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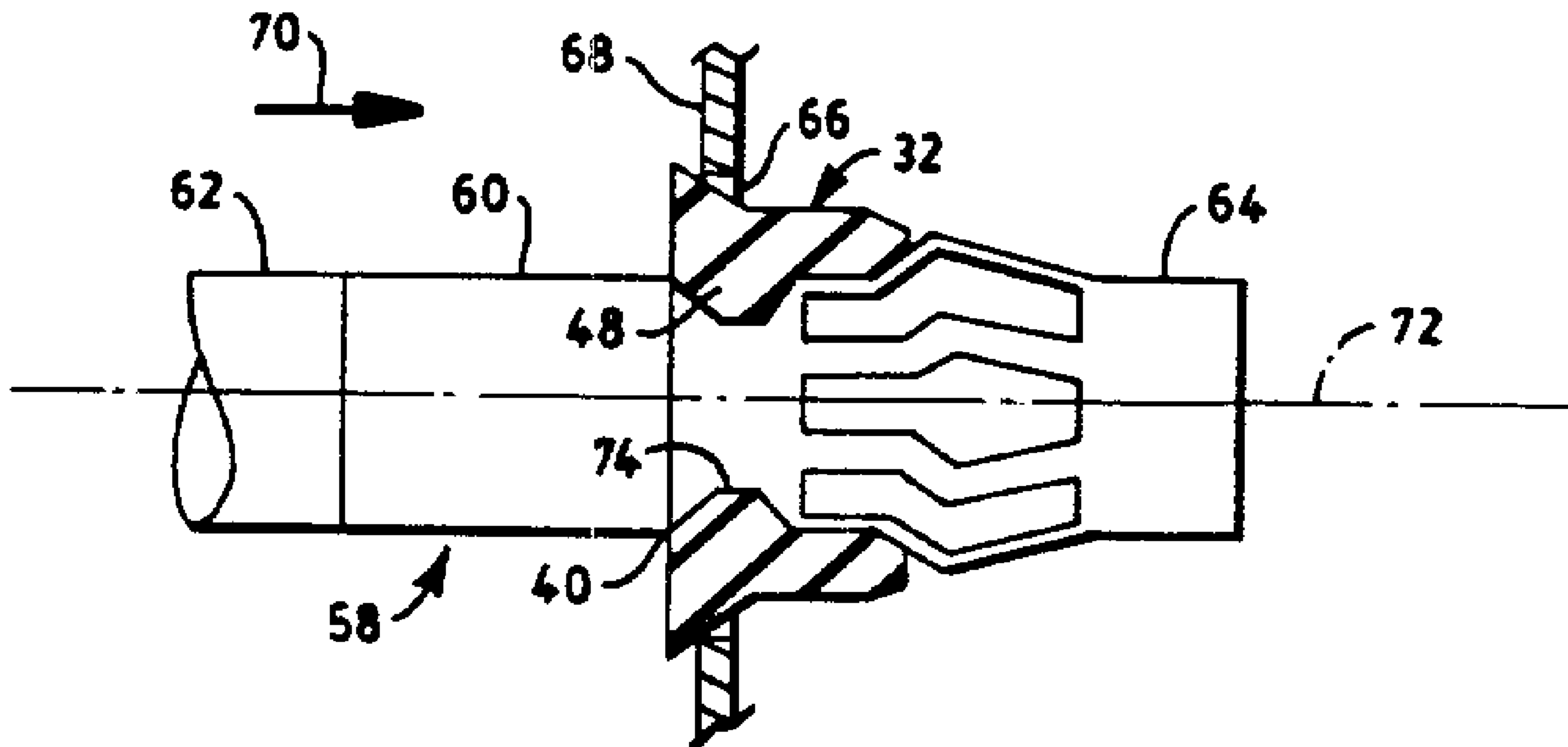
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(54) Titre : JOINT DE CONNECTEUR

(54) Title: CONNECTOR SEAL



(57) Abrégé/Abstract:

A seal for use with an electrical connector is provided. The seal has a tubular configuration with an internal circumferentially extending rib at one end thereof. A weight modified region is provided which forms part of the outer surface of the seal at such one end.



ABSTRACT

5 A seal for use with an electrical connector is provided. The seal has a tubular configuration with an internal circumferentially extending rib at one end thereof. A weight modified region is provided which forms part of the outer surface of the seal at such one end.

CONNECTOR SEAL**BACKGROUND OF THE INVENTION****Field of the Invention**

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The present invention relates to a seal. More particularly, the present invention relates to a seal for use with electrical connectors such as those used, for example, with an antenna connector.

10 **Description of the Prior Art**

Typical electrical connectors such as, for example, those used with an antenna connector for an antenna cable such as that used in the automobile industry for radios includes a male connector generally in the form of a plug and a female
15 connector generally in the form of a ferrule which forms a socket. In use, the male connector is plugged into the female connector to effect a mechanical and electrical connection between the two. Typically, an antenna cable in the form of a coaxial cable is electrically and mechanically attached to one of the connectors such as the male connector, and the other connector, such as the female connector, is
20 electrically and mechanically attached to a circuit such as a circuit on a printed circuit board. The female connector or male connector is typically inserted into an aperture of an enclosed antenna base structure to mate with a male or female connector, respectively, contained within such antenna base structure. In order to insulate the antenna base structure from the environment, the female or male
25 connector being inserted into such aperture is provided with a tubular rubber or rubber-like seal which abuts the periphery of the aperture of the antenna base structure to seal such aperture; that is, to insulate the antenna base structure from environmental elements such as moisture, dirt, etc.

30 An example of such a prior art seal 20 is depicted in Figs. 1 and 2. The seal 20 is in the form of a generally tubular segment 22 having a bore 24 formed by an inner

surface 26 of the tubular segment. A rib 28 comprises a portion of the inner surface 26. The rib 28 extends towards a longitudinal axis 30 of the tubular segment 22.

5 The attachment of the seal 20 to the female or male connector is typically effected at the manufacturing facility in an automated manufacturing process during which it is necessary to orient the seal relative to the connector in an axial direction. Such orientation is necessary so that the generally tubular bore of the seal may be positioned relative to the generally tubular end of the connector so that the end of the connector and the bore may be fitted together in the conventional manner with
10 the connector extending through the bore. The alignment of the seal 20 relative to the male or female connector is typically effected by means of a conventional vibrating hopper or feeder.

One of the problems incurred during such manufacturing process is that vibration of
15 the hopper or feeder does not always properly align each seal with a respective male or female connector.

DISCLOSURE OF THE INVENTION

20 It is an object of the present invention to provide a seal for use with an electrical connector which contributes to the alignment of the seal with such electrical connector during the assembly thereof.

It is another object of the present invention to provide a seal which will be properly
25 oriented, relative to a male or female connector to which the seal is to be attached, during a vibratory manufacturing process.

This invention achieves these and other objects by providing a seal which comprises a tubular segment extending along a longitudinal axis and having a first end, an
30 opposite second end, an inner surface defining a bore which extends from the first end to the opposite second end, and an outer surface. A rib is provided which includes a portion of the inner surface. The rib protrudes towards the longitudinal

axis. A weight modified region is also provided. Such region comprises a portion of the outer surface.

BRIEF DESCRIPTION OF THE DRAWINGS

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This invention may be clearly understood by reference to the attached drawings in which:

FIG. 1 is a plan view of a prior art seal;

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FIG. 2 is a sectional view of the seal of FIG. 1 taken along lines 2-2;

FIG. 3 is a plan view of one embodiment of the present invention;

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FIG. 4 is a view of the embodiment of FIG. 3 taken along lines 4-4;

FIG. 5 is an elevational view of the embodiment of FIGS. 3 and 4 in use;

FIG. 6 is a plan view of another embodiment of the present invention;

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FIG. 7 is a view of the embodiment of FIG. 6 taken along lines 7-7;

FIG. 8 is a plan view of another embodiment of the present invention;

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FIG. 9 is a view of the embodiment of FIG. 8 taken along lines 8-8;

FIG. 10 is a plan view of another embodiment of the present invention; and

FIG. 11 is a view of the embodiment of FIG. 10 taken along lines 10-10.

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BEST MODE FOR CARRYING OUT THE INVENTION

For a better understanding of the present invention, together with other and further objects, advantages and capabilities thereof, reference is made to the following disclosure and appended claims taken in conjunction with the above-described drawings.

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Referring now to the drawings with greater particularity, the embodiment of this invention which is illustrated in Figs. 3 and 4 is particularly suited for achieving the objects of this invention. Figs. 3 and 4 depict a seal 32 which comprises a tubular segment 34 which extends along a longitudinal axis 36 from a first end 38 to an
10 opposite second end 40. The seal of the present invention may be fabricated from any known material from which seals are made. Preferably such material will be rubber or rubber-like. In the preferred embodiment seal 32 is fabricated from ALCRYN 2080 sold by DuPont. The tubular segment includes an inner surface 42 which defines a bore 44 which extends from end 38 to end 40, and an outer surface
15 46. The seal 32 also includes a rib 48 which comprises a portion of the inner surface 42. Rib 48 protrudes radially towards the longitudinal axis 36. In the embodiment of Figs. 3 and 4, rib 48 extends in a circumferential direction 50 relative to axis 36 and is adjacent end 38. The seal thus far described is similar to the prior art seal of Figs. 1 and 2.

20

The seal of the present invention further includes a weight modified region which comprises a portion of the outer surface of the tubular segment. In the preferred embodiment, such weight modified region will be adjacent an end of the tubular segment. In the embodiment of Figs. 3 and 4, the weight modified region
25 comprises a protuberance 52 located adjacent end 38. Protuberance 52 protrudes radially away from the outer surface 46 of the tubular segment 34 and the axis 36. Like rib 48, protuberance 52 extends in circumferential direction 50 relative to axis 36. In the preferred embodiment, the protuberance 52 comprises a base 54 which is contiguous with the end 38 as depicted in Fig. 4. Protuberance 52 also includes
30 an inclined surface 56 which extends away from axis 36 from outer surface 46 to the base 54.

In use, the seal of the present invention may be attached to an electrical connector such as an antenna connector. For example, Fig. 5 depicts seal 32 attached to a female antenna connector 58. It will be apparent to those skilled in the art that seal 32 may be attached to a male connector in the same manner described herein regarding a female connector and that the description herein regarding attachment to a female connector is by way of example only. Female and male connectors are known in the art and form no part of the present invention. Female antenna connector 58 is only generally described herein for an understanding of the seal of the present invention. Female antenna connector 58 is a generally tubular structure having a first end 60 which may be connected to, for example, a first length a coaxial cable 62 and a second end 64 which may be electrically and mechanically connected to a mating male antenna connector (not shown) in the usual manner. Typically, female antenna connector 58 will be inserted into an aperture 66 of an antenna base 68, and the seal 32 will insulate the antenna base from environmental elements such as moisture, dirt and the like. The attachment of the seal 32 to the female antenna connector 58 is typically effected at the manufacturing facility in an automated manufacturing process during which it is necessary to orient the seal relative to the female antenna connector in the direction 70 of axis 72 of the female antenna connector. Such orientation is necessary so that the generally tubular bore 42 of the seal 32 may be positioned relative to the generally tubular end 60 of the female antenna connector 58 as depicted in Fig. 5 so that the end 60 and bore 42 may be fitted together in the conventional manner with the connector 58 extending through bore 42 and the rib 48 mating with a groove 74 which extends about the periphery of the connector. The alignment of the seal 32 relative to the female antenna connector 58 is typically effected by means of a conventional vibrating hopper or feeder. Without intending to be bound by any theory of operation, it is believed that the end of the seal 32 having the weight modified region will become oriented in the desired direction 70 during vibration of the seal as a result of the modification of its weight at one end thereof. It has been observed that the presence of the internal rib 28 of the prior art seal 20 does not effectively orient the seal as desired during the manufacturing process described herein.

- Figs. 6 to 11 depict some alternative embodiments of the seal 32, and like elements are designated by like reference numerals. Each of the seals of Figs. 6 to 11 include a tubular segment 34 which extends along a longitudinal axis 36 from a first end 38 to an opposite second end 40. The tubular segment includes an inner surface 42 which defines a bore 44 which extends from end 38 to end 40, and an outer surface 46. Each seal also includes a rib 48 which comprises a portion of the inner surface 42. Rib 48 protrudes radially towards the longitudinal axis 36, extends in a circumferential direction 50 relative to axis 36 and is adjacent end 38.
- 10 The seal depicted in Figs. 6 and 7 includes a weight modified region which comprises a protuberance, adjacent end 38, which protrudes radially away from the outer surface 46 and axis 36, and which extends in circumferential direction 50 relative to axis 36. Such protuberance comprises a flange 76 having a rounded peripheral surface 78.
- 15 The seal depicted in Figs. 8 and 9 includes a weight modified region which comprises a plurality of protuberances 80 adjacent end 38. Each protuberance 80 protrudes radially away from outer surface 46 and axis 36. In the preferred embodiment protuberances 80 are equally spaced in circumferential direction 50.
- 20 For example, in the embodiment of Figs. 8 and 9 there are four protuberances 80 spaced from each other in an amount equal to 90° . It will be apparent to those skilled in the art that there may be more or less than four protuberances 80, and such protuberances may be spaced equally or unequally, as desired, so long as the desired weight modified region is provided.
- 25 The seal depicted in Figs. 10 and 11 include a weight modified region which comprises a recessed segment 82 of outer surface 46 adjacent end 38. In particular, outer surface 46 comprises a first cylindrical segment 84 having a diameter 86 and a second cylindrical segment 88 having a diameter 90. The recessed segment 82 is
- 30 formed by providing an outer surface 46 wherein diameter 86 is greater than diameter 90.

The weight modified regions formed at 76, 80 and 82 of the seals of Figs. 6 and 7, 8 and 9 and 10 and 11, respectively, serve the same function as that described above regarding the weight modified region formed by protuberance 52 of seal 32 of Figs. 3 and 4.

5

The embodiments which have been described herein are but some of several which utilize this invention and are set forth here by way of illustration but not of limitation. It is apparent that many other embodiments which will be readily apparent to those skilled in the art may be made without departing materially from
10 the spirit and scope of this invention.

CLAIMS:**What is claimed is:**

- 5 1. A seal, comprising:

 a tubular segment extending along a longitudinal axis and having a first end,
an opposite second end, an inner surface defining a bore which extends from said
first end to said opposite second end, and an outer surface;

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 a rib comprising a portion of said inner surface, said rib protruding towards
said longitudinal axis; and

 a weight modified region which comprises a portion of said outer surface.

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2. The seal of claim 1 wherein said weight modified region is adjacent said
first end.

3. The seal of claim 1 wherein said rib is adjacent said first end.

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4. The seal of claim 1 wherein said weight modified region comprises a
protuberance adjacent said first end, which protrudes away from said outer surface
and said longitudinal axis, and which extends in a circumferential direction relative
to said longitudinal axis.

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5. The seal of claim 4 wherein said protuberance comprises a base which is
contiguous with said first end, and an inclined surface which extends away from
said longitudinal axis from said outer surface to said base.

- 30 6. The seal of claim 5 wherein said rib is adjacent said first end.

7. The seal of claim 4 wherein said protuberance comprises a flange, adjacent said first end, which protrudes away from said outer surface and said longitudinal axis, and which extends in a circumferential direction relative to said longitudinal axis.

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8. The seal of claim 7 wherein said flange comprises a rounded peripheral surface.

9. The seal of claim 8 wherein said rib is adjacent said first end.

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10. The seal of claim 1 wherein said weight modified region comprises a plurality of protuberances, adjacent said first end, each protuberance of said plurality of protuberances protruding away from said outer surface and said longitudinal axis.

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11. The seal of claim 10 wherein said plurality of protuberances comprises protuberances which are equally spaced in a circumferential direction relative to said longitudinal axis.

20 12. The seal of claim 11 wherein said rib is adjacent said first end.

13. The seal of claim 1 wherein said weight modified region comprises a recessed segment of said outer surface adjacent said first end.

25 14. The seal of claim 13 wherein said rib is adjacent said first end.

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PATENT AGENT FOR THE APPLICANT

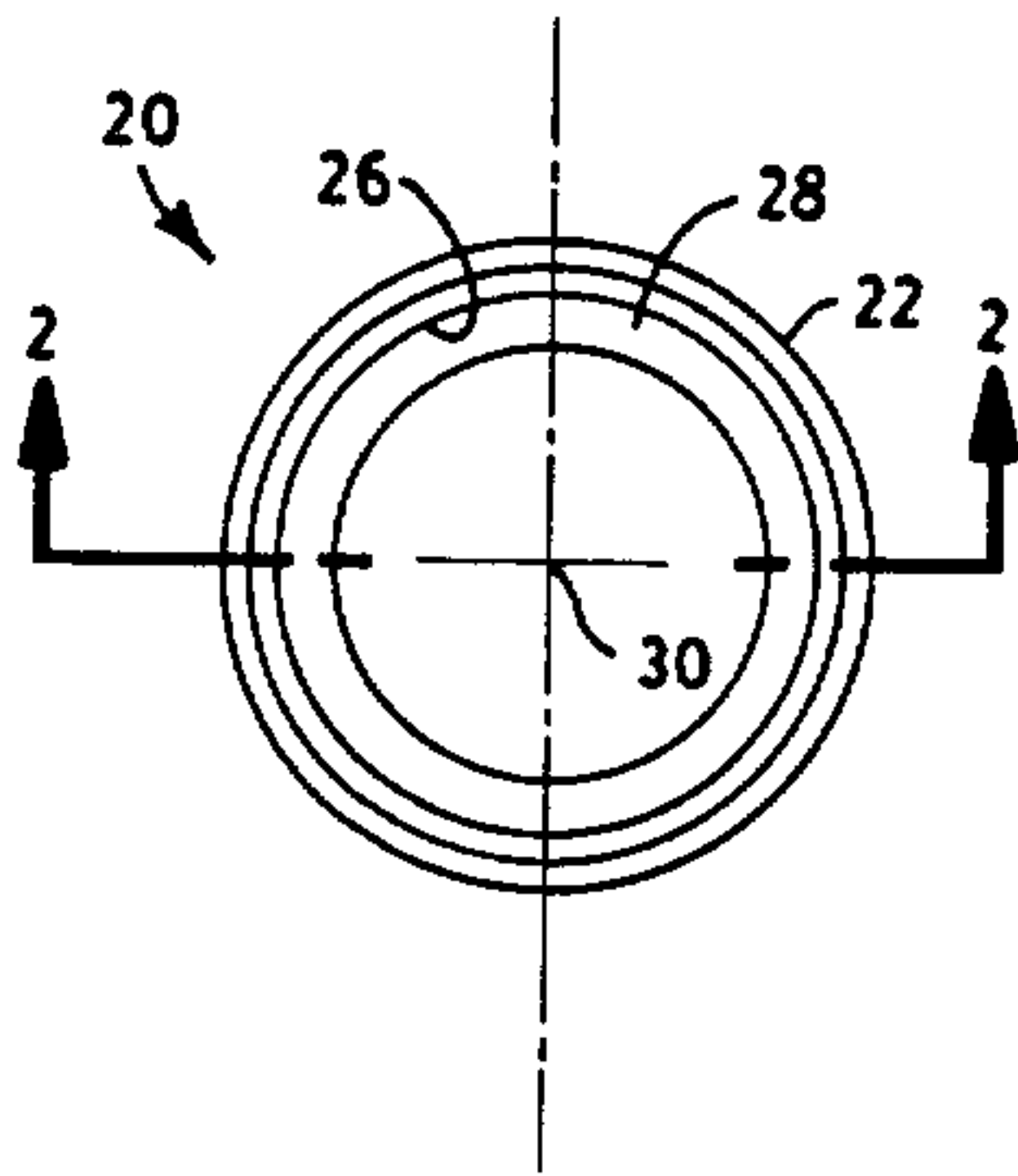


FIG. 1
PRIOR ART

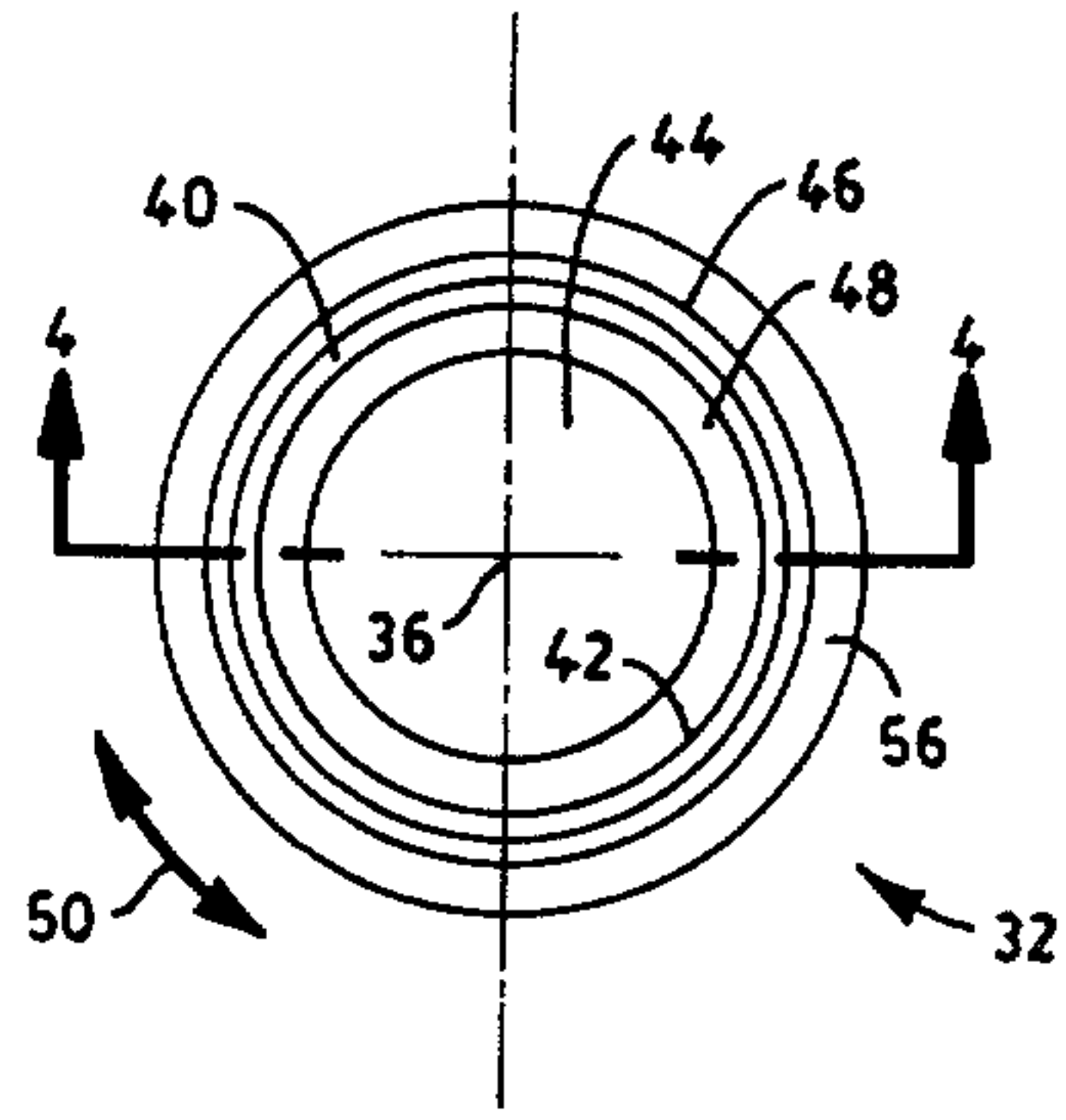


FIG. 3

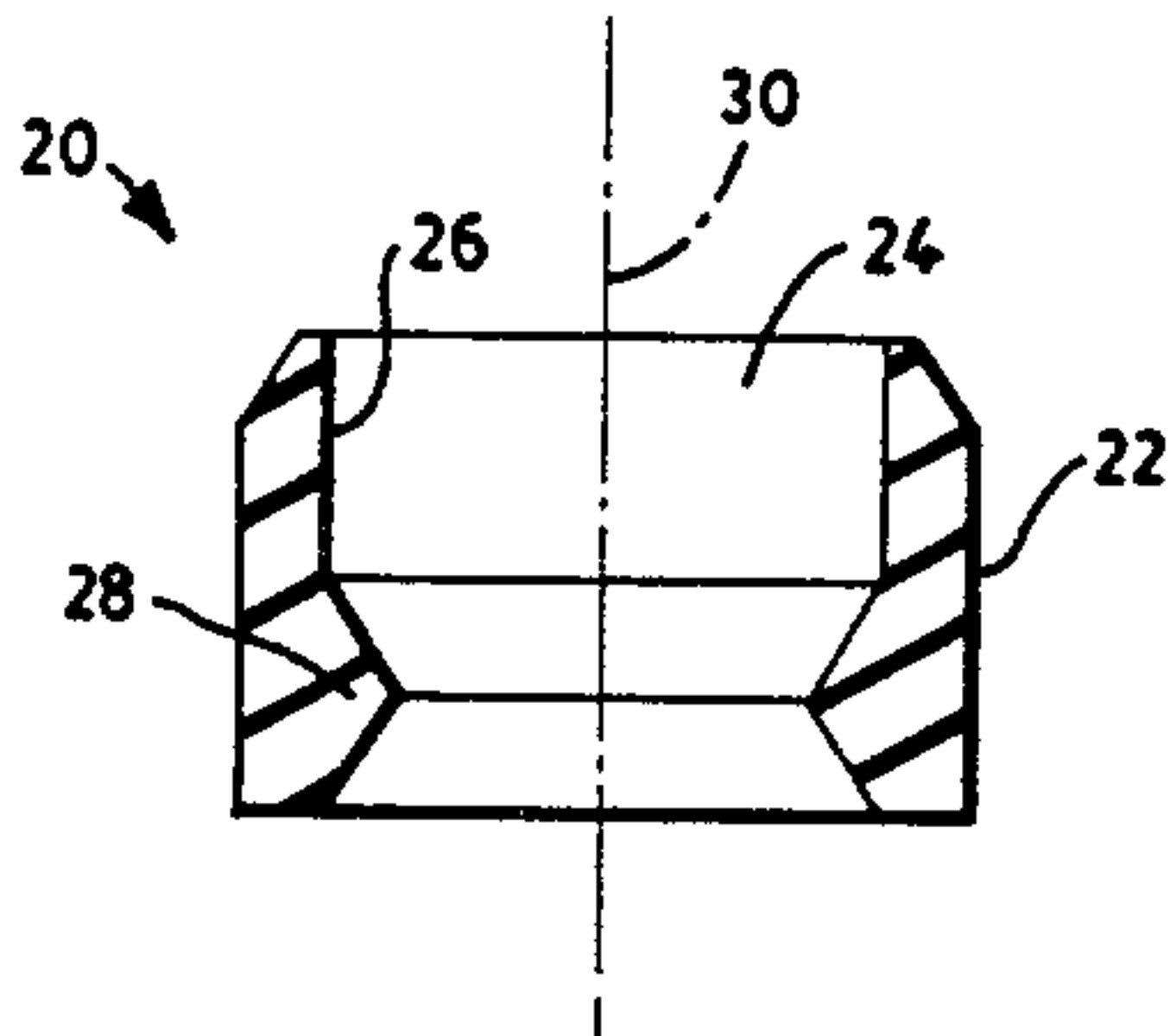


FIG. 2
PRIOR ART

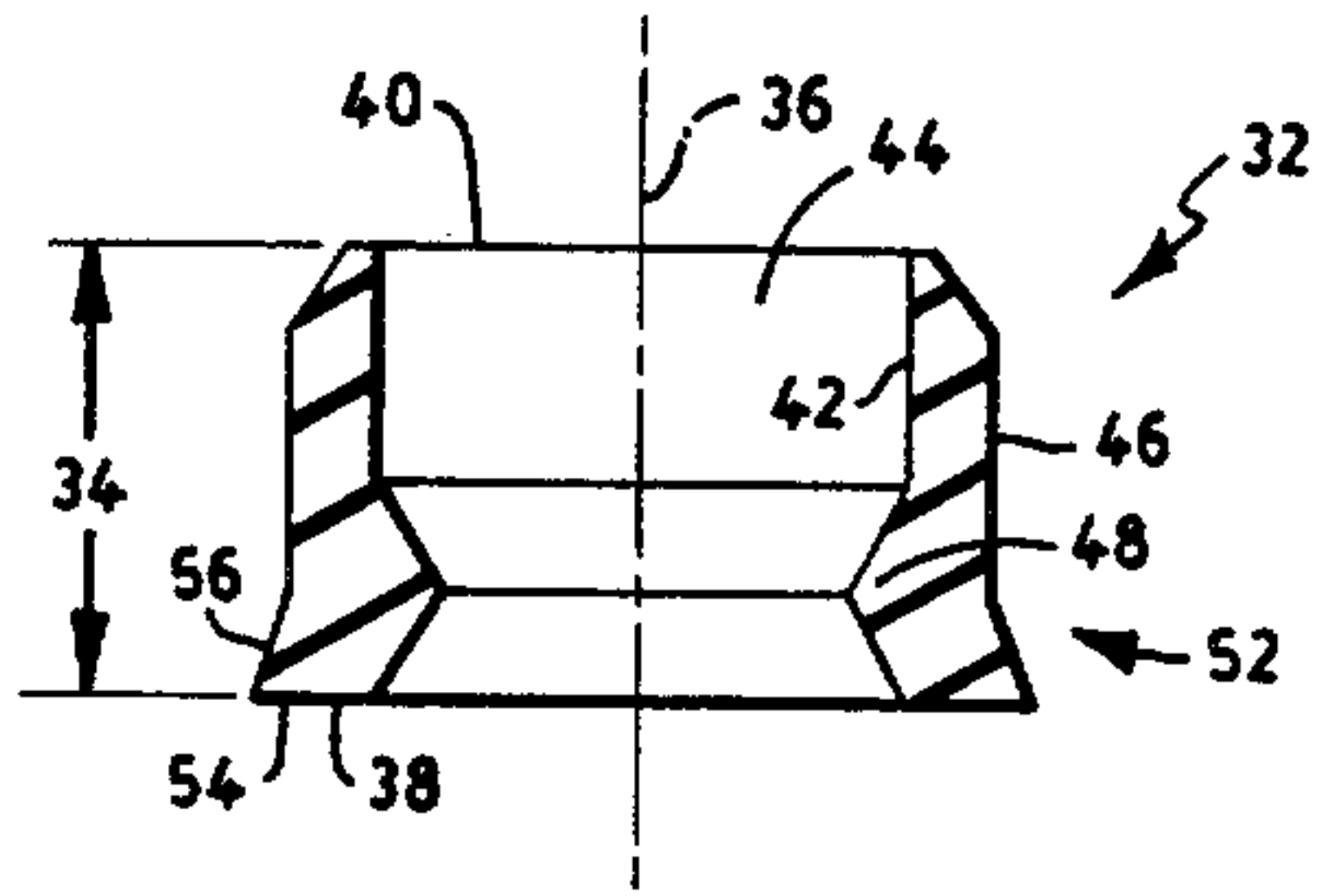


FIG. 4

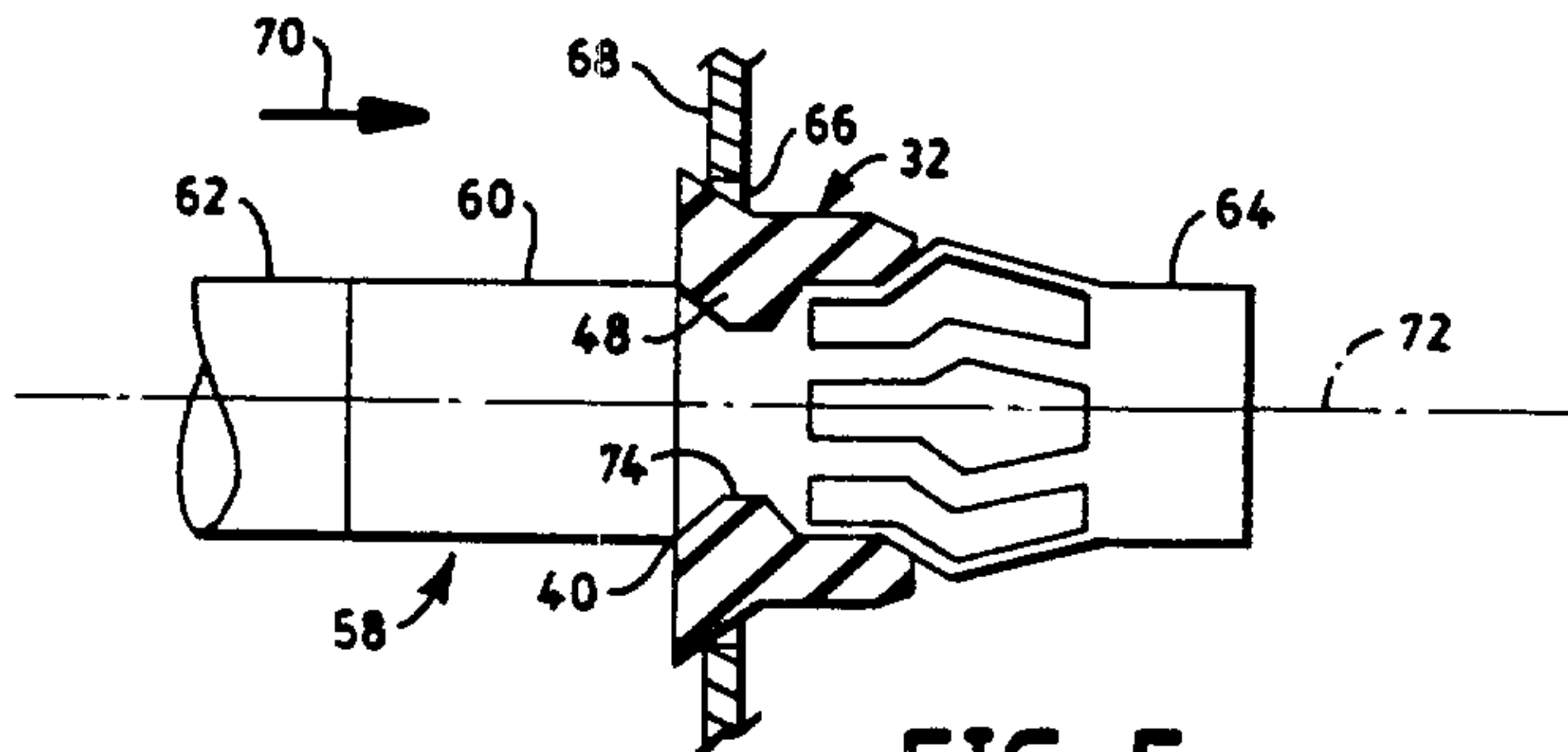


FIG. 5

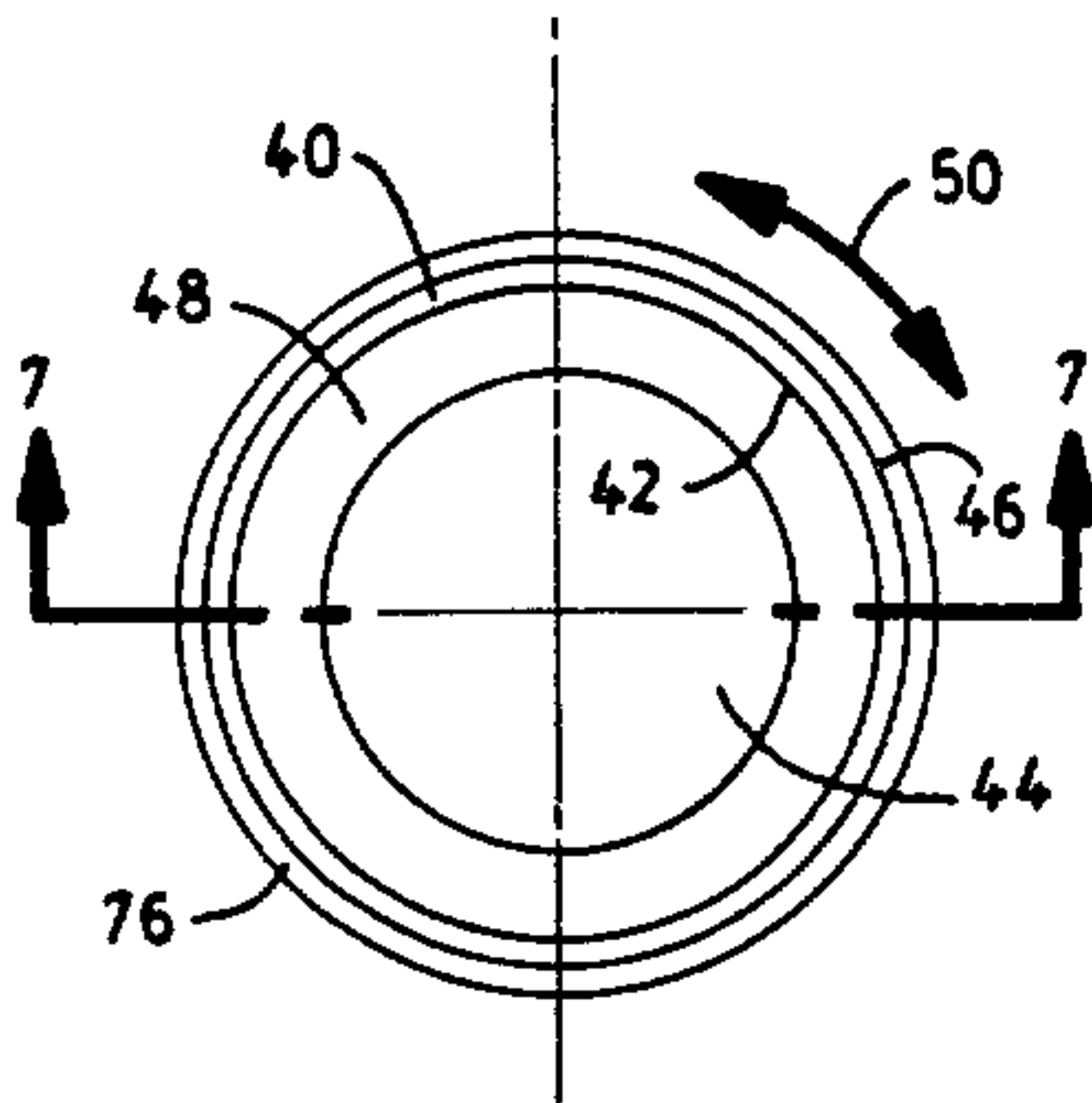


FIG. 6

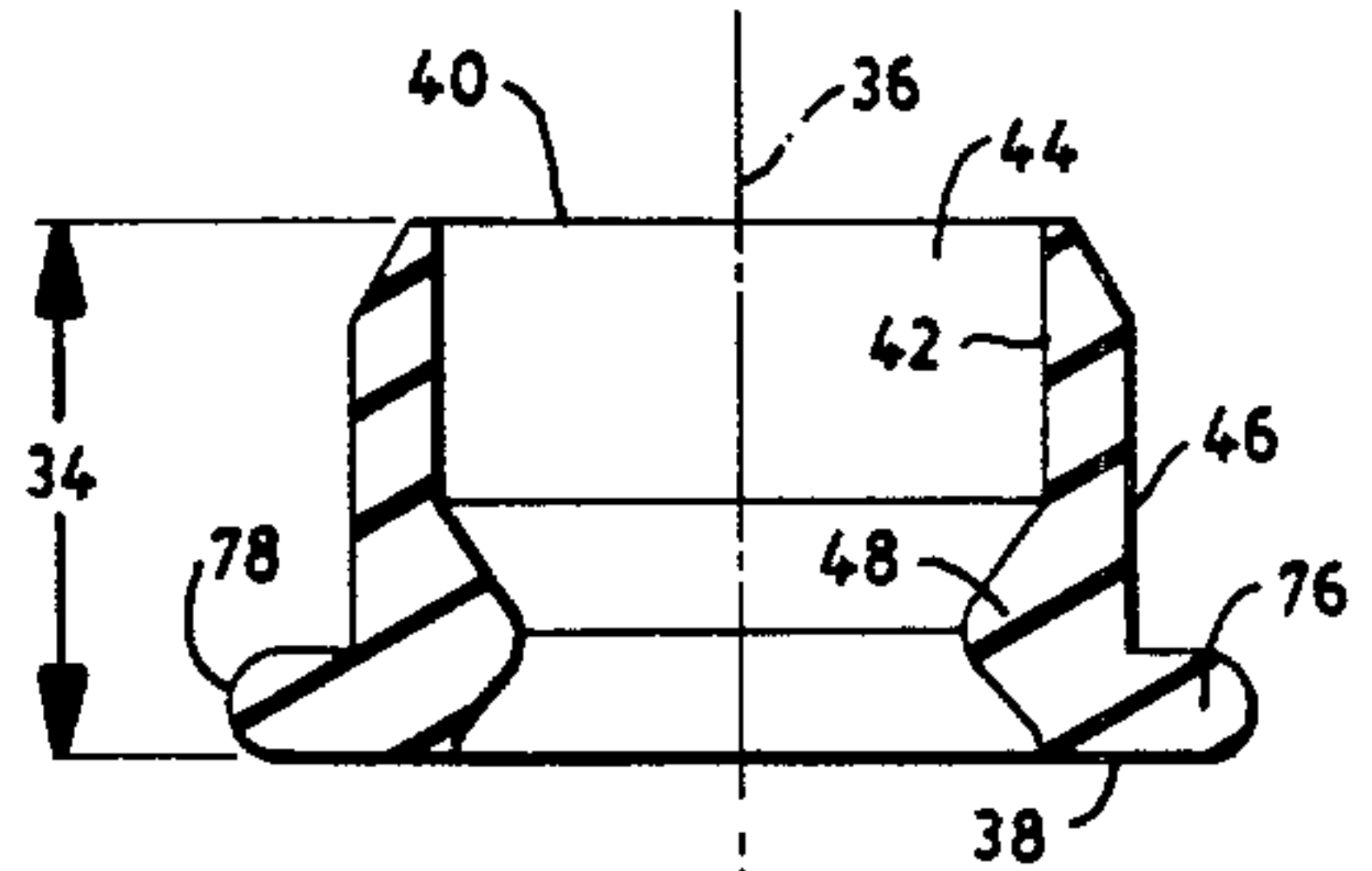


FIG. 7

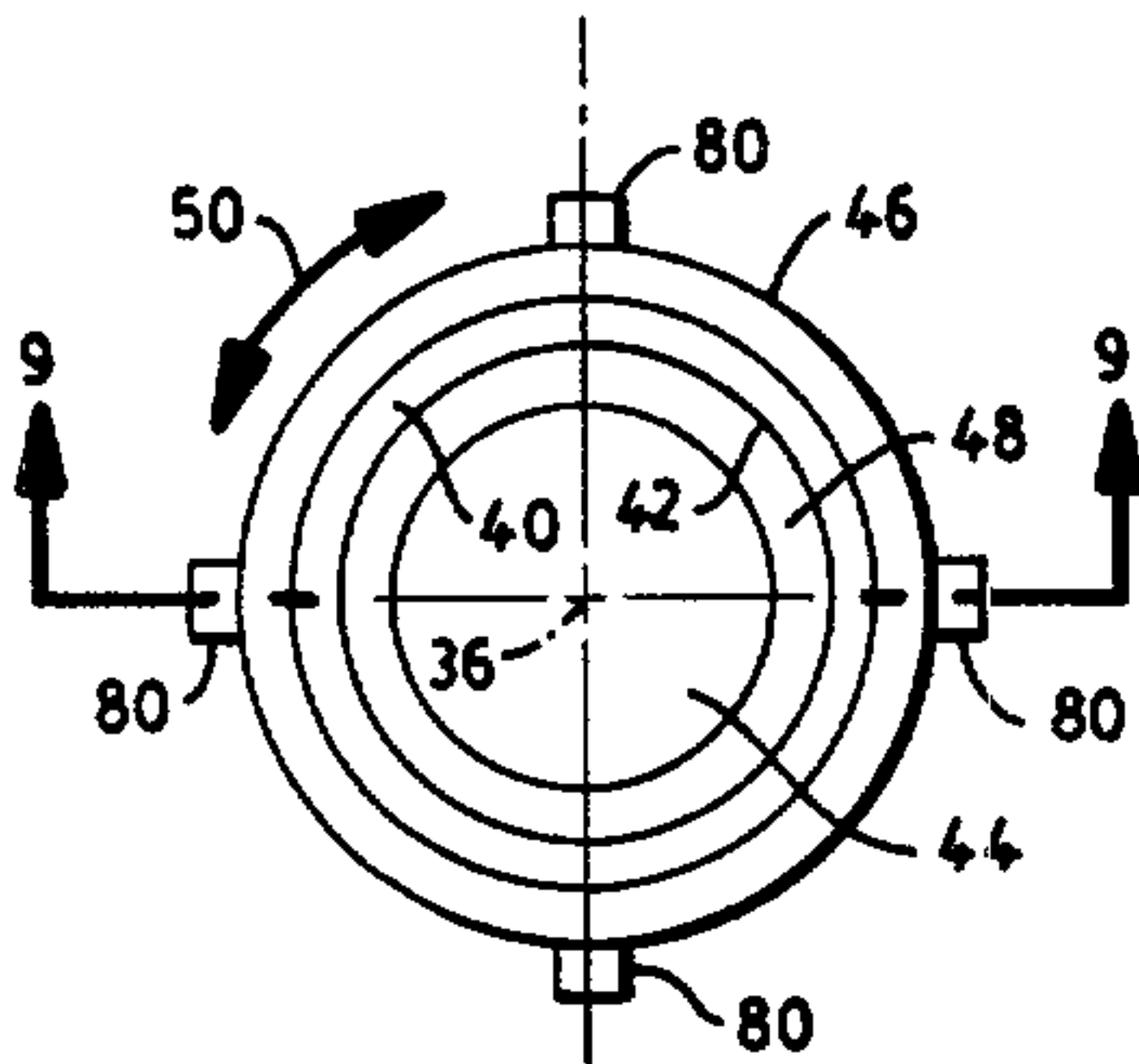


FIG. 8

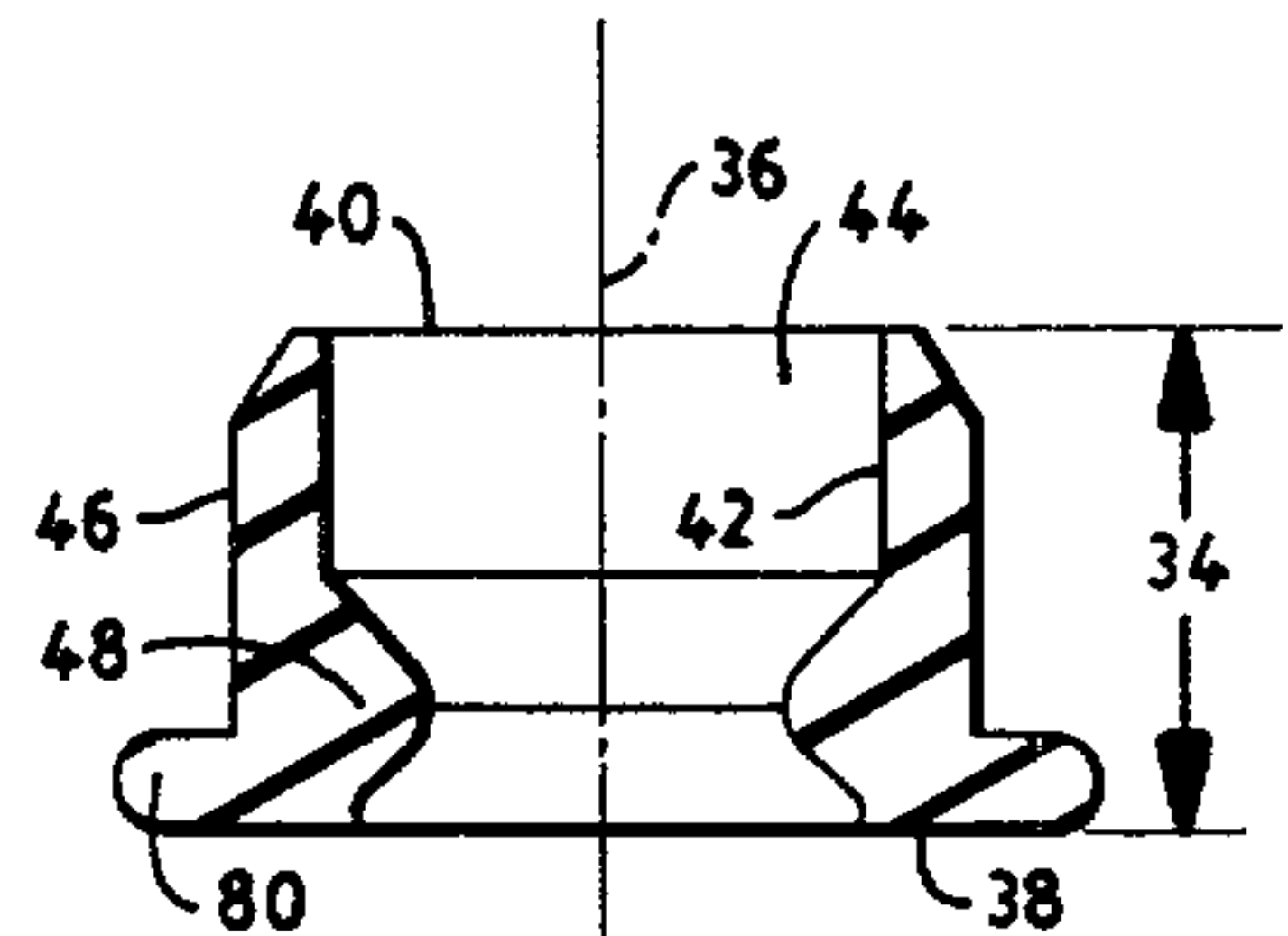


FIG. 9

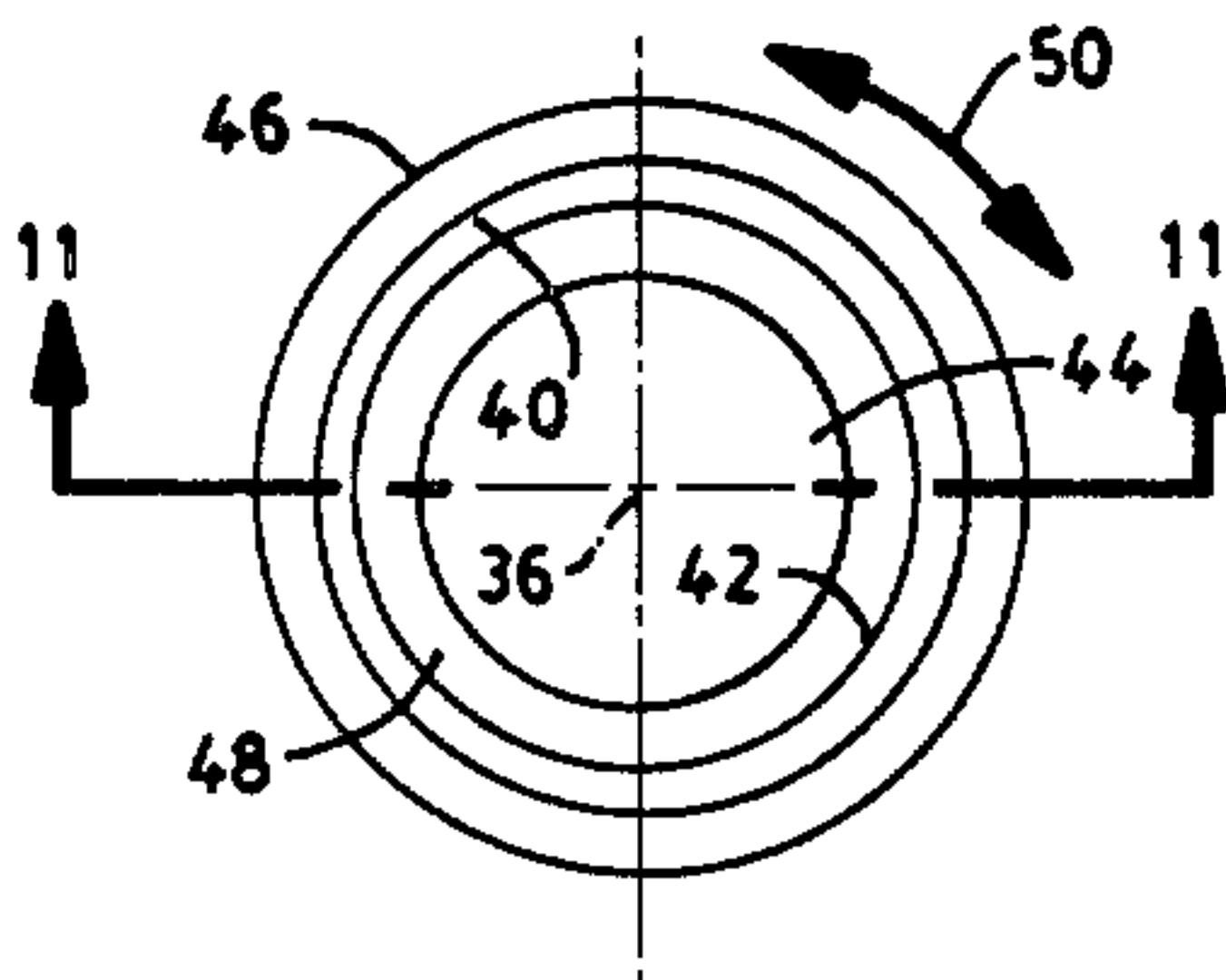


FIG. 10

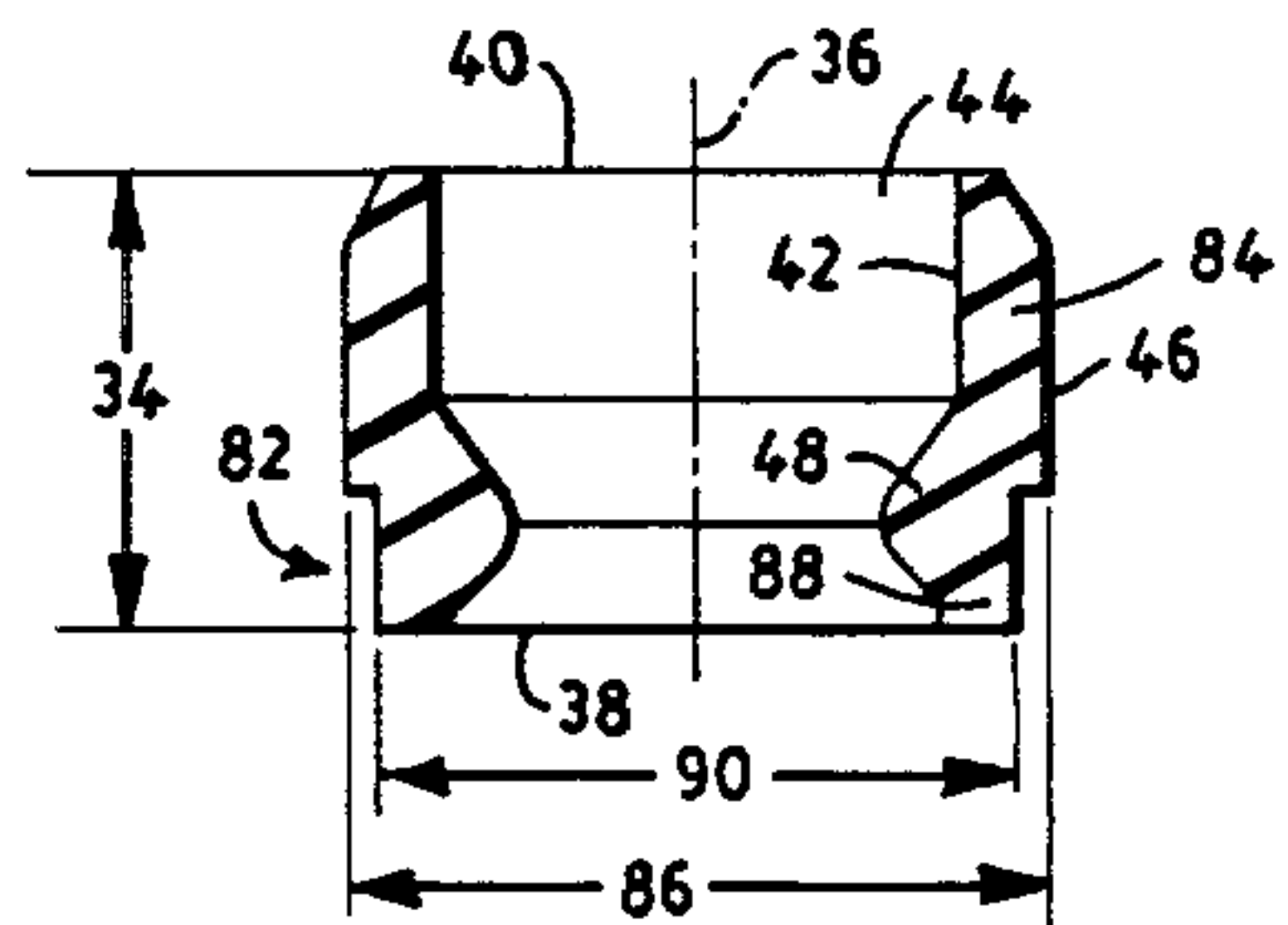


FIG. 11

