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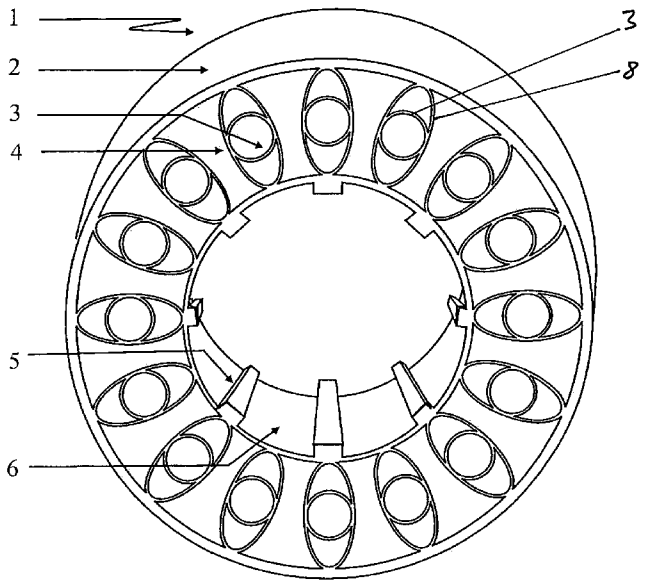
(54) Title: TIRE FOR VEHICLES



(57) Abstract: A, preferably airless, rimless, tire for vehicles, composed of the tire's tread and a parallel internal ring linked to the wheel disc. There are linking means, neighboring but not joining each other, between the tire's tread and the inner ring. These means are made of two interrelating pieces: The first is oval in shape linking the tire's tread with the inner ring; the other is circular and having one united center with the oval linking means. The circular linking means is connected to the rims of the oval means in the points that are vertically connected to the points that link the oval means with the tire's tread and the inner ring. On the inner ring there are rubber projections from the side connected to the wheel disc, opposed with grooves on the wheel disc designed to let the rubber projections in, thus preventing the tire from slipping when brakes are applied to stop the vehicle.

WO 2007/137858 A2

Tire for Vehicles

Description

This invention is related to vehicle tires, particularly those tire that do not need to be filled with air or any kind of gases in order to take the appropriate shape for running . These tires are airless with no rims or side walls. They are composed of a rubber ring representing the tire's tread on ground, and another parallel ring connected with the wheel disc. There are pieces of hard rubber linking the two rings in a way to retain the shape of the tire and to support the weight of the vehicle. At the same time, this tire has an elasticity that allows compression when faced with obstacles on the road, then resuming its original shape after the obstacles' absence.

There are different causes for vehicle accidents, among which are tire blow ups which may, when suddenly happening in front tires at high speed, result in the vehicle overturn causing possible casualties or serious physical handicaps. In all cases, losses are very high, whether in lives or materially due to the high expenses of physiotherapy.

The causes of tire blow ups are several, too. The first of which is the lack of tire care, tire and tire air pressure check, in addition to sharp objects causing tire punctures on the road.

To eliminate those accidents caused by tire punctures, tire specialized companies strived to develop their industries in order to provide the highest degree of safety to vehicle users in terms of tire use. This resulted in an invention by Michelin Company, embodied in an airless tire with no side walls and no need to be filled with air to take shape and consequently support the vehicle. Michelin airless, rimless tire is composed of a rubber ring representing the tire's tread on the ground, and another parallel ring connected with the wheel disc. There are pieces of hard rubber linking the two rings in a way to retain the shape of the tire and to support the weight of the vehicle. At the same time, this tire has an elasticity that allows compression when faced with obstacles on the road, then resuming its original shape after the obstacles' absence.

But the shortcoming of this kind of tires is that, with the passage of time and under the weight pressure of the vehicle, they wear out faster than traditional air tires because the rubber pieces connecting the tire's tread with the ring linked to the wheel disc are heavily affected by the vehicle's weight which weakens them.

It is therefore an object of the current invention to provide an enhanced tire for vehicles, especially overcoming or lowering the above-mentioned problems.

This object is solved by a tire according to claim 1, claims 2 to 15 refer to specifically advantageous realization of a tire according to claim 1.

This invention has the advantage of a new design of the rubber linking between the two parallel rings of the airless tire. These rubber joints may take the shape of straight parallel lines or the zigzag form of the letter (V) when connected repeatedly. The new design of the rubber joints gives them the distinctive property of being independent neighbored joints at equal distances and ovally shaped with a circle in the middle having a united center with the oval shape and a united diameter with the short axis of the oval shape in addition to the tangency between the two shapes. When the tire is compressed by obstacles on the road or under the pressure of the vehicle's weight, the inner circle pulls the sides of the oval shape to alleviate their compression, thus prolonging the life of the airless tire.

Preferably an embodiment relates to an airless, rimless tire for vehicles, composed of the tire's tread and a parallel internal ring linked to the wheel disc. There are linking means, neighboring but not joining each other, between the tire's tread and the inner ring. These means are made of two interrelating pieces: the first is oval in shape linking the tire's tread with the inner ring; the other is circular and having one united center with the oval linking means. The circular linking means is connected to the rims of the oval means in the points that are vertically connected to the points that link the oval means with the tire's tread and the inner ring.

Preferably on the inner ring there are rubber projections from the side connected to the wheel disc, opposed with grooves on the wheel disc designed to let the rubber projections in.

The advantages and further features of the tire according to the invention will become even clearer in view of the following figures showing embodiments of the invention:

Figure 1 shows an embodiment of an airless tire according to the invention with a design of rubber connecting the parallel rings of rubber, and the projections of tire slipping prevention to be fixed in the wheel disc .

Figure 2 shows another embodiment of the airless tire with the new design of the rubber connecting the two parallel rings of rubber .

Figure 3 shows an airless tire with the new design of the rubber connecting the two parallel rings of rubber when the tire is compressed .

Figure 4 shows the new design of the rubber connecting the two parallel rings of rubber in normal status.

Figure 5 shows the new design of the rubber connecting the two parallel rings of rubber while compressed.

Figure 1 shows the tire 1 in general where the tire's tread 2 appears on the road, and the inner rubber ring 6 parallel to it and which connects with the wheel disc (not illustrated) . The rubber projections 5 can be seen on the inner rubber ring 6 from the side opposing the wheel disc . Opposite these projections, there are grooves on the wheel disc designed to prevent the tire 1 from slipping when the vehicle moves and the tire 1 revolves .

In Figure 2, we find another design for the tire 1 without the rubber projections, as the tire 1 can be designed without them.

The rubber projections 5 can link between the two rims of the inner ring widthwise, and they can be small pieces no more than a few centimeters long with their number ranging from at least one to an unlimited number, but it is better to have two of them to ensure tire 1 stability in place, particularly when using the brakes to stop the vehicle .

Figures 1 and 2 show the rubber linking the inner ring 6 to the tire's tread 2, this rubber is composed of two pieces: one is the oval linking means 4, and the other is the circular support means 3 . The linking means 4 is connected by one end to the tread 2, and by the other to the inner ring 6, whereas the support means 3 is connected with the linking means 4 by two sides only in a way that the center of the circular support means 3 unites with the center of the linking means 4, and consequently both become united in one axis .

Figures 3 and 5 show the effect of the vehicle weight on the linking means 4 and the support means 3 which compresses them both under its own pressure or under the pressure of a road obstacle . When the linking means 4 is compressed, it pulls the sides of the supporting means 3 outwards, making the circular shape of the support means 3 closer to an oblong shape . Consequently, the support means 3 pulls the sides of the linking means 4, preventing it from going oblong, thus maintaining a distance between the tire's tread 2 and the inner ring 6 and preventing the linking means 4 from being exposed to maximum compression, and thus protecting the wheel disc against damage .

Figure 4 shows the normal status of the linking means 4 and the support means 3 when there is no pressure falling on them, like the vehicle weight or the road obstacles . Illustration (5) shows the linking means 4 while under pressure from the vehicle weight or a road obstacle with its sides going apart, thus making the support means 3 go as much oblong as to become closer to a straight line, and pulling the sides of the linking means 4 so as to retain its normal shape after the absence of the cause of compression, as in illustration (4) .

This new design protects the airless tire 1 from fast erosion and makes its presumed life longer when compared with previous technologies in the same field . It also protects the wheel disc from damage .

In another design of this invention, Figure 1, we can add rubber projections 5 on the inner ring 6 from the side opposing the wheel disc where they are encountered by grooves to let those rubber projections 5 get into them to give the tire stability in place and to prevent it from slipping around the wheel disc due to road circumstances or heat or other factors .

The linking rubbers, composed of the tire's linking means 4 and support means 3, are distributed at close distances, but not joined, between the tire's tread 2 and the inner ring 6 in

a way that each two successive linking means 4, when receiving compression, push each other reversewise (towards retaining the linking rubbers to their normal status) on contact when the tire 1 is compressed, enhancing the tire's power of tolerance and preventing its collapse .

In another design of the linking rubbers, composed of the tire's means of linking 4 and means of support 3, these rubbers are arranged at equal distances in a way that they do not touch each other when extending widthwise, thus allowing the tire 1more elasticity than when compressed .

Preferably, the tire and/or elements thereof are made of rubber, especially the same material which is typcially used for manufacturing of tires. Of course, also other materials, including plastic or metal materials or any combination of rubber, metal and/or plastic materials can be used.

Preferably, the tire is an airless tire, so that the tire not necessarily has to be inflated, however, it is also possible to in addition inflate the tire. It is possible to adopt the tire according to the invention to respective requirements, especially with respect to its flexibility and mellowness or softness, depending on the requirements and e.g. the weight of the vehicle. The properties can be especially adopted to be suitable for light duty use, e.g. within the limits of cities, or for heavy duty use for vehicles inside and outside cities and possibly also on non-paved roads.

The tire can be installed on special wheel discs or rims, especially as no inflation is necessary, it is, however, also possible to install the tire on conventional wheel discs or rims according to the prior art, while inflation can optionally be provided, although not being necessary. The tire according to the invention has therefore enormous advantages with respect to safe and secure utilization, while enabling a high controlability, there is no need for maintenance and the tire has a long life span, while it can be adopted to various applications. It also has to be noted that preferalby two eye-shaped rings as inner and outer element can be used, while they are controllable at the stage of design and constructions in terms of height, thickness, number in one tire according to design requirements, such as kind and volume of the weight the tire has to support, required mellowness or softness, comfort and stability in the vehicle or depending on the kind of use.

The features of the present invention disclosed in the specification, the claims and/or in the accompanying drawing, may, both separately and in any combination thereof, be material for realizing the invention in various forms thereof.

Claims

1. A tire for vehicles, comprising

   - a tread (2),

   - an inner ring (6), linkable to a wheel disc or a rim,

   - multiple flexible linking means (4) for linking said treat (2) and said inner ring (6),

   said linking means (4) having an inner element (3) and an outer element (8) connected to each other, the outer element (8) being connected to the tread (2) and the inner ring (6),

   wherein, in a cross-section perpendicular to an axis of rotation of the tire (1), the inner element (3) has an essentially circular form and the outer element (8) has an essentially oval form, such that there is a distance between said inner element (3) and said outer element (8) in a radial direction, when said tire is in a non-compressed condition.

2. A tire according to claim 1, wherein said linking means are arranged neighboring but not contacting each other.

3. A tire according to claim 1 or 2, wherein said inner element (3) and said outer element (8) have one united center.

4. A tire according to one of the preceding claims, wherein said inner element (3) is connected to said outer element (8) by two contact lines being parallel to an axis of rotation of the tire (1) and having the same distance of said axis of rotation.

5. A tire according to claim 4, wherein said two contact lines (10) are arranged such that their distances to the tread (2) and the inner ring (6) are essentially identical.

6. A tire according to one of the preceding claims, wherein said internal ring (6) comprises at least one rubber projection (5) at its inner side for engaging with a respective groove at a wheel disc or a rim.

7. A tire according to claim 6, wherein said at least any projection is a rubber projection (5).

8. A tire according to claims 6 or 7, wherein there are at least two projections (5).

9. A tire according to claims 6, 7 or 8, wherein said at least one projection (5) extends over at least 50% of the width of the inner ring (6) in a direction of the axis of rotation of the tire (1).

10. A tire according to one of the claims 6 to 9, wherein said at least one projection (5) extends over at least 80% of the width of the inner ring (6) in a direction of the axis of rotation of the tire (1).

11. A tire according to one of the claims 6 to 10, wherein said at least one projection (5) extends over the entire width of the inner ring (6) in a direction of the axis of rotation of the tire (1).

12. A tire according to one of claims 6 to 11, wherein said at least one projection (5) is interrupted at least once over its extension along the width of the inner ring (6).

13. A tire according to one of the preceding claims, wherein said linking means (4) are arranged essentially with equal distances around the circumference of the tire (1).

14. A tire according to one of the preceding claims, wherein said tire (1) is a rimless tire (1).

15. A tire according to one of the preceding claims, wherein said tire (1) is an airless tire (1).

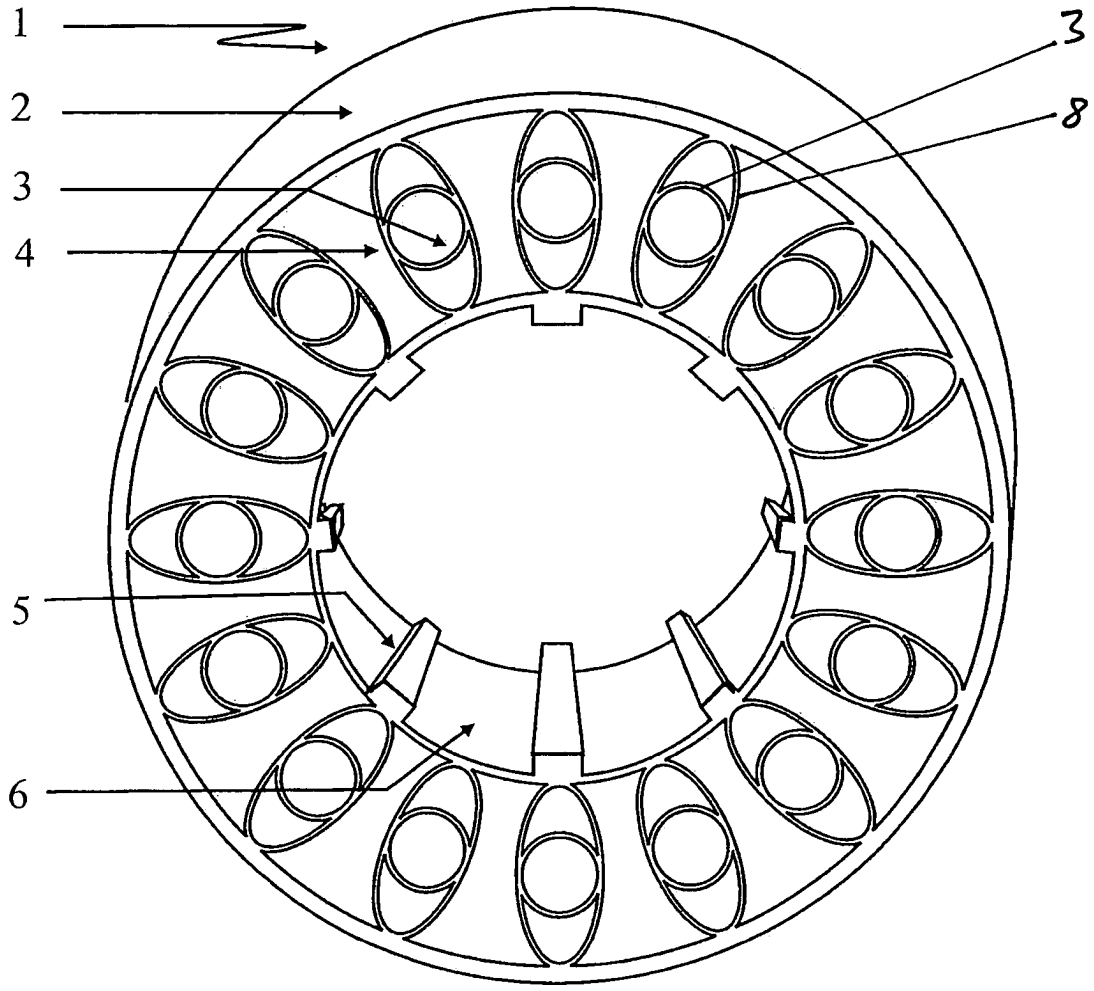


Fig. 1

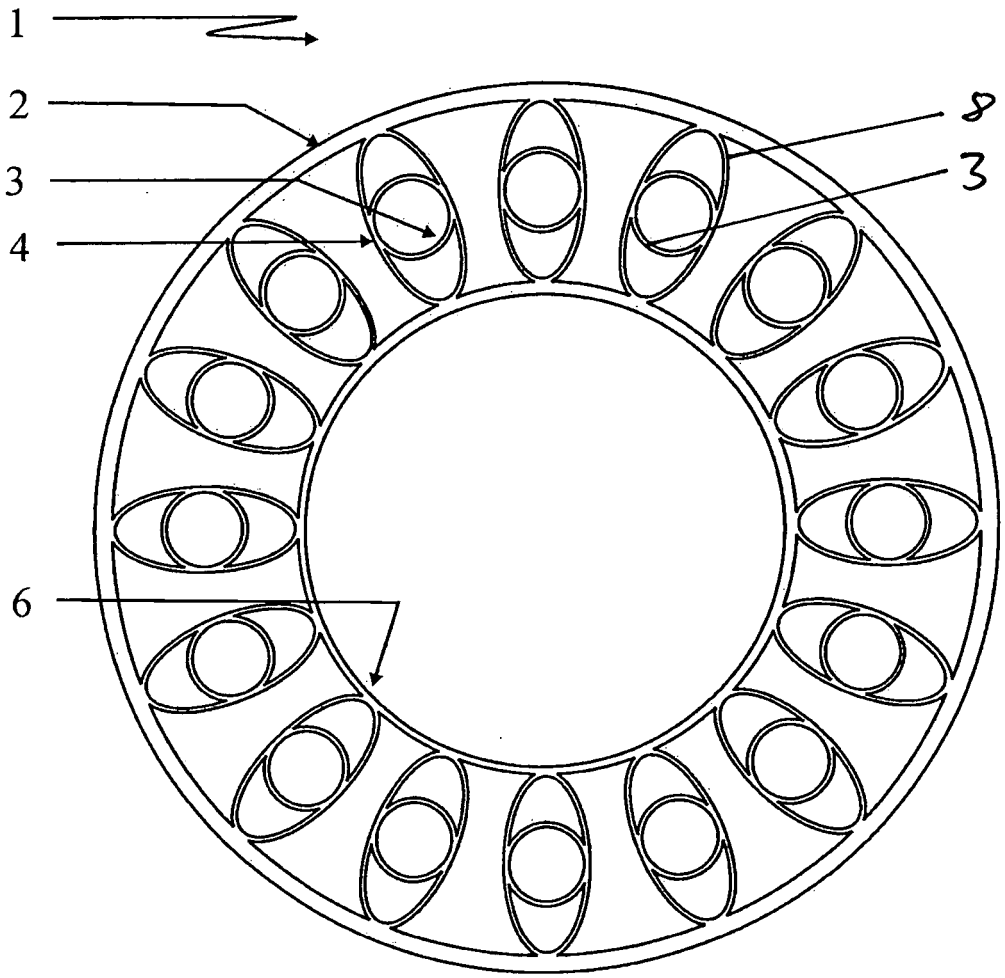


Fig. 2

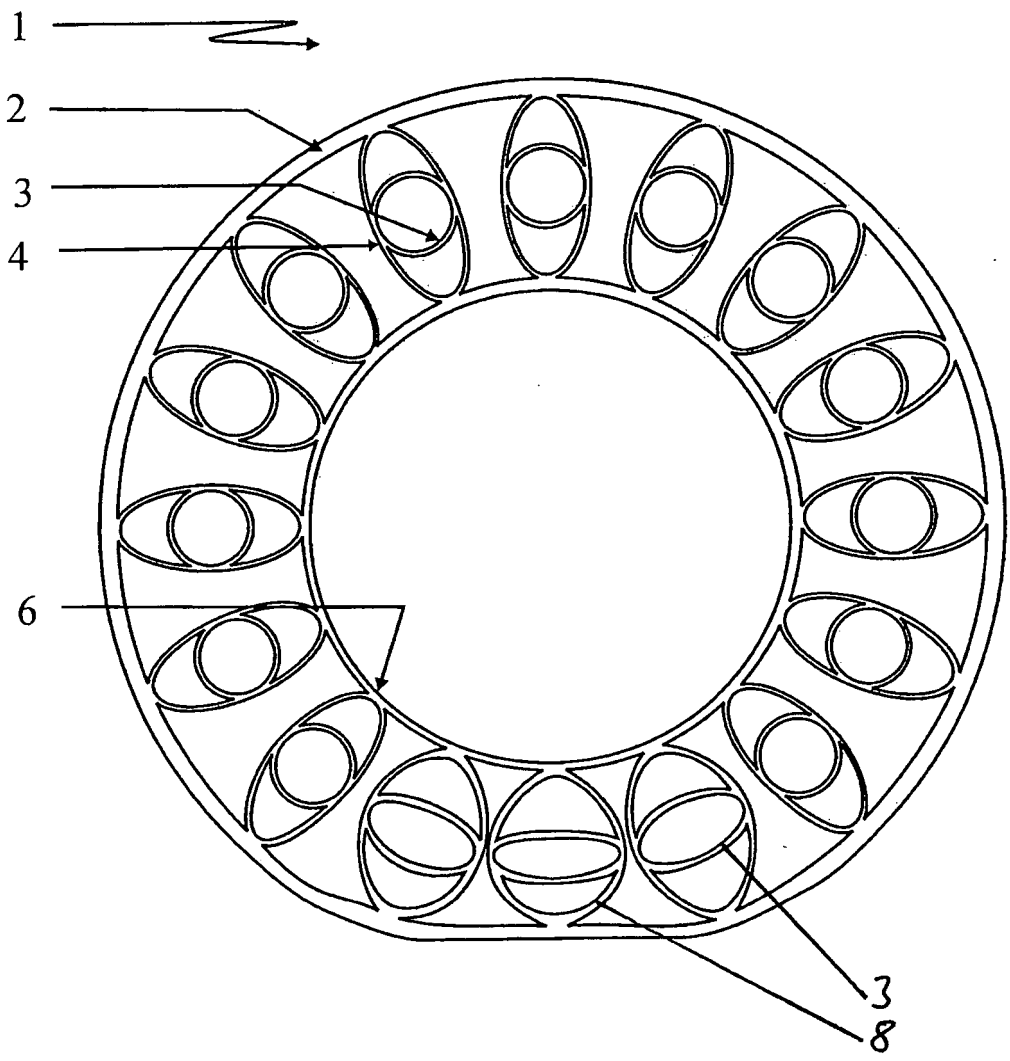


Fig. 3

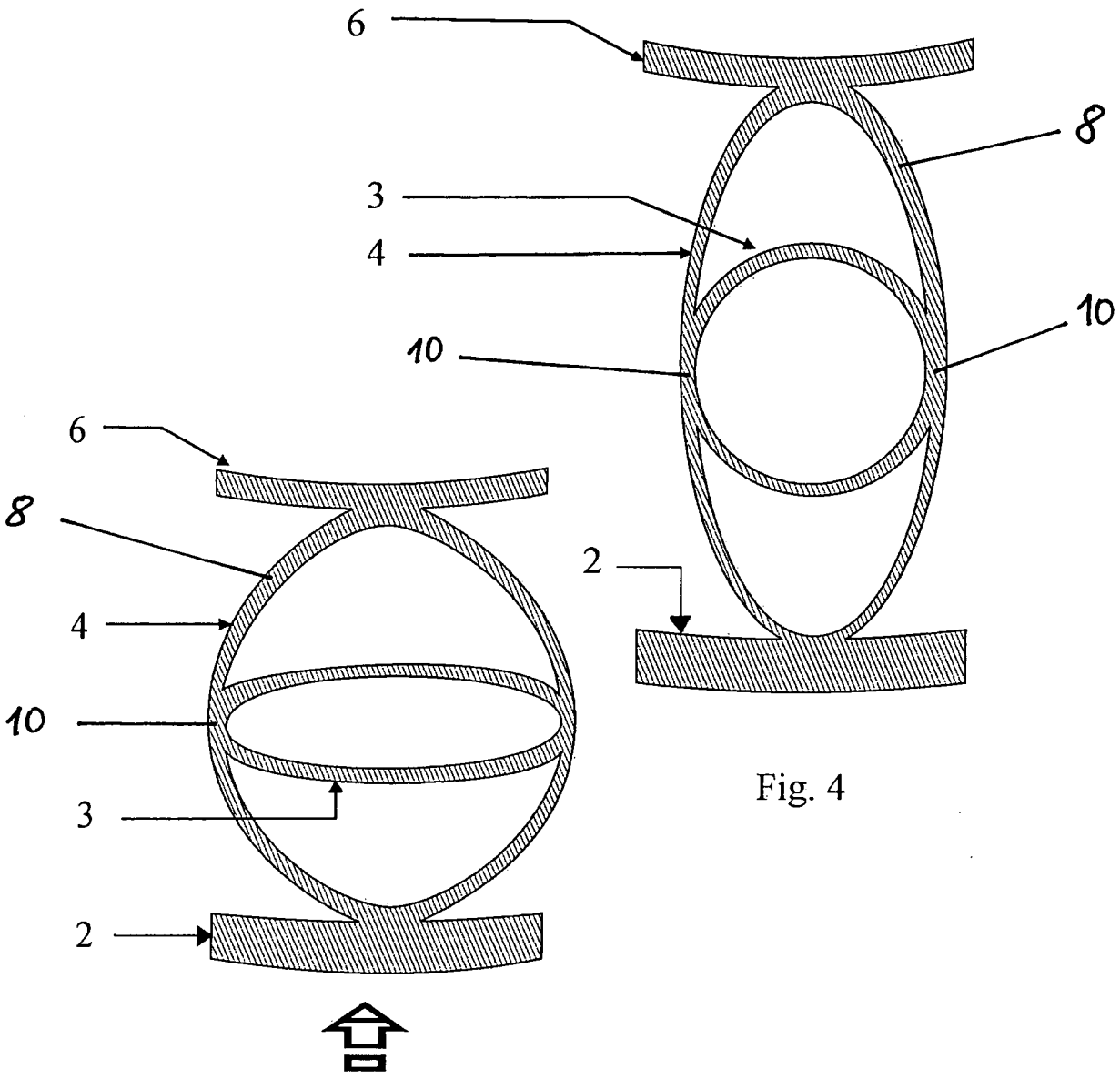


Fig. 4

Fig. 5