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(71) Applicant: **Richardson, Kenneth**
Box 11 Site 14 R.R. 4
Edmonton Alberta T5E 5S7(CA)

(72) Inventor: **Richardson, Kenneth**
Box 11 Site 14 R.R. 4
Edmonton Alberta T5E 5S7(CA)

(74) Representative: **Cheyne, John Robert Alexander**
Mackenzie European Patent Attorney et al,
Haseltine Lake & Co. Hazlitt House 28 Southampton Buildings Chancery Lane
London WC2A 1AT(GB)

(54) Multi-use cushioning device usable, for example, as a trampoline.

(57) A cushioning device in the form of a trampoline includes a hollow inflatable annulus (20; 20') extending about an axis (30) and defining respective end planes (32, 34) generally normal to said axis (30), whereby the annulus (20; 20') can be supported on a horizontal surface in one of said planes (34) with its said axis (30) generally upright. The annulus is enclosed by a net (26; 26') which provides an exercise surface extending across at least part of the central opening of the annulus in the other of the said planes (32). The device also includes means (28; 40; 42; 52; 28') for limiting inward expansion of the annulus. The annulus (20; 20') is capable of resiliently cushioning impacts resulting from a person jumping on said surface, and of causing the surface to rebound subsequent to each impact.

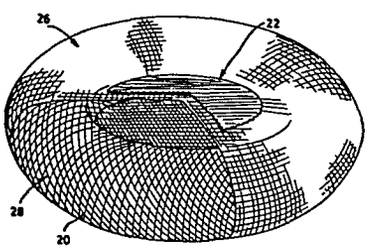

FIG. 1

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TITLE MODIFIED
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CUSHIONING DEVICE

This invention relates to a cushioning device intended primarily (but not exclusively) for use as a trampoline.

Traditionally, a trampoline comprises a relatively large rectangular sheet of canvas or the like supported by springs from a rigid rectangular frame having support legs at its corners. The canvas sheet provides a relatively large exercise area, allowing the trampoline to be used for gymnastic exercises. The beneficial effects of trampoline exercising have long been recognized, but generally a high degree of skill and physical fitness is required for a person to be able to effectively use a trampoline. It has also been recognized that relatively simple bouncing exercises on a trampoline can nevertheless form an effective part of body toning programmes.

Small circular trampolines have been proposed for use by individuals following a body toning programme. These trampolines have a rigid circular frame of relatively small diameter (four or five feet) from which a circular sheet of canvas or the like is suspended by springs. Des-

pite their relatively small size, these trampolines are still quite cumbersome and are not readily portable.

An object of the present invention is to provide an improved cushioning device which, according to one embodiment of the invention, takes the form of a trampoline designed primarily for use by an individual in performing bouncing or jumping exercises.

The trampoline provided in accordance with this preferred embodiment includes a hollow inflatable annulus extending about an axis and defining respective end planes generally normal to said axis, whereby the annulus can be supported on a horizontal surface in one of said planes with its said axis generally upright. Means supported by said annulus and providing an exercise surface extends across at least part of the central opening of the annulus at a spacing from said one plane. The annulus is capable of resiliently cushioning impacts resulting from a person jumping on said surface, and of causing said surface to rebound subsequent to each impact.

According to an alternative embodiment of the invention, the device may be used as a seating unit.

More broadly, the invention provides a cushioning device which includes a hollow inflatable annulus of the form defined above.

A primary advantage of a cushioning device of the form provided by the invention is that it can be made readily collapsible by deflating the annulus for ease of transportation and storage. Also, the degree of cushioning provided can be controlled by inflating the annulus to an appropriate extent.

In order that the invention may be more clearly understood, reference will now be made to the accompanying drawings which illustrate a number of preferred embodiments of the invention by way of example, and in which:

Fig. 1 is a perspective view, partly broken away, of a cushioning device inteneded for use as a trampoline according to a preferred embodiment of the invention;

Fig. 2 is a plan view corresponding to Fig. 1;

Fig. 3 is a sectional view on line III-III of Fig. 2;

Fig. 4 is a plan view corresponding to Fig. 2 but with the mat of the trampoline removed;

Fig. 5 is a sectional view on line V-V of Fig. 4; and,

Figs. 6 to 20 illustrate alternative embodiments of the invention and will be more particularly described later.

Reference will first be made to Figs. 1 to 5 in describing a trampoline provided in accordance with a preferred embodiment of the invention. The trampoline includes a hollow inflatable annulus denoted 20 which supports two mats 22 and 24 providing respective exercise surfaces of the trampoline. In Figs. 4 and 5, the mats have been omitted in order to show details of an outer nylon net indicated at 26 (by which the mats are supported), and an inner net 28 of annular form which closely surrounds the annulus and provides means for limiting radial expansion of the cross-section of annulus 20 (see later).

Referring primarily to Figs. 2 and 3, it will be seen that annulus 20 extends about an axis 30 and defines a respective end planes 32 and 34 generally normal to the axis. The annulus can be supported on a surface coincident with either one of the planes 32 or 34 and with axis 30 generally upright. In other words, the annulus is reversible and can lie on either side with its opening facing upwardly. Two mats are provided so that the trampoline can be used either way up. The two mats may have different surface characteristics. For example, mat 22 could be a plain mat while mat 24 might have an outer (exercise) surface covered with an array of small protuberances designed to exert a "massaging" effect on the feet of the person using the trampo-

line. However, in this particular embodiment, the two mats are the same and are both formed from interwoven polypropylene fibres. The mats are both secured to the supporting outer net 26 by adhesive, although other fastening methods may be used (see later).

A mat made of woven polypropylene fibres has been found to be particularly suitable in this embodiment of the invention because it is pervious to air. Thus, the particular trampoline shown is designed to use a relatively large diameter mat (as compared with the diameter of annulus 20) and to permit air to pass through the mat as it moves up and down in use. If the mat were not pervious to air, a "piston" effect would occur and the air trapped below the mat would severely inhibit up and down movement of the mat. Of course, in an alternative embodiment, the trampoline could be designed to use an air-impervious mat, for example, by making the mat smaller or by providing a support for the annulus which would allow air to escape outwardly around the bottom of the annulus.

The annulus itself is capable of resiliently cushioning impacts resulting from a person jumping on either of the mats 22 and 24 and of causing the relevant mats to rebound subsequent to each impact. In this embodiment, the annulus is made of butyl rubber and has an outside diameter of 44 inches and an inside diameter of

24 inches. The annulus is of circular cross-section of 10 inches diameter. In Fig. 2 a valve for inflating the annulus is indicated at 36. In another embodiment, the valve could be designed to be stowed within the annulus or otherwise disguised, for example, in a carrying handle at the external diameter of the annulus. It is preferable for the annulus to be inflatable and deflatable so that the trampoline can be collapsed for ease of transportation and storage, although within the broad scope of the invention, the annulus could of course be permanently inflated.

Referring now primarily to Figs. 4 and 5, the two nets 26 and 28 are made of nylon filaments fused together in a criss-cross configuration defining squares with 1 inch sides. Parts only of the two nets are shown in Fig. 4 for ease of illustration but in fact both nets are complete as shown in Fig. 1. Net 26 completely encloses the annulus and is fitted relatively tightly therearound. It is formed from an appropriate length of net which is seamed into a tube with and one end of which is closed by tying the net. The net is then draped over the annulus and the other end of the tube is tied to a retaining ring indicated at 38 in Fig. 4. The annulus can then be inflated until the required tension is obtained in net 26. Finally, the two mats 22 and 24 are secured to the respective sides of the outer net.

The inner net 28 is of annular form and is shaped to closely fit around and enclose the annulus itself. The net is formed around the annulus into a tube by wrapping a generally annular shaped net section around the annulus and securing together the inner and outer circular edges of the annular net around the inner diameter of annulus 20. This can be done by securing the edges together using suitable adhesive or by providing buttons or other projections on one edge which are engaged through the net along the opposite edge. In any event, the inner net 28 fits snugly around the annulus and has the effect of limiting radial expansion of the cross-section of the annulus; that is, the dimension indicated by arrow D in Fig. 5.

In practice, it has been found preferable to provide some means such as net 28 for restricting inward radial expansion of the annulus (that is, expansion which would have the effect of reducing the internal diameter of the annulus) while the annulus is being inflated. Such expansion would have the effect of closing the central opening of the annulus and thereby reducing the area which will be available for bouncing. Thus, when the annulus expands during inflation, it will eventually begin to tension the outer net and in fact the intention is that the annulus will be inflated until the outer net is tensioned to the extent appropriate for the required character-

istics of the trampoline. Typically, the internal pressure of the annulus might be in the range 4 pounds to 9 pounds per square inch but this will depend on the resiliency of the material from which the annulus is made and on the personal preference of the user. In any event, as the annulus begins to tension the outer net, the resistance provided by that net will have the effect of tending to cause the annulus to expand inwardly as inflation continues.

It may be possible to limit inward expansion of the annulus by using a specially designed annulus, for example, one which has walls which are thicker around the internal circumference of the annulus than around the outer circumference. However, this form of annulus may be expensive to manufacture and, for this reason, it may be preferred to use an annulus having uniform wall thickness. Inward radial expansion could then be controlled by a rigid inner "hub" inside the annulus (see Figs. 9 and 10) but this has the disadvantage that the annulus is not then completely collapsible. Another possibility would be to provide rigid rings extending around the end circumference of the annulus, but again the problem of non-collapsibility remains.

It has been found preferable to control inward radial expansion of the annulus by limiting radial expansion of the annulus cross-section (dimension D in Fig. 5)

such as the inner net 28. In this way, it has also been found possible to exercise some control over the "bounce" provided by the trampoline and prevent it from becoming too soft. Thus, it may not be possible to control the resiliency and "bounce" of the trampoline entirely by varying the inflation pressure of annulus 20. If the pressure is increased to reduce the resiliency, the trampoline becomes "hard" and "lifeless". Conversely, if the pressure is reduced too far the annulus becomes too soft and the trampoline may tend to "throw" a person who jumps anywhere but directly in the centre of the trampoline; in other words, the trampoline becomes unstable.

Net 28 has been found to provide a particularly expedient means for limiting inward expansion of annulus 20 but other means may alternatively be used; examples of such other means will now be described with reference to Figs. 6 to 10.

Figs. 6, 7 and 9 are plan views showing three alternative means which may be employed to prevent inward radial expansion of the annulus of a cushioning device of the form provided by the invention. Figs. 8 and 10 are cross-sectional views taken respectively on lines VIII-VIII of Figs. 7 and on line X-X of Fig. 9.

In each of Figs. 6 to 10, the annulus itself is generally denoted by reference numeral 20. In the

embodiment of Fig. 6, the annulus is wrapped by straps 40 of a material capable of stretching in one direction only (for example, a knitted material having inextensible filaments extending in one direction). The material is arranged so that the straps 40 are inextensible in the direction extending circumferentially around the cross-section of the annulus but can stretch in the circumferential direction of the annulus. In this way, the annulus can grow radially outwardly while the cross-section of the annulus remains substantially constant. The straps 40 may be formed from a continuous length of material spirally wound around the annulus or individual straps may be used.

It will of course be understood that an outer net or other expedient will be used externally of the straps 40 but has been omitted for clarity of illustration.

Referring now to Figs. 7 and 8, in this embodiment expansion of the cross-section of the annulus is controlled by a "glove" generally denoted by reference numeral 42. This glove is made of a material which is substantially inextensible and is shaped to enclose annulus 20. The glove is formed with a series of slits or openings, some of which are indicated at 44, which allows the glove to have an external circumferential dimension greater than its internal circumferential dimension sufficient to fit snugly around annulus 20. For ease of

illustration, only some of the slits 44 have been shown in Fig. 7 but it will of course be understood that the slits will extend right around the glove. A zip fastener 46 extends around the inner circumference of glove 42 and provides a means by which the glove may be fitted to and removed from the annulus. In other embodiments, zip fastener 46 could of course be replaced by snaps or other fasteners.

Figs. 7 and 8 also illustrate an alternative method by which the nets providing exercise surfaces may be supported from annulus 20. While this feature has been specifically illustrated in conjunction with the glove 42, it is to be understood that it may be used with other forms of inner expansion control means. In this embodiment, only one mat is shown and is indicated by reference numeral 48. The mat is supported by a plurality of straps 50 each of which has an inner end sewn to mat 48 and which extends radially outwardly of mat 48 and around annulus 20. At the underside of the annulus as seen in Fig. 7, the straps may be sewn to a second similar mat or to some other form of anchoring means. Alternatively, the straps could extend right around below the annulus and be attached to mat 48 at the opposite ends. In the particular embodiment illustrated in Fig. 7, it is to be noted that the straps 50 are specifically positioned over the slits 48 in the glove 42 so

that annulus 20 can to some extent expand through the slits and act directly on the straps 50 for tensioning mat 48.

Figs. 9 and 10 illustrate a further alternative embodiment in which inward radial expansion of annulus 20 is prevented by a rigid inner hub 52 around which the annulus extends. It will be noted from Fig. 10 that the hub 52 is of arcuate shape in cross-section so as to conform generally to the curvature of annulus 20. The annulus is merely placed around the hub and inflated and is not secured to the hub.

The particular form of the trampoline provided by the invention has many advantages compared with prior art trampolines including collapsibility and ready portability. The characteristics of the trampoline can be readily varied at will by varying inflation of the annulus. In addition, it has been found in practice that the trampoline provides a "ride" which is particularly pleasing. Not only does the inflated annulus provide cushioning but the particular design of the trampoline provides for added resiliency which has been found to give the user a "floating" feeling and be particularly useful in body toning exercises. Referring particularly to Fig. 3, it will be appreciated that an impact downwardly in the direction of arrow A on to mat 22 will have the effect not only of partially compressing the annulus, but the tension forces engendered in

the upper surface of the outer net 26 at the time of impact, will cause the annulus 20 to tend to "roll" inwardly as indicated by arrow B. In other words, the annulus will not only be compressed axially, but will also be torsionally stressed or "rolled" inwardly which will have an additional effect on the "bounce" of the trampoline. When the user reaches the bottom of the bounce both the air pressure within the annulus and the resilient nature of the walls of the annulus will cause the components of the trampoline to tend to restore towards their original conditions providing for a rebound effect on the user.

Reference will now be made to Figs. 11 to 15 in describing further features of the invention. Fig. 11 is a perspective view of a stand which may be used in conjunction with a cushioning device of the form provided by the invention; in Figs. 12 and 13, the device and stand are shown in use together forming a seating unit, while in Figs. 14 and 15 the stand is used as a support during use of the cushioning device as a trampoline. In each of Figs. 12 to 15, the cushioning device is generally indicated by reference numeral 54 and the stand is denoted as 58.

Referring first to Fig. 11, the stand has a three-legged form generally similar to an easel and comprising a front frame 58 which is generally of inverted U-shape and which defines the two front legs of the stand. A third,

telescopic leg extends downwardly from the top of frame 58 and is denoted 60. Hand grips 62 are provided on either side of the point of attachment of leg 60 to frame 58. These hand grips may be omitted where the stand is used solely as part of a seating unit. A nylon cord 64 is secured between the legs of the stand for controlling their spread. Two short arms 66 and 68 protrude forwardly from the respective legs of frame 58 and a sling 70 extends between the arms and forms a support for the cushioning device 54 as best shown in Figs. 12 and 13. In the embodiment of Figs. 14 and 15, these arms 66 and 68 and slings 70 are omitted.

Referring to Figs. 12 and 13, it will be seen that the cushioning device 54 is supported on sling 70 against the legs of frame 58. The cushioning device itself is essentially of similar form to the device as shown in Figs. 1 to 5 in that it comprises an annulus 20, an outer net 26, and an inner net 28. The device has an inner mat 22 only and the device is placed so that the mat 22 is disposed at the side of the device which is in contact with stand 56. The portion of the outer net 26 at the opposite side of the device is relaxed and hangs loosely inside the space at the centre of annulus 20 and is indicated by reference numeral 26a in Fig. 13. This relaxed portion of the net provides a "pocket" in which a person

can sit, whereby the cushioning device and stand form a seating unit.

Relaxation of the outer portion 26a of net 26 is possible because a tension control band indicated at 72 is incorporated in the outer net. This band takes the form of a wire or cord woven into the outer net and tightened about annulus 20 so that the portion of net 26 which carries mat 22 cannot pull around the annulus while the outer portion 26a can be relaxed. Tension in this outer portion of the net is released by detaching the net from the retaining ring 38 (Fig. 4). In this embodiment, the ring will take the form of a length of cord or rope which can be simply released to relax the outer portion of the net.

Figs. 14 and 15 are side and plan views respectively showing the stand 56 (without the arms 66 and 68 or sling 70) in association with a trampoline 54 of the form provided by the invention. The trampoline is placed between the two front legs of the stand and the person using the trampoline can grasp the stand at the position of the hand grips 62 and use the stand as a support. It is thought that this facility of using the stand as a support will be particularly useful for people learning to use the trampoline or for people having a physical disability. For example, the stand/trampoline combination could be

used as a rehabilitation apparatus for people recovering from injuries.

Reference will now be made to Figs. 16 to 20 in describing a trampoline manufactured in accordance with a particular preferred embodiment of the invention. Figs. 19 and 20 are perspective views from above and below respectively of the finished trampoline, while Figs. 16, 17 and 18 illustrate the construction of the trampoline. Primed reference numerals have been used in these views to denote parts which correspond with parts shown in previous views.

The trampoline includes an inflatable rubber annulus 20' which is enclosed within an inner net 28' (Fig. 16). A valve for inflating annulus 20' is shown protruding through the inner net at 36'. The trampoline also includes an outer net 26' which is not shown in Figs. 16 and 17. These views do, however, show a cover 80 which is fitted over the inner net 28' and which is enclosed by the outer net in the finished trampoline. Cover 80 is not an essential component of the trampoline but does have the advantage that it allows the two nets to move relative to one another but without interference when the trampoline is in use. Also, the cover conceals the inner net and annulus, which may be desirable aesthetically. In this particular embodiment, the cover also incorporates a foam pad (to be described) but again this is optional.

The two nets 26' and 28' are made of nylon filaments arranged in a criss-cross (diamond) configuration. Typically the nets are of the type known as knotless nylon nets made by knitting on a raschel machine (see U.S. Patents Nos. 2,992,550, 3,171,272 and 3,200,619). In this case, the inner net 28' is one inch mesh size while the outer net is 1/2 inch mesh size; where cover 80 is omitted, the inner net may also be 1/2 inch mesh size. Both nets are formed from flat sections of net as will be described; the diamond configuration of the mesh allows the nets to expand and fit closely around the annulus. In the case of the inner net 28', a flat net section of the appropriate size is wrapped around the annulus 20' (i.e. into a generally torrodial configuration) and the longitudinal margins of the section are brought together as best seen in Fig. 17 to form a seam 82 extending around the inner circumference of the annulus with the relevant marginal portions of the section in face-to-face relationship. These portions of the section are then chain stitched together by a nylon cord 84 to complete the seam. The ends of the cord (not shown) are then tied and fused. An elastic cord 86 is provided inside net 28' and extends around the inner circumference of the annulus just inwardly of seam 82. This cord assists in maintaining proper orientation of the inner net.

Referring back to Fig. 16, the end portions of the torrodially shaped net are then brought together and bound generally in abutting relationship by a further cord 88 to form a seam 90 which extends around the cross-section of the annulus. Again, the ends of the cord 88 are tied and fused to permanently secure the net about the annulus.

Of course, the section from which the inner net is formed must be properly dimensioned to ensure that the net fits snugly around the annulus when the annulus has been inflated to the required extent (e.g. not more than 12 p.s.i. internal pressure).

Fig. 17 also shows the cover 80. The cover extends around the outer circumferential portion of annulus 20 as best seen in Fig. 16 and covers slightly more than half of the circumferential surface of the annulus. The cover is made from a stretch fabric (e.g. a fabric made from Lycra (TM) yarn) and incorporates elastic cords 92 and 94 which assist in retaining the cover snugly on the annulus. The fabric is arranged to define a pocket 96 extending around approximately the upper half of cover 80 and the pocket receives a foam pad 98 which provides additional cushioning on the annulus. Lines of stitching through the fabric are indicated at 100 and 102 in Fig. 17 and at 104 in Fig. 16. Stitching 104 effectively defines

the ends of pocket 96 and the foam pad 98 extends substantially to the ends of the pocket.

As indicated above, the cover 80 is itself optional; similarly, where a cover is provided, the pocket 96 and foam pad 98 are optional.

Referring now to Figs. 18 to 20, the outer net 26' is made up of two generally rectangular net sections 106 and 108. In assembling the trampoline, the two sections are arranged in a crossed configuration one above the other generally as shown in Fig. 18 and are draped downwardly over the assembly comprising the annulus, together with the inner net 28' and the cover 80; this assembly is denoted 110 in Fig. 18. The sections 106 and 108 are dimensioned so that the width of each section corresponds approximately to the diameter of the assembly 110. A foam pad 112 may optionally be placed between the two sections either before or after they have been draped over the assembly 110. In any event, with the sections draped over the assembly, the end portions of the sections are brought around below assembly 110 and adjacent side edges of the respective sections are bound together with cord as indicated 114 in Figs. 19 and 20. Fig. 20 shows the trampoline turned upside down with respect to Fig. 19 and with the cords 114 in place. The cords are simply looped through the mesh of the net and tied and fused at their

ends.

The end edges of the sections 106 and 108 are then drawn together generally adjacent the inner circumference of the annulus and a further, single cord denoted 116 is threaded through the mesh in a generally circular path and knotted to form a circular tie as can best be seen in Fig. 20. By adjusting the length of the circular portion of this cord, it is possible to adjust the maximum diameter to which the annulus 20' can be inflated, and hence the characteristics of the trampoline.

It will be understood that, in practice, the net sections 106 and 108 will probably not be placed over the annulus and then bound together as described but will be assembled separately from the annulus, probably even including cord 116. The outer net will then be draped over the assembly 110 (Fig. 18) and the cord 116 set to the required diameter before the annulus is inflated, or at least before it has been fully inflated.

It will of course be appreciated that the preceding description relates to specific embodiments of the invention and that many modifications are possible within the broad scope of the invention (in addition to or instead of the modifications referred to above). For example, the particular materials and dimensions referred to are given merely by way of example and may vary in practice. The

annulus may be made of any appropriate material having a resilient memory. In the embodiments described with reference to the drawings, the cushioning device is referred to as having two mats (22 and 24) and reference is also made to the possibility of using a single mat only. In another embodiment, the mats could be omitted entirely (for example, where the cushioning device is to be used as part of a seating unit). Where the mats are omitted and the device is to be used as a trampoline, the outer net or equivalent may itself provide the exercise surface(s) of the trampoline. Where one or more mats are provided, they need not be necessarily secured to the outer net by adhesive as described above. Each mat could in fact be made as two layers positioned on respect of the opposite sides of the outer net and stitched together through the net. Another possibility would be to clip the mat onto the net; in this event, the mat could be designed to be reversible. Where a single mat is provided, it may be desirable to provide a movement control band such as that indicated in ghost outline at 74 in Fig. 3 to prevent the annulus "rolling" inside out when the top mat (22) is subjected to impacts in the direction of arrow A. This movement control band may simply take the form of a substantially inextensible cord or rope woven into the inner net 28.

In describing Fig. 2, reference was made to a

valve 36 for inflating the annulus. It will of course be understood that the position of the valve may vary. Where the annulus is completely enclosed in an open woven material, the valve can be placed on the outer circumference of the annulus. Alternatively, if access is available to the inner circumference of the annulus, the valve may be placed on that circumference, for example, midway between the mats. In any event, the valve should be accessible so that the internal pressure of the annulus can be varied when the cushioning device is in use.

It should also be noted that reference in this application to an "annulus" is to be construed broadly as indicating generally a closed geometric figure. In other words, the "annulus" need not be strictly circular. For example, an oval annulus could be used or the annulus could have the general shape of a rectangle with rounded corners.

The device may be made available in a range of different sizes. For example, three typical sizes may be approximately 3', 5'5" and 10'6" nominal diameter when inflated to recommended pressures (e.g. 4-5 p.s.i. for larger sizes and up to 12 p.s.i. for smaller sizes). Overall size will of course vary with inflation pressure.

CLAIMS

1. A cushioning device in the form of a trampoline, characterized in that the device comprises:

hollow inflatable annulus (20; 20') extending about an axis (30) and defining respective end planes (32, 34) generally normal to said axis (30) whereby the annulus (20; 20') can be supported on a horizontal surface in one of said planes (34) with its said axis (30) generally upright;

means (26; 50; 26') supported by said annulus (20; 20') and including a first portion defining an exercise surface and extending across at least part of the central opening of the annulus (20; 20') generally in the other of said planes (32), and a second portion which is flexible and which extends around the annulus so that said exercise surface portion can be tensioned by varying the inflation pressure of the annulus (20; 20'); and,

means (28; 40; 42; 52; 28') limiting inward radial expansion of the annulus (20; 20')

the annulus (20; 20') being capable of resiliently cushioning impacts resulting from a person jumping on a said surface and of causing the said surface to rebound subsequent to each impact, and said means providing an exercise surface being adapted to permit movement of air

through the central opening of the annulus (20; 20') caused by depression and rebounding of said surface.

2. A device as claimed in claim 1, characterized in that said means providing an exercise surface comprises a net (26; 26') enclosing said annulus (20; 20') and extending across the central opening thereof in said end plane whereby said net (26; 26') can be tensioned to control rebounding of said surface by varying the inflation pressure of said annulus (20).

3. A device as claimed in claim 2, further comprising a mat (22) secured to said net (26) in one of said planes and defining said exercise surface.

4. A device as claimed in claim 3, characterized in that two said mats (22, 24) are provided and are secured to portions of said net (26) in each of said planes (32, 34).

5. A device as claimed in claim 3 or 4, characterized in that the or each said mat (32, 34) is pervious to air.

6. A device as claimed in claim 1, characterized in that said means limiting inward radial expansion of said annulus (20; 20') comprises a net (28; 28') of annular

form enclosing said annulus (20; 20') and dimensioned to closely fit said annulus (20; 20') when it has been inflated to a nominal size.

7. A device as claimed in claim 1, characterized in that said annulus (20; 20') is made of butyl rubber.

8. A device as claimed in claim 3, 4 or 5, characterized in that the or each said mat (22, 24) comprises interwoven polypropylene fibres.

9. A device as claimed in claim 2, characterized in that said net (26') comprises two generally rectangular net sections (106, 108) arranged in overlapping relationship and disposed generally mutually at right angles, overlapping portions of said sections (106, 108) defining said exercise surface, and remaining portions of said sections (106, 108) being drawn around the annulus (20; 20') and secured together at the side thereof opposite said surface by a common drawstring (116) which is adjustable to vary the effective size of the net (26') and hence the tension in the tread surface produced by inflating said annulus (20; 20').

10. A device as claimed in claim 2, characterized in that said means limiting inward radial expansion of the annulus (20') comprises a net (28') of annular form en-

closing said annulus (20') and dimensioned to closely fit said annulus (20') when it has been inflated to a normal size, and in that the device further comprises a cover (80) extending around said annular net (28') and enclosing at least portions of said net which would otherwise contact said net (26') enclosing the annulus (20').

11. The combination of a device (54) as claimed in claim 1 and an exercise stand (58) adapted to be used as a support by a person jumping on said device (54).

12. The combination of:

a cushioning device (54) comprising: a hollow inflatable annulus (20) extending about an axis and defining respective end planes generally normal to said axis;

a net (26) enclosing said annulus and extending across the central opening thereof in said end planes, said net including first and second portions in said respective planes, and wherein one of said portions is capable of being relaxed while the other portion remains tensioned; and,

a stand (58) capable of supporting said cushioning device (54) in an inclined position with said relaxed net portion at the outer side of the device, whereby the combination can be used as a seating unit.

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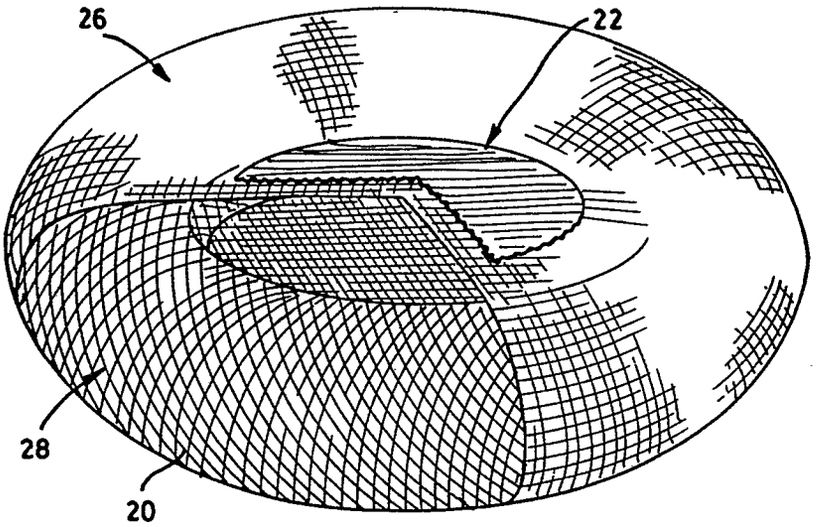

FIG. 1

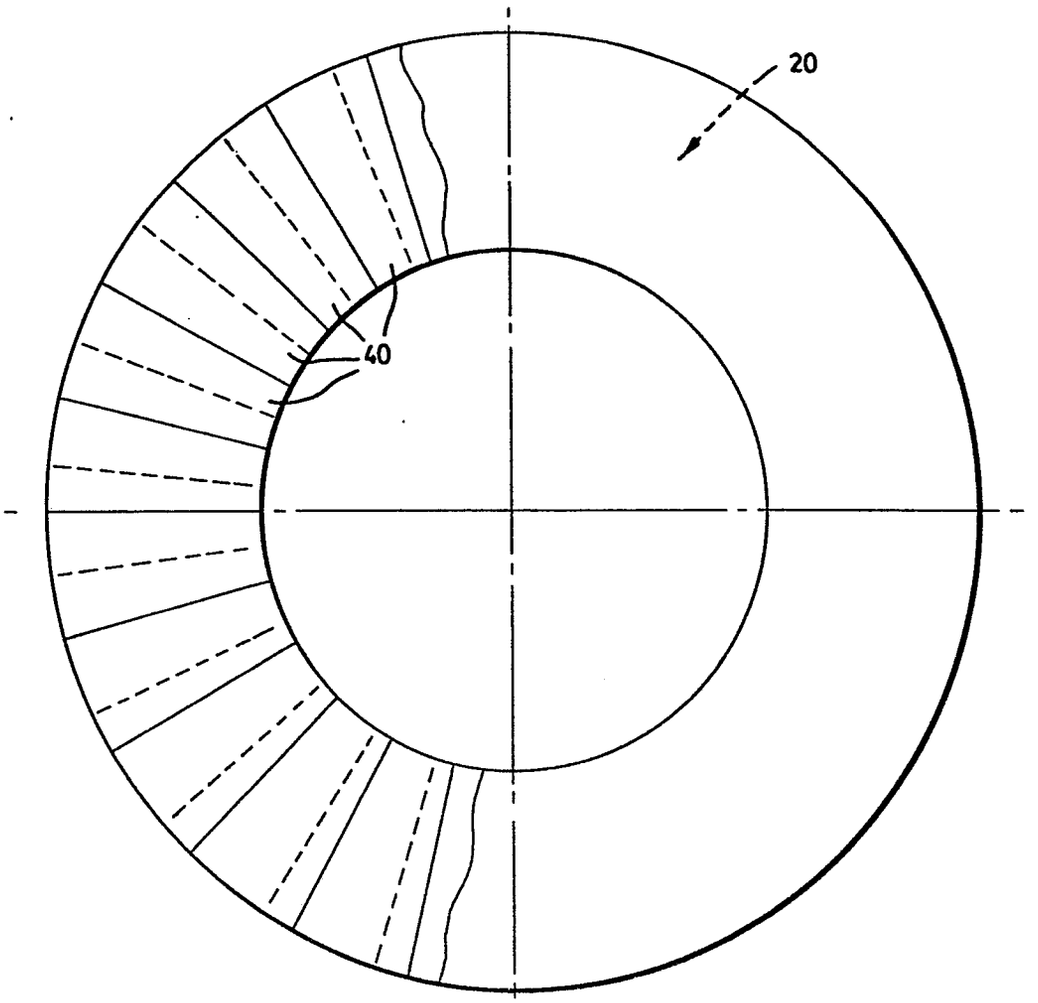

FIG. 6

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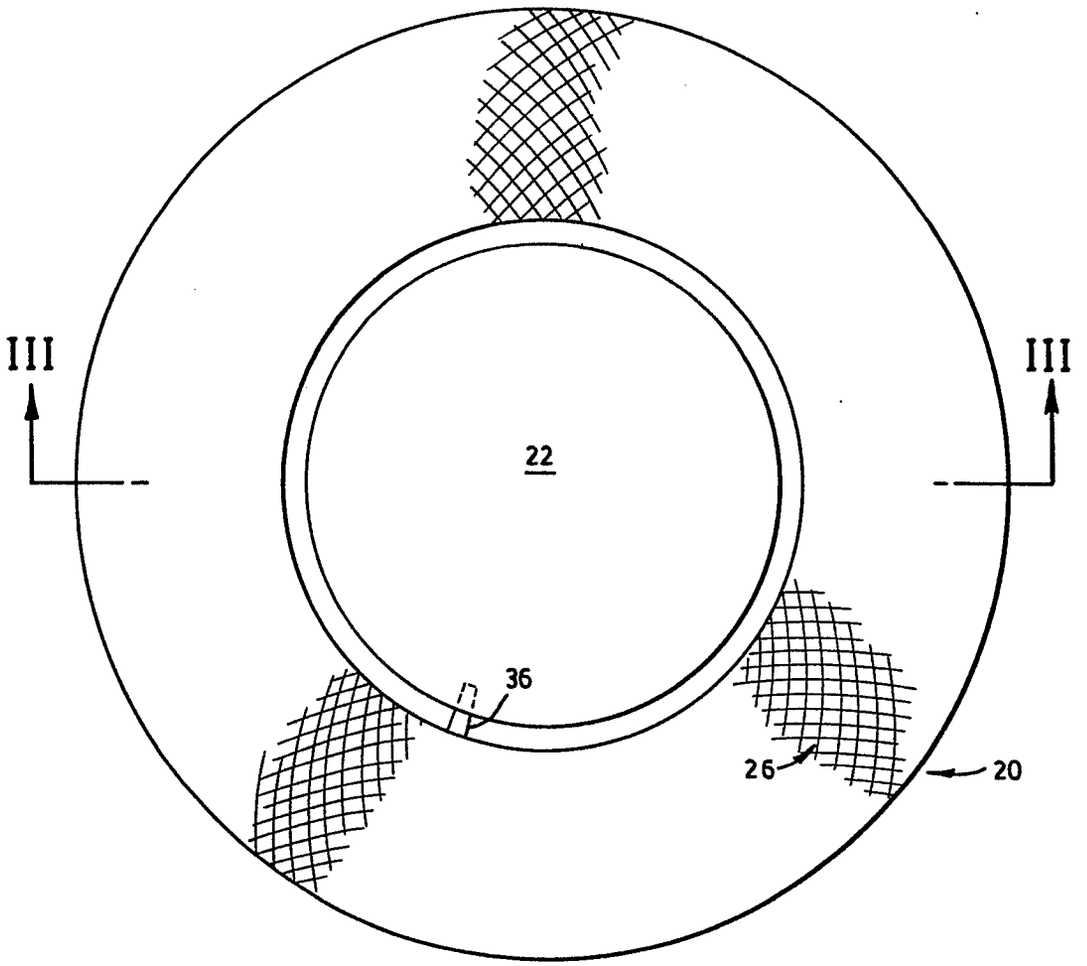

FIG. 2

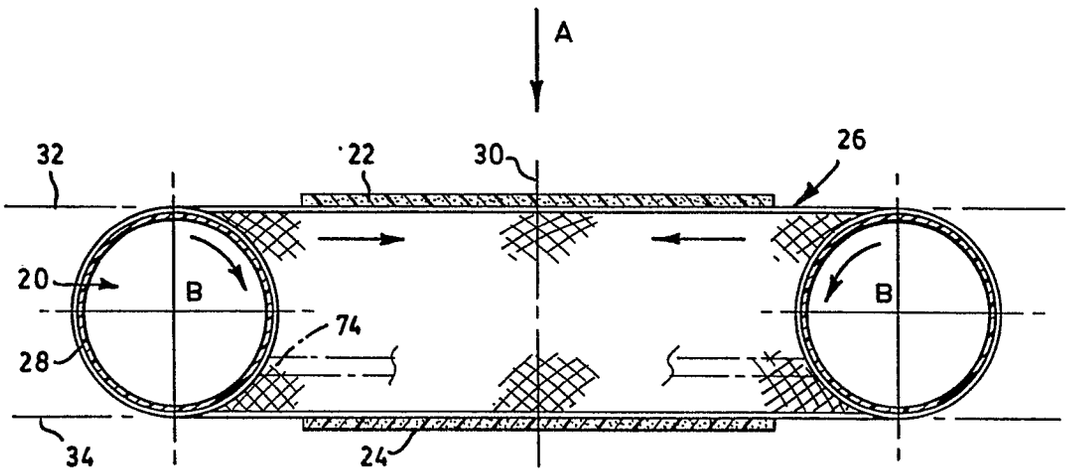

FIG. 3

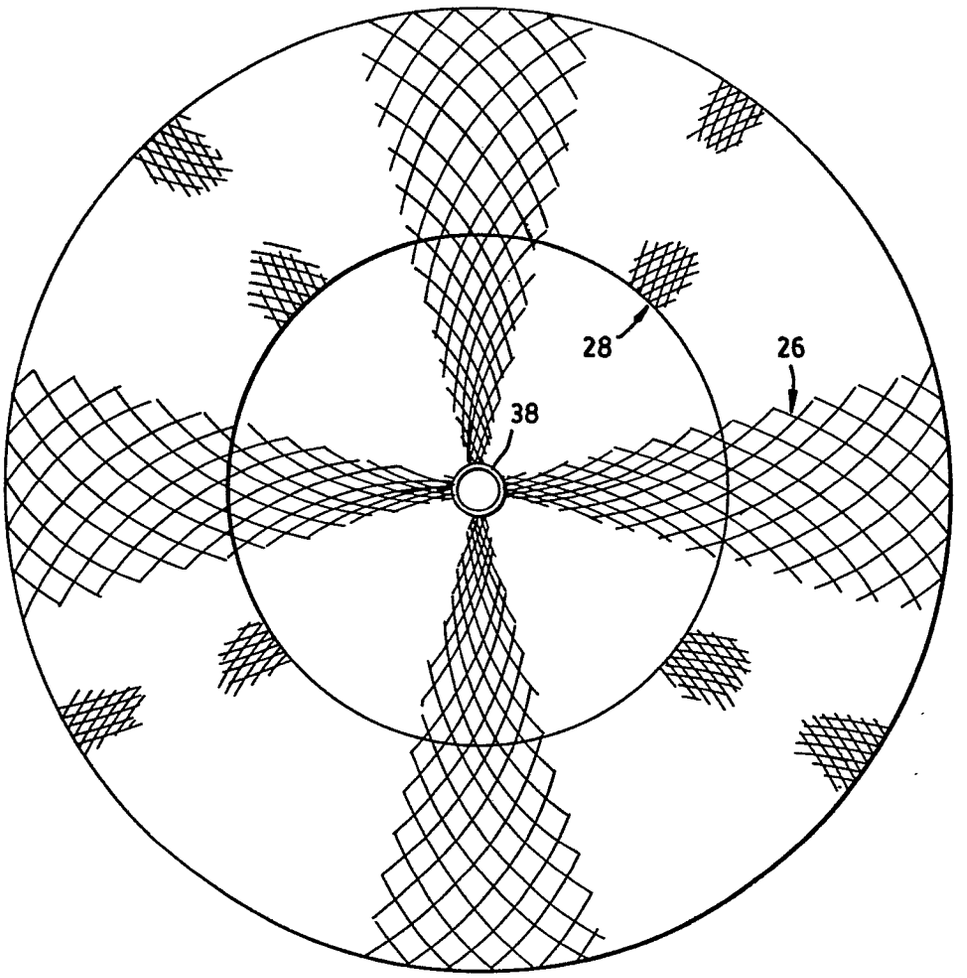

FIG. 4

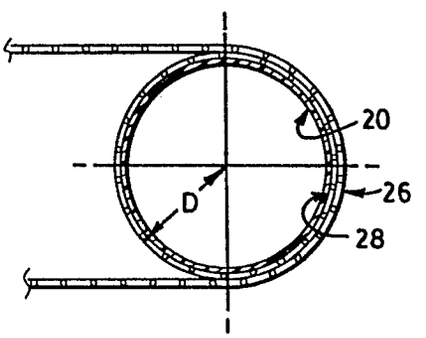

FIG. 5

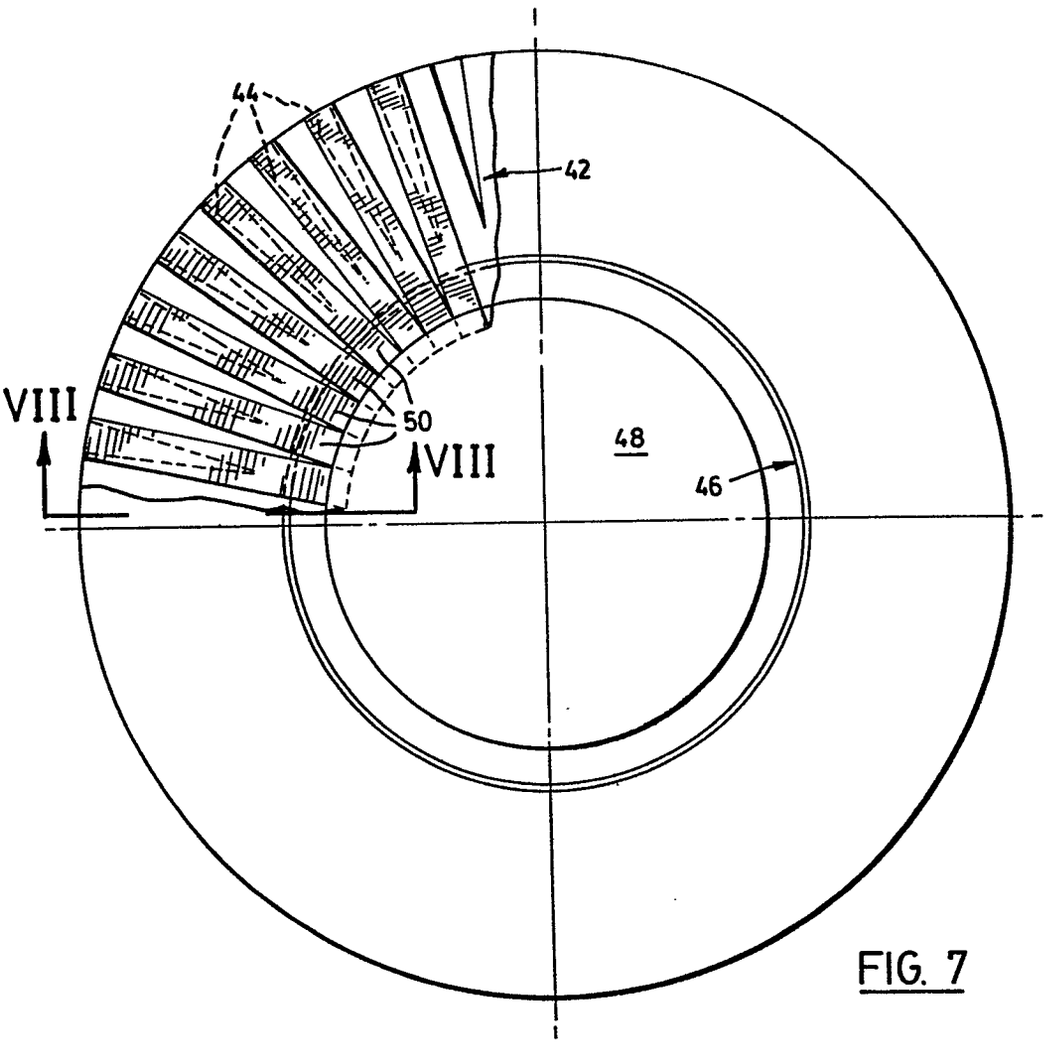

FIG. 7

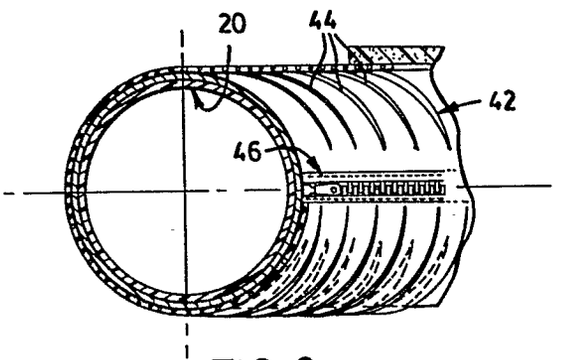

FIG. 8

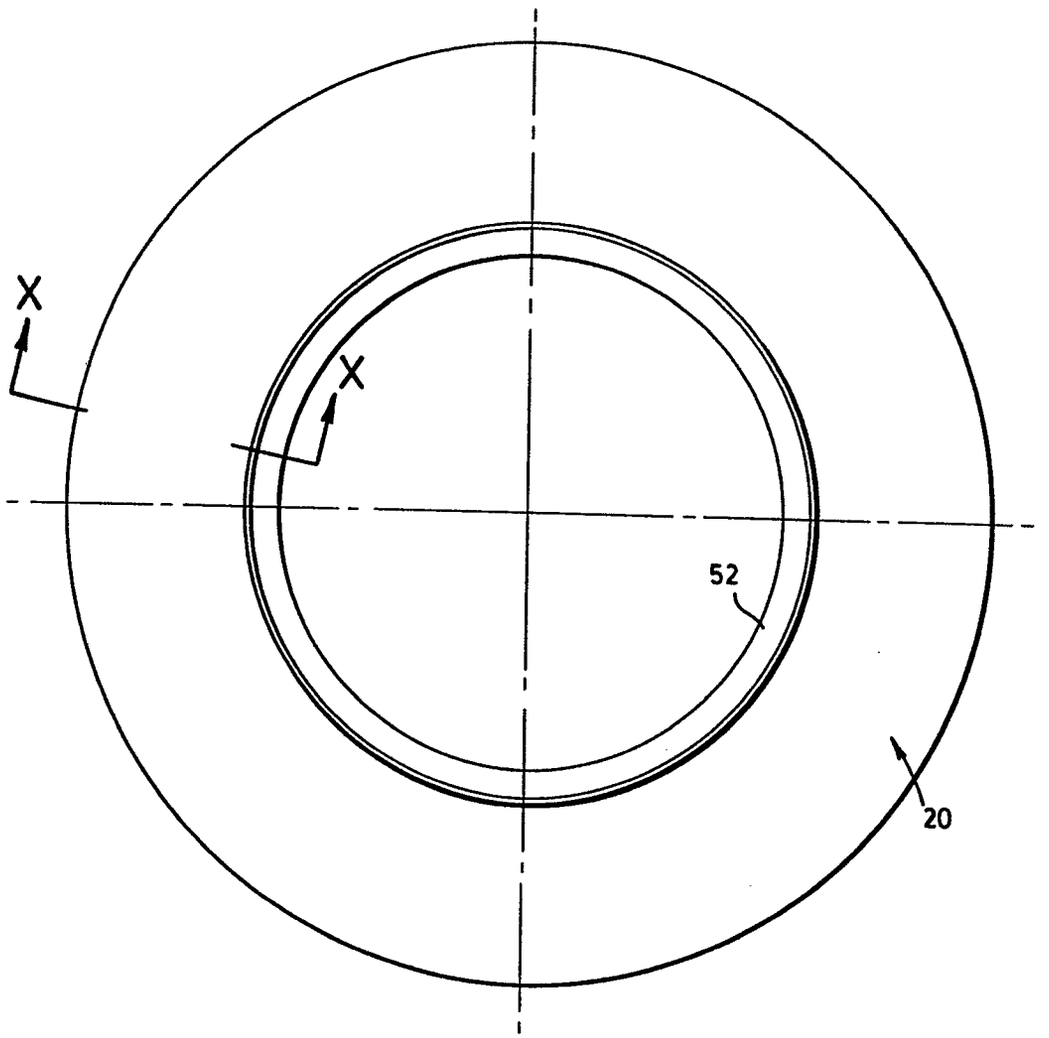

FIG. 9

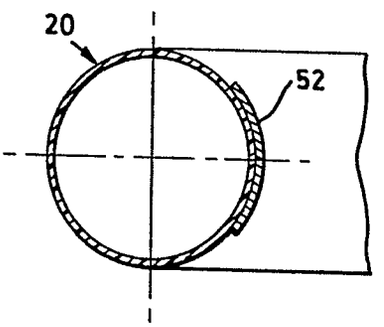

FIG. 10

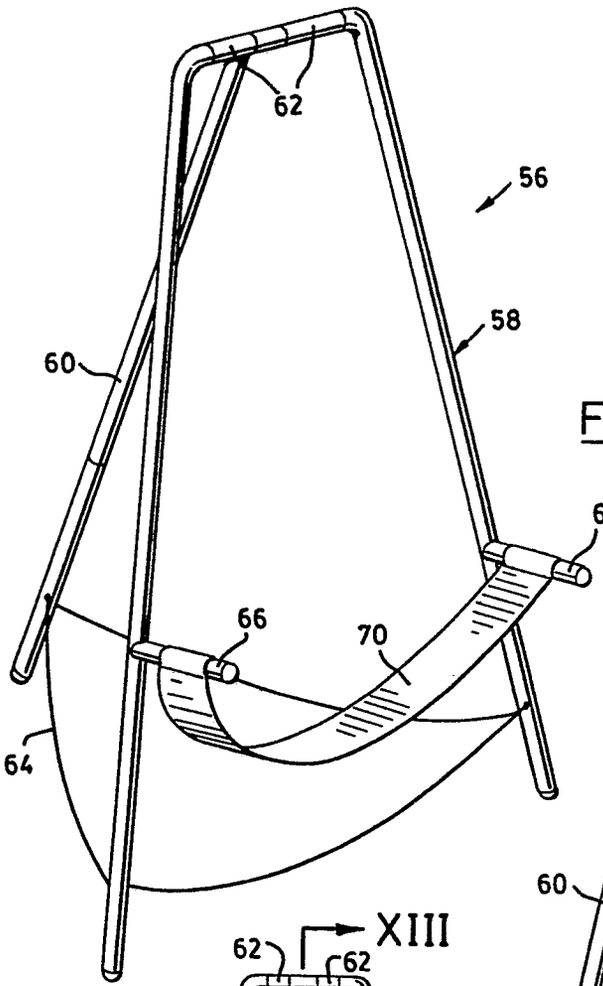

FIG. 11

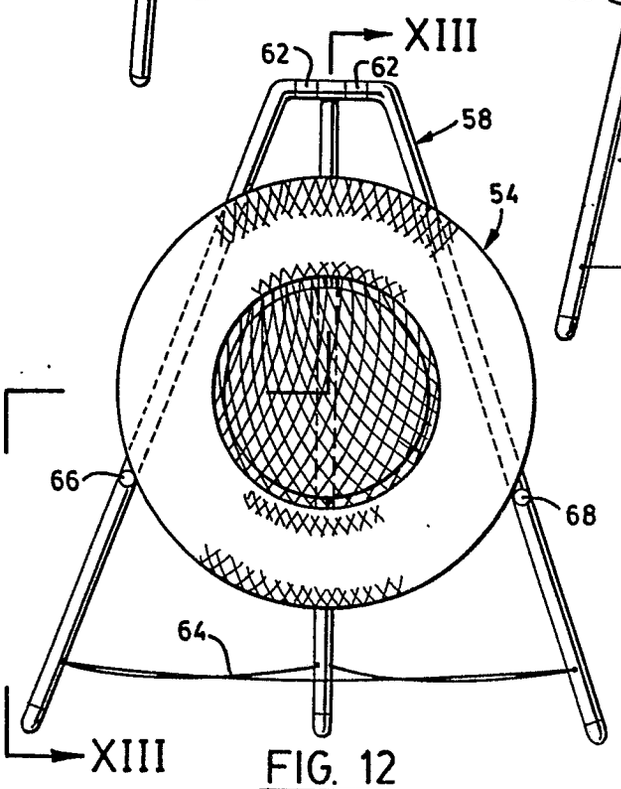

FIG. 12

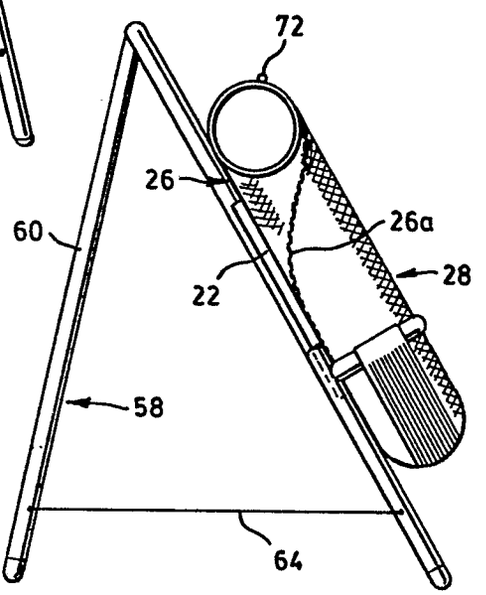

FIG. 13

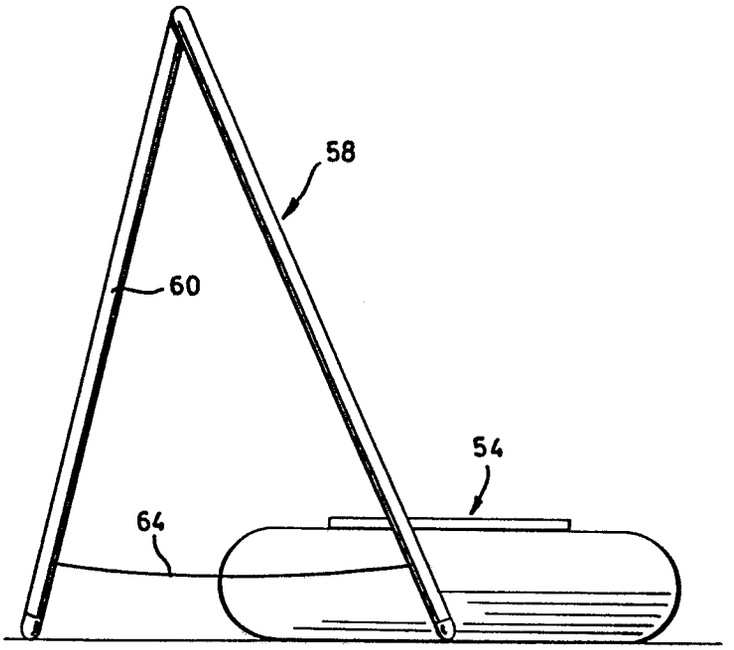

FIG. 14

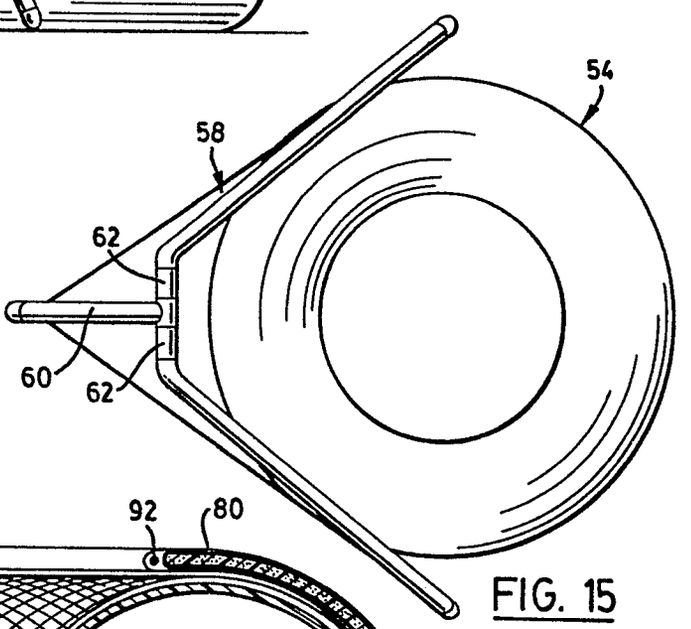

FIG. 15

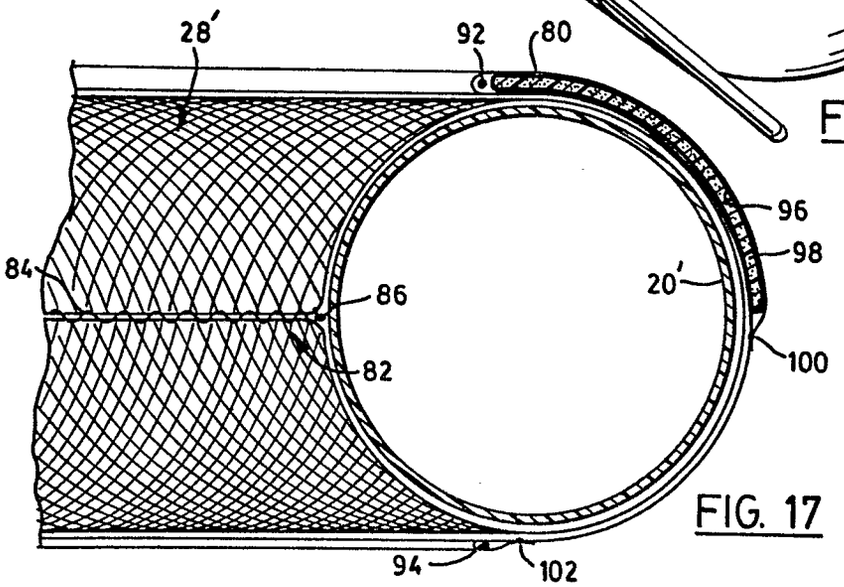

FIG. 17

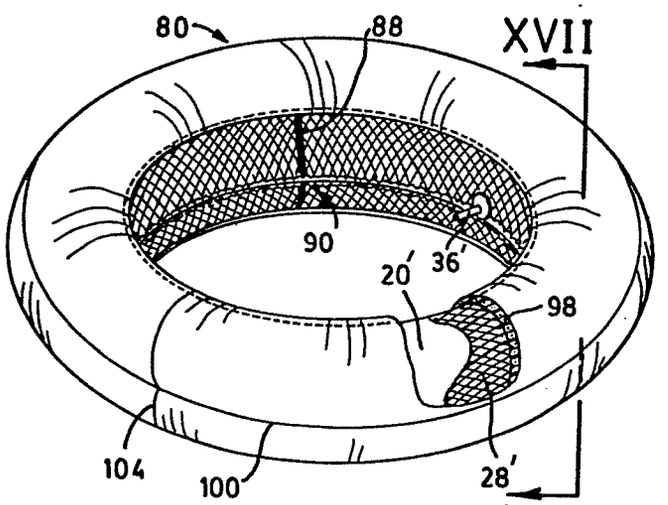

FIG. 16

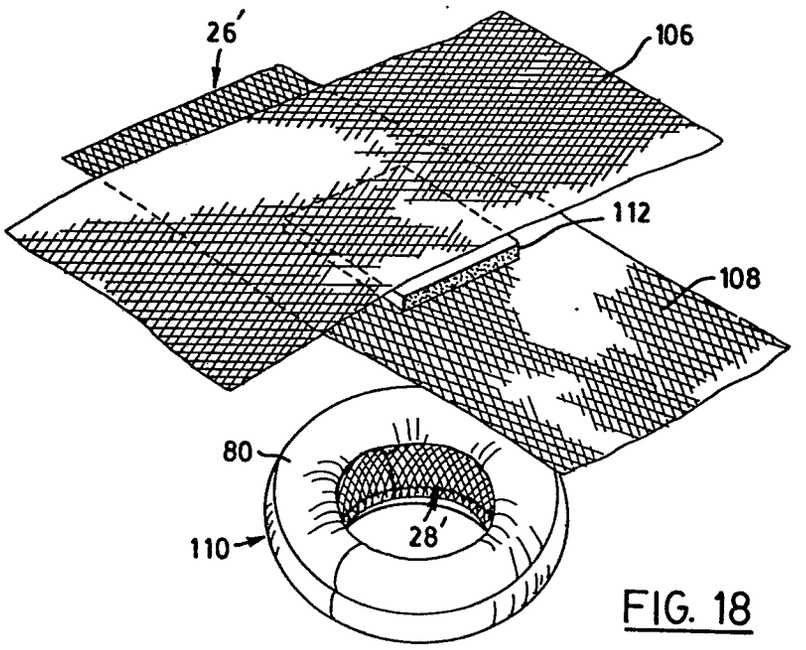

FIG. 18

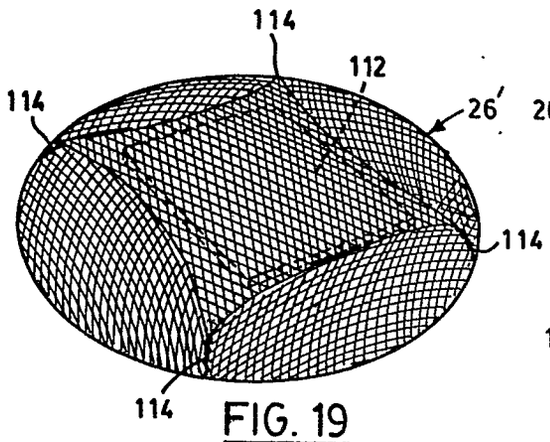

FIG. 19

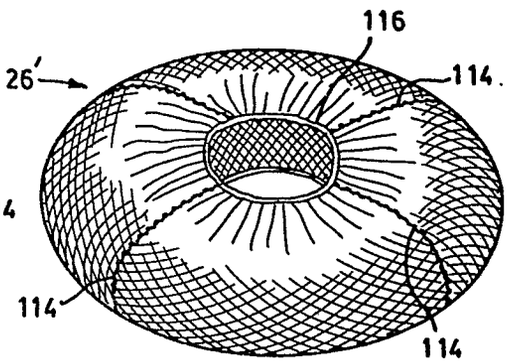

FIG. 20