Office de la Propriété Intellectuelle du Canada
Un organisme d'Industrie Canada

Canadian Intellectual Property Office
An agency of Industry Canada

CA 2502139 C 2009/05/12

(11)(21) 2 502 139

(12) BREVET CANADIEN
CANADIAN PATENT

(13) C

(22) Date de dépôt/Filing Date: 2005/03/23

(41) Mise à la disp. pub./Open to Public Insp.: 2005/09/26

(45) Date de délivrance/Issue Date: 2009/05/12

(30) Priorité/Priority: 2004/03/26 (DE10 2004 015 467.8)

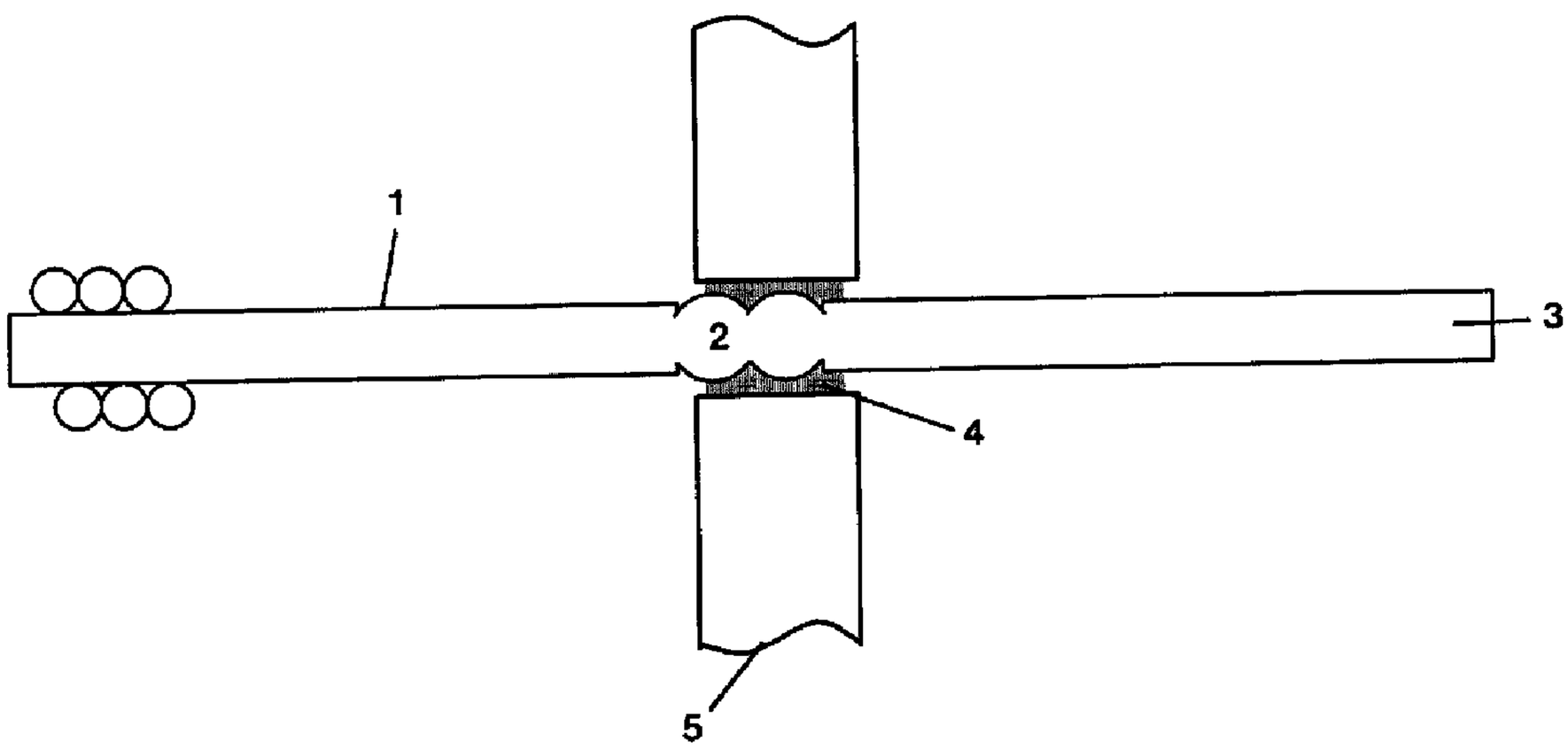
(51) Cl.Int./Int.Cl. *H01J 61/36* (2006.01),
H01J 61/04 (2006.01)

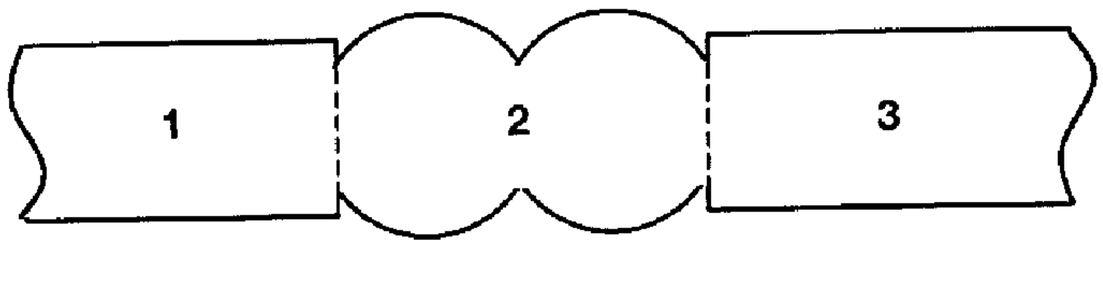
(72) Inventeurs/Inventors:
WEILAND, REINHOLD, DE;
MANHARDT, HARALD, DE;
LUPTON, DAVID, DE

(73) Propriétaire/Owner:
W.C. HERAEUS GMBH, DE

(74) Agent: MACRAE & CO.

(54) Titre : SYSTEME D'ELECTRODES A TRAVERSEE DE COURANT PAR UN ELEMENT DE CERAMIQUE
(54) Title: ELECTRODE SYSTEM WITH A CURRENT FEEDTHROUGH THROUGH A CERAMIC COMPONENT





(57) Abrégé/Abstract:
An electrode system with a current feedthrough through a ceramic discharge vessel is provided which, on one hand, increases the visible output of lamps and, on the other hand, allows smaller dimensions. For this purpose, the current feedthrough comprises

CA 2502139 C 2009/05/12

(11)(21) 2 502 139

(13) C

(57) Abrégé(suite)/Abstract(continued):
rhenium or a platinum-group metal. In this way, improved color reproduction is also achievable. In preferred embodiments: - the current feedthrough comprises rhenium or a rhenium alloy or a platinum-group metal or a platinum-group metal alloy, the current feedthrough is brazed flush in the discharge vessel, - the discharge vessel has no shaft, - the current feedthrough comprises one or more joined spheres.

Abstract

An electrode system with a current feedthrough through a ceramic discharge vessel is provided which, on one hand, increases the visible output of lamps and, on the other hand, allows smaller dimensions. For this purpose, the current feedthrough comprises rhenium or a platinum-group metal. In this way, improved color reproduction is also achievable.

In preferred embodiments:

- the current feedthrough comprises rhenium or a rhenium alloy or a platinum-group metal or a platinum-group metal alloy, the current feedthrough is brazed flush in the discharge vessel,
- the discharge vessel has no shaft,
- the current feedthrough comprises one or more joined spheres.

Unser Zeichen: P10394 CA
14. März 2005

Electrode system with a current feedthrough through a ceramic component

The present invention relates to an electrode system for a discharge lamp with a ceramic discharge vessel comprising an electrode, a current supply line, and a current feedthrough, which is guided through the ceramic discharge vessel and which comprises a platinum-group metal or rhenium. The present invention also relates to a method for fabricating an electrode system, in which a platinum group metal-based or rhenium-based current feedthrough is brazed flush in the ceramic component with a metallic braze. In addition, the invention relates to a preferred ceramic discharge vessel for the electrode system, as well as to the use of the electrode system or the preferred discharge vessel in metal halide lamps.

An electrode system for a metal halide lamp is known from DE 102 26 762 A1, comprising a ceramic discharge vessel, an electrically conductive feedthrough, and an electrode. The construction is designed for high operating temperatures. However, the light output of a lamp is limited by its dimensions.

The object of the present invention, on one hand, is to increase the light output of lamps and, on the other hand, to allow smaller dimensions.

The object is achieved in that the current feedthrough through the ceramic discharge vessel comprises rhenium or platinum-group metal metals, in particular it is composed of rhenium or a platinum-group metal or a rhenium or platinum-group metal alloy.

In this way, the invention can be used for metal halide lamps with increased light efficiency. Smaller lamps with improved light efficiency can be fabricated with the electrode system. The electrode system according to the invention withstands temperatures up to 2000°C in the area of the current feedthrough. Consequently, improved color reproduction can also be achieved.

Furthermore, according to the invention the discharge vessel can be equipped without a shaft for the current feedthrough. This enables in turn further reduction of the lamp dimensions.

In a synergistic way, the inventive technology enables the production of lamps with increased radiation output, improved color reproduction, and considerable reduction of the dimensions.

In a preferred embodiment, the current feedthrough is brazed into the ceramic discharge vessel with a platinum-group metal braze.

Further preferred embodiments are:
the embodiment of the electrode as tungsten,
the current supply line as a non-noble metal pin,
rhenium or a platinum-group metal as a significant portion, as the main component, or as the predominant portion of the current feedthrough,
the current feedthrough comprising rhenium or a rhenium alloy or a platinum-group metal or a platinum-group metal alloy, especially iridium or an iridium alloy,
a ceramic discharge vessel comprising aluminum oxide, and
a flush brazing of the current feedthrough in the discharge vessel.

The design of the current feedthrough in the form of one or more joined spheres enables an economical production of the electrode system, especially if the current feedthrough comprises a platinum-group metal or rhenium or their alloys. Furthermore, the embodiment of the current feedthrough in spherical form has proven to be advantageous for the production of large quantities.

In a preferred embodiment, the current feedthrough comprises two joined spheres made of a platinum-group metal or rhenium, or their alloys, wherein the intermediate space between the spheres and the discharge vessel is filled with a platinum group metal-based braze.

The combination of the current feedthrough resistant up to 2000°C according to the invention and the direct brazing of the current feedthrough with the ceramic burner enables a compact, new design of the ceramic burner with optimized light efficiency and reduced metal halide content.

This current feedthrough no longer requires any projecting lengthening beyond the width of the vessel wall. According to the invention, the elimination of this shaft enables a direct reduction of the lamp dimensions for comparable output of lamps with comparable temperature. Therefore,

for the production of small lamps, not only the output increase plays a role on the temperature increase. In a preferred embodiment, the discharge vessel is shortened by eliminating the shafts, which are typically arranged for receiving the current feedthrough.

A current supply line pin can optionally be arranged between the current supply line and the current feedthrough and can electrically connect these parts to each other.

The ceramic discharge vessel can be designated as a burner and can comprise Al_2O_3, sapphire, yttrium aluminum garnet, aluminum nitride, aluminum oxynitride, silicon aluminum oxynitride, and especially can comprise Al_2O_3.

The current feedthrough penetrates the ceramic discharge vessel in a gas-tight manner and connects the electrode to the current supply line or to the current supply line pin. According to the invention, the current feedthrough contains rhenium or a platinum-group metal. Preferably, alloys of these metals are used, and current feedthroughs are especially made of Ir or an Ir alloy.

Preferably, the braze is brazed flush with the current feedthrough and the discharge vessel. A braze made of a platinum-group metal or its alloy is very suitable for this purpose.

In the following, particular embodiments of the invention are explained with reference to the drawings.

Fig. 1 shows a cross section of an electrode system according to the invention for use in metal halide lamps with a ceramic (Al_2O_3) discharge vessel.

Fig. 2 shows a cross section of the ceramic discharge vessel with an integrated electrode system.

Fig. 3 shows a comparison cross section of a discharge vessel.

Embodiments:

This electrode system comprises an electrode 1 like those typically used in discharge lamps, a current supply line 3, which can be formed as a non-noble metal pin, and a current feedthrough

2. The current feedthrough 2 comprises rhenium or a platinum-group metal as essential components and comprises two joined spheres.

The joined spheres 2 together with a braze 4 fill the opening for the current feedthrough in the discharge vessel 5. Here, the current feedthrough 2 projects minimally into the discharge vessel 5, so that the electrode material of the electrode 1 does not come into contact with the discharge vessel 5. The interior of the discharge vessel 5 is closed tight with the braze.

The number of spheres is arbitrary. In the embodiment with one sphere, the braze 4 can be applied equally well on the electrode side or on the current supply line side or on both sides.

The current supply line 3 serves for the electrical connection between the lamp socket and the current feedthrough 2 through the ceramic discharge vessel 5. Preferably, a current supply line pin is provided for contact between the current supply line 3 and the current feedthrough 2. For metal halide lamps with conventional current feedthrough 2, this pin as a rule comprises an Nb alloy. For metal halide lamps with the current feedthrough 2 according to this invention, in addition to Nb alloys, other materials based on non-noble metals including the refractory metals are also possible.

The discharge vessel 5 has no ceramic shaft in the region of the current feedthrough. However, slight reinforcements in this region can be an advantage (Fig. 2).

By the use of a platinum group metal-based braze, as well as a platinum group metal-based or Re-based current feedthrough, higher temperatures up to ca. 1900°C can arise in the region of the current feedthrough during the operation of the lamp, without leading to damage or negative effects on the functionality of the lamp. In turn, this enables the construction of lamps with a considerably more compact design (Fig. 2) than for conventional metal halide lamps (Fig. 3).

From Fig. 3, it can be seen that the conventional lamp design requires on both ends of the ceramic discharge vessel a shaft made of Al_2O_3, in which the electrode systems are brazed, as a rule, with the aid of a vitreous braze or frit. These "projections" are necessary for the conventional current feedthroughs.

By using the electrode system according to the invention with a platinum group metal-based or Re-based current feedthrough, these ceramic "projections" can be eliminated or considerably

shortened (see Fig. 2). In addition, the new electrode system forming the basis of this invention allows the lamps to operate at higher temperatures, which leads to better color reproduction and to higher light efficiency.

WHAT IS CLAIMED IS:

1. An electrode system for a discharge lamp with ceramic discharge vessel (5) comprising an electrode, a current feedthrough (2) brazed with a braze (4) into the discharge vessel through the discharge vessel (5), and a current supply line (3) or a current supply line pin (3), characterized in that the current feedthrough (2) comprises platinum group metals and is brazed direct to the ceramic of the discharge vessel by the braze (4).

2. A method for producing an electrode system for a discharge lamp with ceramic discharge vessel (5) comprising an electrode (1), a current feedthrough (2) through the ceramic discharge vessel (5), and a current supply line (3) or a current supply line pin (3), characterized in that a platinum group metal-based solder is soldered flush with the platinum group metal-based or rhenium-based current feedthrough and the ceramic discharge vessel.

3. A ceramic discharge vessel (5), which has no significant wall widening at a current feedthrough (2) through a discharge vessel wall, characterized in that the current feedthrough (2) is brazed with a braze (4) into the discharge vessel wall and comprises a platinum group metal-based or rhenium-based material.

4. Use of a ceramic discharge vessel (5) in metal halide lamps, which has no shaft arranged in the housing wall in the area of the current feedthrough (2), characterized in that the vessel (5) has a platinum group metal-based or rhenium-based current feedthrough (2).

5. Use of an electrode system with a current feedthrough (2) through a discharge vessel wall, comprising a platinum-group metal in metal halide lamps, characterized in that the current feedthrough (2) is brazed with a platinum group metal based braze (4) into the discharge vessel wall.

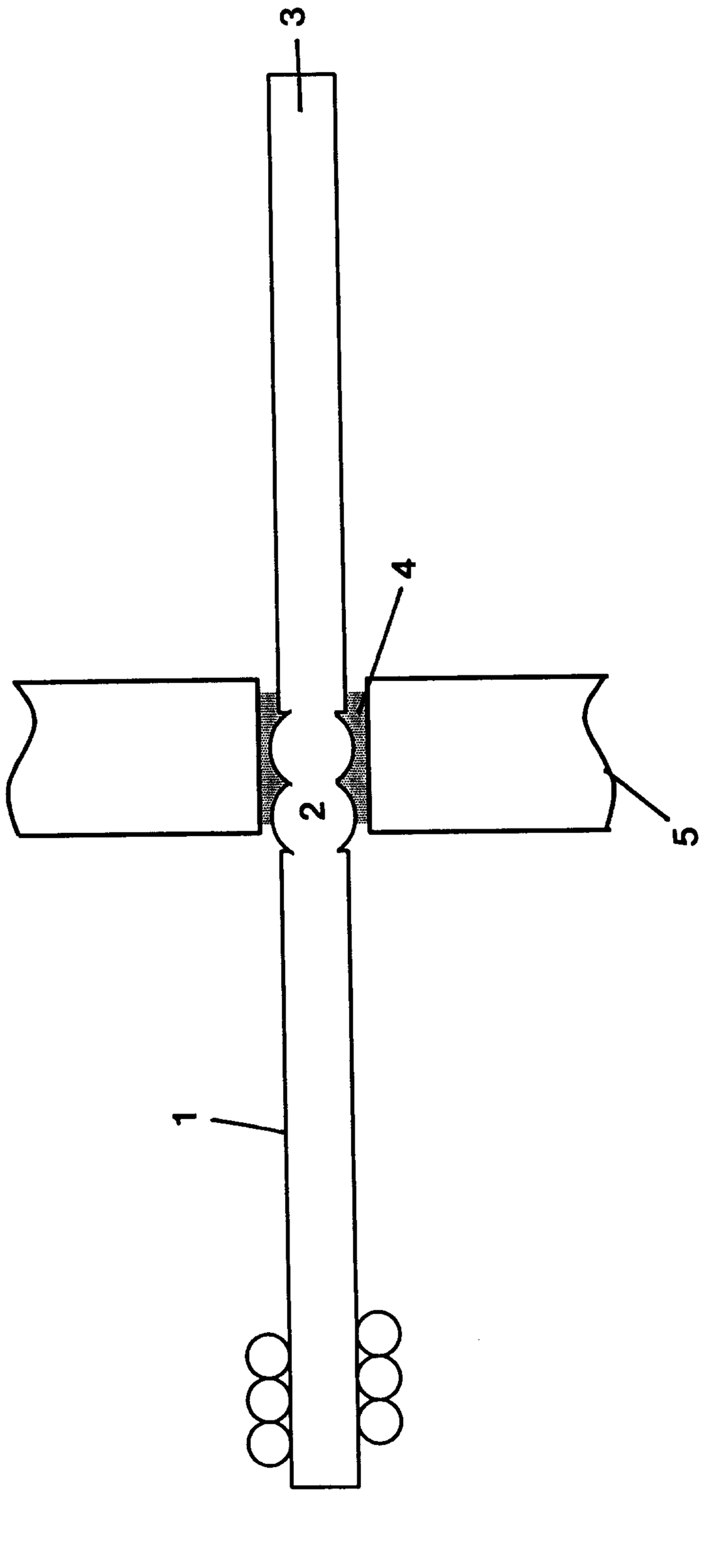
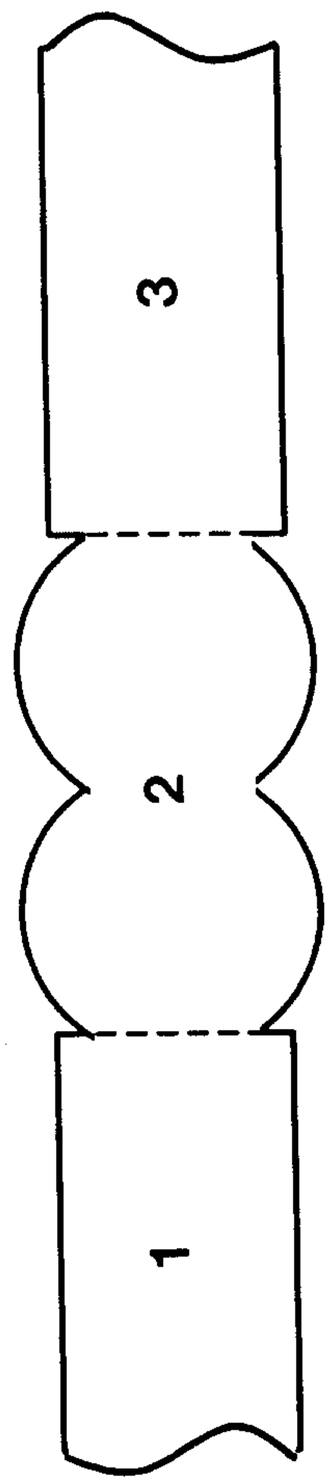


FIG. 1



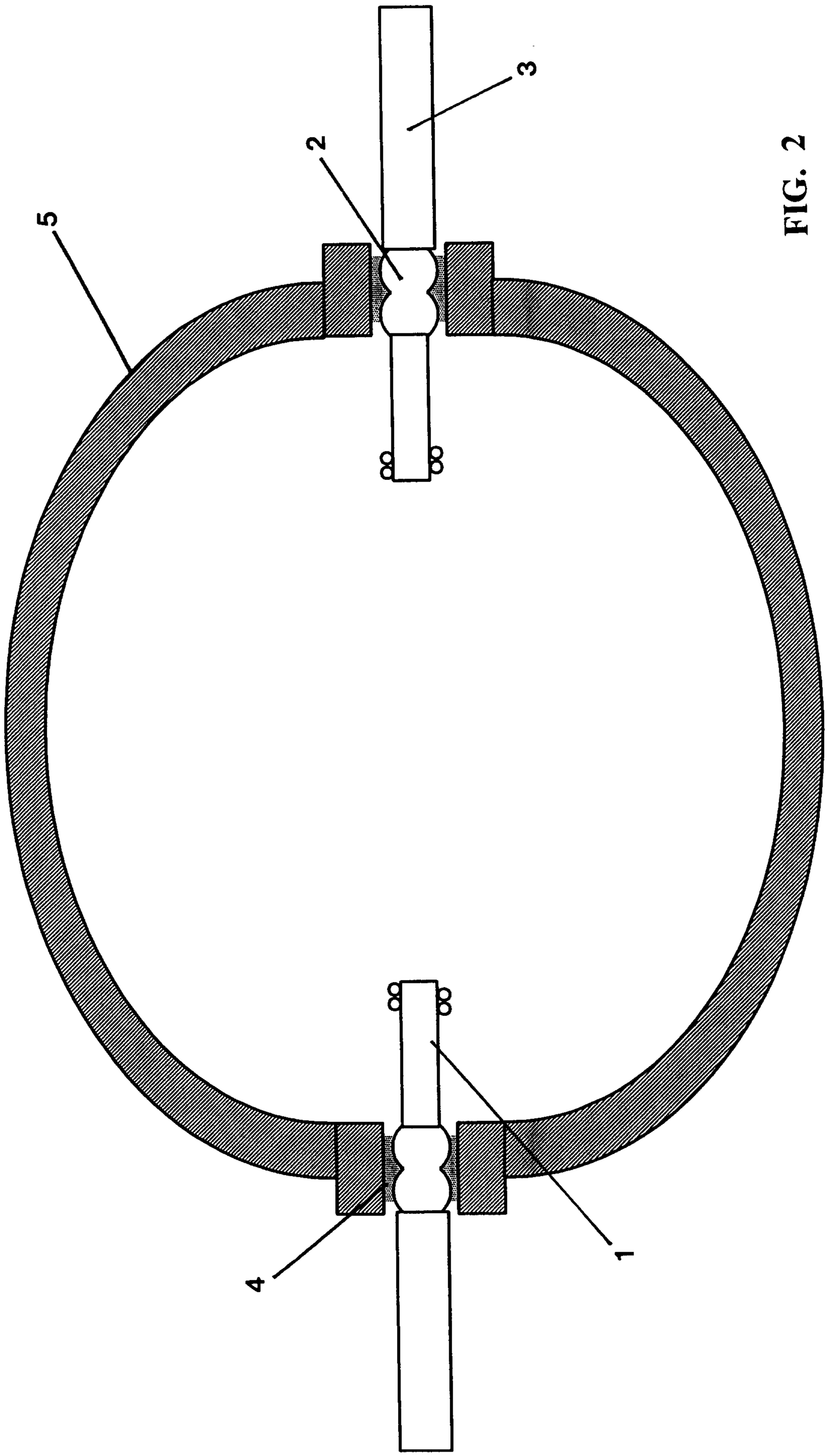


FIG. 2

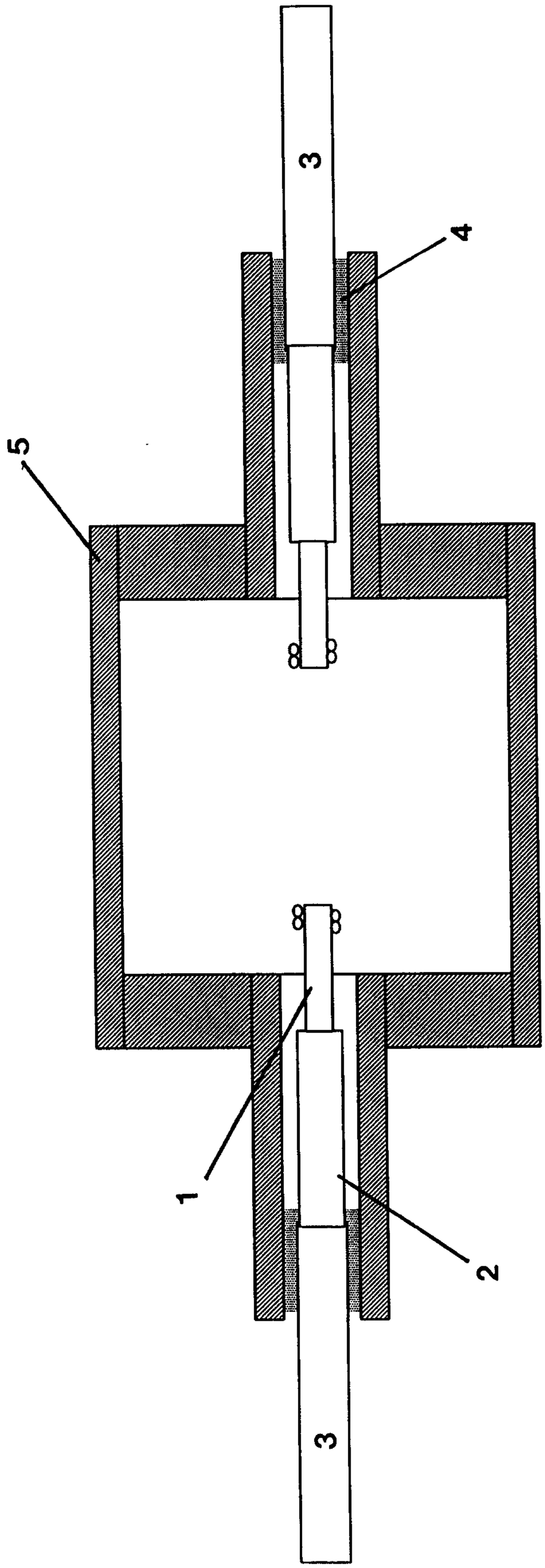
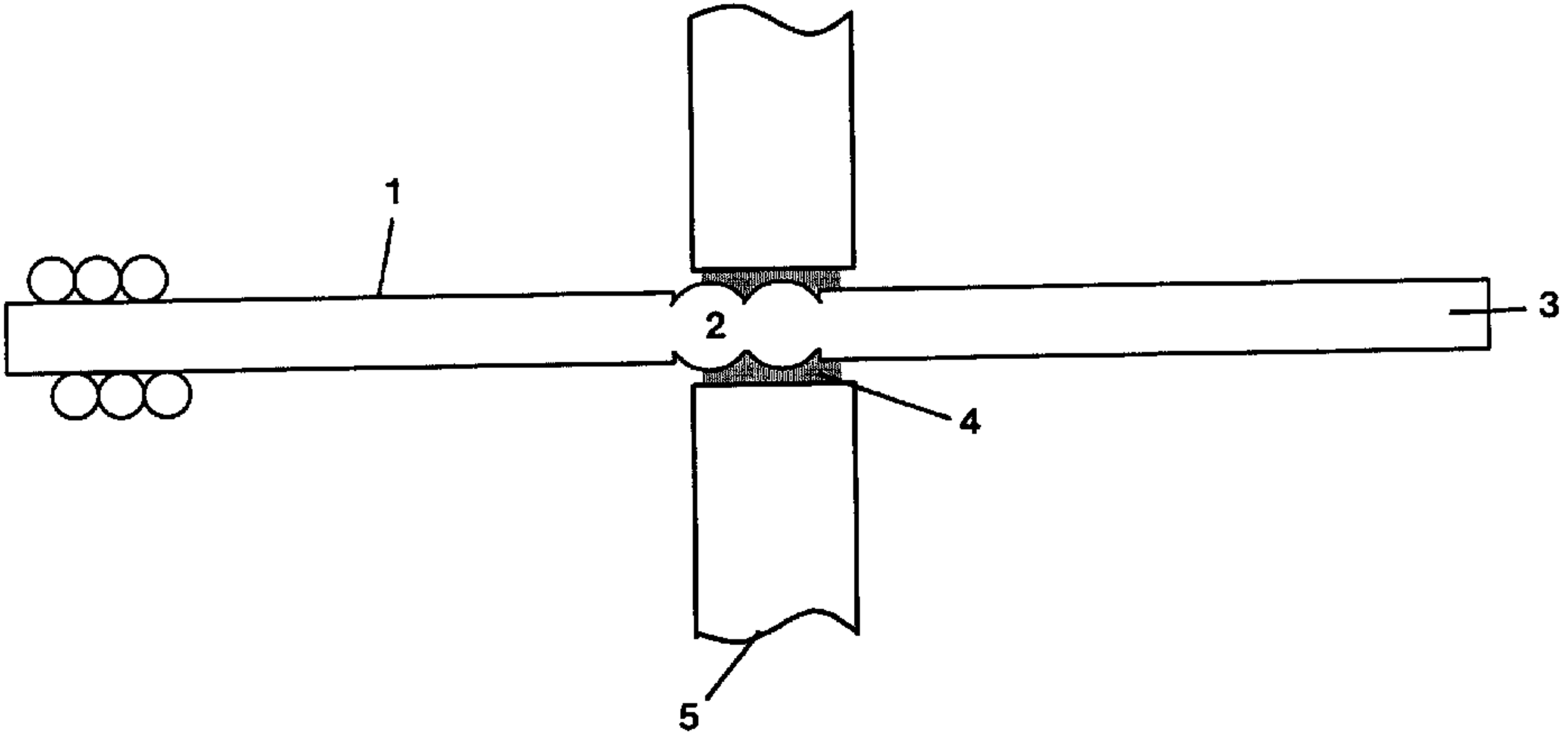
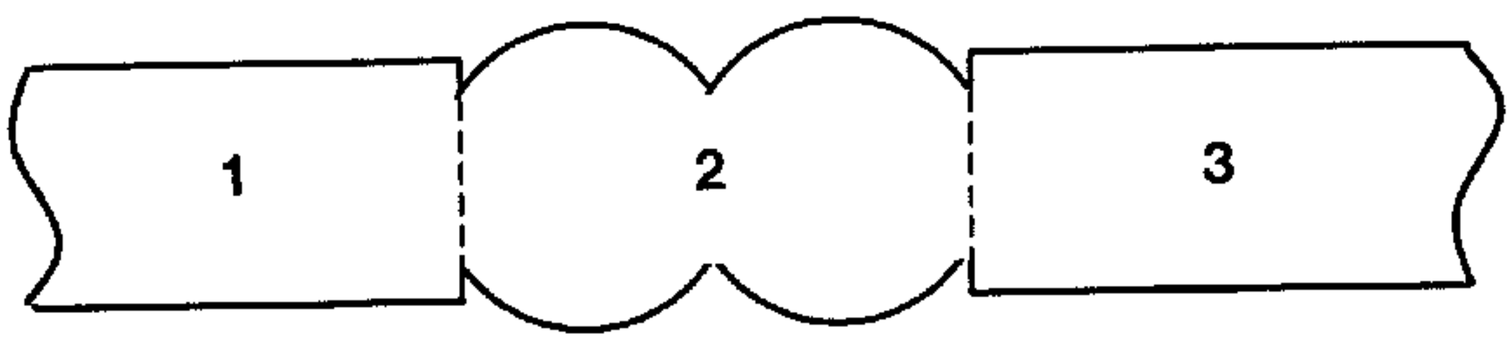


FIG. 3


1
2
3
4
5


1
2
3