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CA 2023588 C 2002/07/23

(11)(21) **2 023 588**

(12) **BREVET CANADIEN
CANADIAN PATENT**

(13) **C**

(22) Date de dépôt/Filing Date: 1990/08/20

(41) Mise à la disp. pub./Open to Public Insp.: 1992/02/21

(45) Date de délivrance/Issue Date: 2002/07/23

(51) Cl.Int.⁵/Int.Cl.⁵ B65D 17/32, B65D 17/34

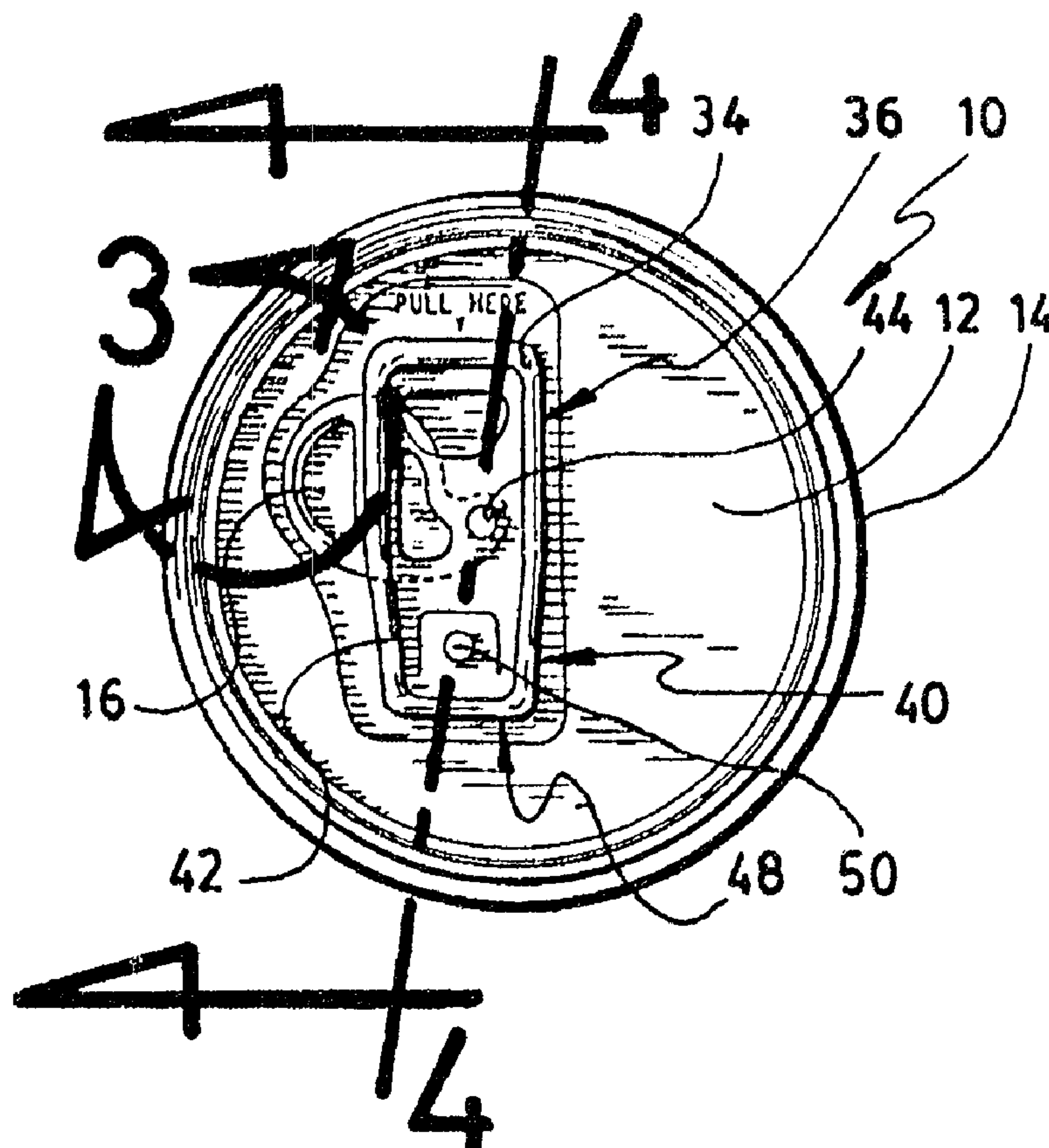
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(54) Titre : COUVERCLE POUR BOITE METALLIQUE

(54) Title: CAN TOP



(57) Abrégé/Abstract:

The present invention provides an improved easy open end wall for a beverage container wherein the removable non-detachable panel covering the dispensing aperture is removed outwardly to prevent contamination of the contents while the force required to start the tear initiation is minimized.



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ABSTRACT

The present invention provides an improved easy open end wall for a beverage container wherein the removable non-detachable panel covering the dispensing aperture is removed outwardly to prevent contamination of the contents while the force required to start the tear initiation is minimized.

The present invention relates to an improved easy open end wall for a beverage container.

Beverage containers are well known in the art and are widely used throughout the world. The present invention deals with the type of beverage can which is widely used for beer and soft drinks and is normally fabricated of a metallic material such as aluminum or steel or alloys thereof.

10 To provide access to the contents of the container many different closure systems have been proposed in the art. For a long period of time, a tear strip was used whereby the tear strip was removable from the end wall of the can with or without an attached tab. These type of tear strips became obsolete since they were frequently discarded by the public tending to create litter problems as well as posing hazardous scenarios at beaches and parks.

20 Following the banning of tear strips by many jurisdictions, the industry went to alternatives such as arrangements wherein the tear strips and tabs are secured in a non detachable manner to the container. One structure which has received wide usage is the provision of a panel which is non detachably secured to the end wall. With this structure, the panel is subject to an inward force by means of a tab member functioning as lever whereby the panel is pushed inwardly, but remains attached at one or more points to the end wall. As mentioned, several of these designs have received wide commercial usage; they suffer from the disadvantage that since the tab is pushed inwardly, the exterior surface of the panel contacts the contents of the container and any foreign contaminants thereon may be allowed

to enter the container.

It is also known in the art to provide an end wall closure system wherein there is provided a panel which utilizes a tab member to initiate opening of the panel in a manner similar to the aforementioned systems, but wherein the panel is removed exteriorly of the end wall such that the contents of the container cannot be contaminated. Such a system is illustrated in U. S. Patent 4,207,991 to Amabili. The present invention is directed to such a system wherein the tear initiation requires less force and wherein accidental detachment of the panel is prevented.

In one aspect of the present invention, there is provided an improvement in a closure system which includes an end wall, a line of weakening within the wall defining a removable panel, a tab member overlying portion of the end wall and removable panel and with the tab member being secured to the end wall near one extremity of the tab. At the other end of the tab there is provided a finger engaging portion, while intermediate the point of securement and the finger engaging portion the tab member is secured to the removable panel such that lifting movement of the finger engaging portion will cause the tab member to start tear initiation along the line of weakening to permit removal of the panel. The improvement particularly comprises a removable panel which has a first major portion thereof adapted for dispensing of the container contents and a second minor portion forming the area where the tab is secured to the removable panel. The minor portion has its outer margin substantially defined by a relatively small radius curve.

This small radius curve joins a curve defining the major portion of the panel. The curve defining the minor portion and the curve defining the major portion are joined by a curved section which reverses itself. This configuration permits easier opening of the end by concentration of the forces exerted.

In another aspect of the invention, there is provided an improved tab member which limits upward movement of the tab to prevent accidental removal of the tab and attached panel.

10 In greater detail, the closure or container end of the present invention may be employed with any suitable container such as is generally found in the soft drink and/or beer industry. In particular, the closure is suitable for use with metallic cans of a steel or aluminum material.

20 The end wall of the closure is sealed on one end of the container in a conventional manner. In this respect, the securement of end walls to the containers is well known in the art and does not form a portion of the present invention. The end wall may be formed of suitable metallic materials and generally would be selected from known suitable alloys of steel and/or aluminum material; the use of such materials is well within the skill of those knowledgeable in the art. Generally, it is preferred that the closure or end be of the same material as the body of the container to permit ready recycling of the complete unit although it is also known in the art to employ separate materials with suitable provisions being made during the recycling process. A dispensing aperture is formed in the end wall; this aperture formed by removal of a panel formed therein. Conventionally, the panel

is defined by a line of weakening such as a score line. In other words, the panel is formed integrally with the end wall and it is removable by forces applied to the score line to permit removal of the panel.

The use of such weakening lines or score lines is again well known and will not be elaborated on herein.

10 The tab member overlies at least a portion of the removable panel and the end wall. The tab member is secured to both the removable panel and the end wall. The tab member has at one end thereof a finger engaging portion which will exert force on the panel in a manner described hereinbelow.

Securement of the tab to the panel and the end wall may be accomplished by many means such as adhesives and/or mechanical means. In the preferred embodiment, embossed rivets integral with the end wall and or panel are utilized. Such embossed rivets are shown, for example, in Canadian Patent 1,005,004 to Cudzik issued February 8, 1987.

20 The tab member may be formed in several different manners and is preferably of a material compatible with the material forming the container body and the balance of the container system - i.e. the end wall. The tab may be of several different configurations although, as is conventional, a somewhat elongated shape is preferable. The tab member may include reinforcing ribs and the like, the use of which technology is well known in the art.

30 The tab member is adapted to be lifted at the finger engageable end thereof such that a force is exerted on the rivet attaching the tab to the removable panel to cause a tear initiation along the line of weakening defining the

removable panel. A continued lifting action on the finger engageable portion will cause the panel to shear completely along the line of weakening while remaining attached to the end by means of the rivet securing the tab to the end.

10 The configuration of the removable panel is of importance to permit the easy removal thereof. In this respect, the panel of the present invention can be considered to have a "major" portion and a "minor" portion. The major portion, as the name implies, forms a portion through which the contents of the container are dispensed while the minor portion is where the panel is attached to the tab. The minor portion is sized to be not substantially larger than required for attachment of the tab.

As will be described in greater detail in the preferred embodiment, the minor portion is defined by an arcuate line of weakening, which arcuate line of weakening changes direction so as to concentrate the forces exerted on the panel through a lifting action of the tab on a relatively short segment of the line of weakening.

20 The tab member of the present invention is also designed to substantially reduce the possibility of accidental removal of the tab and attached panel from the end. This is done by provision of a nose member at the opposite extremity of the tab from the finger engageable portion which will engage the end wall to limit movement of the tab and thereby preventing excess forces from being applied thereto.

Having thus generally described the invention, reference will be made to the accompanying drawings illustrating an embodiment thereof, in which:

Figure 1 is a top plan view of a container end according to the present invention;

Figure 2 is a plan view similar to Figure 1 following opening of the end;

Figure 3 is a detailed plan view of that portion of the end indicated by arrow 3 in Figure 1;

Figure 4 is a cross sectional view taken along the lines 4-4 of Figure 1;

Figure 5 is a cross-sectional view taken along the lines 5-5 of Figure 3;

Figure 6 is a sectional view of that portion of Figure 4 illustrated by arrow 6;

Figure 7 is a sectional view similar to Figure 6 showing opening of the container end;

Figure 8 is an end view taken along the lines 8-8 of Figure 7; and

Figure 9 is an enlarged plan view of the removable panel.

Referring to the drawings in greater detail and by reference characters thereto, there is provided a container end 10 which comprises a wall portion 12 and a rim portion 14. End 10 is designed to seat in a conventional fashion on a container such as is partially shown in Figure 5 wherein rim 14 and a side wall 15 of a container are rolled together for sealing. It will be understood that any other suitable sealing means may be employed.

As is known in the art, end 10 has a removable panel 16 to thereby give a dispensing aperture through which access to the contents of the container may be gained.

The removal of panel 16 leaves a dispensing aperture 17 which consists of a major portion generally designated by reference numeral 18 and a smaller minor portion generally designated by reference numeral 20. The entire removable panel 16 is defined by score line 22. The formation of such score lines or lines of weakening is conventional in the art and need not be discussed herein.

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Lying adjacent to an exterior surface of wall 12 is a tab member 32. Tab member 32 has an outer rim portion 34 which is formed by folding over the edges of the tab. Tab member 32 has a generally elongated outline and includes a finger engaging portion which is generally designated by reference numeral 36 and which finger engaging portion includes an aperture 38 formed therein. Aperture 38 permits the user to more easily grasp this end of tab member 32.

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At an opposed end of tab member 32 there is provided a nose portion 48 while intermediate finger engaging portion 36 and nose portion 48 is a central tab portion 40. Central tab portion 40 has a three sided cut line to permit lifting of the tab as will be described hereinbelow. This portion of the tab is secured to panel 16 by means of rivet 44. Rivet 44 is preferably provided by means of embossing in a manner known to those knowledgeable in the art.

Adjacent nose portion 48 is a further rivet 50 which functions to secure the entire tab portion to wall 12. Again, rivet 50 is formed in wall 12 by means of embossing in a conventional manner.

Nose portion 48, as may be seen from Figure 6, has a first planar portion 52 which lies generally in the same

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plane as the remainder of the tab. From planar portion 52, it extends upwardly through portion 54 and subsequently downwardly (portion 56) to terminate again in a planar portion 58 which generally lies in the same plane as planar portion 52. This enlarged nose portion 48 functions to limit the upward movement of the tab by entering into engagement with wall 12. This limitation of the upward movement is designed to prevent removal of the tab and attached panel even after repeated motions.

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The limitation of the upward movement may also be accomplished by providing a raised land portion on wall 12 which nose portion 48 will engage. In this respect, a raised land portion may be configured, alone or in conjunction with the shape of the nose, to prevent the upward movement of the tab beyond a certain point. Naturally, the limitation of the upward movement is such that the tab will form an angle less than 90 degrees with respect to end 12. Preferably, this angle is limited to less than 75 degrees and even more preferably 60 degrees to prevent the possibility of sufficient stress being applied to the metal to permit cracking of the same.

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Referring to Figures 1, 2, 7 and 8, opening of the container is accomplished by the user lifting finger engaging portion 36. The force is transmitted through rivet 44 to panel 16 which will be more fully described hereinbelow. This force causes a tear initiation to begin proximate rivet 44 and a continued lifting/pulling force exerted on tab member 32 causes the panel 16 to shear completely along score line 22 to completely detach the panel from end wall 12.

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Subsequently, as shown in Figure 2 by arrow 17, the tab with the attached panel may be pivoted about rivet 50 to an out of way position as shown in Figure 2. Thus, tab 32 functions as a second class lever.

As previously mentioned, nose portion 48 is designed to engage with wall 12 to limit the upward movement of tab 32 to the extent that is needed to permit removal of panel 16. Because this movement is limited, even continued flexing of the tab would not cause breakage of the tab to permit discarding of the same. Generally, this tab is designed to limit movement to less than 90 degrees and more preferably to less than 75 degrees.

The configuration of the panel 16 and placement of the rivet with respect thereto are of importance and will now be described in greater detail. In this respect, reference may be had to Figure 9 which is an enlarged view of panel 16 which is defined by score line 22.

As previously described, panel 16 has a major portion 18 and a minor portion 20. For purposes of discussion, reference line 60 has been drawn between the two portions; this reference line 60 is for purposes of explanation only and does not constitute any physical marking on the removable panel 16. Reference line 60 is only an approximation and is not intended to be a precise position on the panel 16. In Figure 9, points ABCD and E are used to define line segments for purposes of discussion of the operation of the invention.

The major portion 18 of removable panel 16 is generally defined by segment ABCD while minor portion 20 is defined by

line segment DEA.

Line segment ABCD is of a continuous arcuate configuration as is known in the art to provide for easy shearing. Line segment DEA, is also a continuous arcuate configuration.

Rivet 44 is formed to secure removable panel 16 to tab member 32.

As noted, line segment DEA is arcuate with the curve generally continuing in a single direction. Similarly, line direction ABC also has an arcuate configuration with the curve generally continuing in the same direction. Line segment CD, however, has a “reverse” arcuate configuration - i.e. the curves reverse direction between the two portions. Adjacent point D, the curve has a concave configuration or section.

In the opening of the container, it is desirable to concentrate the force which is being transmitted through rivet 44 from tab member 32 to as small an area as possible. The configuration of the panel 16 shown in Figure 9 functions to do this. Thus, the force exerted by rivet 44 is generally concentrated on the line segment DE. The reverse arcuate configuration prevents this force from being dissipated or spread over a larger segment which would be the case if the direction of the curve of score line did not reverse itself. Its concentration of the opening force permit the tear initiation to commence following which it is relatively easy to continue with the shearing and removal of panel 16.

The reverse arcuate configuration is shown as only being on one side of panel 16. It has been found that it is only necessary for the one side as the force is generally

concentrated on one side. However, if so desired, a similar configuration could be utilized on the other side.

As may be seen from Figure 9, major portion 18 has a major axis as shown by dotted line 64. Minor portion 20 as described above, is sized to be not substantially larger than requirements for the formation of the rivet therein. Thus, a somewhat diametrical line extending through rivet 44 and which intersects the major axis 64 of major portion 18 within the boundaries of the removable panel will form an angle of between 15 degrees and 105 degrees.

The side of the line of weakening having the reverse arcuate section is that side to which the force is first applied. In other words, the force is first applied to line segment DE with the lifting force (i.e. the finger engaging portion) being located on that side.

It will be understood that the above described embodiments are for purposes of illustration only and that changes and modifications may be made thereto without departing from the spirit and scope of the invention.

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

1. In a closure system which includes an end wall, a line of weakening within said end wall defining a removable panel, a tab member overlying at least a portion of said end wall and said removable panel, said tab member being secured to the end wall proximate one extremity thereof, a finger engaging portion at an opposed extremity of said tab member, said tab member being secured to said removable panel proximate said line of weakening whereby a lifting movement of the finger engaging portion will cause said tab member to start a tear initiation along said line of weakening of said panel to permit removal of said panel, the improvement wherein said removable panel comprises a major portion adapted for dispensing of the container contents and a minor portion forming the area where said tab is secured to said removable panel, said minor portion having its line of weakening substantially defined by a relatively small radius curve, said curve joining a curve defining said major portion, the curve defining the minor portion being in a first direction, said curve reversing itself in a second direction when joining the curve defining said major portion of said removable panel to thereby define a concave section.
2. The system of Claim 1 wherein said tab member is secured to said end wall and to said removable panel by means of embossed rivets formed integrally with said end wall and removable panel respectively.
3. The system of Claim 1 wherein said line of weakening comprises a score line.
4. The system of Claims 1, 2 or 3 wherein said end wall and tab member are each of an aluminum material.

5. The system of Claims 1, 2 or 3 wherein the end of said tab which is secured to said end wall has an enlarged portion to engage the end wall to limit upward movement of the tab member such that the angle between the tab member and the end wall is less than 75 degrees.

6. In a closure for a beverage container which has a metallic end wall, a line of weakening within said end wall defining a removable panel, a tab member overlying a portion of the end wall and the removable panel, the tab member being secured to the end wall proximate one extremity thereof with a finger engaging portion at an opposed extremity of the tab member, and the tab being secured by a rivet to the removable panel proximate the line of weakening whereby a lifting movement of the finger engaging portion will cause the tab member to function as a second class lever and start a tear initiation along the line of weakening of said panel to permit removal of the panel, the improvement wherein said removable panel has a major portion and a minor portion, said major portion having a major axis extending from one end of the removable panel in a general direction towards the minor portion of the removable panel, said major axis intersecting a straight diametrical line drawn through said rivet formed in said minor portion at an angle of between 15 degrees and 105 degrees, said point of intersection being located within the area of the removable panel.

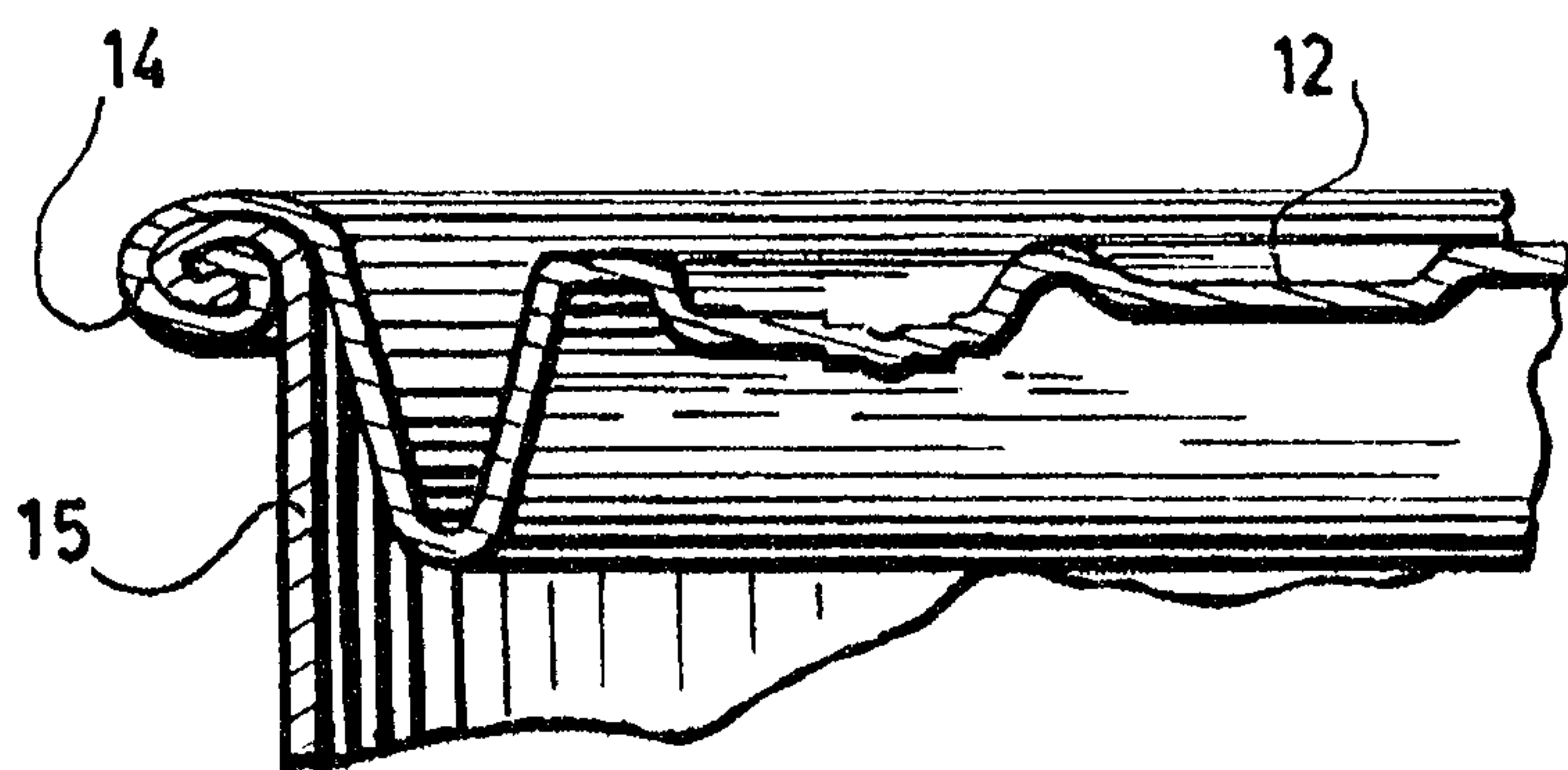
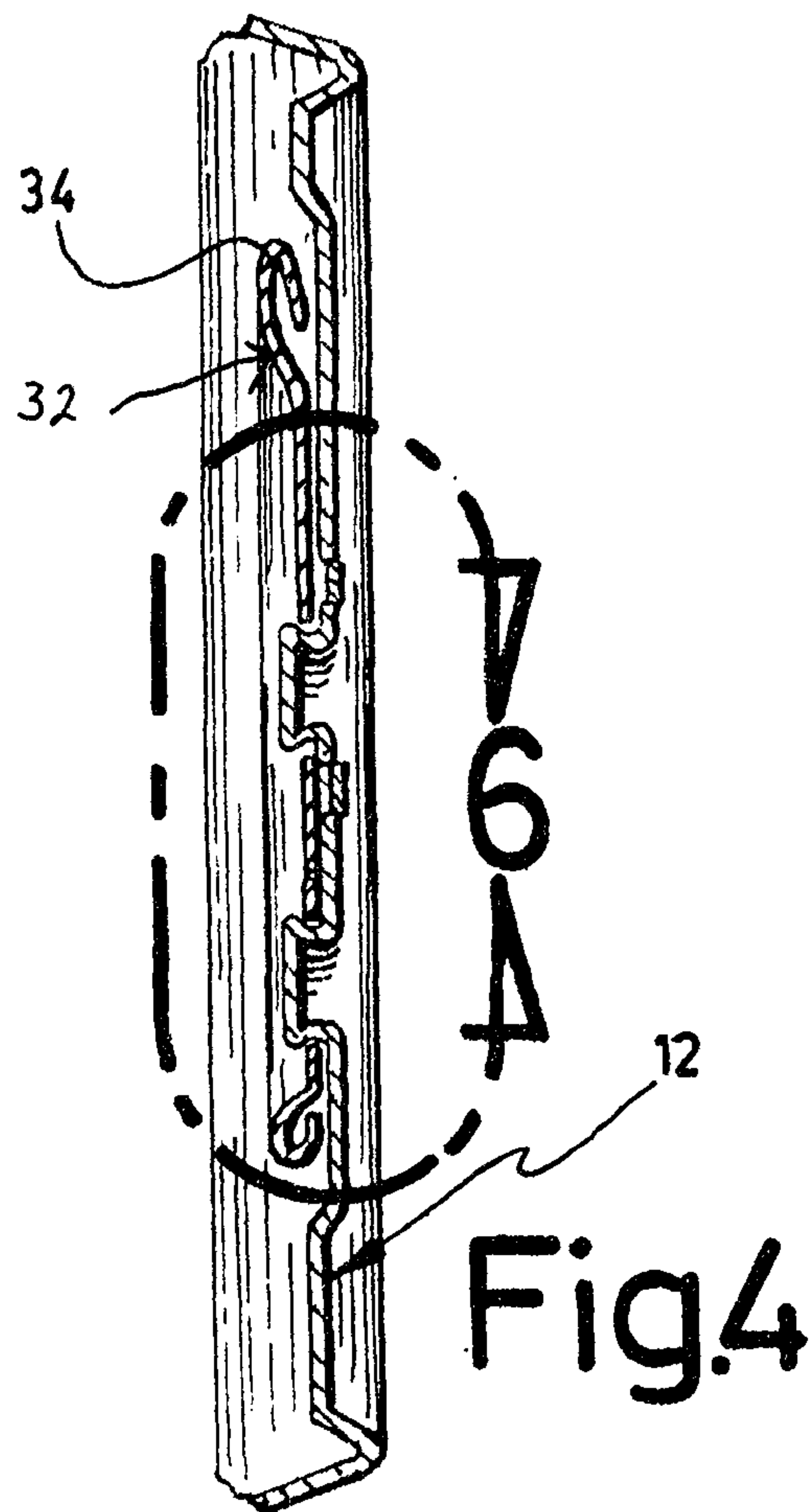
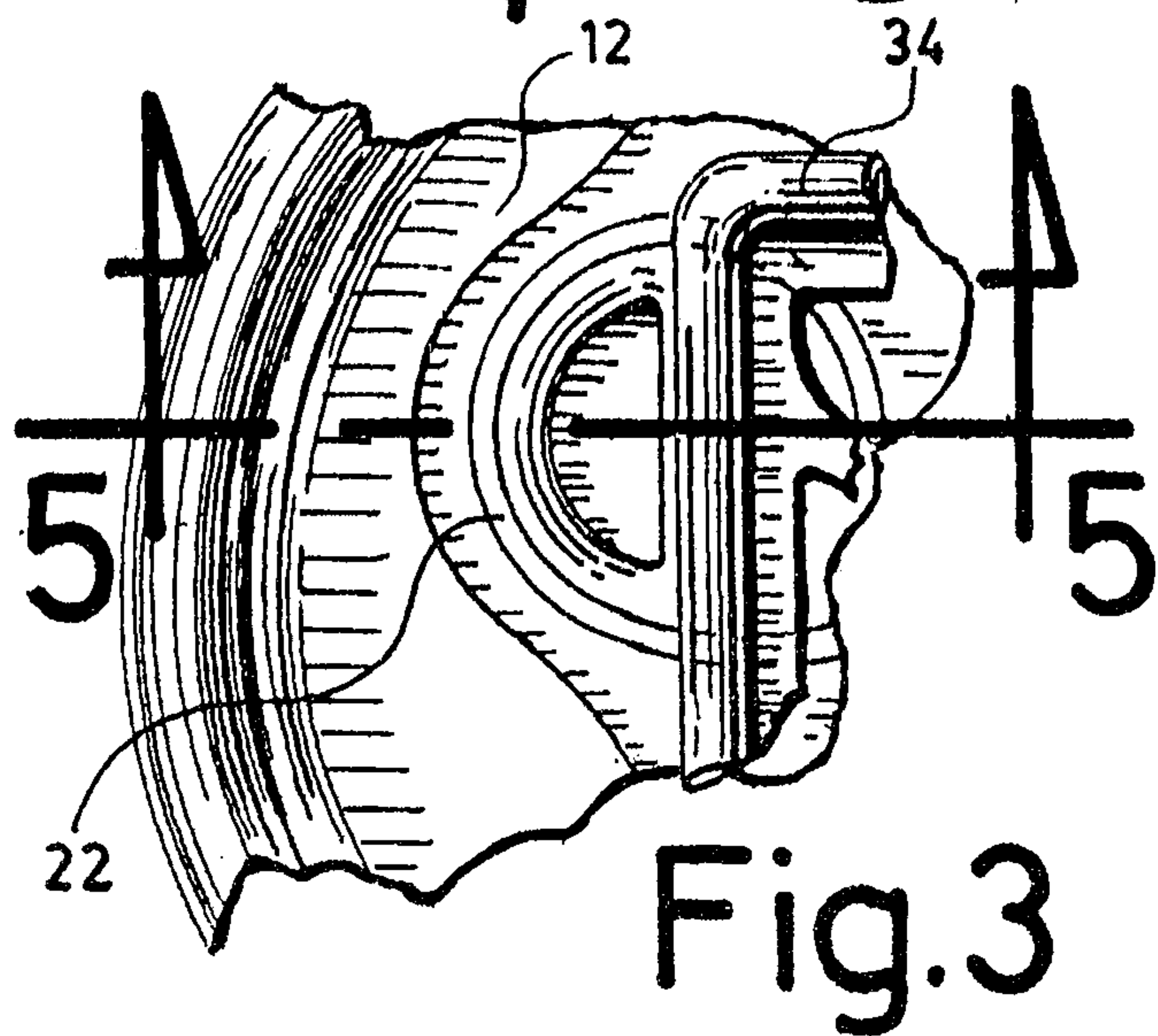
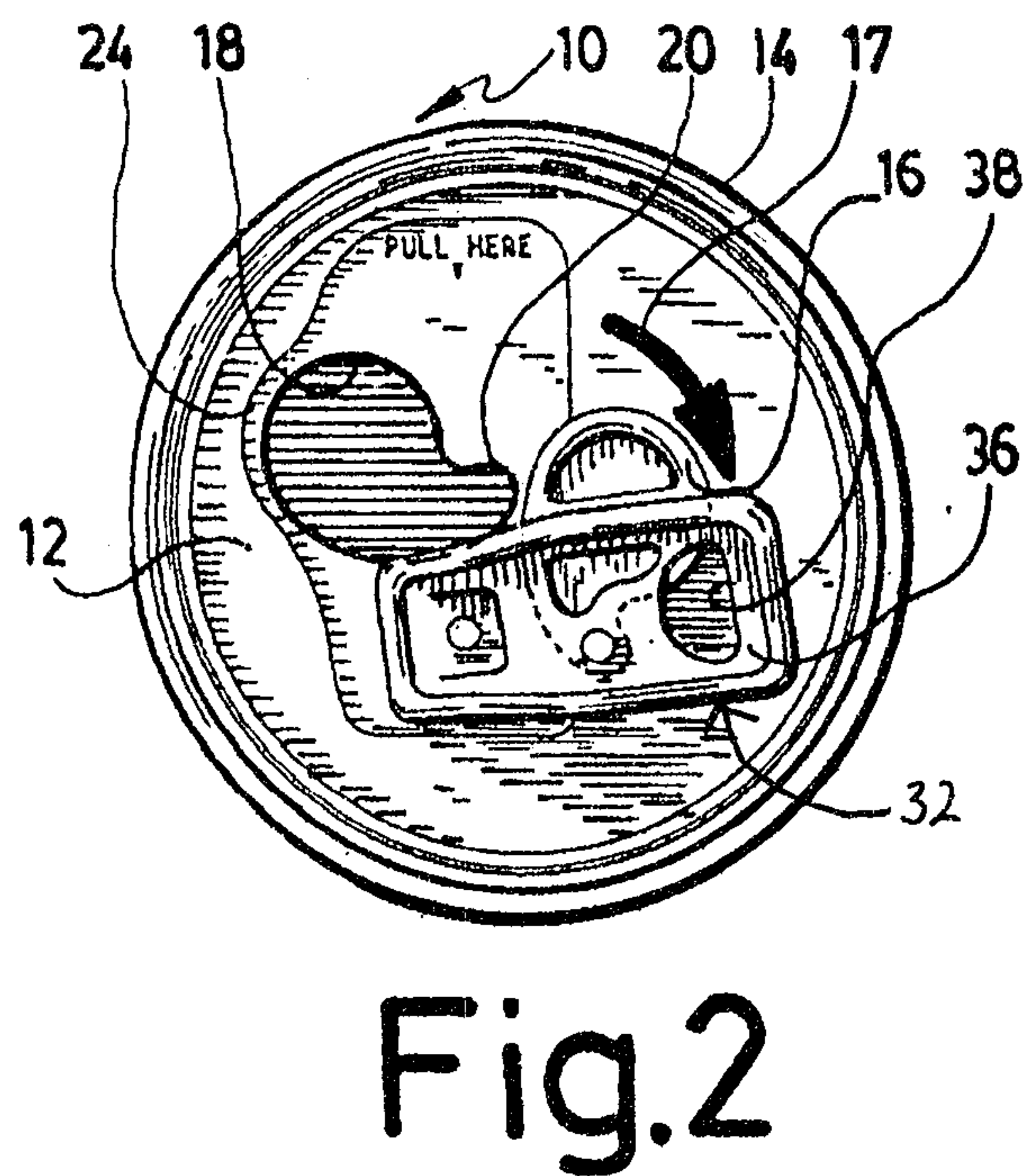
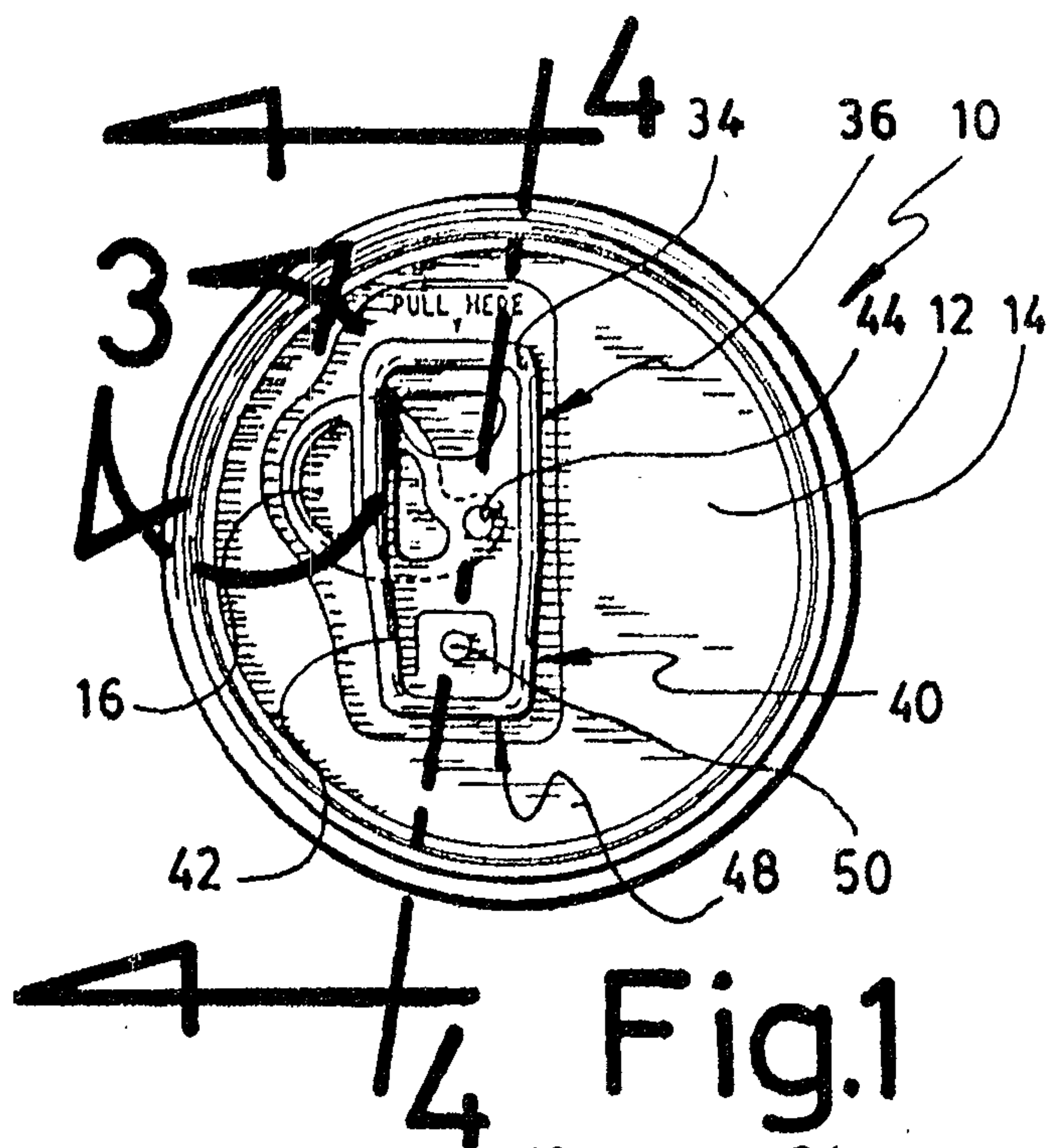


Fig. 5

Fig. 4

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Patent Agent

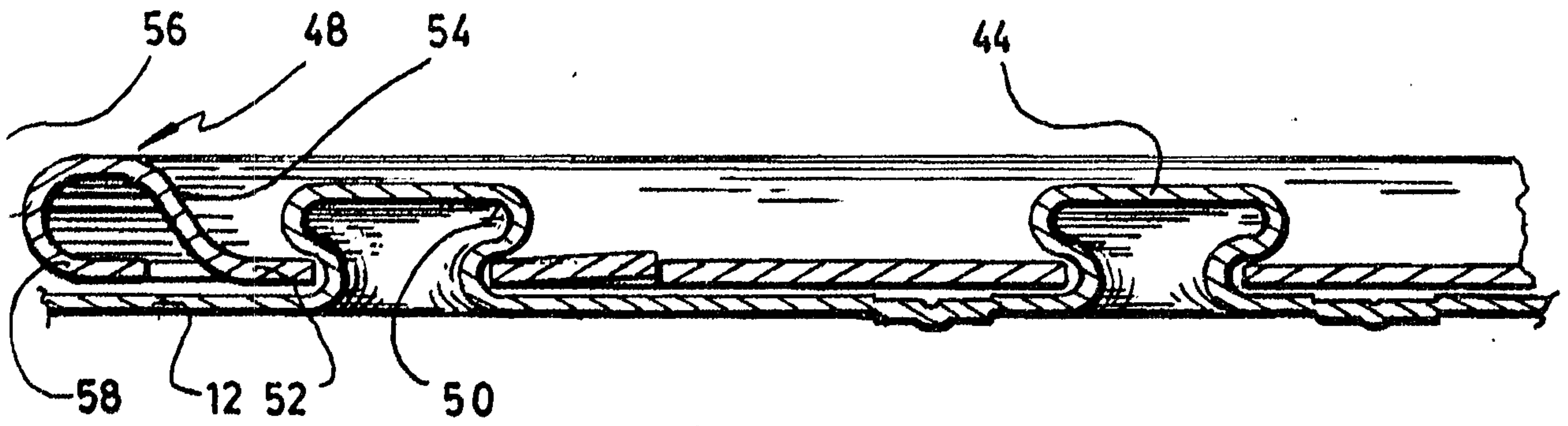


Fig. 6

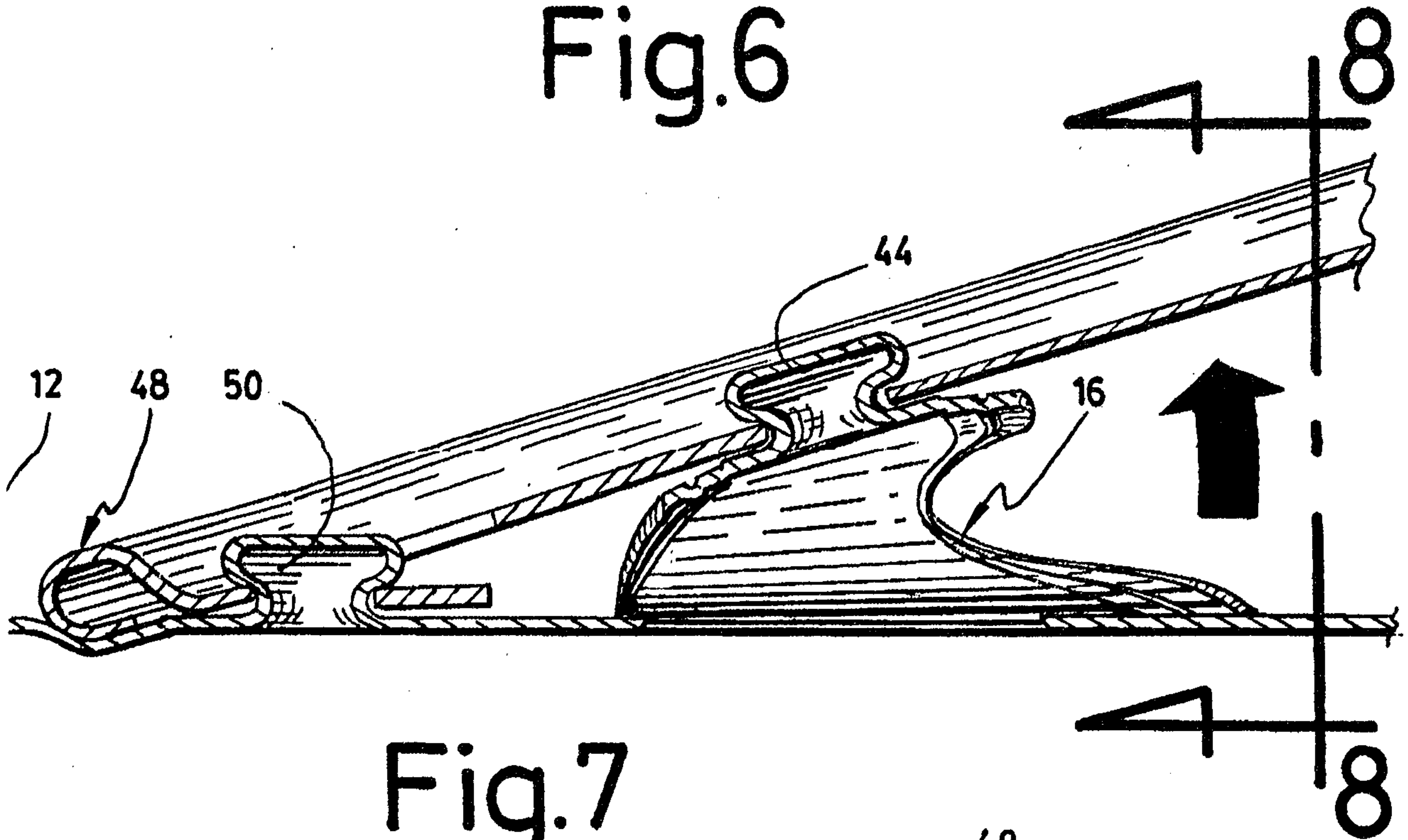


Fig. 7

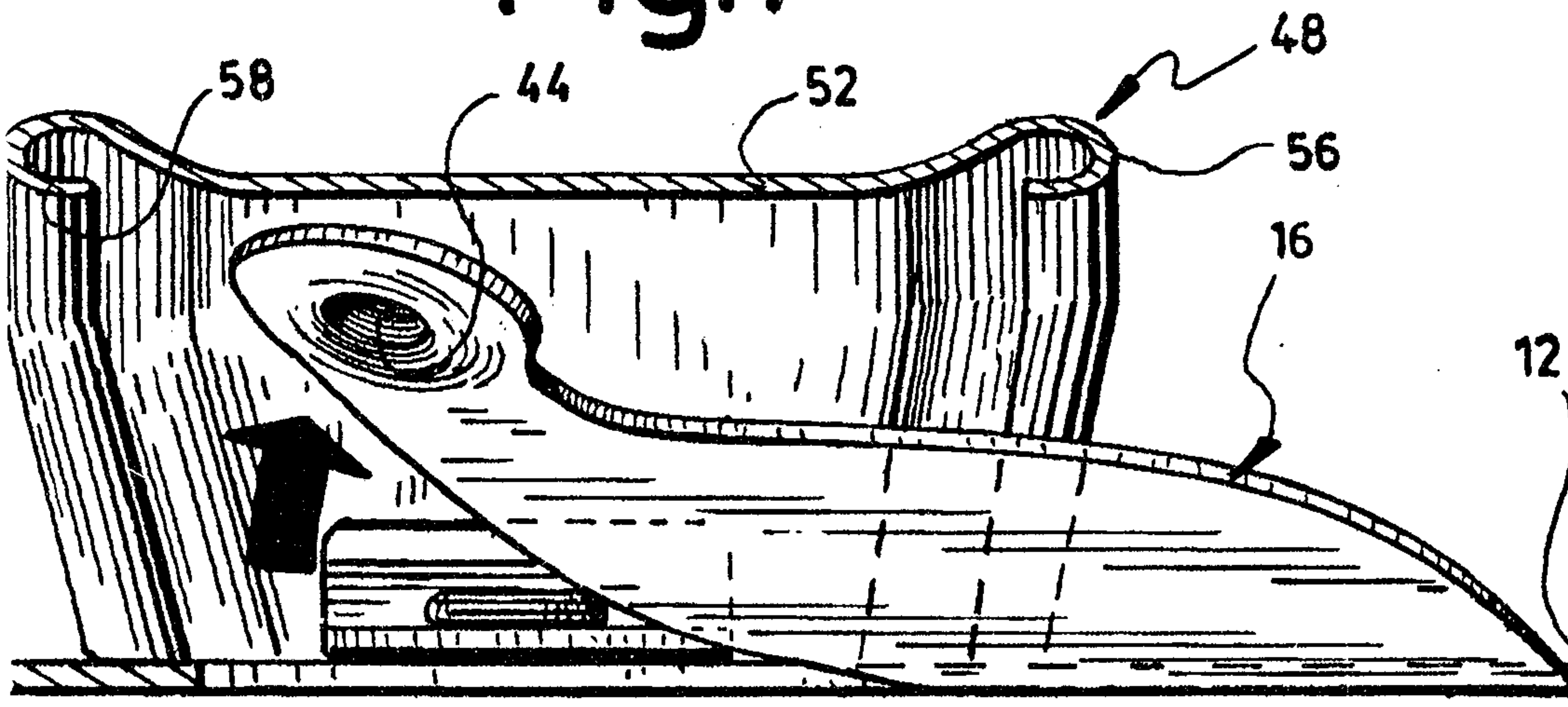


Fig. 8

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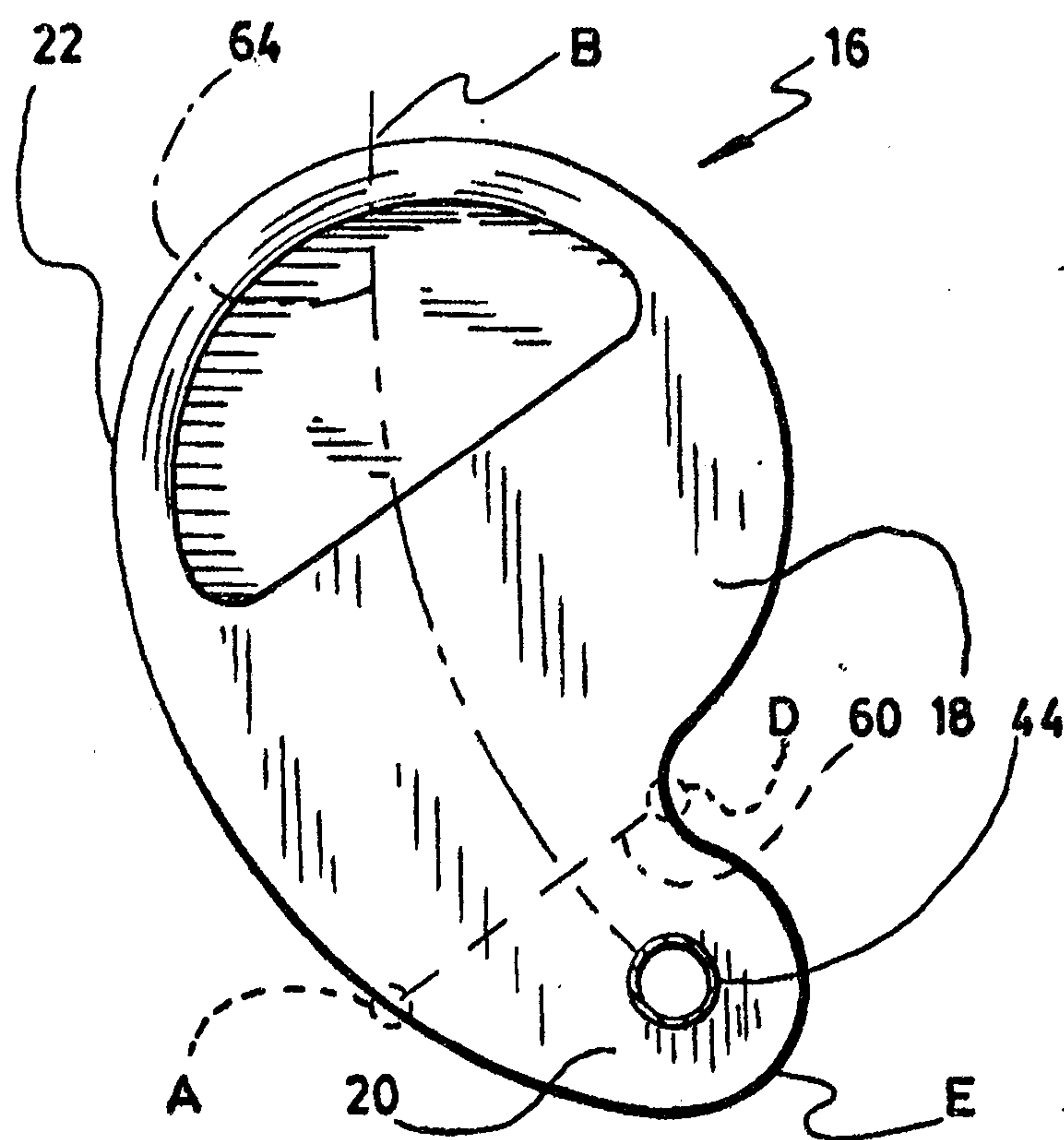


Fig.9

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