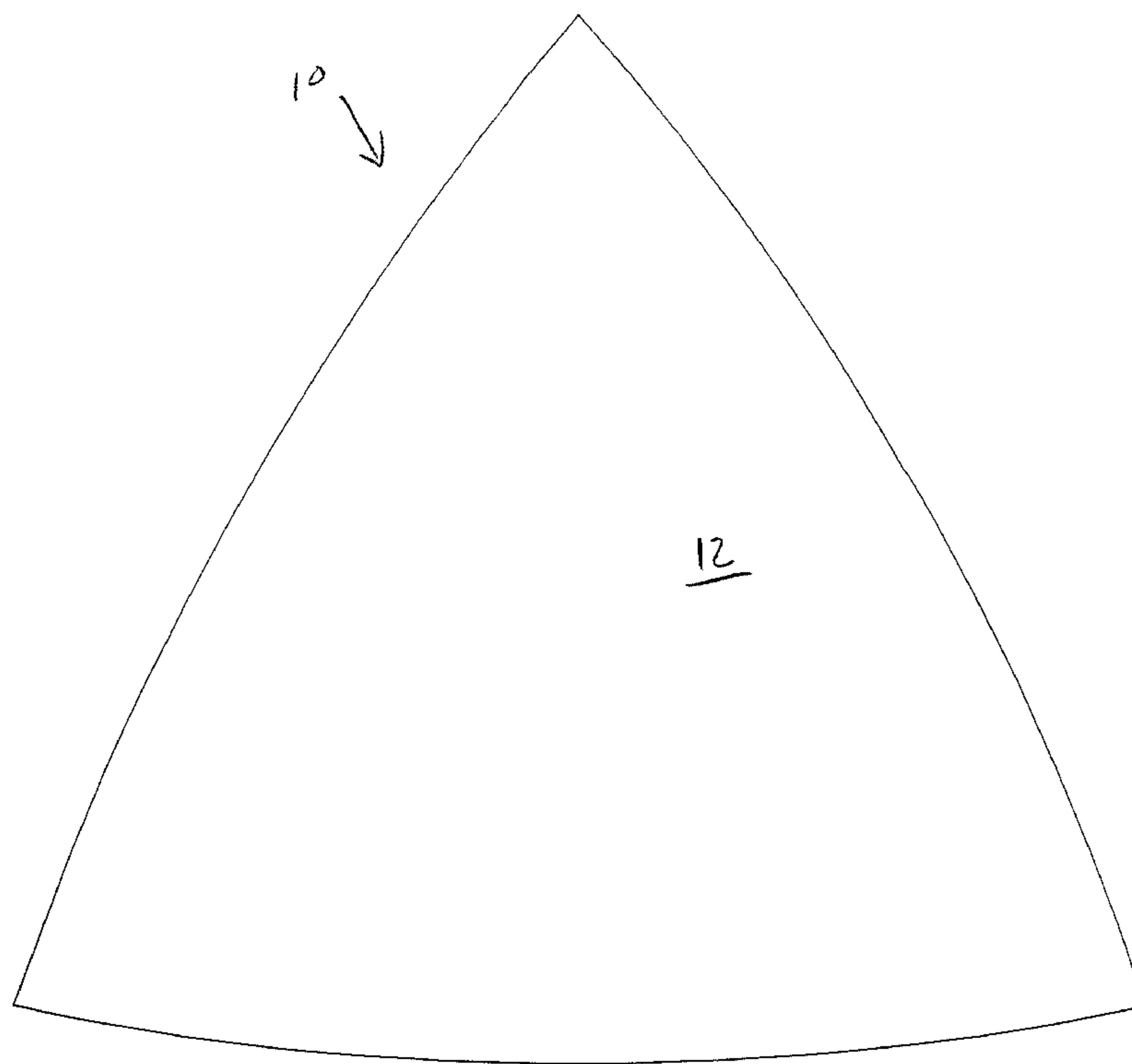




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(54) Titre : MORCEAU DE CASSE-TETE AYANT DES MOYENS DE RACCORDEMENT MAGNETIQUES
(54) Title: PUZZLE PIECE HAVING MAGNETIC CONNECTION MEANS



(57) **Abrégé/Abstract:**

A puzzle having more than one puzzle piece is made of a rigid plastic material. Each puzzle piece is essentially substantially two dimensional, having top and bottom surfaces, and sides. Each side is relatively short compared to the top and bottom. Each side is comprised of an essentially flat outer edge or surface. At least one recess is formed within the outer edge for housing a magnet having both a north and south polarity on one face, or at least two separate magnets where one has an exposed north polarity and the other has an exposed south polarity. When the magnet is, or magnets are, secured within the recess(es), the magnet(s) are preferably flush with the outer edge providing for an essentially gapless seam when two puzzle pieces are magnetically connected to one another.

ABSTRACT

1
2 A puzzle having more than one puzzle piece is made of a rigid plastic
3 material. Each puzzle piece is essentially substantially two dimensional, having top and
4 bottom surfaces, and sides. Each side is relatively short compared to the top and bottom.
5 Each side is comprised of an essentially flat outer edge or surface. At least one recess is
6 formed within the outer edge for housing a magnet having both a north and south polarity
7 on one face, or at least two separate magnets where one has an exposed north polarity and
8 the other has an exposed south polarity. When the magnet is, or magnets are, secured
9 within the recess(es), the magnet(s) are preferably flush with the outer edge providing for
10 an essentially gapless seam when two puzzle pieces are magnetically connected to one
11 another.

1 PUZZLE PIECE HAVING MAGNETIC CONNECTION MEANS

2 BACKGROUND OF THE INVENTION

3 1. Field of the Invention

4 The present invention relates to a puzzle comprised of a plurality of puzzle
5 pieces. More specifically, the present invention is directed toward two or three dimensional
6 puzzles comprised of more than one rigid plastic puzzle piece having magnetic connection
7 means to connect the puzzle pieces together.

8 2. Description of the Prior Art

9 There have been a number of well known puzzles of all varieties of
10 construction. In some, pieces have to be matched relative to the surface depiction by
11 continued manipulation. This includes both two dimensional puzzles, and three dimensional
12 puzzles comprising shapes such as spheres or globes.

13 Both two dimensional and three dimensional globe-type puzzles previously
14 disclosed have been generally directed to jigsaw puzzles having interlocking puzzle pieces.
15 For three dimensional globe puzzles, puzzle pieces have included mechanical fasteners for
16 removably securing the pieces to a globe surface.

17 Some spherical puzzles utilize magnet connection means in place of fastener
18 devices to hold the puzzle pieces together, such as those shown in U.S. Pat. Nos. 4,625,967,
19 3,618,955 and 3,865,382. These devices employ permanent magnets attached to the puzzle
20 piece or otherwise permanently magnetize the puzzle piece for attraction to a spherical base.
21 In the alternative, as shown in U.S. Pat. No. 4,625,967, a magnetic core is used to retain the
22 puzzle pieces in a globe configuration.

23 Still other three-dimensional puzzles have utilized solid shapes for forming

1 a sphere having magnetic means attachment at the core of the sphere. An example of one
2 such device is seen in U.S. Pat. No. 5,127,652. In this device, a combination breakable toy
3 and puzzle is shown having eight identical wedge-shaped elements made of a resilient
4 deformable foam core with a soft, smooth outer skin. Still other puzzle devices have
5 included solid puzzle pieces, such as blocks, connected by magnetic means to be assembled
6 together as a unit to form a larger geometric shape. One such device is disclosed in the
7 patent to Dimitriou, et al., U.S. Pat. No. 6,712,358. In yet another device, U.S. Pat. Nos.
8 5,921,548 and 6,207,117 to Goldberg, an encryption game is disclosed utilizing magnetic
9 means to connect game pieces together. However, the Goldberg teachings require that each
10 game piece is able to be connected to only selected other game pieces.

11 The above prior art has a number of disadvantages however. No art,
12 singularly or in combination, teaches an essentially two dimensional rigid plastic puzzle piece
13 that may be arcuate in configuration and has an edge member for inlaid, or recess mounted,
14 magnetic means having a north/south polarity on each edge. As a result, the prior art does
15 not teach a globe or sphere puzzle whose pieces are magnetically connected to any other
16 piece without utilizing a core metal or magnetic member. Further, the art of record does
17 not show or teach a substantially hollow globe puzzle comprising substantially rigid plastic
18 puzzle pieces whose edge members connect by magnet means with the edge members of
19 other puzzle pieces. Moreover, the stated art fails to provide a substantially two
20 dimensional puzzle piece whose edge members are connected by magnetic means where the
21 polarity of the magnet is or magnets are irrelevant to the coupling of successive puzzle
22 pieces due to the orientation of the magnet or magnets.

SUMMARY OF THE INVENTION

1
2 A puzzle having more than one puzzle piece is made of a rigid plastic
3 material. Each puzzle piece is essentially substantially two dimensional, having top and
4 bottom surfaces, and sides. Each side is relatively short compared to the top and bottom.
5 Each side is comprised of an essentially flat outer edge or surface. At least one recess is
6 formed within the outer edge for housing a magnet having both a north and south polarity
7 on one face, or at least two separate magnets where one has an exposed north polarity and
8 the other has an exposed south polarity. When the magnet is, or magnets are, secured
9 within the recess(es), the magnet(s) are preferably flush with the outer edge providing for
10 an essentially gapless seam when two puzzle pieces are magnetically connected to one
11 another.

12 It is thus an object of the present invention to provide for an essentially two
13 dimensional puzzle piece having a flat edge that is capable of mating with another similar
14 puzzle piece having a flat edge.

15 It is another object of the present invention to provide for a rigid plastic
16 puzzle piece that is essentially two dimensional with magnetic connection means.

17 It is yet another object of the present invention to provide for a plastic puzzle
18 piece having an edge comprising a flat surface with a recess for housing or at least partially
19 retaining a magnet.

20 It is still yet another object of the present invention to provide for a puzzle
21 comprised of at least two or more puzzle pieces wherein each puzzle piece is essentially two
22 dimensional and made of a rigid plastic where each piece is releaseably secured to another

1 of the puzzle pieces by edge mounted magnetic means.

2 It is but another object of the present invention to provide for a three
3 dimensional hollow puzzle comprised of puzzle pieces that are essentially two dimensional
4 and made of a rigid plastic where each piece is releaseably secured to another of the puzzle
5 pieces by edge mounted magnetic means.

6 It is still yet another object of the present invention to provide a puzzle piece
7 that has a radius or curvature with a geometry or geometries that when connected together
8 with other puzzle pieces forms a three dimensional spheroid.

9 These and other features of the present invention will become more clear
10 when the drawings as well as the detailed description are read together.

11 BRIEF DESCRIPTION OF THE DRAWINGS

12 For a more complete understanding of the nature of the present invention,
13 reference should be had to the following detailed description taken in connection with the
14 accompanying drawings in which:

15 FIG. 1 is a top plan view of a puzzle piece having an essentially arcuate triangular
16 shape of the present invention;

17 FIG. 2 is a bottom plan view of a puzzle piece having an essentially arcuate
18 triangular shape of the present invention, shown with magnets;

19 FIG. 3 is a side view of the puzzle piece of FIG. 1, shown with and without magnets

20 FIG. 4 is a partial sectional and perspective view of the puzzle piece of FIG. 1;

21 FIG. 4A is a fragmented cross section view taken along line A-A of FIG. 4;

22 FIG. 5 is an exploded view of the puzzle piece of FIG. 4;

1 FIG 6 is an exploded view of the puzzle piece of FIG. 4 with some magnets
2 removed;

3 FIG. 7 is a perspective view of an alternative embodiment of the present invention
4 showing different magnet retention means;

5 FIG. 7A is a perspective view of a second alternative embodiment of the present
6 invention showing different magnet means and magnetic retention means;

7 FIG. 8 is a perspective view of a puzzle formed of the puzzle pieces of the present
8 invention;

9 FIG. 9 is a perspective view of a puzzle formed of different puzzle piece geometries
10 of the present invention;

11 FIG. 10 is a perspective view of a puzzle formed of still different puzzle piece
12 geometries of the present invention;

13 FIG. 11A is a perspective view of a puzzle piece including an indicum or ornament
14 secured thereon;

15 FIG. 11B is a perspective view of a puzzle piece including an indicum or ornament
16 secured thereon;

17 FIG. 11C is a perspective view of a puzzle piece including an indicum or ornament
18 secured thereon;

19 FIG. 11D is a perspective view of a puzzle formed of the present invention in the
20 shape of a person;

21 FIG. 12 is a perspective view of an alternative embodiment of the present invention;

22 FIG. 13 is a side view of the alternative embodiment shown in FIG 12;

1 FIG. 14 is a perspective view of another alternative embodiment of the present
2 invention, and;

3 FIG. 15 is a perspective view of a puzzle formed of the present invention, and an
4 alternative embodiment thereof in the form of a cube.

5 DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

6 A preferred embodiment of the invention is generally shown in FIGS. 1-6.
7 FIG. 1 depicts a puzzle piece 10 having a geometric shape. The geometry shown in FIG.
8 1 is generally triangular shaped. However, the geometry of the puzzle piece 10 can be
9 altered so as to conform to the stated claims of the invention, i.e., a pentagonal shape, an
10 hexagonal shape, a free form shape [See FIG. 10]. The puzzle piece 10 is manufactured of
11 a substantially rigid plastic, such as ABS (acrylonitrile butadiene styrene), nylon,
12 polystyrene, polycarbonate or a polyolefin. The plastic puzzle piece 10 can be formed by
13 conventional injection molding or other well known means for forming plastics.

14 More specifically, FIGS. 1-6 illustrate the puzzle piece 10 comprising a top
15 12, bottom 14 and edges 16. The preferred embodiment of the puzzle piece 10 further
16 comprises a curvature or arcuate configuration such that the top 12 has a convexity and the
17 bottom 14 comprises a concavity. The arcuate configuration is required in this embodiment
18 to form a substantially three dimensional puzzle when the puzzle pieces 10 are manipulated
19 together.

20 The puzzle piece 10 comprises an essentially two dimensional shape, whereas
21 the top 12 and bottom 14 are substantially longer than the edge members 16. Each edge
22 member 16 has an outer surface or face 18. The outer surface 18 of the edge member 16

1 is relatively short compared to the length of the top 12 and bottom 14 of the puzzle piece
2 10. Depending upon the molding technique employed to manufacture the puzzle piece 10,
3 an inner edge member surface 20 may also be formed, or the piece 10 may be solid as shown
4 in, among other figures, FIGS. 3 and 4 without any inner edge member surface 20.

5 As shown in the preferred embodiment, the triangular shape of the puzzle
6 piece 10 provides for three edge members 16. Each edge member 16 of the puzzle piece
7 has at least one recess 22 for retaining a magnet 24. However, the preferred embodiment
8 of the puzzle piece 10 invention provides for at least two recesses 22 for housing or
9 retaining one magnet 24 per recess 22.

10 The magnet 24 is shaped or configured to fit snugly within the recess 22 of
11 the puzzle piece 10. Thus, preferably, the magnet shape conforms to the shape of the recess
12 22. The preferred embodiment discloses a recess 22 for housing the magnet 24 such that
13 when the magnet 24 is inserted into the recess 22, the exposed portion 26 of the magnet 24
14 and the outer surface 18 of the edge member 16 are in the same plane and flush with one
15 another. The purpose of providing a magnet exposed portion 26 when the magnet 24 is
16 retained within the recess 22 is to provide for an essentially "gapless" seam between more
17 than one puzzle piece 10 when the relative puzzle pieces 10 are manipulated and connected
18 to one another. The resultant connection provides for a cleaner, "gapless" fit of the puzzle
19 pieces 10. However, as may be well understood, if one preferred to practice the invention
20 without providing for a gapless seam between connected puzzle pieces 10, the recess
21 member 22 of the edge member 16 could provide for a magnet 24 that protrudes partially
22 from the recess 22 and, thus, extends beyond the outer surface 18 of the edge member 16.

1 In order to maintain the desired appearance of a puzzle formed from the puzzle pieces 10,
2 a magnet 24 should not protrude from the outer surface 18 of edge member 16 more than
3 0.25 inches.

4 In addition to the recess 22 providing for a gapless seam between connected
5 puzzle pieces 10, the recess 22 also provides for a means to secure the magnet 24 therein
6 due to the above mentioned conformed fit. In the preferred embodiment taught, the recess
7 22 is shaped as an inverted "U" having an open end 28 and a closed end 30. The preferred
8 magnet 24 disclosed is generally disk shaped and is manufactured of a neodymium-iron-
9 boron (NdFeB) metal. The magnet 24 is inserted into the open end 28 of the recess 22 and
10 moved to the closed end 30 at which point it is secured within the recess 22 by a pressure
11 fit (See FIG. 7). Additional adhesive (not shown) on the underside of the magnet 24 that
12 is not exposed may be applied to ensure the secured fit of the magnet 24 within the recess
13 22.

14 Retaining means in order to ensure a secured fit of the magnet 24 within the
15 recess 22, is accomplished by forming a channel 32 into the recess 22 as best seen in FIG.
16 4A. The channel 32 has a bottom wall 34 and two side walls 36. The side walls 36 and
17 bottom wall 34 are substantially perpendicular to one another. The channel 32 has a
18 substantially open top 38 whose edges 40 extend inward towards the channel 32. In
19 addition, within the channel 32 on each side wall is a ridge 42. When a magnet 24 is
20 inserted into the open end 28 of the channel 32 of recess 28, it is slid across the bottom wall
21 34 and pushed beyond each ridge 42 until the magnet 24 rests at the closed end of the
22 recess. The top edges 40 the channel prevent the magnet 24 from pulling out of the recess

1 22 along the outer surface 18 of the edge member 16, and the ridges 42 prevent the magnet
2 24 from escaping the recess 22 through its open end 28.

3 The preferred number of magnets 24 disposed on each edge 16 of the puzzle
4 piece 10 is at least two. In this manner, each magnet 24 should have as its exposed portion
5 26 a polarity opposite that of the other. For example, and referring to FIG. 2, each edge 16
6 of the puzzle piece 10 would have as the right magnet 24 a north polarity and the left
7 magnet 24 would have a south polarity exposed. Accordingly, respective puzzle pieces 10
8 when manipulated to be in contact with one another would have a north polarity magnet and
9 a south polarity magnet aligning one another causing the magnetic poles to attract and
10 releaseably secure one puzzle piece to the other. In this regard, the present inventions
11 teaches the connectivity of any one edge member 16 of a puzzle piece 10 to any other edge
12 member 16 of another puzzle piece 10. The invention can also be practiced with one
13 magnet 24 so long as the magnet 24 possesses a north/south polarity on any one particular
14 magnet face, such as a flexible, vinylized magnet 44 [See FIG. 7A].

15 Given the aforementioned arcuate configuration of each puzzle piece 10, a
16 completed puzzle 50 as shown in FIG. 8 results in a globe (or other three-dimensional shape
17 such as a spheroid, ellipsoid, cylinder, etc.). In this regard, it is noted that each puzzle 50
18 is substantially core-less or hollow. One example of a globe puzzle 50 as shown in FIG. 8
19 incorporates the use of twenty triangular puzzle pieces 10. FIG. 9 depicts the puzzle 50
20 which incorporates the use of both pentagonal 52 and hexagonal 54 puzzle pieces 10. In
21 this form of the spheroid puzzle 50, twelve pentagonal 52 puzzle pieces 10 and twenty
22 hexagonal 54 puzzle pieces 10 are employed. As another embodiment of the puzzle 50 of

1 the present invention, FIG. 10 depicts puzzle pieces 10 having a free form shape 56 with a
2 magnet 24 (not shown) disposed on the outer surface 18 of a concave area 58 and one
3 disposed (not shown) on the outer surface of a convex member 58' on each edge 16 of the
4 puzzle piece 10.

5 A globe puzzle 50 may incorporate some type of illustration or design on the
6 top 12 of each puzzle piece 10 so that when the puzzle 50 is assembled, a full illustration
7 results. For example, if the present invention incorporates arcuate puzzle pieces 10 to form
8 a globe puzzle 50, a depiction of the planet Earth will result with, perhaps, respective puzzle
9 pieces 10 each depicting on the top 12 illustrations representing the land and water masses
10 of Earth. Other designs may be employed in a similar fashion, i.e. soccer ball, baseball,
11 basketball, to result in a completed spheroid puzzle 50 design as desired.

12 Furthermore, the present invention contemplates, as seen in FIG. 11A-C,
13 particular puzzle pieces 10 having secured thereon the top 12, by glue or other means, three
14 dimensional indicia or components 60. These components might represent clothing
15 replications such as a hat 62, or body or face features such as an arm 64 or a leg 66, to
16 result in a puzzle 50 comprising a make-believe person, or family of people. Other
17 components 60 can include eyes, a nose, lips, teeth, ears, a neckless, a bow tie or such other
18 indicia. For example, in FIG. 11D, with the inclusion of appropriate indicia 60, a person-
19 like (or animal-like) form 70 can be created when the puzzle pieces 10 are connected to
20 form a puzzle 50. Still other indicia 60 might take form of topographical elements such as
21 mountains, bodies of water, forests, deserts, etc. (not shown).

22 While the preferred embodiment of the puzzle piece 10 discloses a member

1 having a curvature to form a spheroid object, the invention also incorporates the use of
2 substantially flat, essentially two dimensional puzzle pieces 10 as shown in FIGS. 12 and 13.
3 The flat puzzle piece 10' includes the same magnetic means 24' as taught in the preferred
4 embodiment recessed in the outer surface 18' of edge member 16'. However, the puzzle
5 formed (not shown) from the puzzle pieces 10' is essentially flat. In this form, the flat
6 puzzle could be used to create essentially two dimensional forms, such as maps, etc. The
7 flat puzzle piece can also be used to form other three dimensional shapes, however. In FIG.
8 14, an alternative embodiment of the puzzle piece 10" is flat and essentially and may be
9 essentially square, rectangular, etc. While some magnets 24" can be recessed in the outer
10 surface 18" of the edge member 16", other magnets 24" would be recessed on the outer
11 surface 18" of edge member 16" of the bottom 14" to be joined with a conventional puzzle
12 piece 10 as hereinabove described. In this regard, the respective puzzle pieces 10" and 10
13 could form a corner of a puzzle 50" such as in the form of a cube shown in FIG. 15.

14 Since many modifications, variations and changes in detail can be made to
15 the described preferred embodiment of the invention, it is intended that all matters in the
16 foregoing description and shown in the accompanying drawings be interpreted as illustrative
17 only and not in a limiting sense. Thus, the scope of the invention should be determined by
18 the appended claims and their legal equivalents.

19

1 5. The puzzle piece of Claim 4, wherein said bottom wall is disposed between
2 said sides walls is substantially perpendicular to them.

1 6. The puzzle piece of Claim 2, wherein at least one said side wall comprises
2 a ridge.

1 7. The puzzle piece of Claim 6, wherein said ridge is disposed on said side wall.

1 8. The puzzle piece of Claim 3, wherein both of said side walls each further
2 comprises a ridge.

1 9. **The puzzle piece of Claim 1, wherein said magnetic means comprises two**
2 **separate magnets having a different polarity on each of said exposed portion.**

1 10. **The puzzle piece of Claim 9, wherein said magnets are formed of a**
2 **composite metal.**

1 11. **The puzzle piece of Claim 10, wherein said composite metal is neodymium,**
2 **iron and boron.**

1 12. **The puzzle piece of Claim 1, where said magnetic means is formed of a**
2 **vinylized magnet.**

1 17. The puzzle piece of Claim 1, where in said top has illustrated thereon a
2 drawing.

1 18. The puzzle piece of Claim 1, wherein said top has secured thereon a three
2 dimensional indicium.

1 19. The puzzle piece of Claim 1, wherein said piece has an arcuate
2 configuration.

1 20. The puzzle piece of Claim 1, wherein said piece is essentially flat.

1 21. The puzzle piece of Claim 1, wherein said magnetic means comprises at least
2 two individual magnets each having an exposed portion.

1 22. A three dimensional puzzle comprised of more than two essentially two
2 dimensional, rigid plastic puzzle pieces, each piece having a top and a
3 bottom, and at least one edge member comprising an outer surface having
4 retaining means for securing magnetic means thereon whereby said magnetic
5 means comprises an exposed portion having both north and south polarities.

1 23. The puzzle of Claim 22, wherein said top is convex and said bottom is
2 concave.

1 24. The puzzle of Claim 22, wherein said puzzle is hollow.

1 25. The puzzle of Claim 22, wherein the top of selected pieces has secured
2 thereon at least one three-dimensional indicium.

- 1 26. A three dimensional puzzle comprised of a plurality of essentially two
2 dimensional, rigid plastic puzzle pieces, each piece having:
- 3 - a top and a bottom;
 - 4 - edge members comprising outer surfaces having retaining means, wherein
5 said retaining means comprises at least one recess disposed on the said outer
6 surfaces of said edge member and having an open end and a closed end
7 forming a channel having two side walls, a bottom wall, and a substantially
8 open top wherein said open top has edges which extend inwardly towards
9 said channel, and;
 - 10 - magnetic means secured within said recess whereby said magnetic means
11 comprises an exposed portion having both north and south polarities.

1 27. The puzzle of Claim 26, wherein at least one said side wall comprises a
2 ridge.

1 28. The puzzle of Claim 26, wherein said magnetic means comprises two
2 separate magnets having a different polarity on each of said exposed portion.

1 29. The puzzle of Claim 28, wherein said magnets are formed of a composite
2 metal.

1 30. The puzzle of Claim 29, wherein said composite metal is neodymium, iron
2 and boron.

1 31. The puzzle of Claim 26, where said magnetic means is formed of a vinylized
2 magnet.

1 32. The puzzle of Claim 26, wherein said magnetic means is dimensioned to
2 conform to the shape of said recess.

1 33. The puzzle of Claim 26, wherein the said top of each puzzle piece has
2 illustrated thereon a drawing.

1 34. The puzzle of Claim 26, wherein the said top of selected puzzle pieces has
2 secured thereon at least one three-dimensional indicium.

1 35. The puzzle of Claim 34, wherein a plurality of the said selected indicium
2 forms a person-like entity when the said puzzle is configured.

1 36. The puzzle of Claim 26, wherein said puzzle pieces are configured to
2 provide a substantially gapless seam.

1 37. The puzzle of Claim 26, wherein said puzzle pieces are essentially arcuate.

1 38. The puzzle of Claim 26, wherein said puzzle pieces are essentially flat.

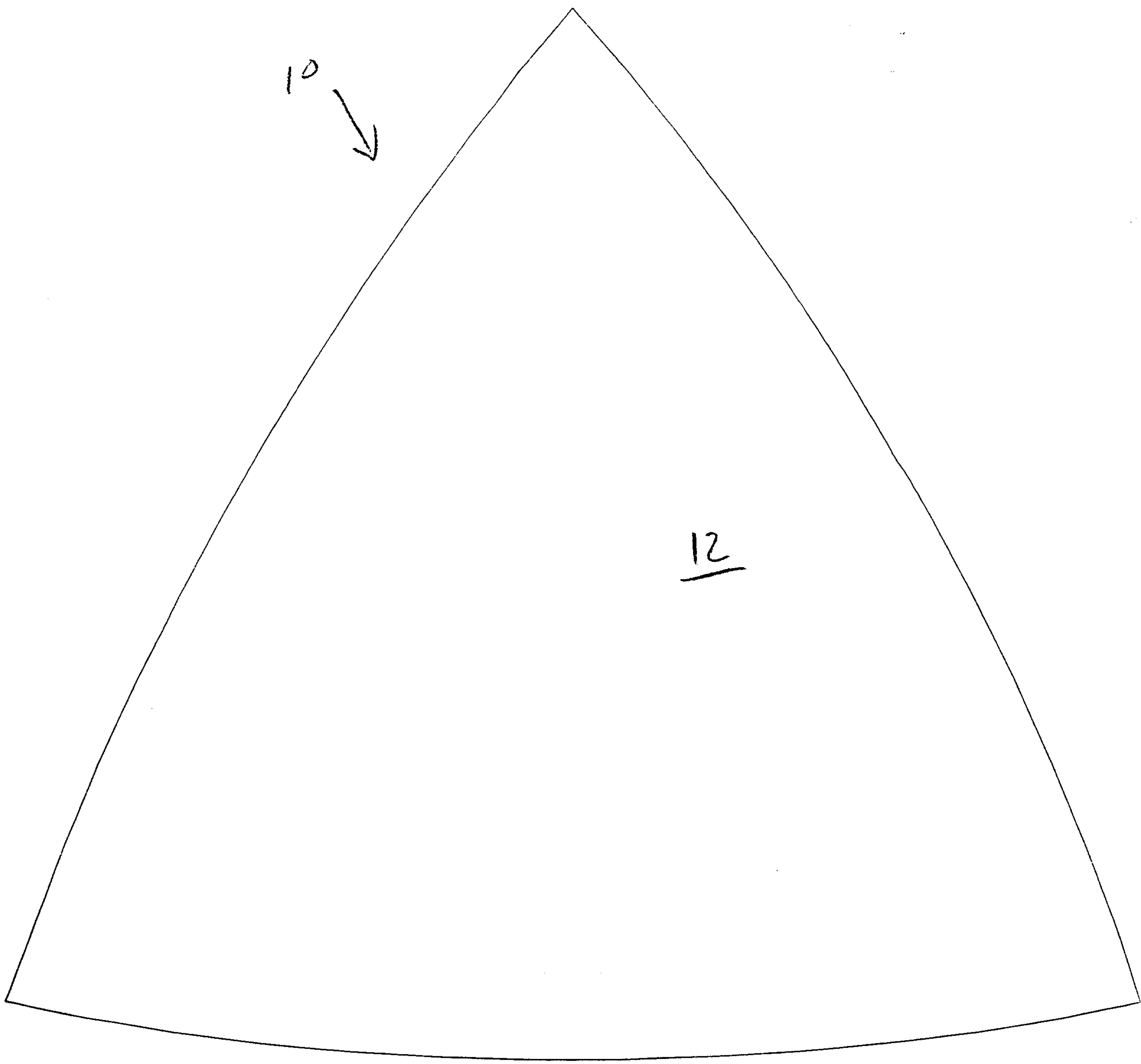


FIG. 1

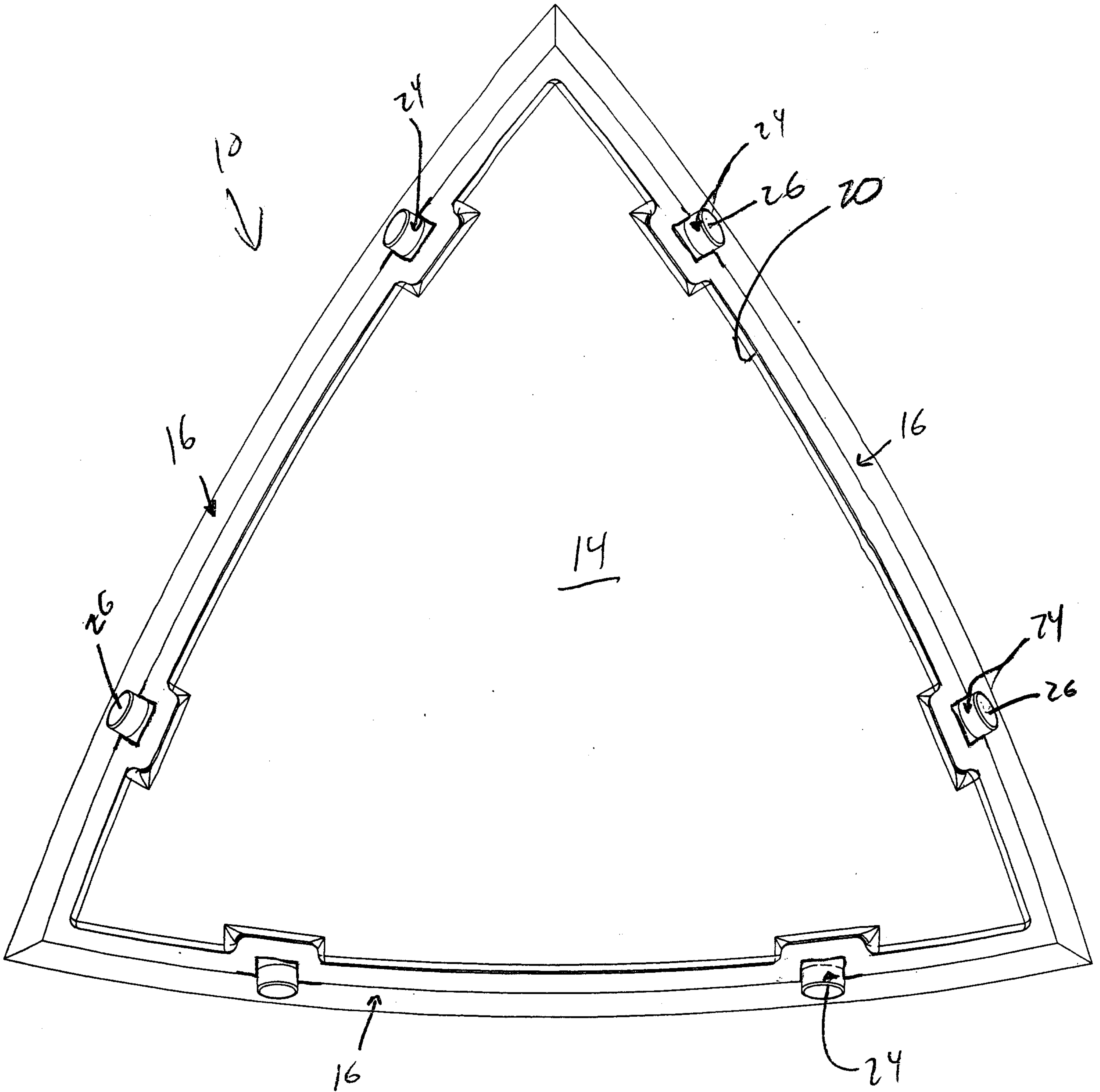


FIG. 2

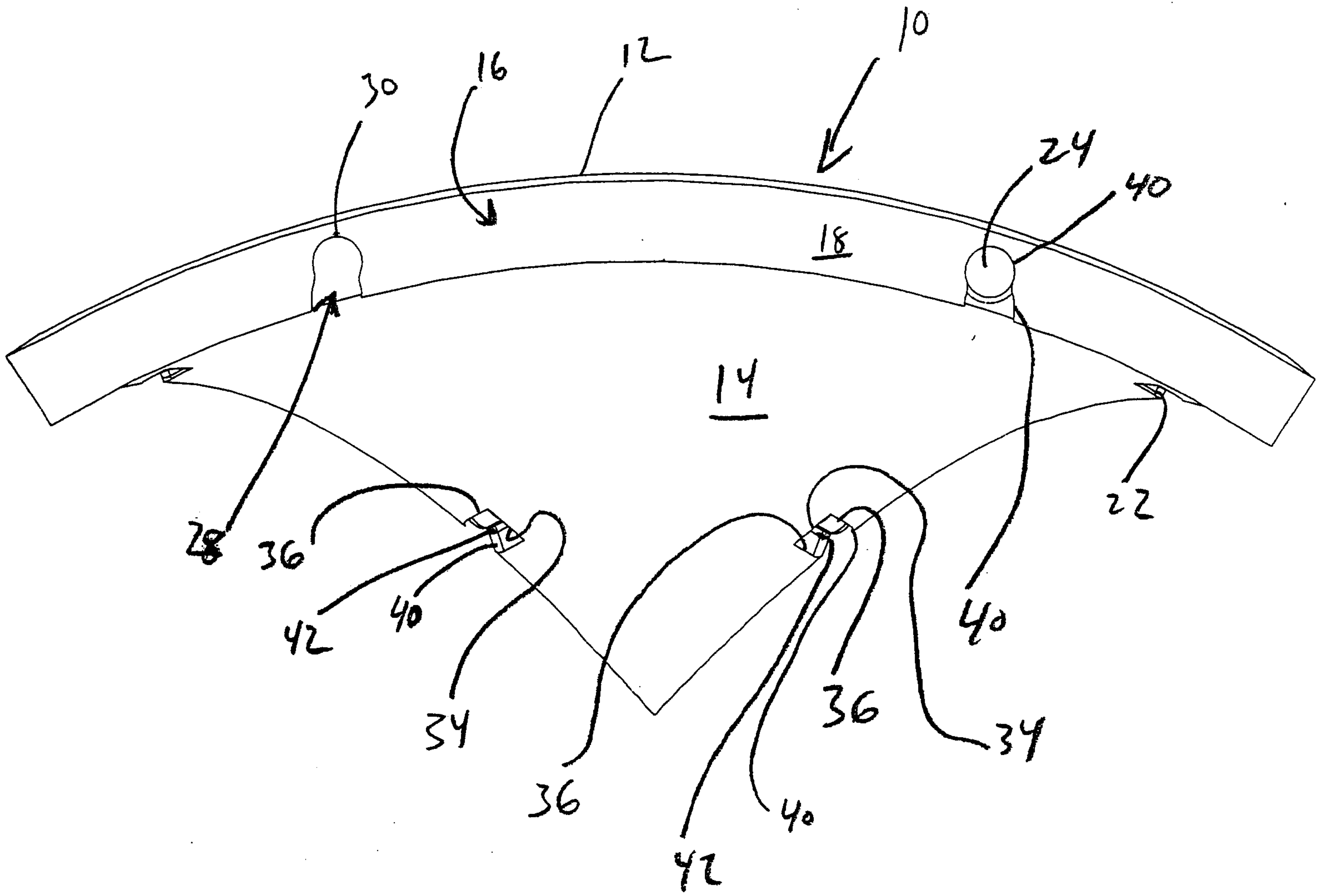


FIG. 3

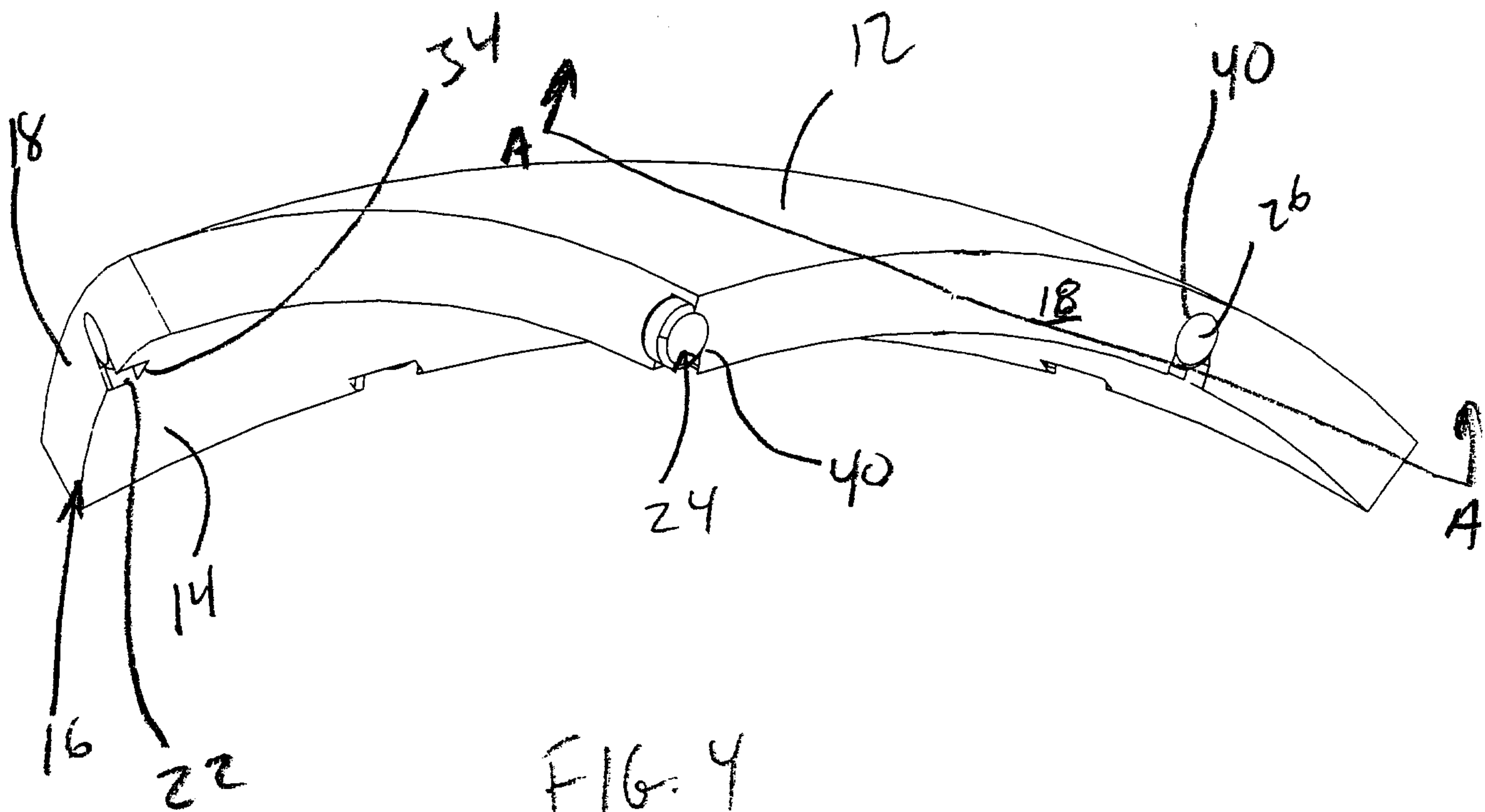


FIG. 4

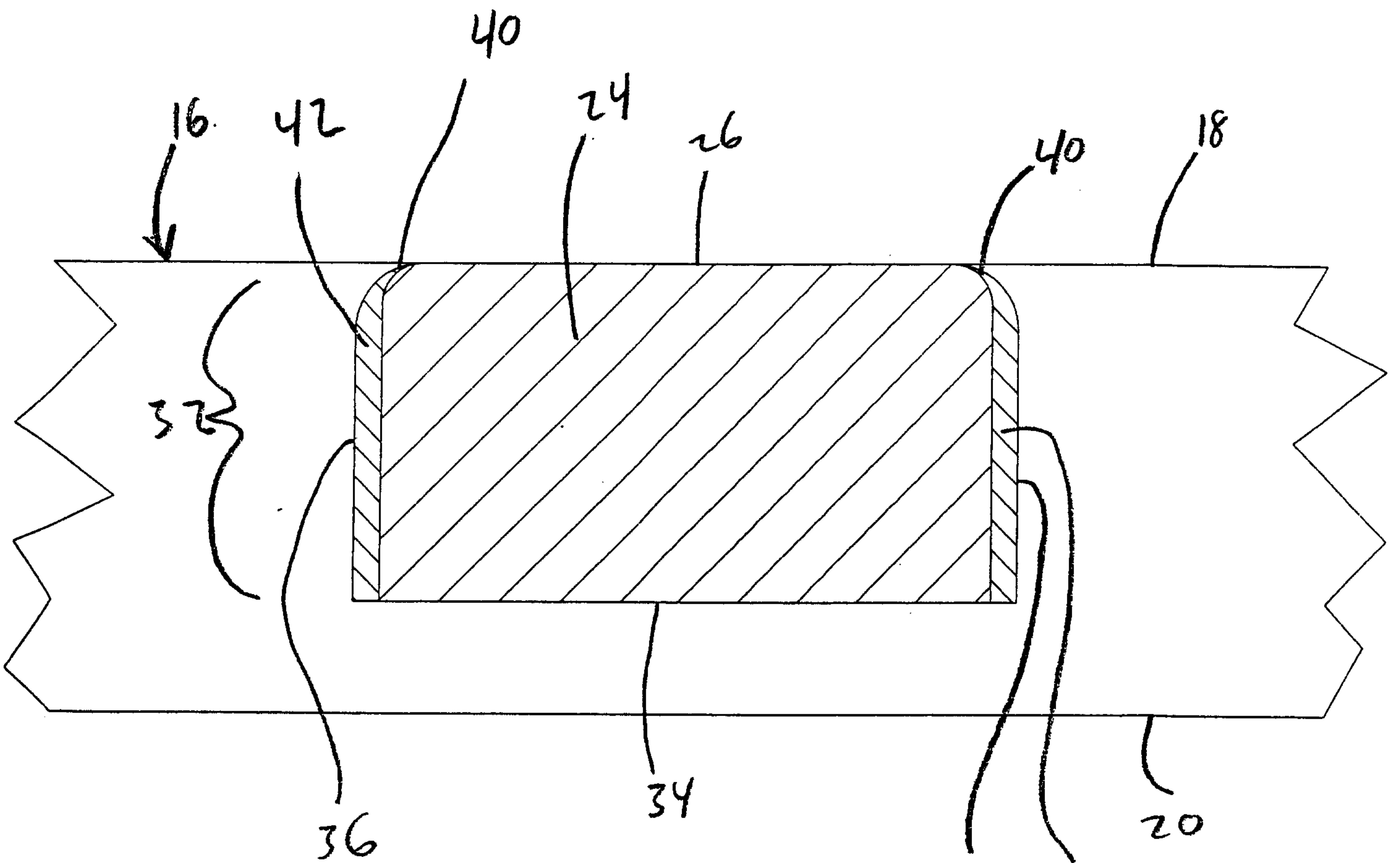


FIG. 4A

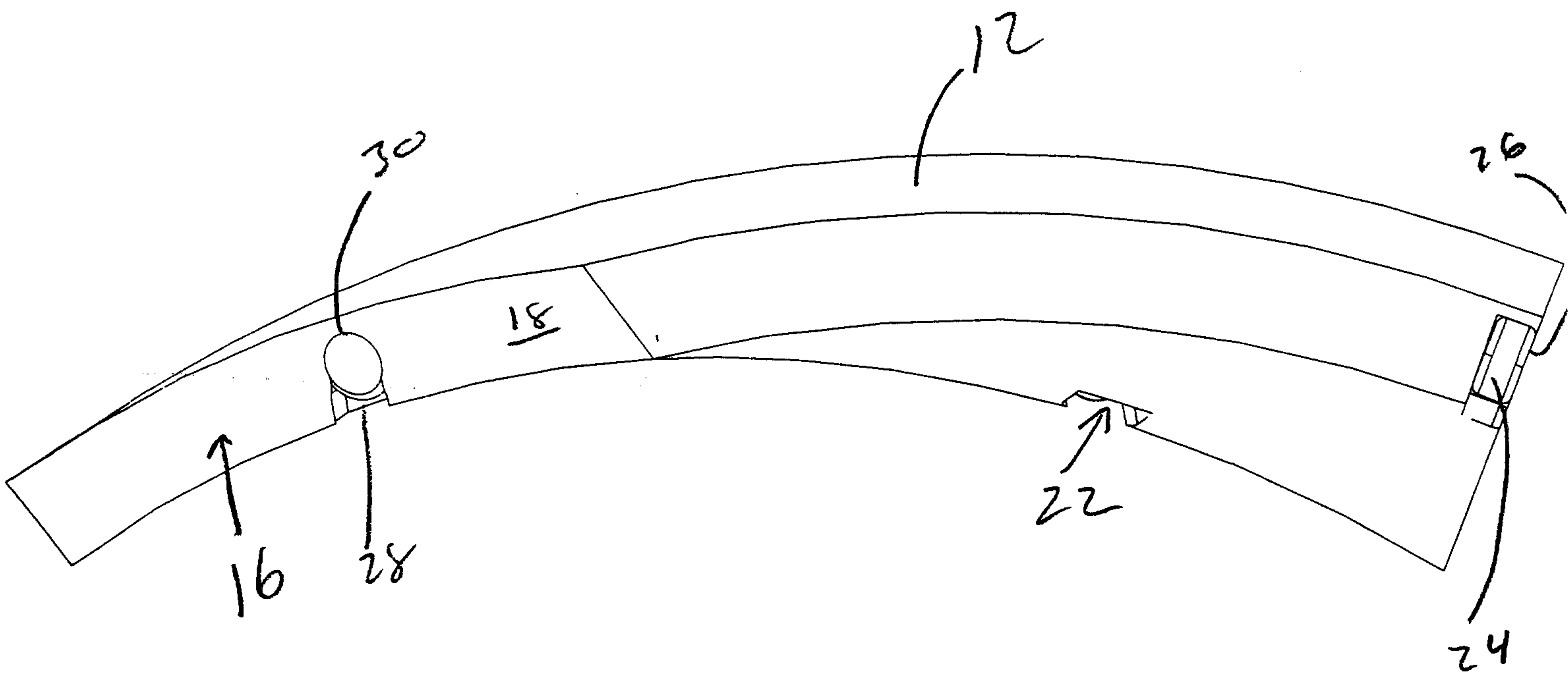


FIG. 5

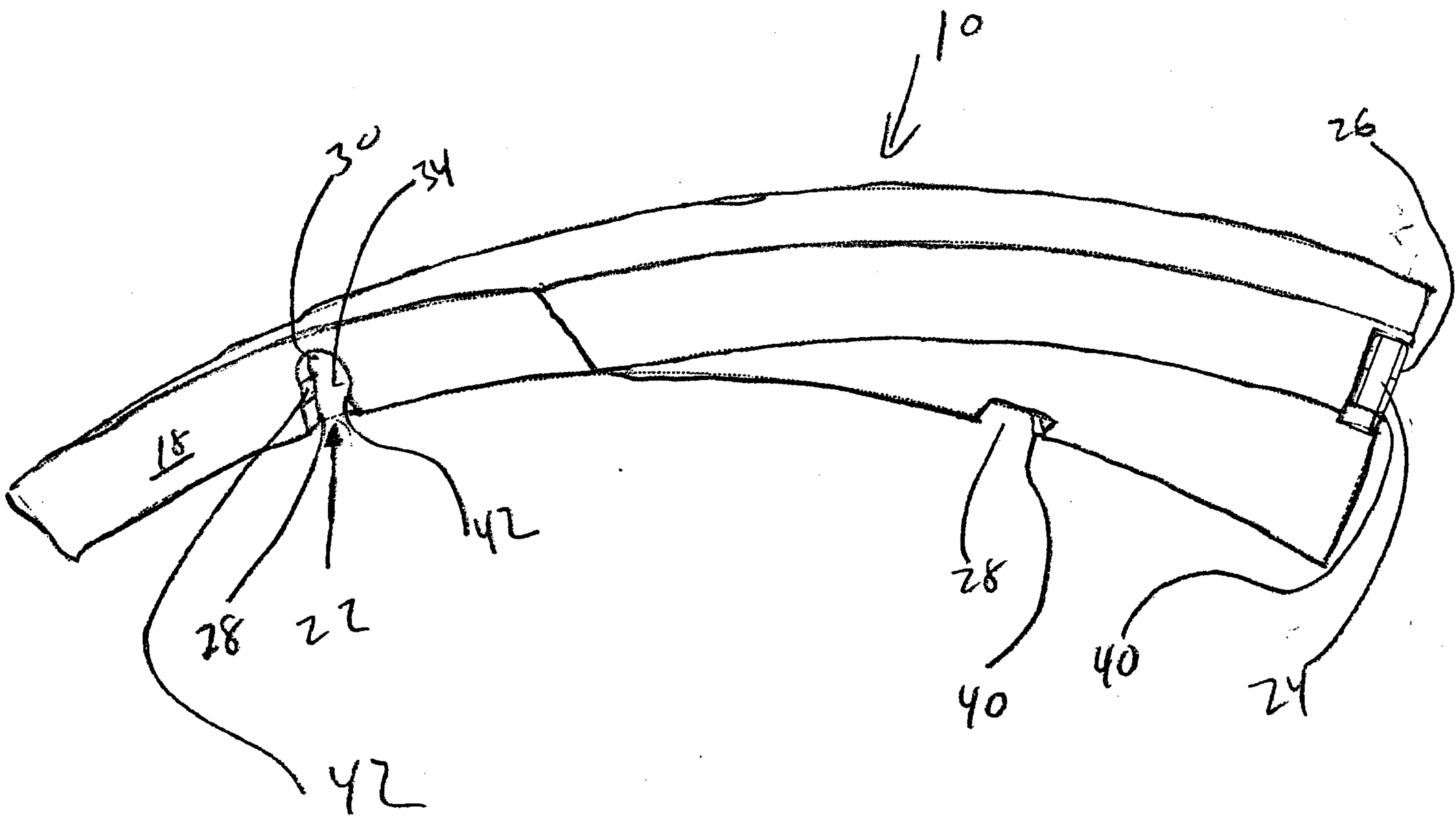


FIG. 6

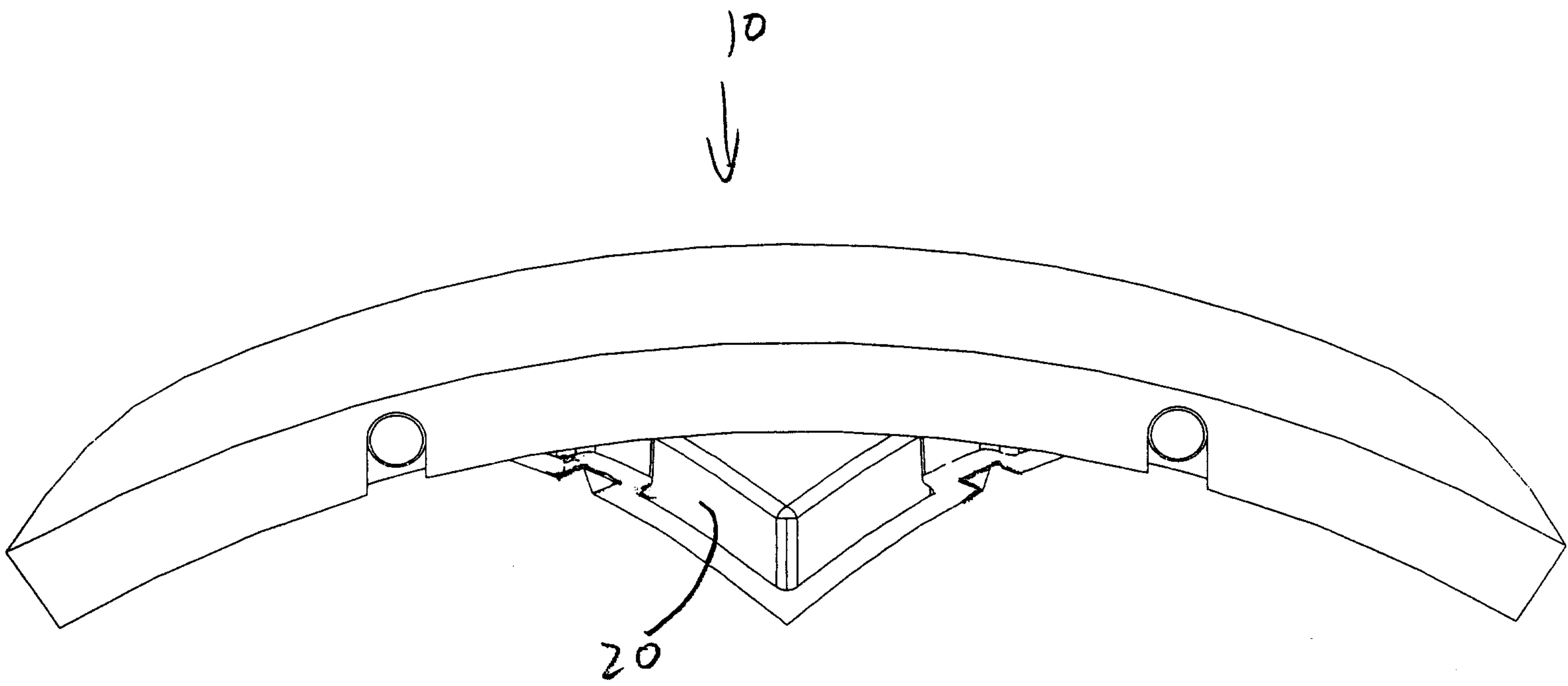


FIG. 7

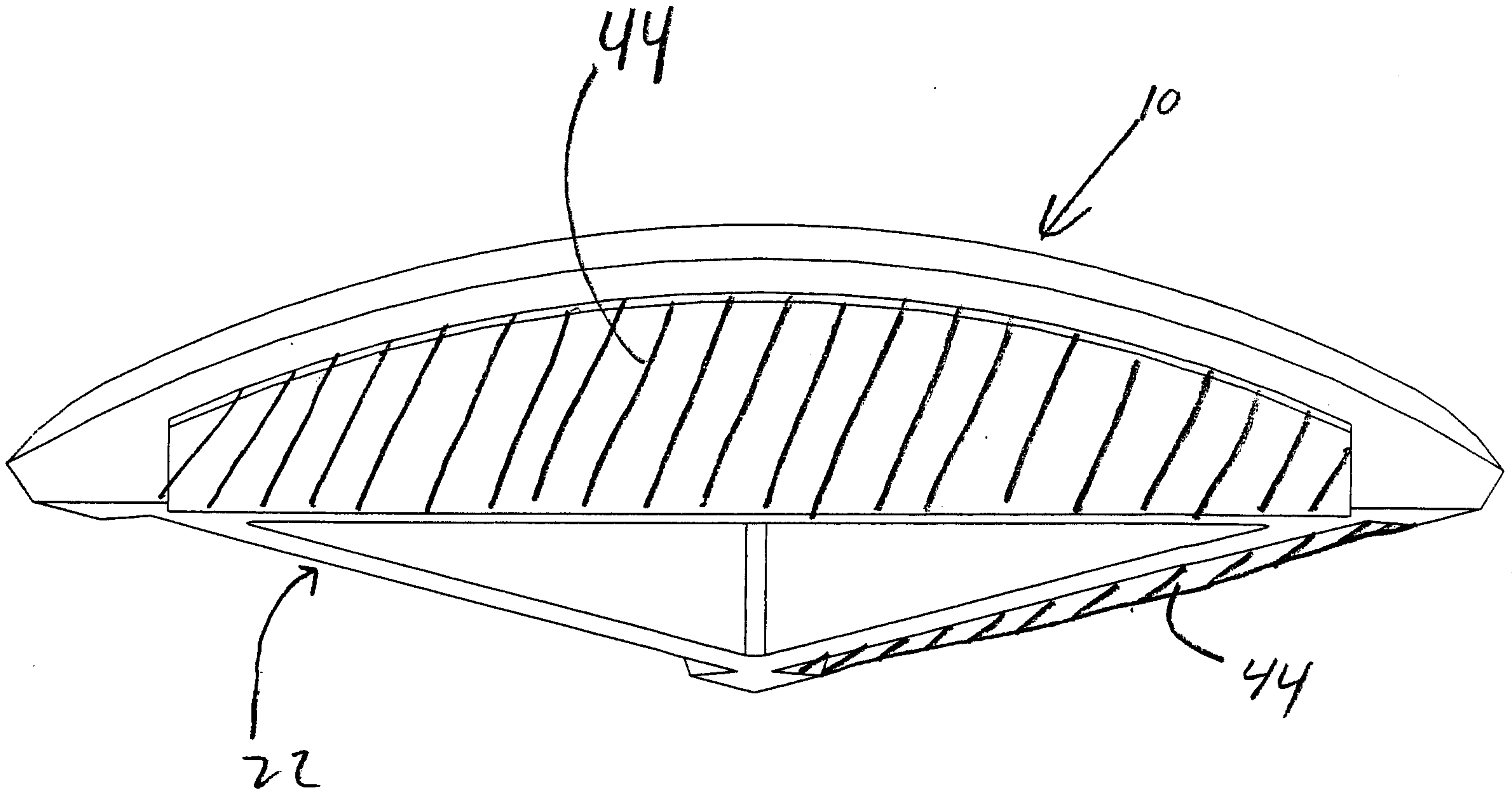


FIG. 7A

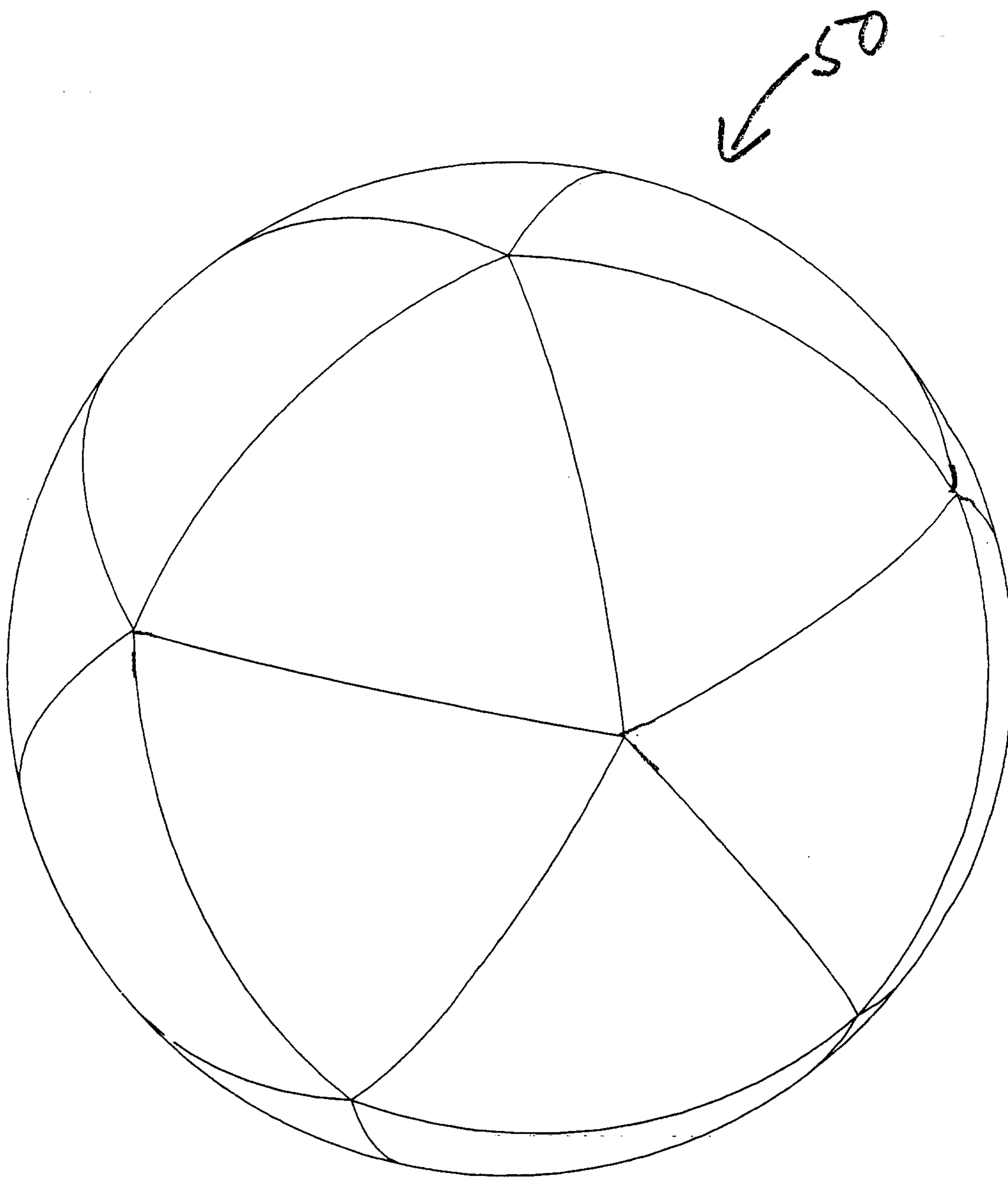


FIG. 8

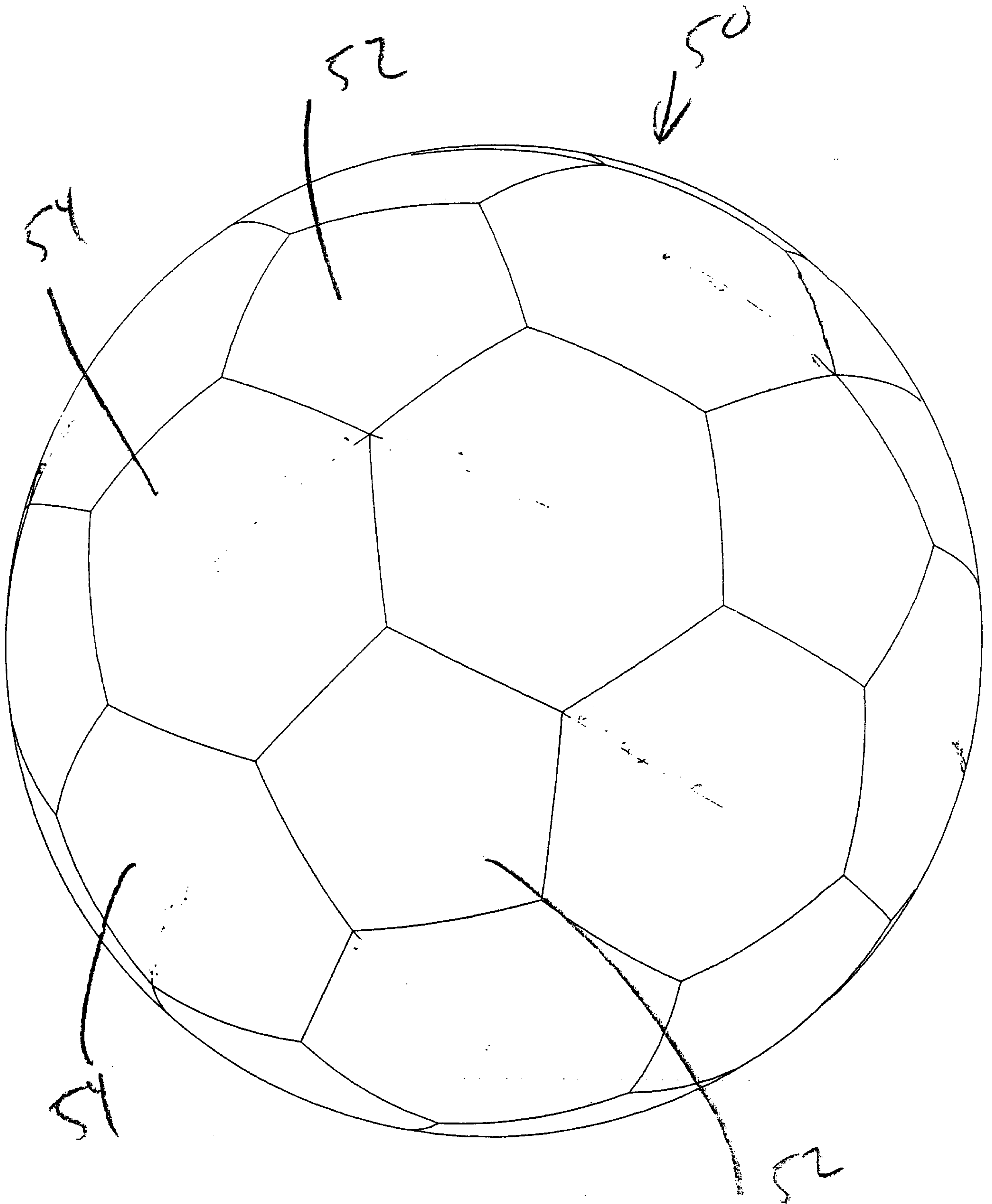


FIG. 9

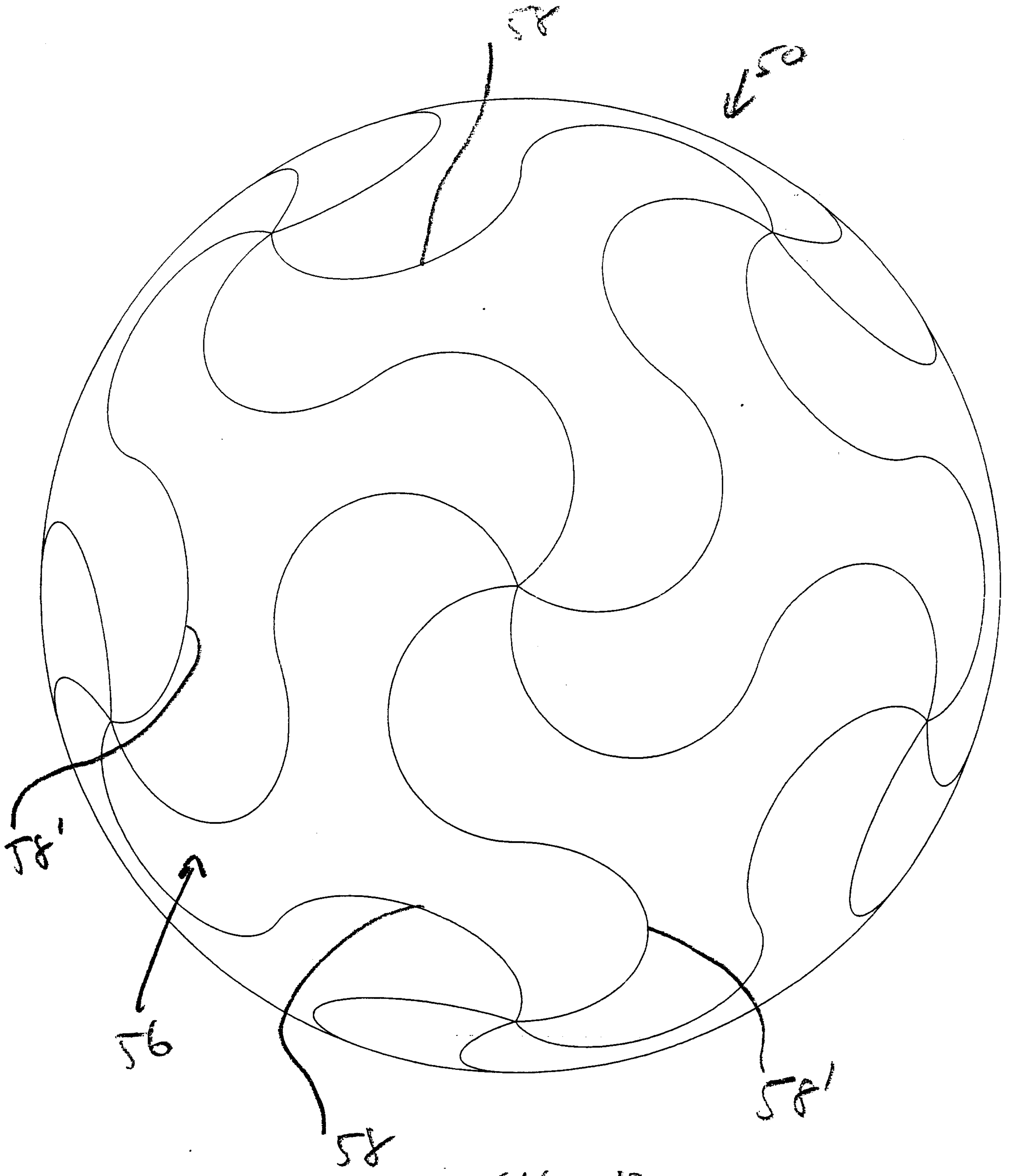
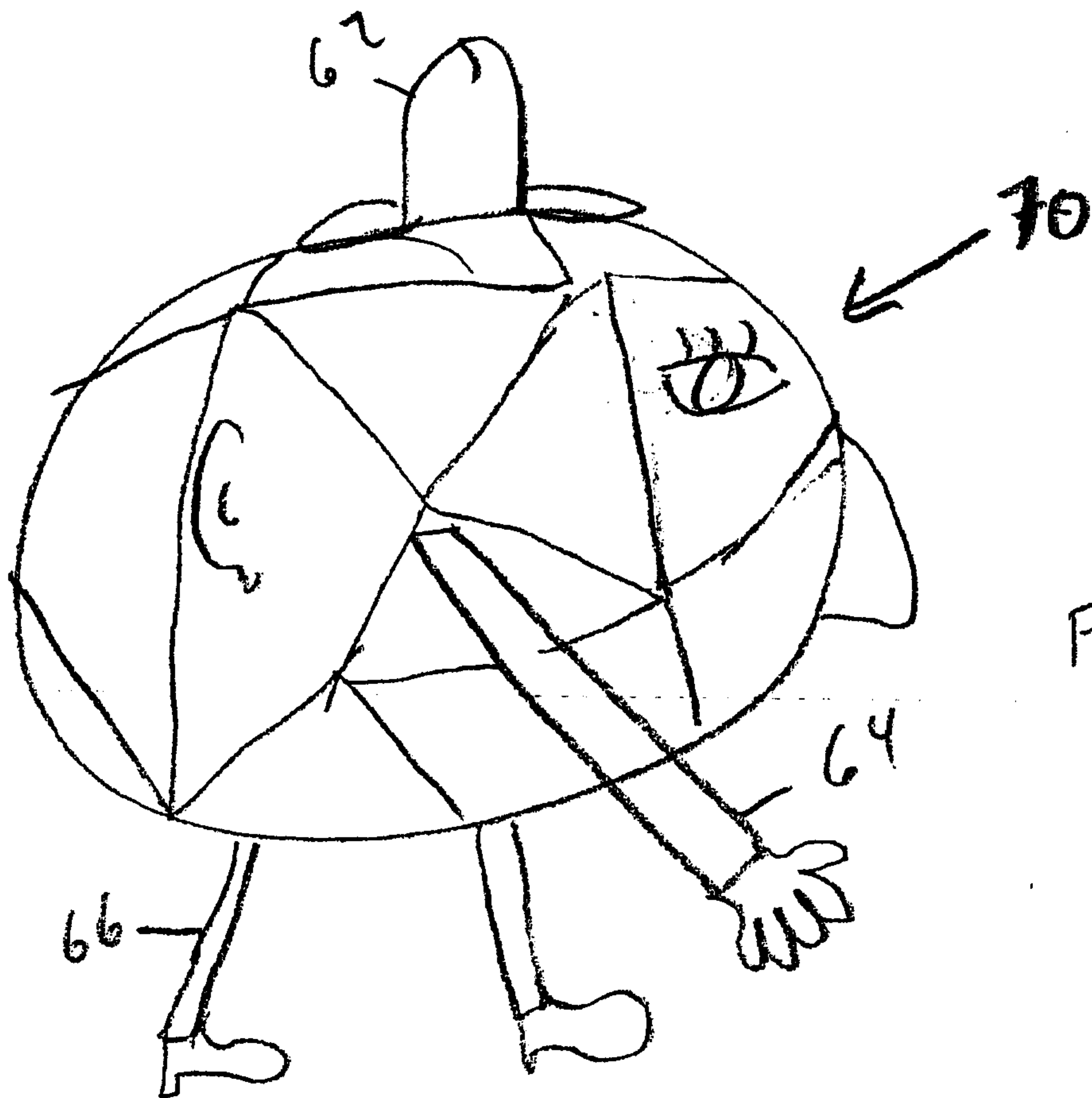
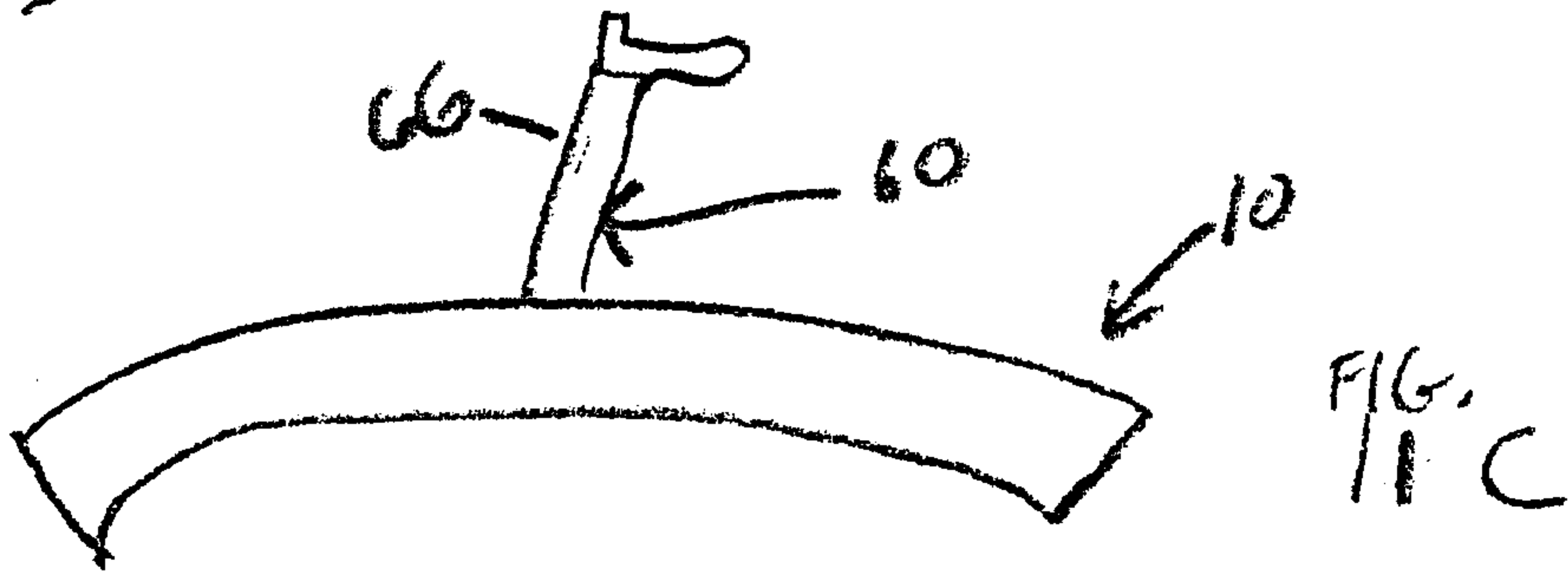
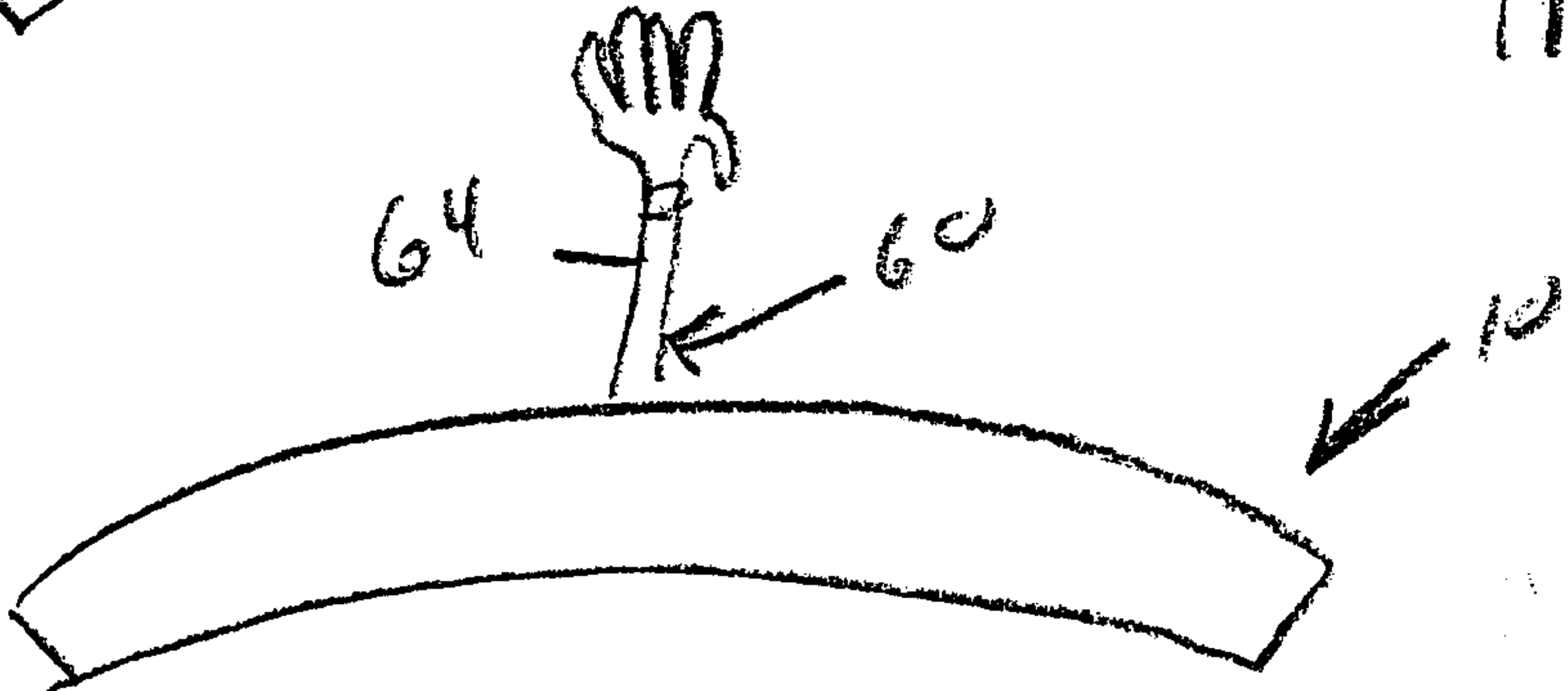
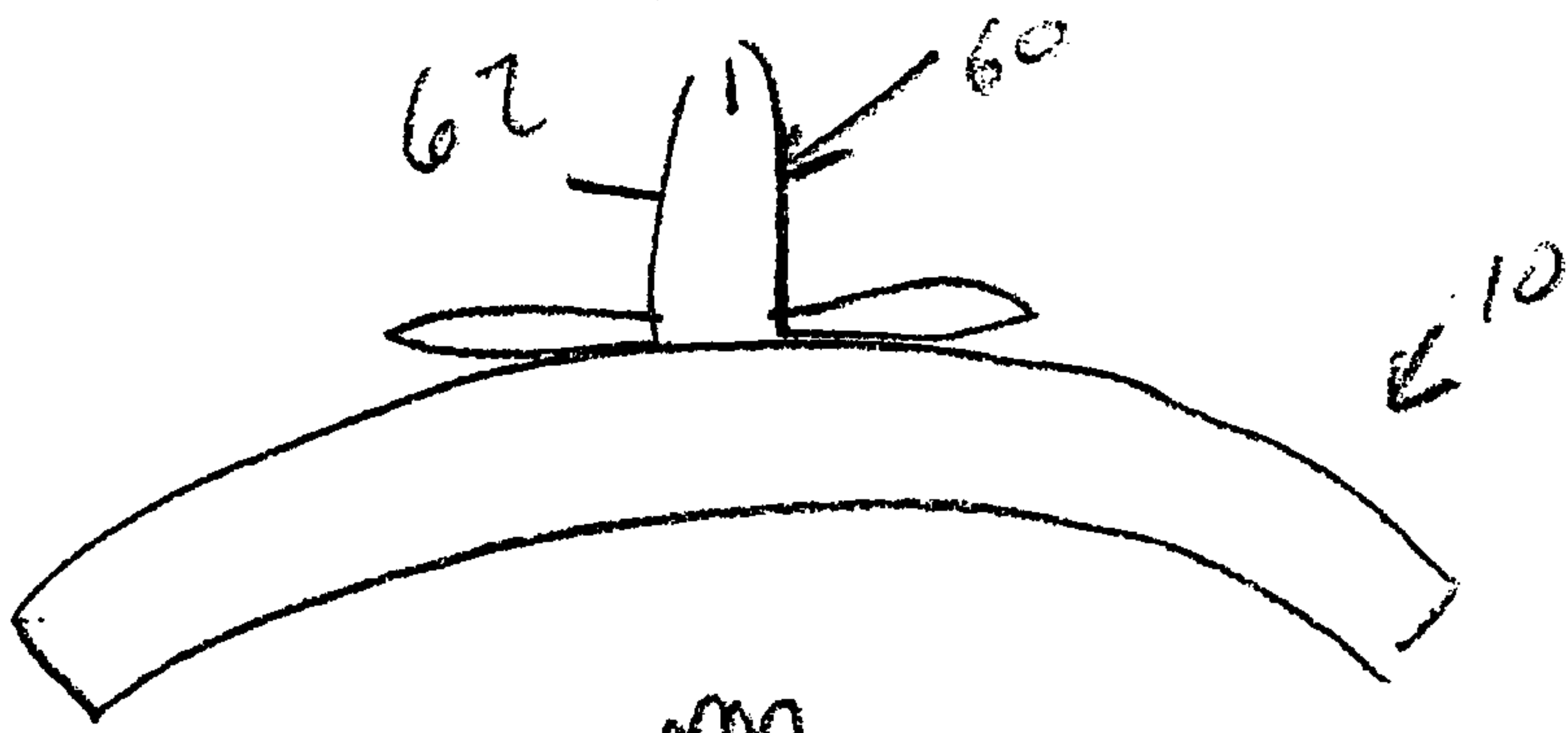


FIG. 10



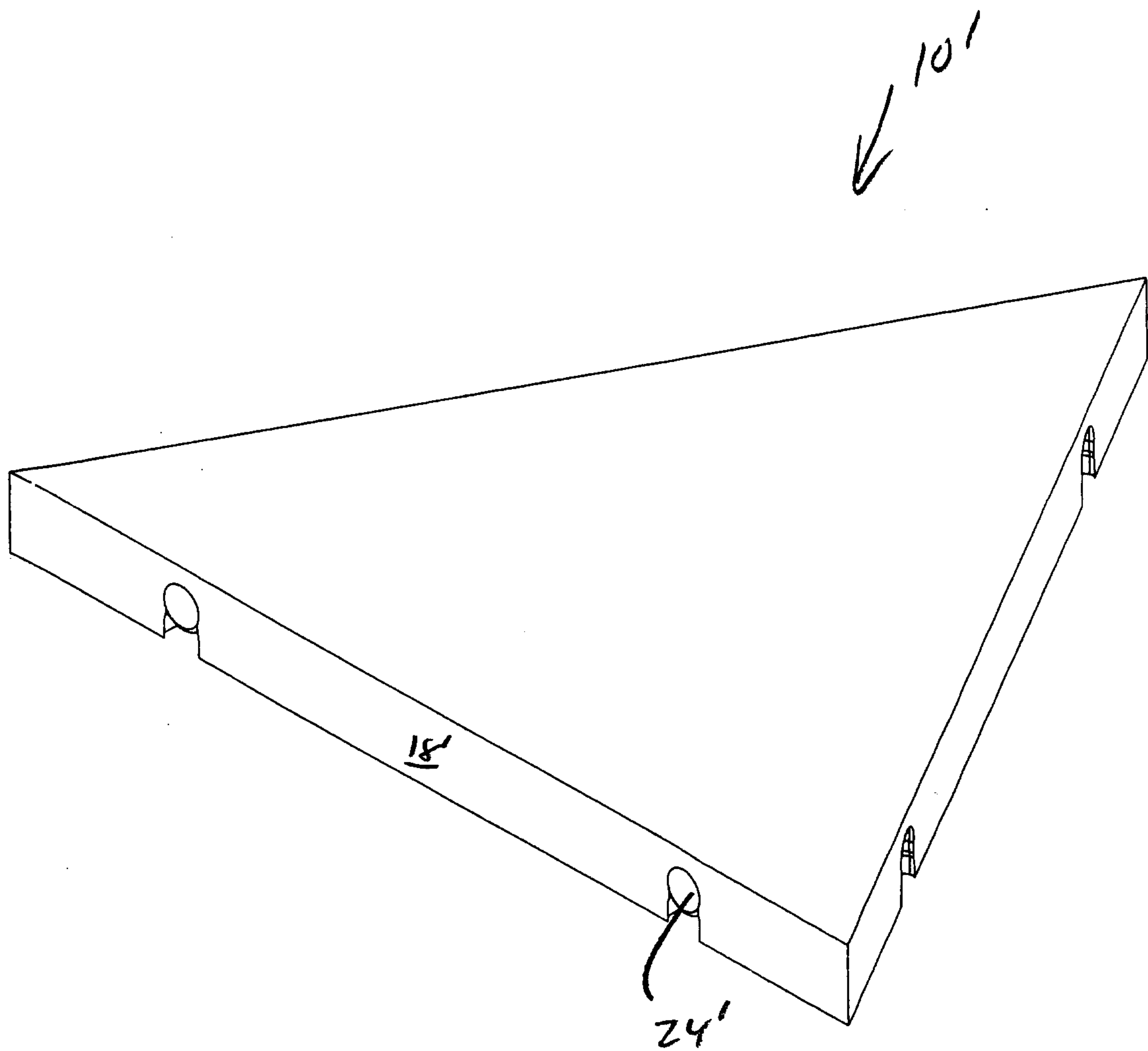


FIG. 12

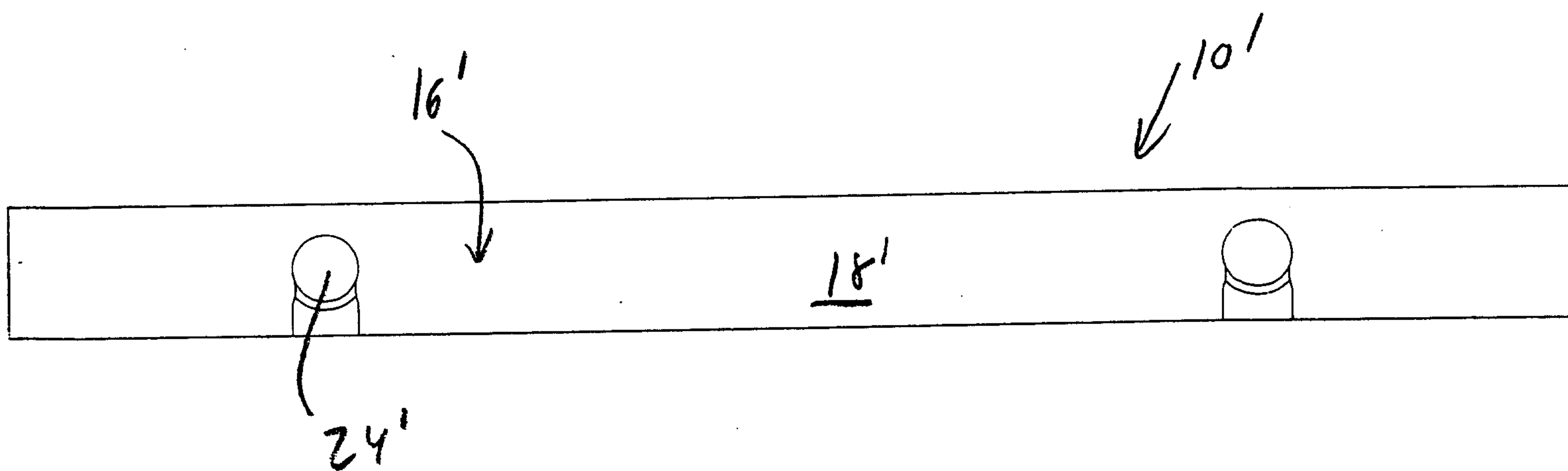


FIG. 13

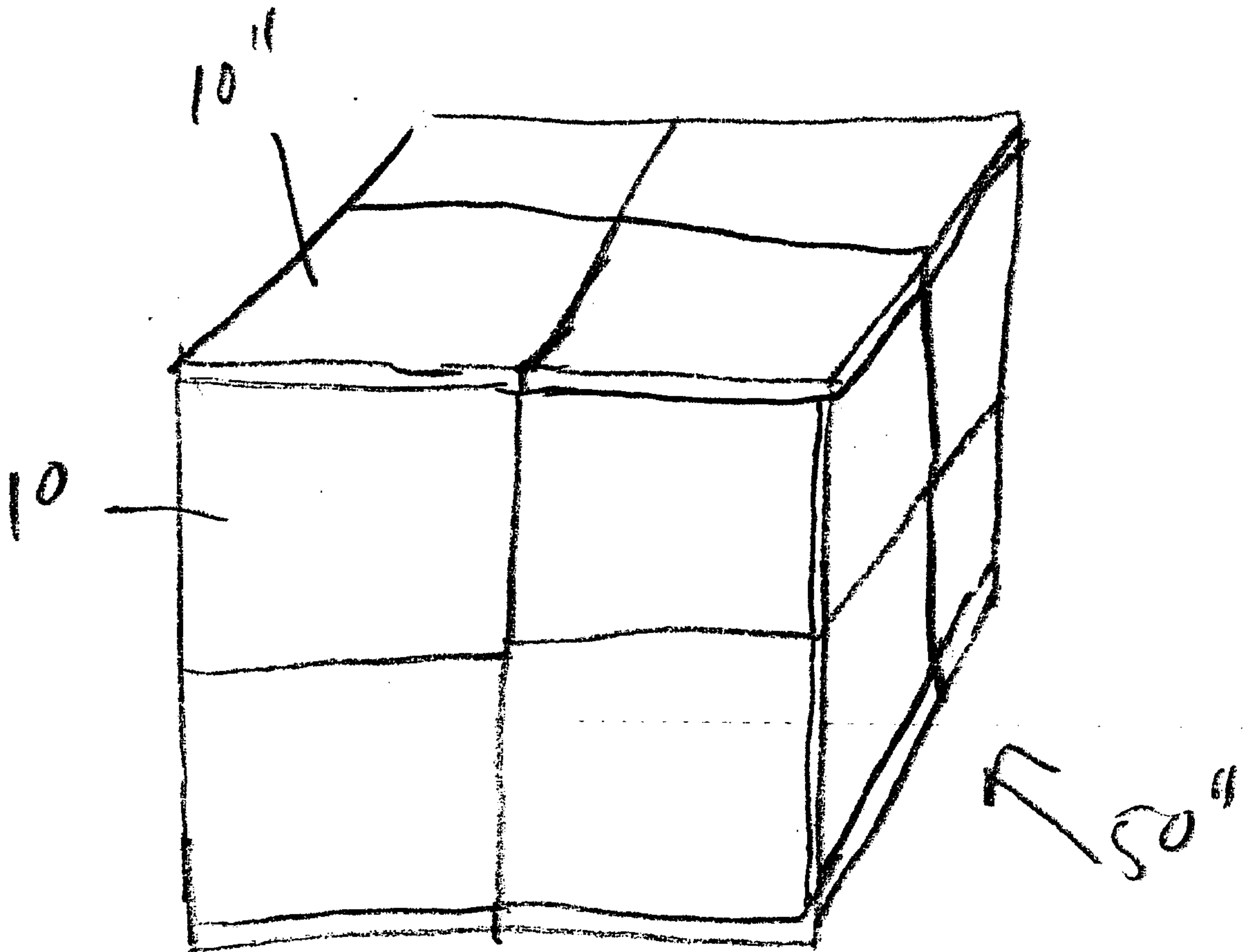
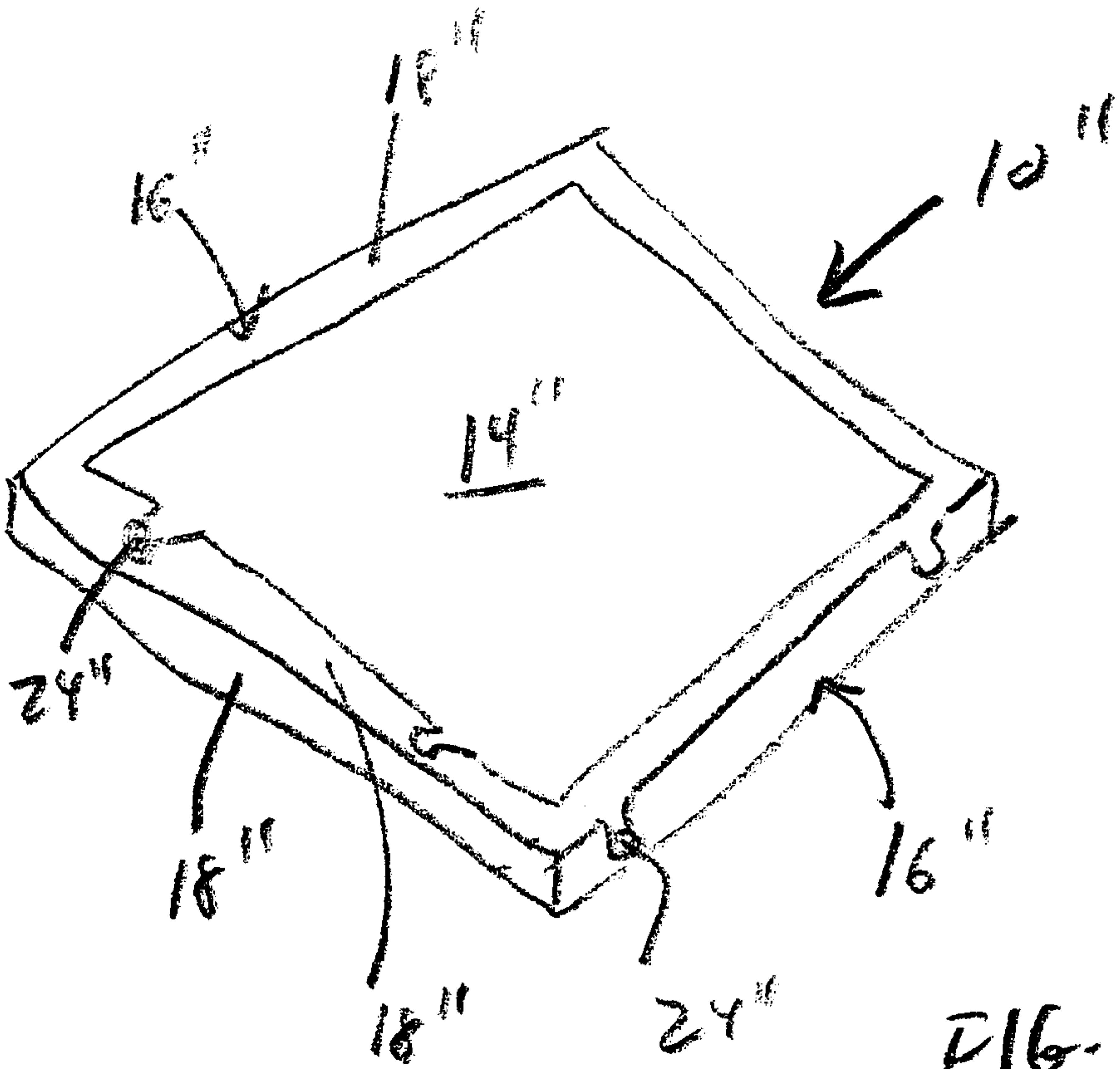
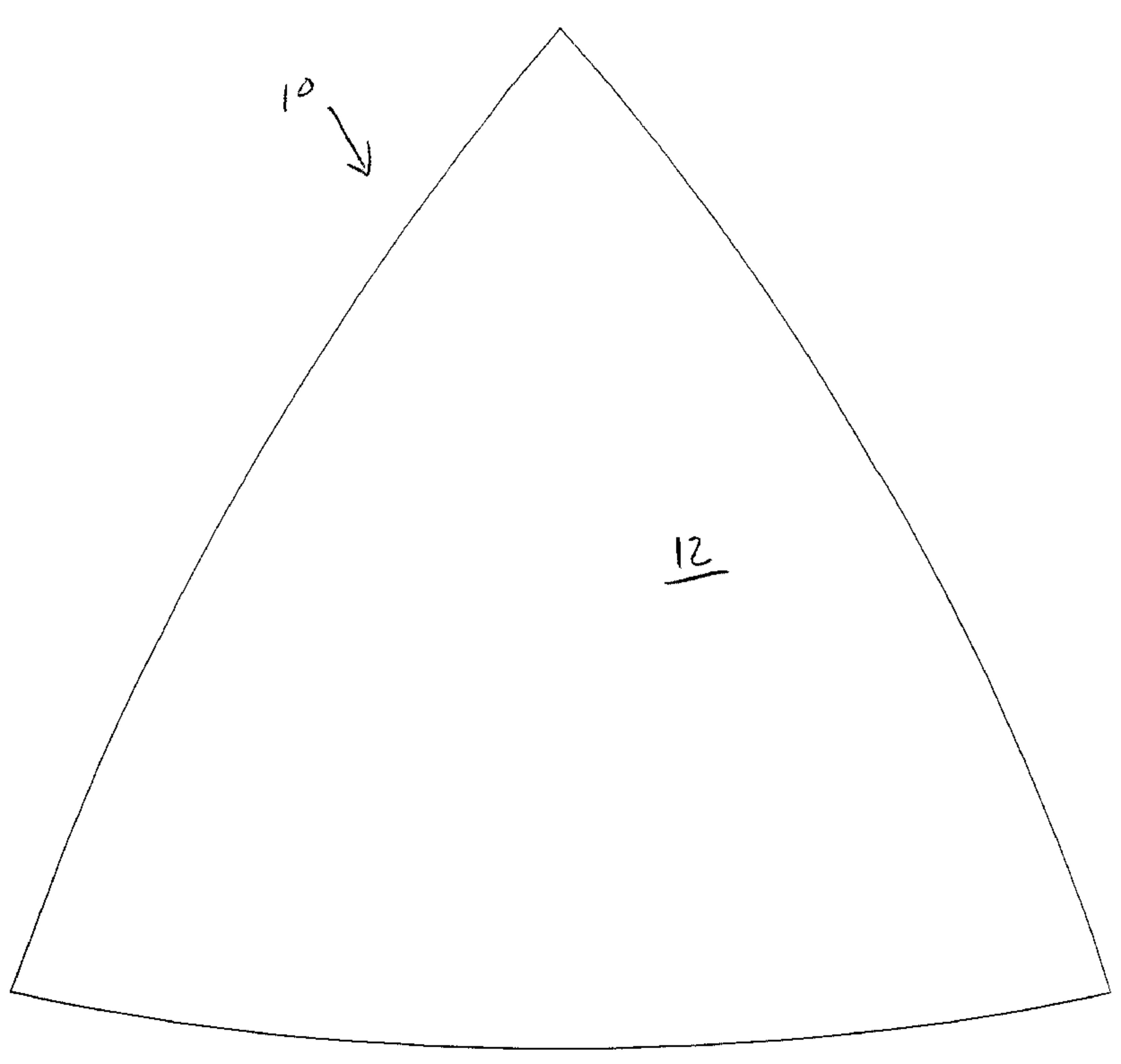


FIG. 15



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12