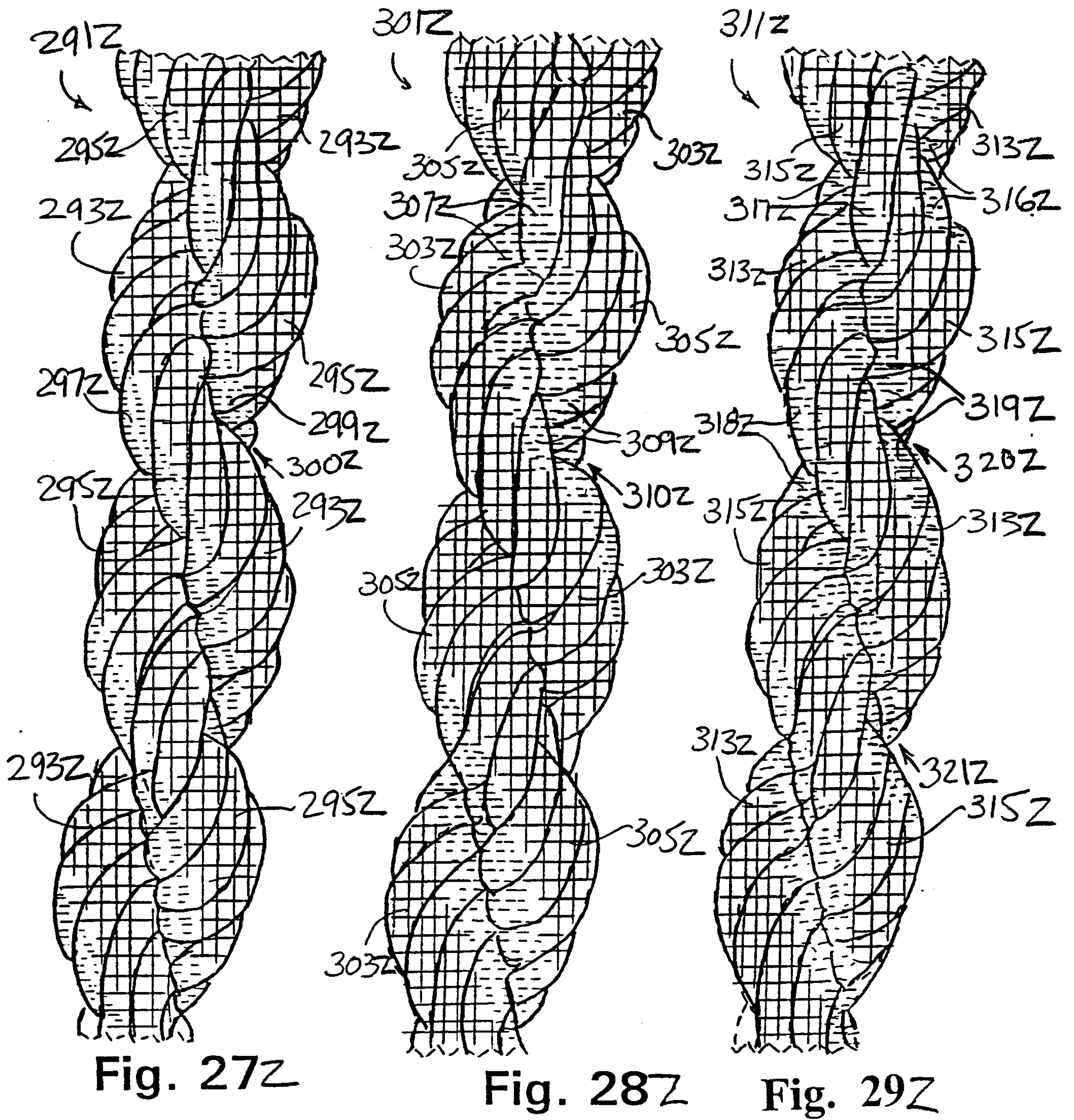
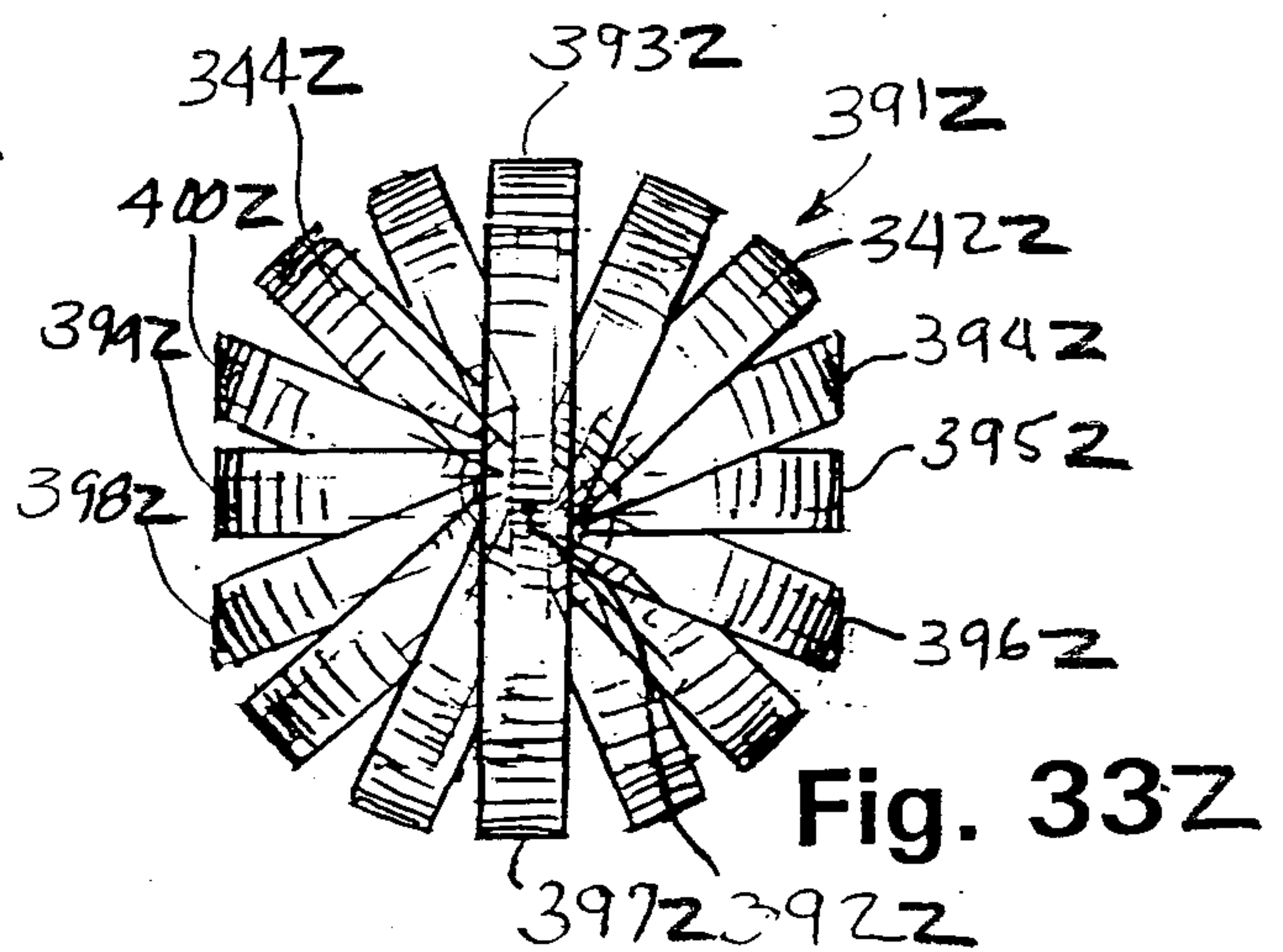
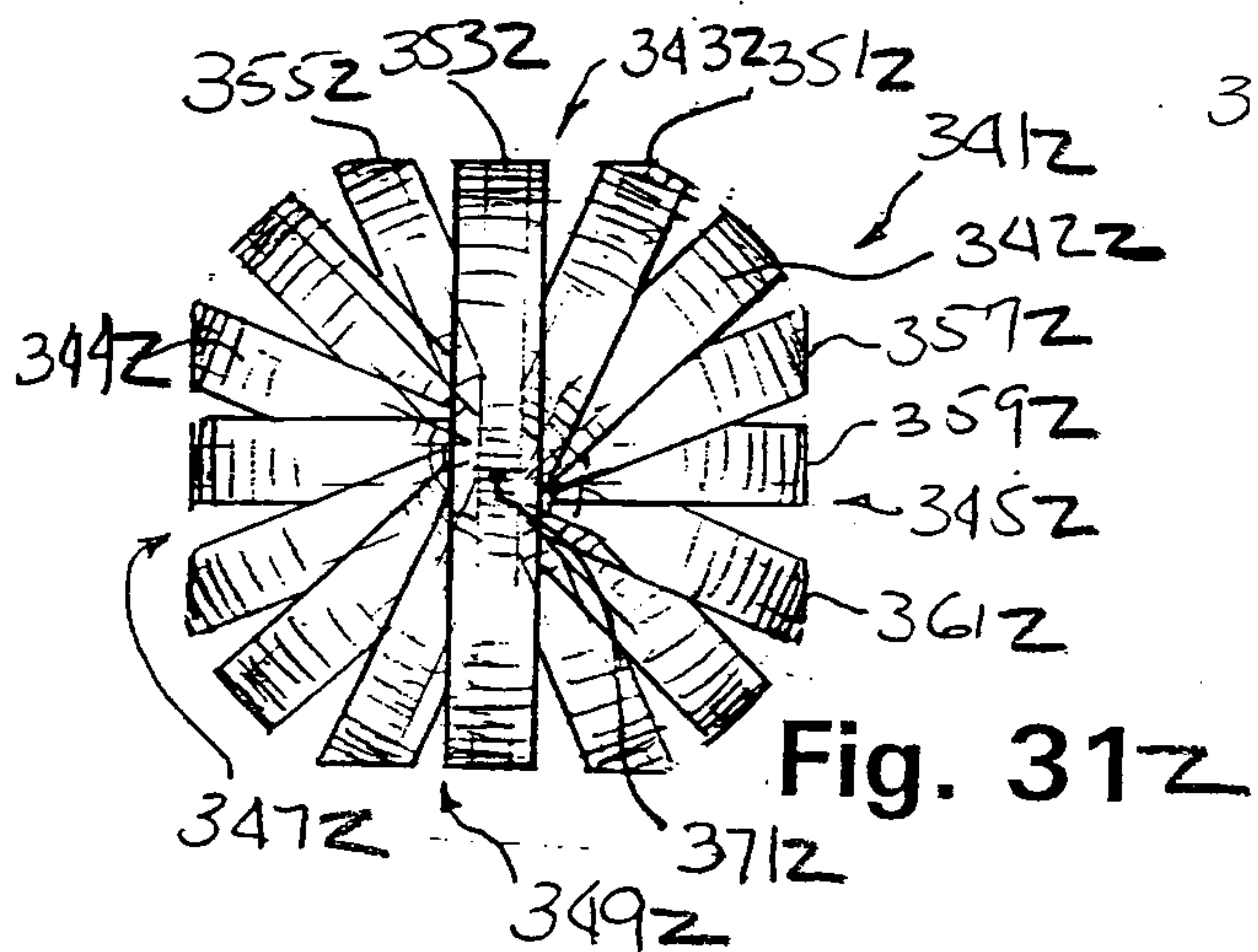
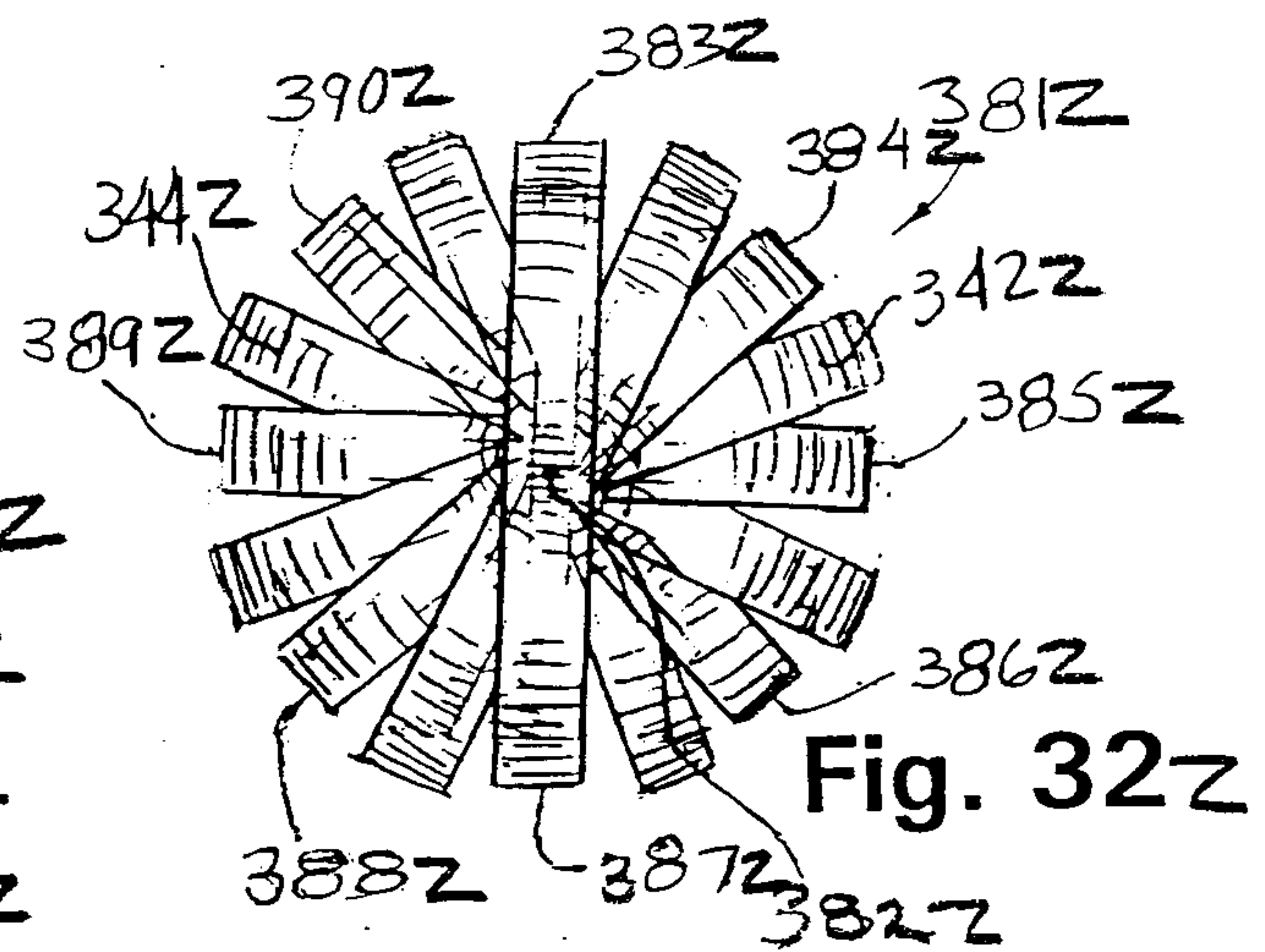
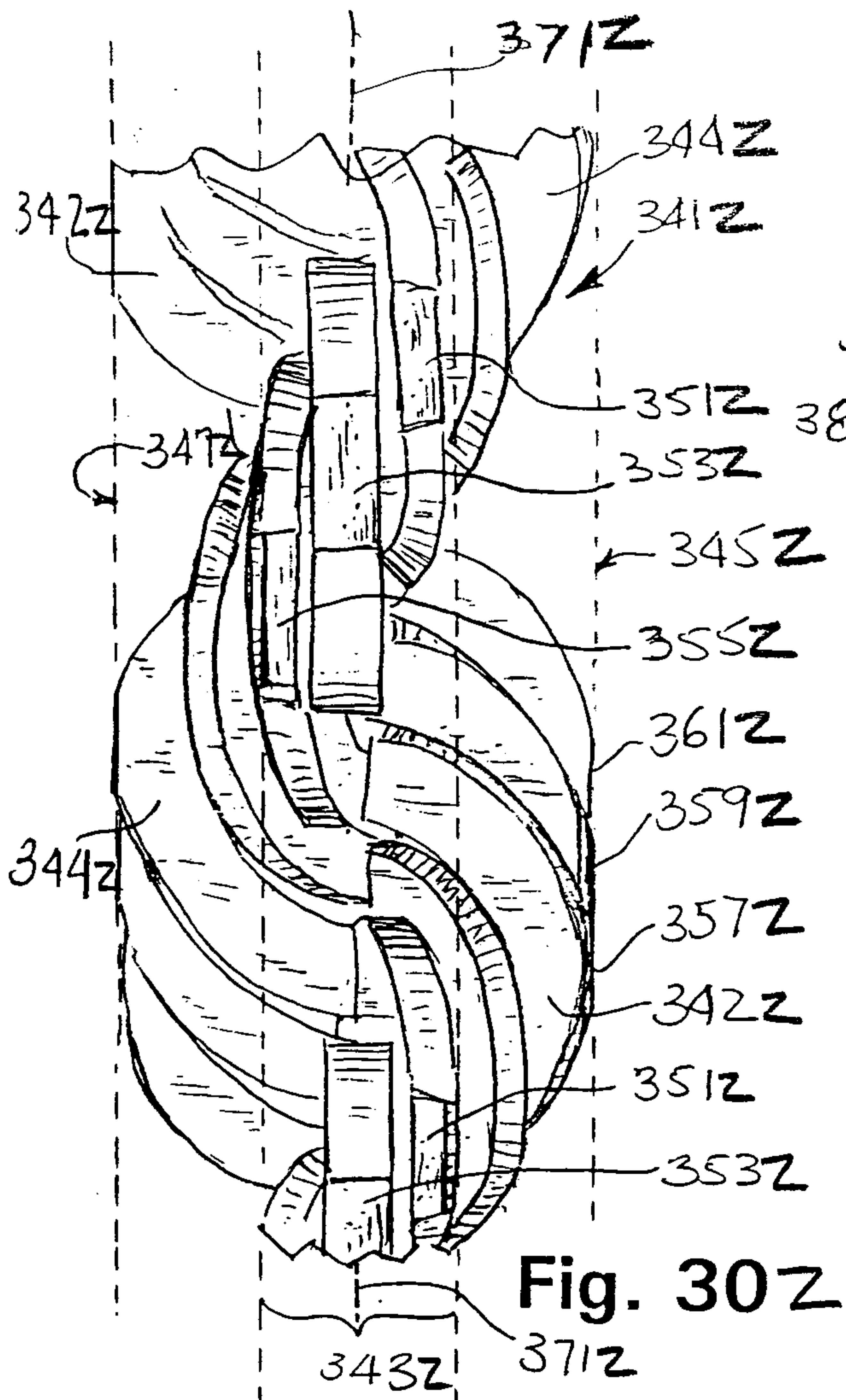


Fig. 25z

Fig. 26z





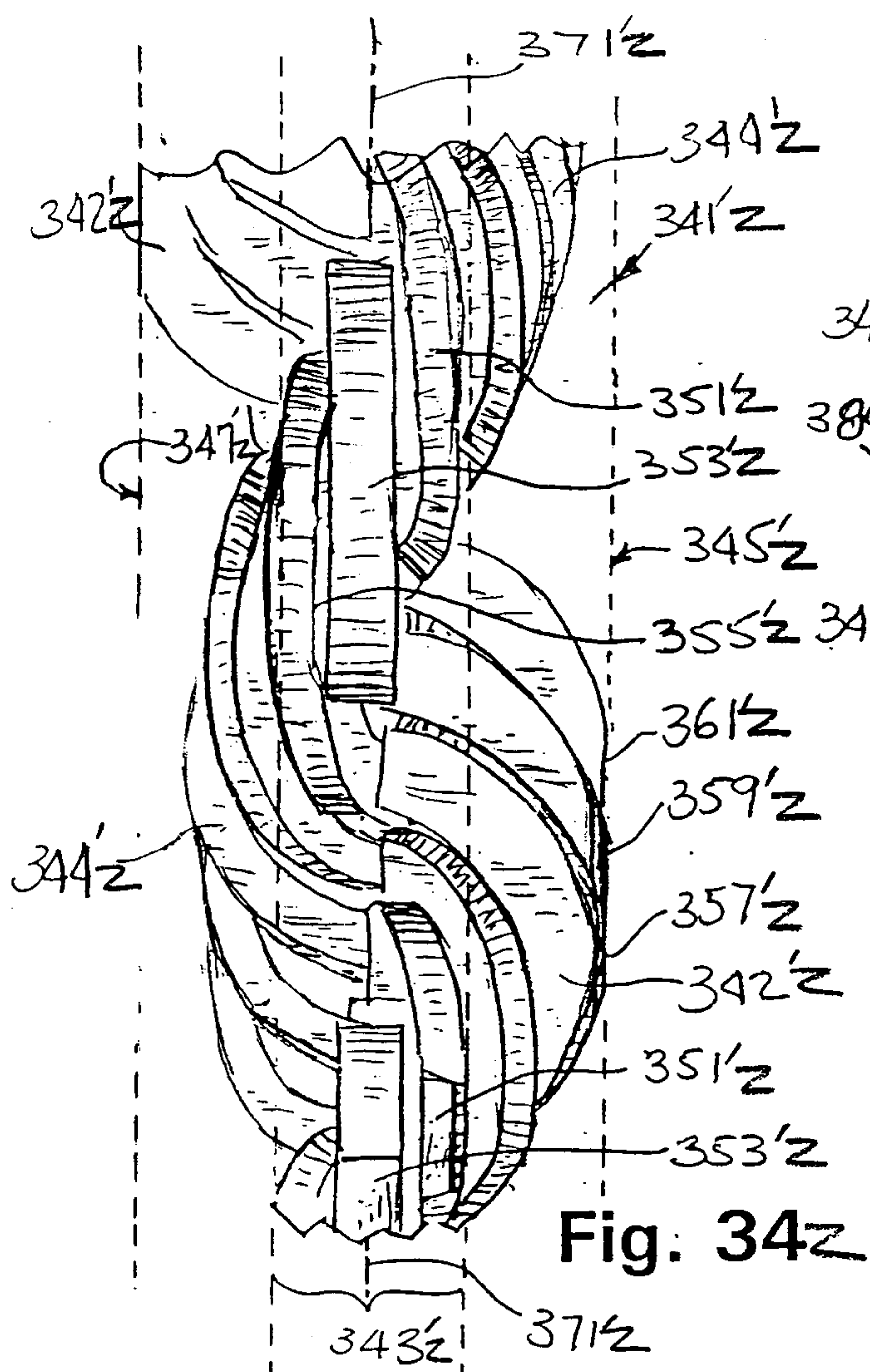


Fig. 34z

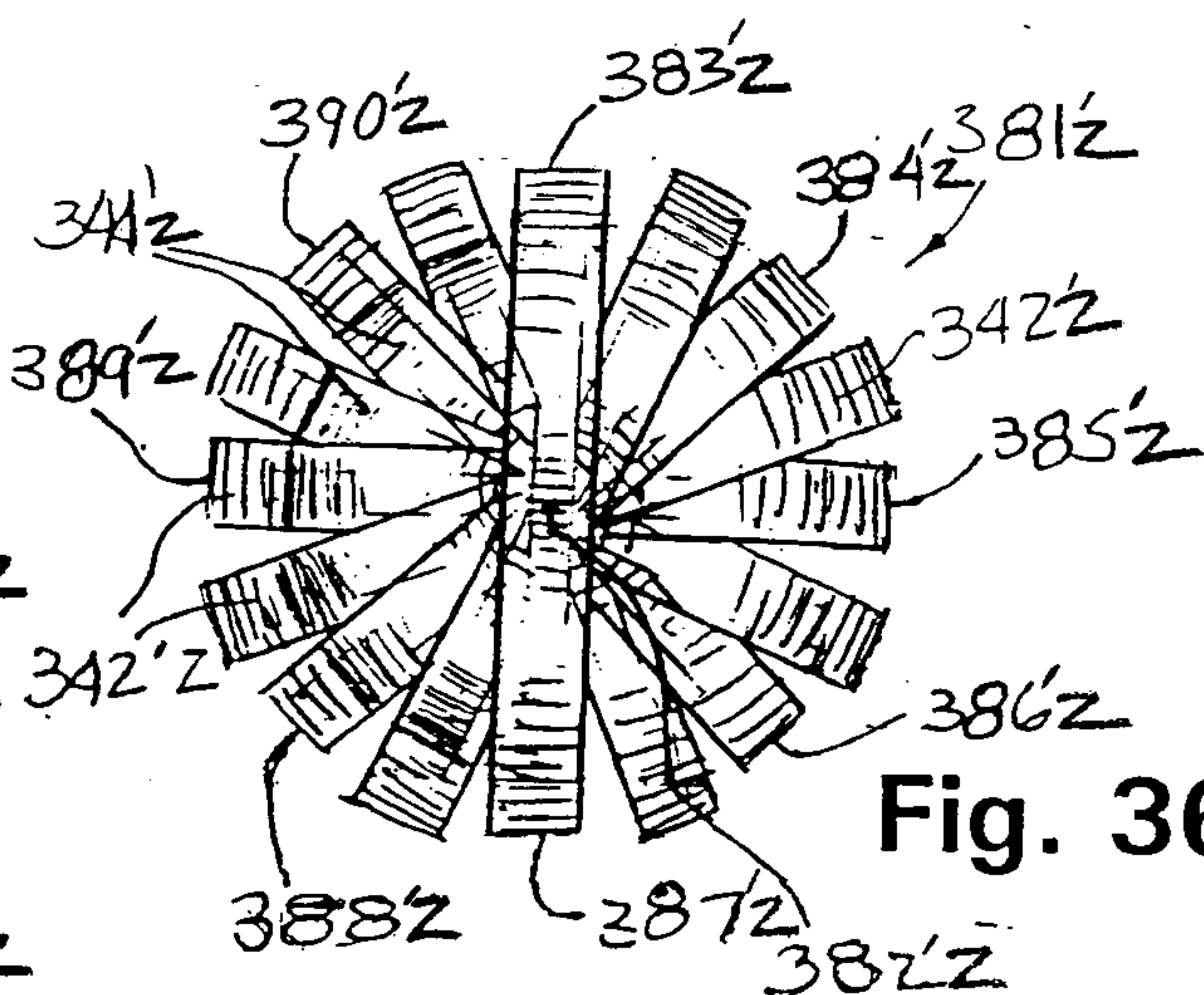


Fig. 36z

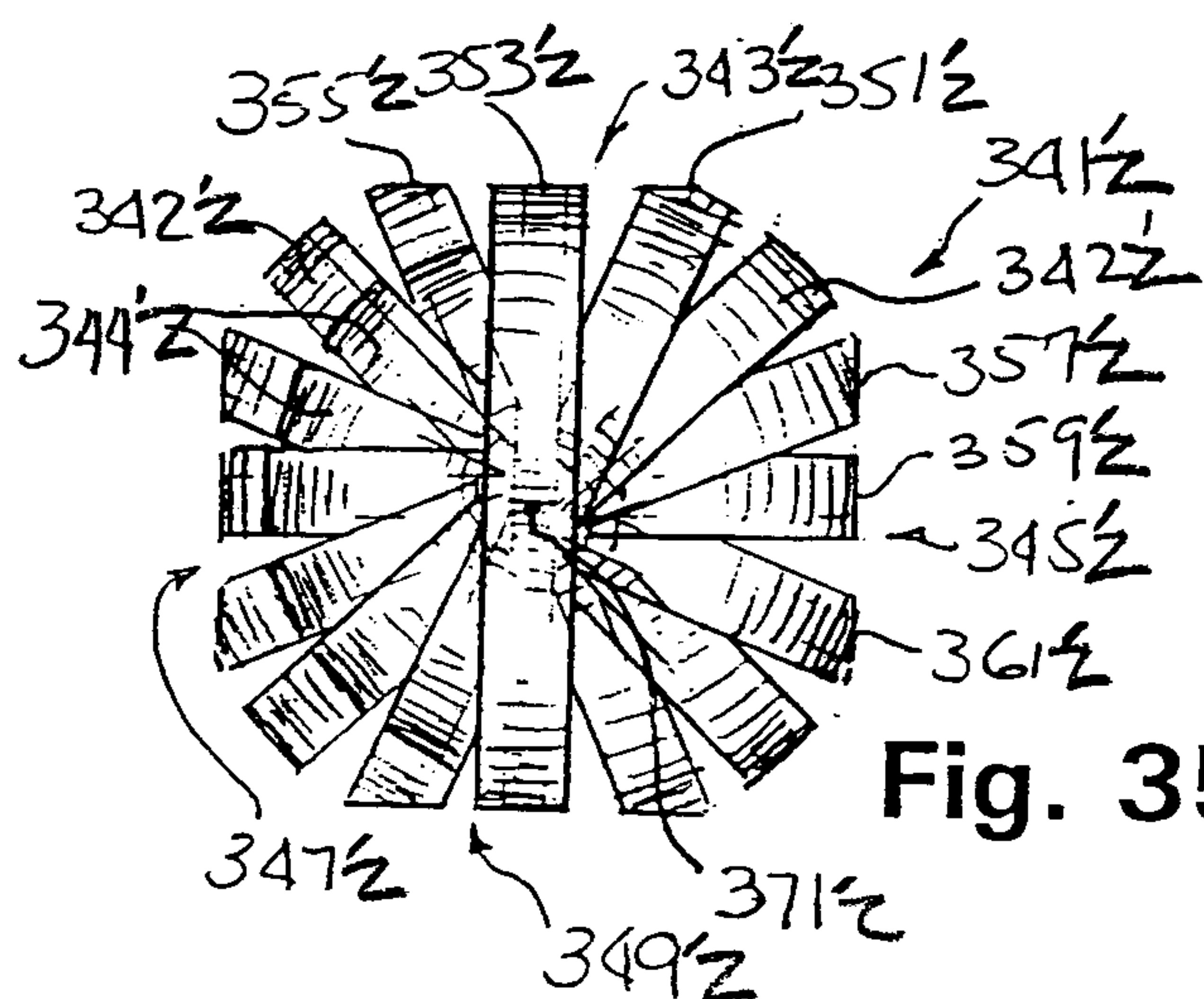


Fig. 35z

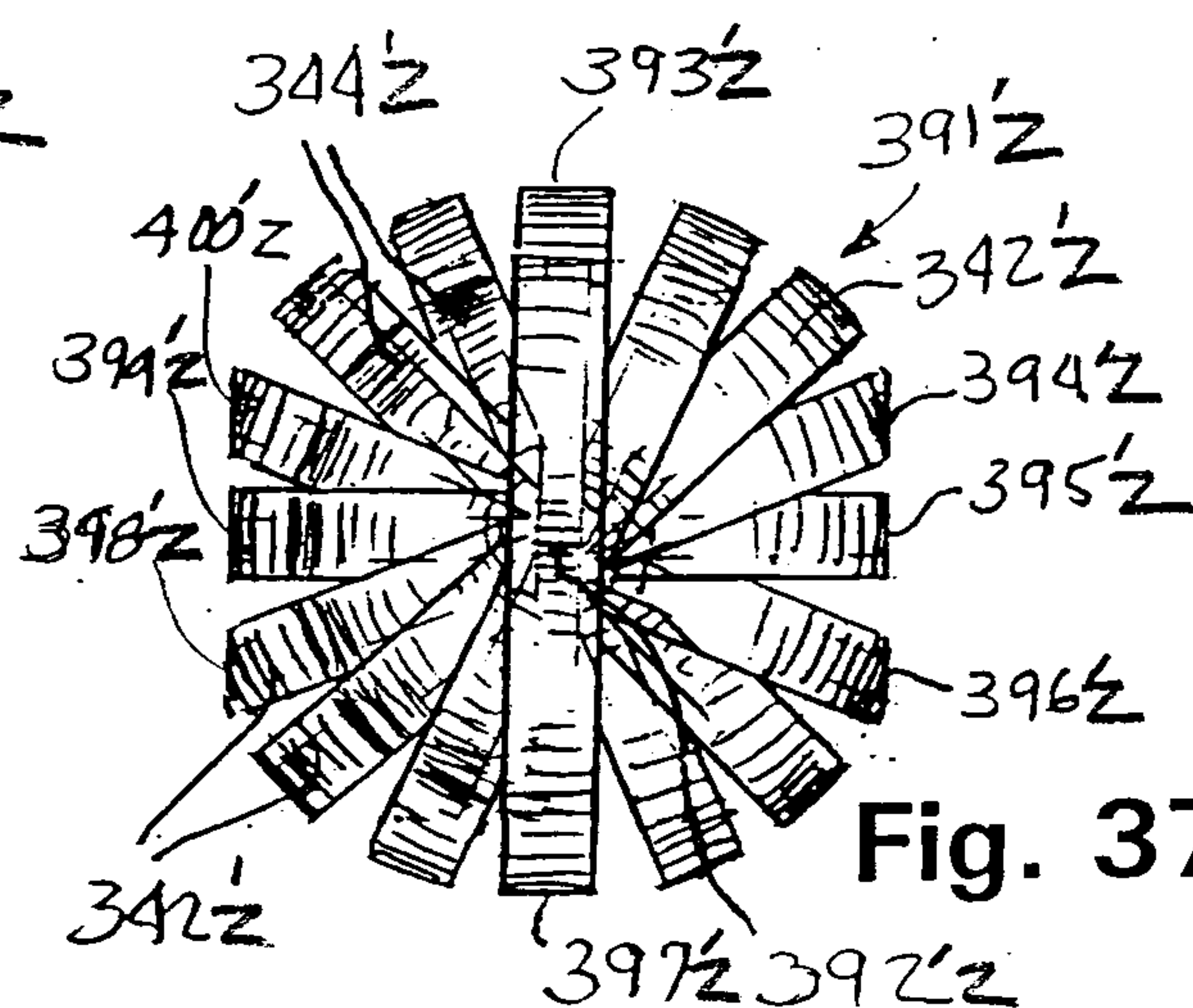


Fig. 37z

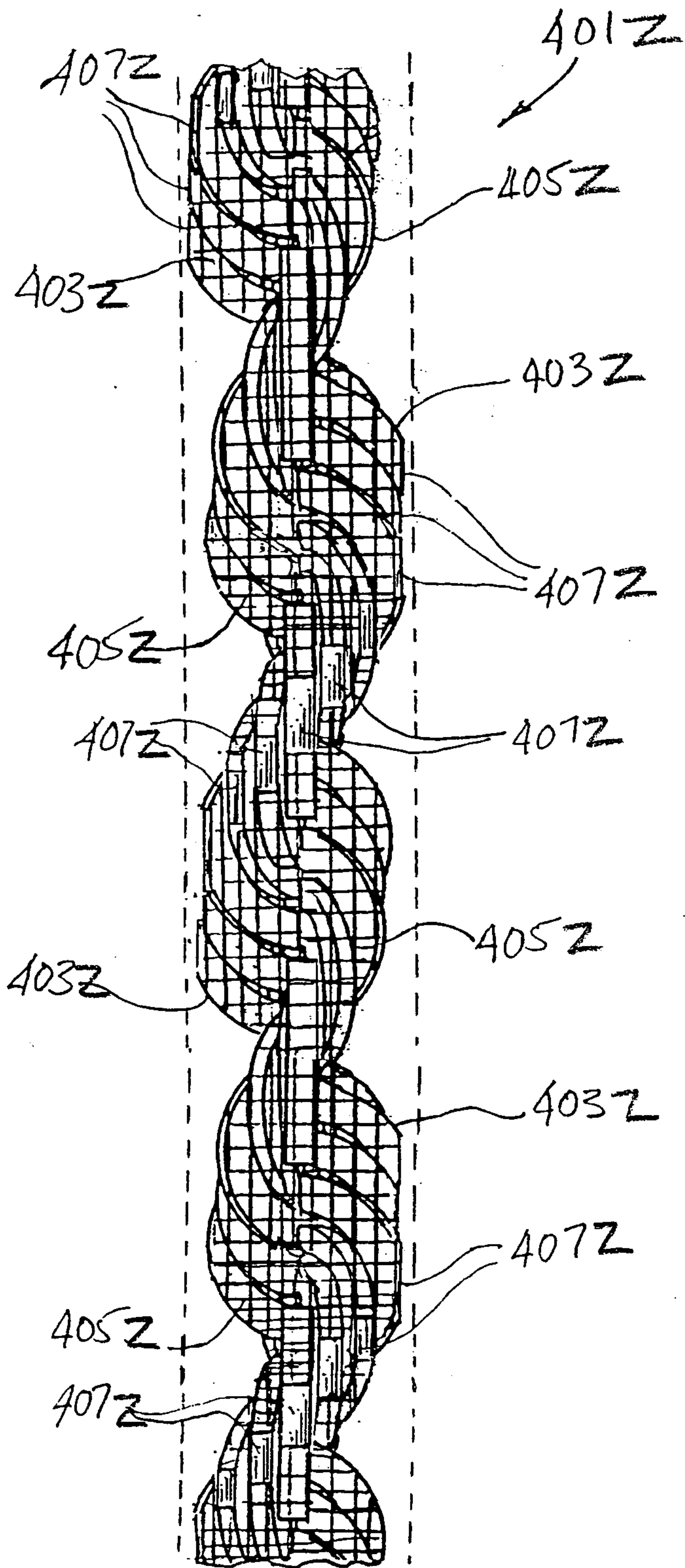


Fig. 38Z

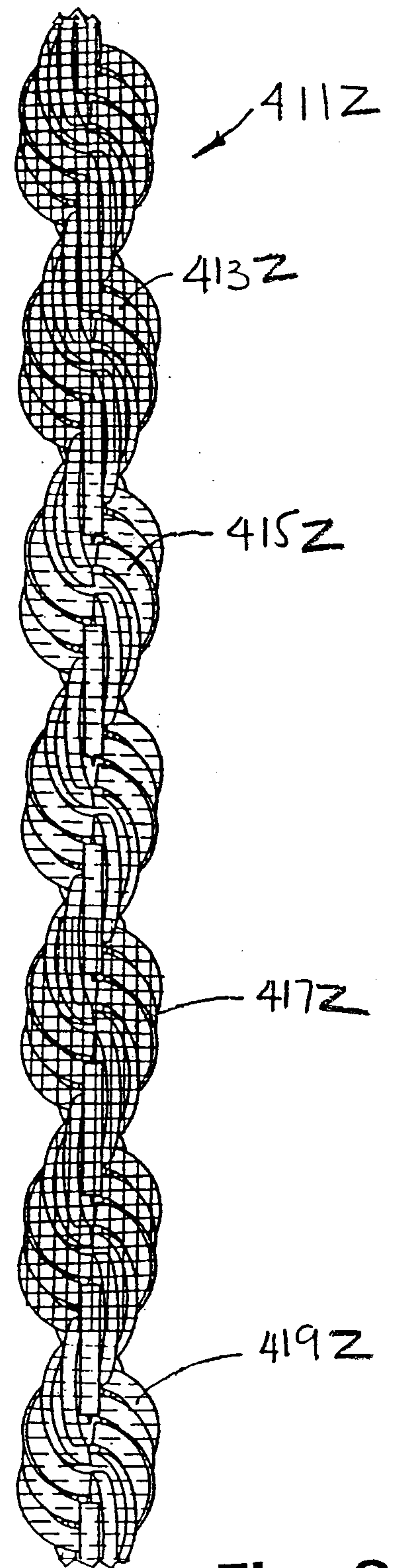


Fig. 39Z

