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(54) **Inflatable non-latex balloon**

(57) The balloon comprises at least two balloon sheets (1) sealed to one another along a peripheral edge (2) to form an inflatable body (4) and an inflatable stem (5) connected by its proximal end to the body. In order to be able to hold the balloon the stem comprises a handle portion (17) which has, in an uninflated flat state of the balloon, an inner width (w) comprised between 30 and 80 mm and a length of at least 80 mm. The stem (5) further comprises a proximal portion (18) which widens in such a manner towards the body (4) that, when holding the balloon in its inflated state upright by the handle portion (17), the body (4) of the balloon returns to one single stable position after having bent the balloon in a transverse direction. Since the balloon can be held by the inflated handle portion, no cups or sticks have to be attached to the balloon.

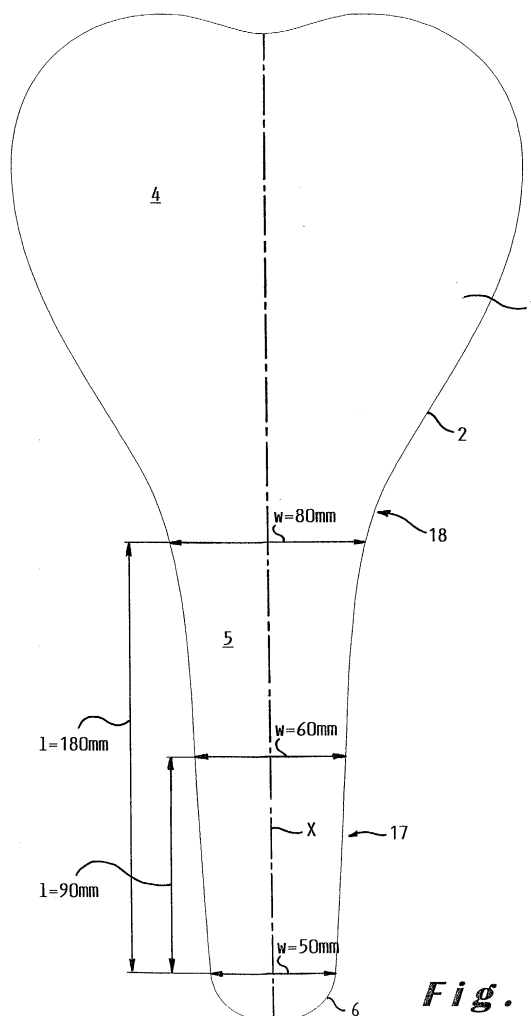


Fig. 1

Description

[0001] The present invention relates to inflatable non-latex balloons comprising at least two balloon sheets sealed to one another along a peripheral edge to form an inflatable body and an inflatable stem having each an interior, the inflatable stem being in fluid communication with the body and having a proximal end by means of which it is connected to the body.

[0002] In practice mainly two different types of toy balloons are on the market, namely stretchable balloons made of latex and substantially non-stretchable balloon which are typically made of a polymer metallized film generally known as "Mylar". "Mylar" is a registered trademark of DuPont. Instead of "Mylar" other polymeric films may be used, in particular laminated films of a polyolefin such as polyethylene or polypropylene and a polyamide. The stretchable latex balloons are sold either uninflated or inflated whilst the non-latex balloons are usually sold in inflated form.

[0003] The non-latex balloons may either be filled with air or with a gas lighter than air such as helium. Lighter than air balloons have the drawback that when released they fly away and end somewhere in the environment. Due to the fact that the non-latex balloons are not biodegradable such lighter than air balloons are to be avoided from an environmental point of view.

[0004] The known air filled non-latex balloons have, on the other hand, the disadvantage that a plastic holder has to be fixed to the stem and, in this holder, a plastic stick or straw in order to be able to hold the balloon by the stick or straw in an upright position. The plastic holder is typically a funnel-shaped plastic cup fixed to one extremity of the plastic stick and having means such as apertures or slots for securing the balloon to the cup and stick. Such holders are normally used with balloons having a diameter under about 18 inches (457 mm) when filled with air. The balloons themselves are usually sealed with heat after being inflated.

[0005] A drawback of the use of a holder and a stick is that they constitute an additional amount of non-degradable waste when disposed. Since they are made of a material different from the material of the balloon itself, the holder and stick moreover make recycling of the balloon more complicated. An additional disadvantage of the straw or stick is that when broken it shows sharp edges which may be dangerous for children. The holder cups are moreover difficult to be attached to the balloon so that in practice this is usually done by the manufacturers or distributors in advance of sale to the retailer, thereby necessitating inflation of the balloons and attachment of the cup and stick to the inflated balloons before transporting them and increasing the cost and the storage space required to handle the product prior to sale. This difficulty has also discouraged or prevented virtually any meaningful sales of uninflated non-latex balloons to consumers although the quality of freshly inflated balloons may be better due to pressure losses

which may occur during transport and storage of inflated balloons as a result of gas escaping slowly out of the balloons.

[0006] US-A-5 306 194 discloses non-latex balloons wherein the difficulty of attaching the plastic holding cup has been solved by providing an inflatable edge holder in the stem of the balloon. This inflatable edge holder has not to be attached to the balloon. The balloon comprises a self-sealing valve which enables to inflate the balloon by means of a straw inserted into the inflatable edge holder. Once inflated, the straw is automatically secured by the inflatable edge holder to the balloon.

[0007] A drawback of the balloons disclosed in US-A-5 306 194 is that they still require a straw for inflating and holding them. Consequently, the problem of recycling such balloons, of the additional amount of non-degradable waste and of the dangerous situations which may arise when the straw is broken are still not solved yet.

[0008] An object of the present invention is to propose therefore a new type of non-latex balloon, in particular a non-latex balloon inflated with air, which solves the problems associated with the presence of a plastic holding stick or straw.

[0009] For this purpose, the balloon according to the invention is characterised in that its inflatable stem comprises a handle portion and a proximal portion, the handle portion showing a longitudinal axis and having, in an uninflated flat state of the balloon, an inner width comprised between 30 and 80 mm and a length of at least 80 mm, and the proximal portion of the stem widening in such a manner towards the body that, when holding the balloon in its inflated state by the handle portion so that said longitudinal axis of the stem extends in a vertical direction, the body of the balloon returns to one single stable position after having bent the balloon in a transverse direction perpendicular to the direction of said longitudinal axis.

[0010] Since the balloon sheets form an inflatable handle portion by means of which the balloon can be kept firmly in an upright position, a cup and stick are no longer required, even not when the balloon is inflated with air. In an advantageous embodiment of the balloon according to the invention, the balloon is therefore entirely made of flexible sheet material and is in other words free of any holding sticks or straws and further also of any attachment means for the attachment of a detachable holding stick or straw to the balloon.

[0011] In a preferred embodiment of the balloon according to the invention, the balloon is provided with a self-sealing valve arranged for inflating the balloon.

[0012] The balloon can thus be easily prepared by the retailer when selling it to the consumers since he has only to inflate the balloon without having to seal it or without having to attach a cup and a stick to the balloon. What's more, even the consumer can easily inflate the balloon again when it would have lost too much pressure after some time.

[0013] Other particularities and advantages of the invention will become apparent from the following description of some particular embodiments of the inflatable non-latex balloon according to the invention. This description is only given by way of illustrative example and is not intended to limit the scope of the invention. The reference numerals used in this description relate to the annexed drawings wherein:

Figure 1 is a top plan view of a balloon according to the invention in its uninflated flat state, the body of the balloon being heart shaped;

Figure 2 is a same view as Figure 1 illustrating however another shape of balloon;

Figure 3 is a diagram illustrating on a reduced scale, in thick lines, different possible curves for the proximal portion of the stem of a 180 mm balloon according to the invention and, in thin lines, the outlines of a balloon having a shape approaching the shape of the middlemost curve; and

Figures 4 is similar to Figure 3 but illustrates a larger balloon according to the invention which is moreover not symmetric.

[0014] The toy balloons illustrated in Figures 1 and 2 comprise two superimposed and heat-sealed balloon sheets 1 sealed to one another along their peripheral edge 2 by means of an edge seal 3 to form an inflatable body 4 and stem 5, the interiors of which are in fluid communication with one another. The stem 5 has a proximal end by means of which it is connected to the body 4 and an opposite distal end or free extremity 6. At the transition between the body and the stem, the edge seal 3 connecting the two balloon sheets 1 extends smoothly and continuously over the body 4 and the stem 5 in order to enable the stem to support the body in a stable way as will be described further hereinafter.

[0015] The balloon sheets 1 are made of a non-latex material, in particular of a substantially non-stretchable material such as "Mylar" or another plastic laminate. Such materials show a certain stretchability which is however considerably smaller than the stretchability of latex balloons. In this way, when inflating the balloon, creases will normally be formed in the sheet material of the balloon, in particular at the edge seal 3. The balloon illustrated in Figure 1 has a simple shape composed of an elongated stem 5 and a heart shaped body 4. Instead of a heart shaped body other shapes can be provided for example a circular shape or even the shapes of animals, persons, etc. For more complex shapes, additional balloon sheets may be used. The edge seal 3 may moreover be interrupted at certain locations to provide a gas inlet into projecting parts of the balloon. An example of such a balloon is illustrated in Figure 2. In this balloon the inflatable projecting part 7 is connected by means of two gas inlet/outlet ports 8 to the main body of the balloon. The projecting part 7 itself is divided by means of seals 9, provided with gas inlet/outlet ports, to

achieve a predetermined three-dimensional shape in the inflated state. At the projecting part 7, the edge seal 3 does not extend continuously along the edge of the balloon at the transition between the body and the projecting part in order to avoid weak spots in the seal 3 but the edge seal 3 follows the edge of the main body part 4. As a result thereof, the projecting part 7 buckles quite easily with respect to the main body of the balloon, this in contrast to the connection between the body 4 and the stem 5 since the stem has to serve as handle enabling to hold the balloon firmly in a upright position.

[0016] For inflating the balloon a valve 10 is provided in the balloon, preferably a self-sealing valve, although it is also possible to provide a valve which has to be sealed by means of a heat-welded seal. As disclosed for example in US-A-5 878 768 a self-sealing valve can be provided in the body of the balloon but in accordance with the present invention the self-sealing valve 10 is preferably provided in the stem 5, the opening of the valve being more preferably situated at the distal extremity 6 of the stem 5.

[0017] An example of a self-sealing valve 10 is illustrated in Figure 2. This valve consists mainly of a tubular sheet 11 formed by two heat-sealable sheets sealed to one another by two longitudinal seals 12. The tubular sheet 11 has two open ends, one end extending in the balloon, the other end being fixed at the distal end in the stem by means of the edge seam 3 and a cross-seal 13. At the side of the cross-seal 13 a portion of the tubular sheet 11 is internally provided with a material, for example a printed material 14, preventing the two layers of the tubular sheet 11 from being sealed to one another when applying (heat-welding) the cross-seal 13 thus leaving a gas inlet/outlet port 15. The upper balloon sheet is further provided with a recess at the distal extremity of the stem to provide an inlet opening 16. To inflate or deflate the balloon, an inflation straw can be inserted through this opening 16, the gas inlet/outlet port 15 and further through the tubular sheet 11 into the interior of the stem 5. Once inflated, the straw can be withdrawn and the gas pressure within the balloon urges the two sheets of the tubular sheet 11 onto one another thereby preventing a flow of gas out of the balloon.

[0018] An essential feature of the balloons according to the invention is that the stem 5 comprises a handle portion 17 having, in the uninflated flat state of the balloon, as illustrated in Figures 1 and 2, a length l of at least 80 mm and an inner width w , i.e. a width measured between the edge seal 3, which is comprised between 30 and 80 mm. The width w of the handle portion 17 may be substantially constant but it preferably increases from a minimum width at the distal extremity 6 of the handle portion to a maximum width at the proximal end of the handle portion 17. In the embodiment illustrated in Figure 1, the handle portion has a minimum width of 50 mm at the distal extremity 6 of the stem 5. When selecting a maximum width w of 80 mm, the handle portion 17 has a length l of 180 mm. The maximum width w of

the handle portion 17 is however preferably smaller than or equal to 60 mm so that the balloon can be held easily even by small children's hands. In case of such a smaller maximum width, the handle portion 17 of the balloon illustrated in Figure 1 has a length l of 90 mm, which is sufficient to hold the balloon.

[0019] In a preferred embodiment, the length l of the handle portion 17 is larger than 100 mm and preferably larger than 150 mm and smaller than 400 mm and preferably smaller than 300 mm. The minimum width w of the handle portion 17 is on the other hand preferably larger than 40 mm.

[0020] In order to be able to hold the balloon sufficiently firmly with the handle portion 17, the stem 5 further comprises a proximal portion 18 which widens in such a manner towards the body 4 that, when holding the balloon in its inflated state by the handle portion 17 so that the longitudinal axis X of the stem 5 extends in a vertical direction, the body 4 of the balloon returns to one single stable position after having bent the balloon in a transverse direction perpendicular to the direction of said longitudinal axis X. This means that the stem of the balloon does not show such major folds or creases in the balloon sheets that the body of the balloon can buckle between two stable equilibrium positions.

[0021] As described with reference to Figure 1, the handle portion 17 may have a width w increasing towards the body 4 of the balloon. Since the handle portion 17 of the balloon is considered to be that portion of the stem having a width smaller than a predetermined maximum width, it is clear that, when the handle portion widens towards the body, it may overlap either partially or even completely with the above defined proximal portion 18 of the stem 5.

[0022] For designing the proximal portion 18 of the stem 5 in such a manner that a sufficiently firm connection is obtained between the body and the stem, and so the body is held in one stable equilibrium position by the stem, use can be made of the following mathematical formula:

$$y = a e^{-\frac{x^2}{2b^2}} + c$$

wherein:

x is the position on the longitudinal or X axis in mm

y is the position on the Y axis in mm

$a \geq c$

$15 \leq c \leq 50$ and preferably ≤ 40 , and

$0.4 a \leq b \leq 1.4 a$.

Figure 3 illustrates three curves obtained by this formula for the values:

$a = 71$ mm

$b = 35.5; 63.9$ and 106.5 , respectively, and

$c = 25$ mm.

[0023] As appears from Figure 3, the above formulae represent exponential curves starting from a maximum of $a+c$ mm to a minimum of c mm, the value b determining the inclination of the curve. Starting from such a curve, the side edge (or edge seal 3) of the proximal portion 18 of the stem of the balloon can be designed.

[0024] An example of a balloon designed on the basis of the middlemost curve ($b = 63.9$ mm) is shown in Figure 3. The longitudinal axis of the stem 5 coincides with the X axis whilst the Y axis of the orthogonal axis system is perpendicular to the X axis and is situated in the body of the balloon. In Figure 3 a part of the proximal portion 18 of the stem 5 starting from $x = 1.1b$ ($=70$ mm) to $x = 2b$ ($=128$ mm) has been indicated. This part is especially important to achieve the required support of the body by the stem. In a preferred embodiment of the balloon according to the invention, the side edges of the interior of the proximal portion 18 of the stem 5 defines a side edge curve which is situated over this part (from $x = 1.1b$ to $x = 2b$) within a distance of at the most 10% above or below the exponential curve, in other words between the two curves defined by the formulae:

$$y = 1.1 (a e^{-\frac{x^2}{2b^2}} + c) \text{ and } y = 0.9 (a e^{-\frac{x^2}{2b^2}} + c).$$

More preferably, the side edge curve only differs with at the most 5% from the respective exponential curve, or is situated in other words between the two curves defined by the formulae:

$$y = 1.05 (a e^{-\frac{x^2}{2b^2}} + c) \text{ and } y = 0.95 (a e^{-\frac{x^2}{2b^2}} + c).$$

Instead of varying within a predetermined range from the exponential curve, the side edge curve of the respective part of the proximal stem portion 18 may also be defined substantially by the following formula:

$$y = a e^{-\frac{x^2}{2b^2}} + c$$

[0025] In Figure 3 two curves which are situated 7.5% above and respectively 7.5% below the middlemost exponential curve have been illustrated in broken lines. The side edge curve of the proximal stem portion 18 is situated over the part from $x = 1.1b$ to $x = 2b$ between these two curves, and even over a larger part, namely from $x = 0.9b$ to $x = 2.5b$, which is a more preferred embodiment of the balloon according to the present invention.

[0026] Instead of forming a smooth lines as in the illustrated examples, the side edge curve may also show

undulations, the curve undulating preferably between the above described two curves.

[0027] In the uninflated, flat state of the balloon, the proximal stem portion has two opposite side edges. These side edges will usually be symmetrical with respect to the longitudinal X axis but it is also possible to design both side edges based on another exponential curve. In this latter case, the longitudinal axis of the stem is then defined as the X axis of both exponential curves.

[0028] As illustrated in Figure 4, the body of the balloon does also not have to be symmetrical and can be given various shapes, in particular more complex shapes than for example a circular or heart shape. Designing balloons of such more complex shapes, optionally with more than two balloon sheets, is already known by the skilled person so that this will not be described further in detail in the present specification.

[0029] When designing the shape of the stem based on the above formulae, the value c is chosen in function of the desired diameter for the handle portion. The value c is therefore larger than 15 mm and smaller than 50 mm, preferably smaller than 40 mm. The value of variable a is on the other hand preferably selected in function of the size of the body of the balloon. In case of a circular shape of the body, the sum of a and c comprises preferably at least 50% of the radius of the circular body and corresponds more preferably substantially to this radius, i.e. deviating by no more than 10% from this radius, in order to be able to provide a maximum support of the body. For non-circular body shapes, the sum of a and c comprises preferably at least 50% of the radius of a circle inscribed within the edge of the body (i.e. touching the side edge) and corresponds also more preferably substantially to this radius, i.e. deviating by no more than 10% from this radius.

[0030] The value a is further preferably at least equal to twice the value c but smaller than 13 times, more preferably smaller than 10 times, the value c.

[0031] In the example illustrated in Figure 4 the part from $x = 0.9b$ to $x = 2.5b$ of the proximal stem portion of the shown balloon was designed to correspond substantially to the exponential curve defined by the formula:

$$y = a e^{-\frac{x^2}{2b^2}} + c$$

wherein:

a = 155 mm
b = 140 mm, and
c = 25 mm.

For the other two curves illustrated in Figure 4, the b value was changed in 56 and respectively 217 mm. An important advantage of the above described balloons is that no holding stick, straws or cups are required

to hold the balloon, even when the balloon is inflated with air. Since such elements may be dangerous for children and make recycling of the balloon more complicated, the balloon is preferably entirely made of flexible sheet material. This means that it is free of any holding sticks, cups or straws. The balloon therefore does not have to show any attachment means for the attachment of a detachable holding stick, cup or straw to the balloon.

Claims

1. An inflatable non-latex balloon comprising at least two balloon sheets sealed to one another along a peripheral edge to form an inflatable body and an inflatable stem each having an interior, the inflatable stem being in fluid communication with the body and having a proximal end by means of which it is connected to the body, **characterised in that** the stem comprises a handle portion and a proximal portion, the handle portion showing a longitudinal axis and having, in an uninflated flat state of the balloon, an inner width comprised between 30 and 80 mm and a length of at least 80 mm, and the proximal portion of the stem widening in such a manner towards the body that, when holding the balloon in its inflated state by the handle portion so that said longitudinal axis of the stem extends in a vertical direction, the body of the balloon returns to one single stable position after having bent the balloon in a transverse direction perpendicular to the direction of said longitudinal axis.
2. A balloon according to claim 1, **characterised in that** said proximal portion of the stem overlaps said handle portion at least partially.
3. A balloon according to claim 1 or 2, **characterised in that**, in the uninflated flat state of the balloon, the interior of the proximal portion of the stem has two side edges each defining a side edge curve which is situated over at least a part of the proximal portion between two curves which are defined in an orthogonal axe system having an X axis coinciding with said longitudinal axis and an Y axis perpendicular thereto by the formulae:

$$y = 1.1 \left(a e^{-\frac{x^2}{2b^2}} + c \right) \text{ and } y = 0.9 \left(a e^{-\frac{x^2}{2b^2}} + c \right);$$

wherein:

x is the position on the longitudinal or X axis in mm
y is the position on the Y axis in mm
 $a \geq c$
 $15 \leq c \leq 50$ and preferably ≤ 40

$$0.4 a \leq b \leq 1.4 a,$$

said part of the proximal portion extending for each edge of this proximal portion at least from $x = 1.1 b$ mm to $x = 2 b$ mm.

4. A balloon according to claim 3, **characterised in that** the two curves between which said side edge curve is situated over at least said part of the proximal portion of the stem are defined by the formulae: 10

$$y = 1.05 \left(a e^{-\frac{x^2}{2b^2}} + c \right) \text{ and } y = 0.95 \left(a e^{-\frac{x^2}{2b^2}} + c \right).$$

5. A balloon according to claim 3 or 4, **characterised in that** at least one of said side edge curves is a curve which undulates between said two curves. 15
6. A balloon according to any one of the claims 3 to 5, **characterised in that** at least one of said side edge curves defined by one of said side edges is defined over at least said part of the proximal portion of the stem substantially by the following formula: 20

$$y = a e^{-\frac{x^2}{2b^2}} + c.$$

7. A balloon according to any one of the claims 3 to 6, **characterised in that** said part of the proximal portion extends from $x = 0.9 b$ mm to $x = 2.5 b$ mm. 25
8. A balloon according to any one of the claims 3 to 7, **characterised in that** in said formulae $a \geq 2 c$. 30
9. A balloon according to any one of the claims 3 to 8, **characterised in that** in said formulae a is smaller than $13 c$, and preferably smaller than $10 c$. 35
10. A balloon according to any one of the claims 1 to 9, **characterised in that** the inner width of said handle portion is, in the uninflated flat state of the balloon, larger than or equal to 40 mm. 40
11. A balloon according to any one of the claims 1 to 10, **characterised in that** the inner width of said handle portion is, in the uninflated flat state of the balloon, smaller than or equal to 60 mm. 45
12. A balloon according to any one of the claims 1 to 11, **characterised in that** the length of the handle portion in the uninflated flat state of the balloon is smaller than 400 mm, preferably smaller than 300 mm. 50
13. A balloon according to any one of the claims 1 to 12, **characterised in that** the length of the handle 55

portion in the uninflated flat state of the balloon is larger than 100 mm, preferably larger than 140 mm

14. A balloon according to any one of the claims 1 to 13, **characterised in that** the balloon is provided with a self-sealing valve arranged for inflating the balloon, which self-sealing valve is situated within the stem, and has preferably an inflation opening situated at the distal extremity of the stem.
15. A balloon according to any one of the claims 1 to 14, **characterised in that** the balloon is made entirely of flexible sheet material.
16. A balloon according to any one of the claims 1 to 15, **characterised in that** the balloon is free of any holding sticks or straws and is further also free of any attachment means for the attachment of a detachable holding stick, cup or straw to the balloon.

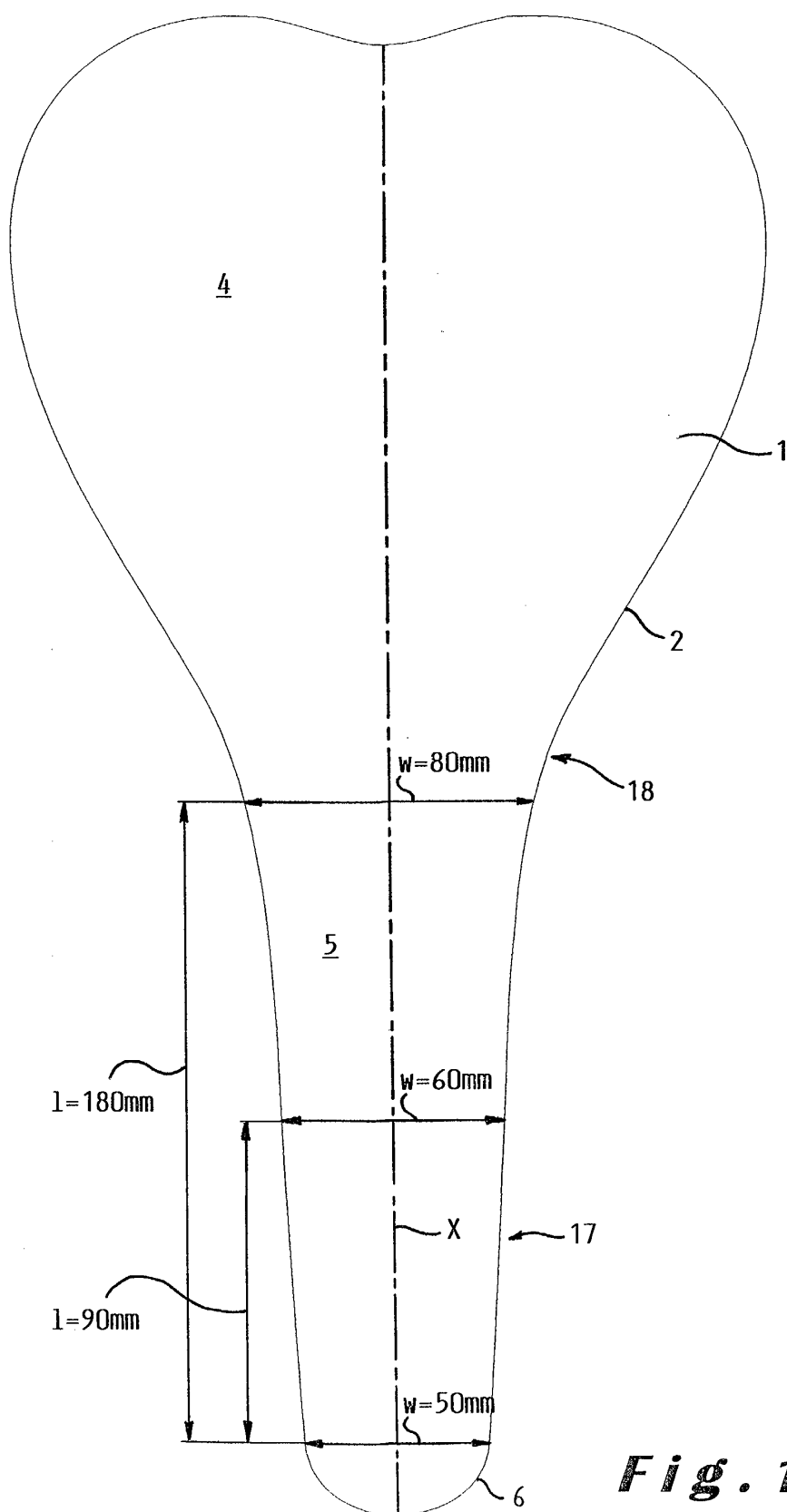


Fig. 1

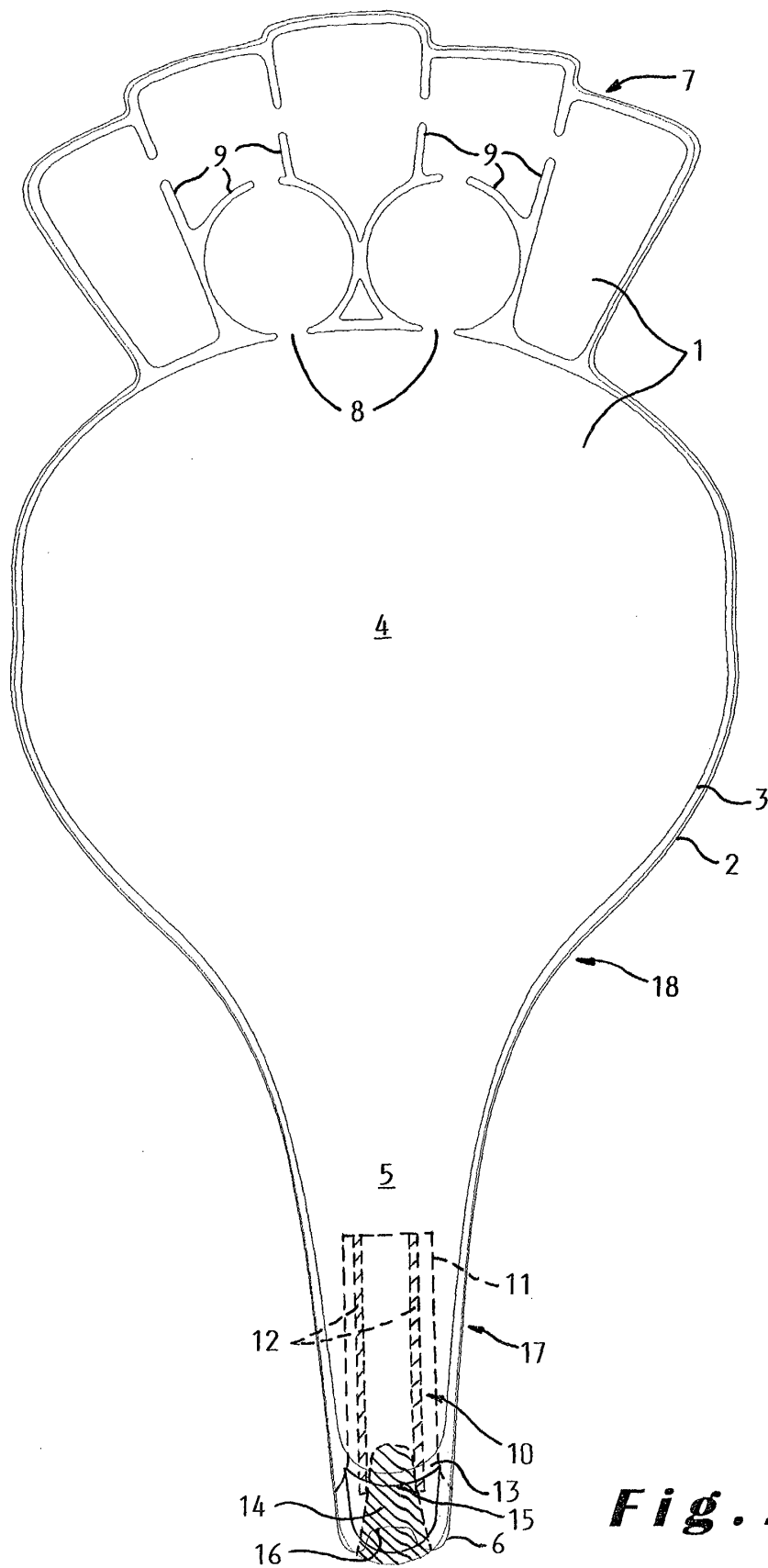


Fig. 2

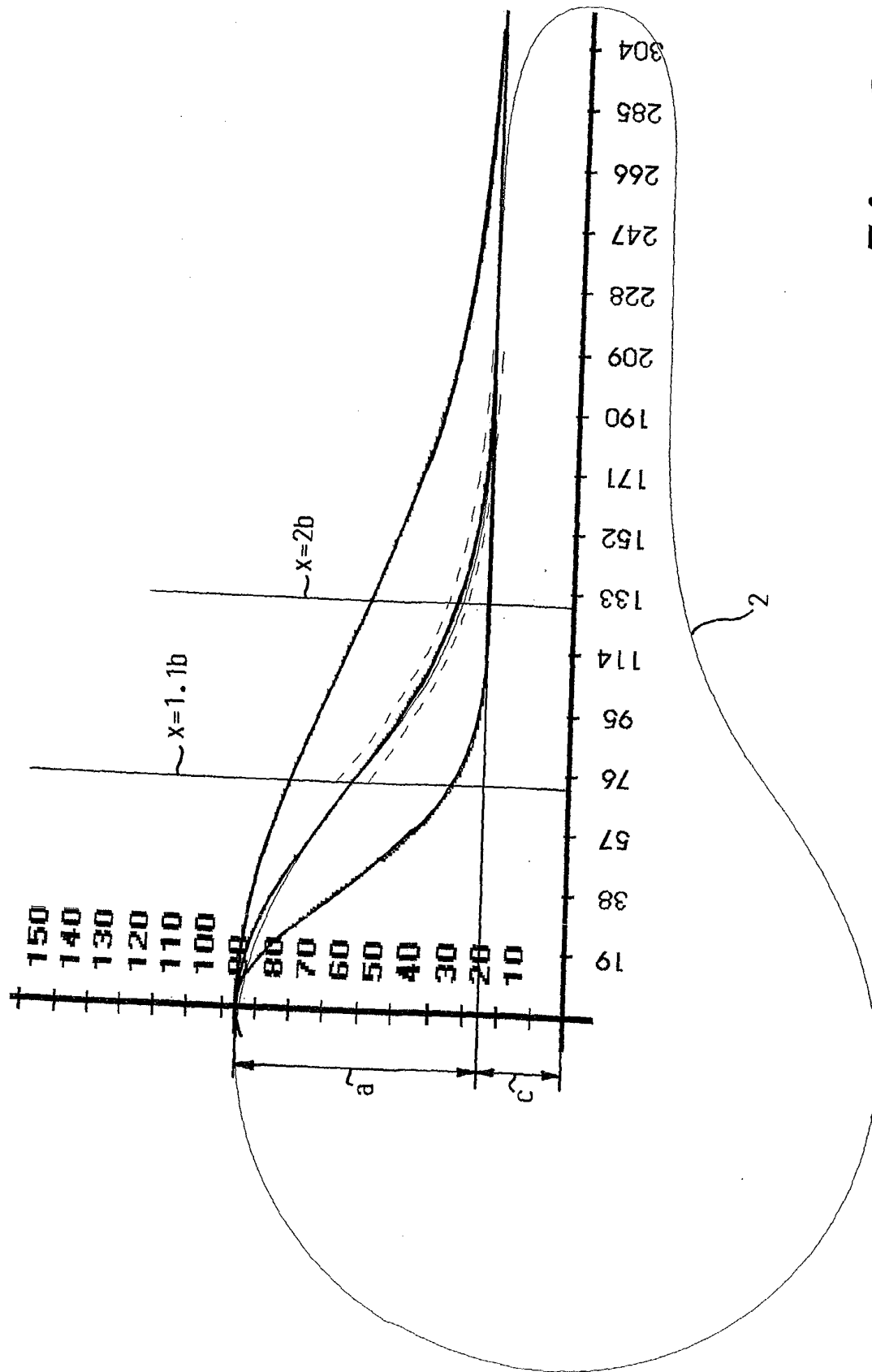


Fig. 3

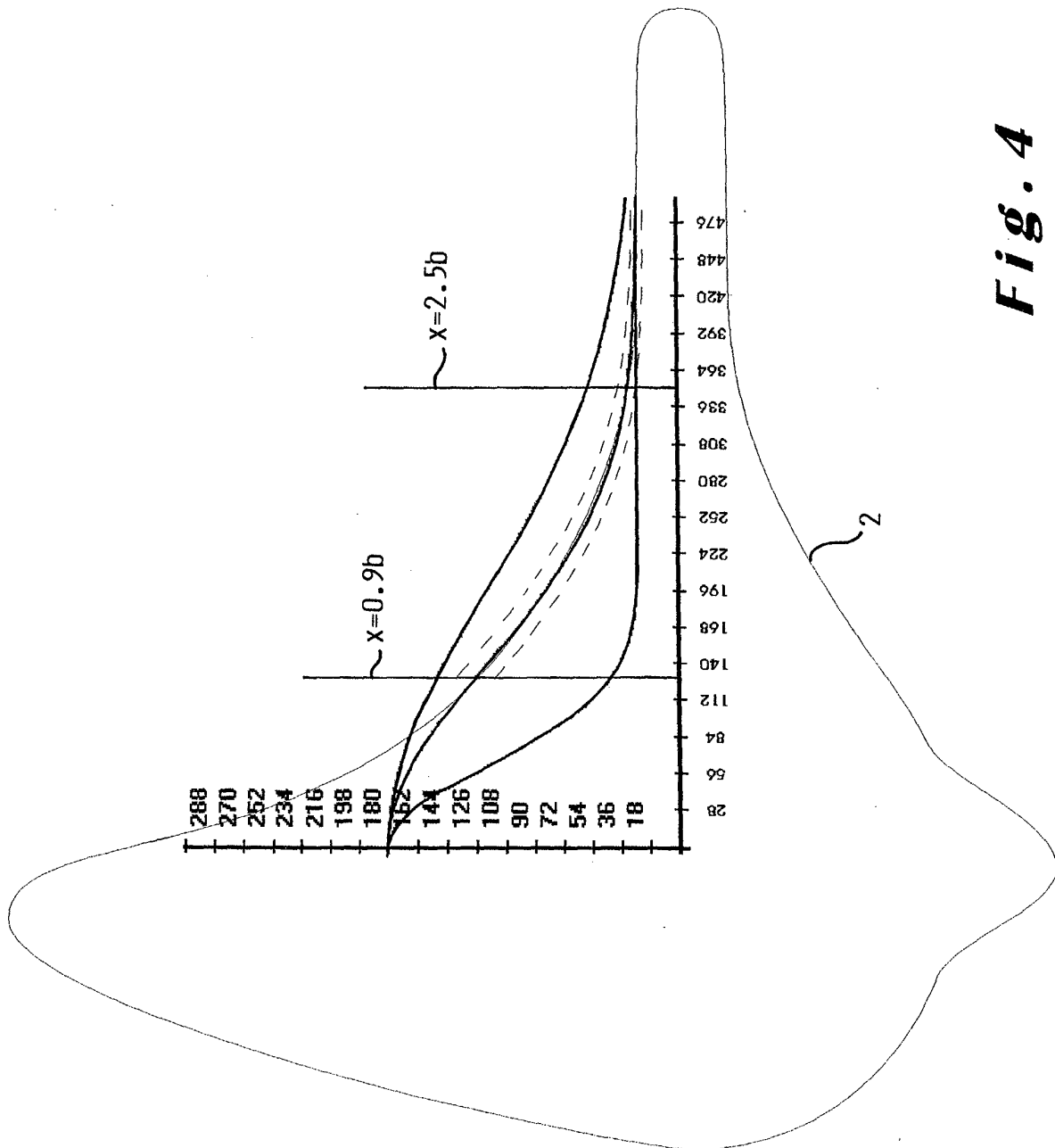


Fig. 4



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EUROPEAN SEARCH REPORT

Application Number
EP 03 44 7006

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	US 6 042 448 A (LITTLEHORN MICHAEL J) 28 March 2000 (2000-03-28) * column 3, line 46 - column 4, line 57; figures *	1,2, 11-16	A63H27/10
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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
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Place of search MUNICH		Date of completion of the search 12 March 2003	Examiner Lucas, P
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 03 44 7006

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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