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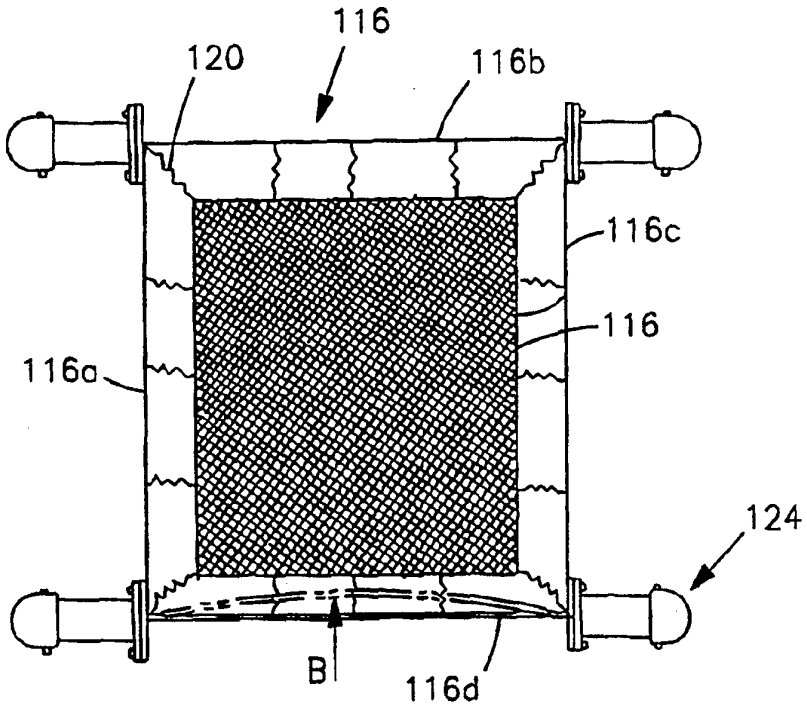
(54) Title: AMUSEMENT APPARATUS

(57) Abstract

An amusement apparatus is disclosed as a series of trampolines (10) which are arranged laterally adjacent and in vertically offset levels to permit a user to move progressively downward from one trampoline (10) to the next adjacent trampoline (10). One aspect of the invention comprises a trampoline in which one supporting edge (116) is deflectable in order to absorb an excess force such as if the user jumps too close to the edge (116) or even directly on the edge (116). Specifically, the supporting edge (116) is a wire (134) supported by spring assemblies (130, 132) at opposing ends thereof. A lift (15) is included to transport the user from a landing area to the top trampoline (10).



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TITLE: AMUSEMENT APPARATUS

FIELD OF THE INVENTION

This invention relates to amusement devices, in particular of the type which employ a trampoline.

SUMMARY OF THE INVENTION

One aspect of the invention comprises a series of trampolines which are arranged laterally adjacent and in vertically offset levels to permit a user to move progressively downward from one to the next adjacent one. At least one supporting edge of each trampoline is deflectable in order to absorb an excess force, such as if the user jumps too close to that edge or even directly onto the edge. Specifically, each supporting edge is a wire supported by spring assemblies at the opposite ends thereof. A lift means is included to transport the user from a landing area to the top trampoline.

DESCRIPTION OF THE DRAWINGS

The accompanying drawing illustrates the invention. In such drawing:

FIGURE 1 is an overall schematic partial side view of the invention;

FIGURE 2 is a plan view of a trampoline assembly;

FIGURE 3 is a front elevational view of the trampoline assembly of FIG. 2;

FIGURE 4A is an enlarged sectional view through 4-4 of Figure 3 of a spring restraint structure of the invention in an expanded position; and

FIGURE 4B is an enlarged sectional view through 4-4 of Figure 3 of the spring restraint structure of the invention in a contracted position.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in Figure 1, this invention is constructed of a series of trampoline assemblies 10, the series being shown as 10a-10e which are installed on a slope 12 so that they are successively laterally adjacent and vertically offset. The number of trampoline assemblies is two or more, any number being possible. As constructed, a starting platform 14 is provided. Not shown is a landing or finishing area which could be a pool of water or a bed of foam or other soft landing material. Also a potential energy storage device is included in the form of a lift 15 which will transport an individual from the bottom of the lift 15a to the top of the lift 15b.

In operation the amusement device is used by a person starting from the platform 14 and jumping onto the first trampoline assembly 10a and successively to the last trampoline assembly 10e, and finally off the device to the landing area (not shown).

This amusement device differs considerably from an ordinary trampoline. This device comprises an accelerator or energy storage device (lift 15) and the series of trampolines 10. In the case of an ordinary trampoline, the player must use his body to provide the forces to enable jumping up and down on the trampoline; therefore the amusement value of an ordinary trampoline is affected by the strength and energy available from the user's own body, that is, a limitation based on fatigue. Use of a normal trampoline can be seen as two separate stages.

In the first stage a maximum jump height is attained. This requires addition of considerable energy from the user to progressively obtain a greater jump height, until the desired jump height is attained. In the second stage an achieved height is maintained. In this stage the drop from the achieved height contributes energy, so the user only has to add sufficient new energy to continue at that achieved height.

In the present invention, the player's enjoyment is derived from the multiple jumps from one trampoline 10 to a lower trampoline 10, and is enhanced by a great reduction of player fatigue. This latter affect is contributed by the lift 15 which adds potential energy by lifting the player to the top. This energy is then available as potential energy to be converted to kinetic energy through each jump until the player reaches the finishing area. The energy contributed by the lift helps to achieve the jump height for each successively lower trampoline 10, with little or no added energy needed. Therefore, the player doesn't need to use much personal body energy and is able to play for a long time. The distance between trampoline assemblies 10 is shown to be equal in Figure 1. But, the distance between trampoline assemblies 10 can vary. This variation can be random to increase interest and challenge, or could be patterned to accommodate changes in energy expended by the player, or to accommodate a variety of different terrain.

It is appreciated that kinetic energy available from each level to the next lower level is partially absorbed by friction upon hitting the next lower trampoline 10. Thus the vertical height difference compensates for the energy absorbed by the trampoline 10 in progressing from a higher trampoline 10 to a lower trampoline 10. Therefore the height difference can be chosen to provide a predetermined

amount of additional kinetic energy. That height is chosen to compensate for the energy absorbed by the trampoline 10. Similarly the characteristics of the trampoline 10 can be designed for greater or less absorption or stiffness. Also, the trampoline 10 springs can be changed or adjusted to modify the stiffness.

The preferred embodiment of the invention is show in Figures 2 - 4. Referring to Figures 2 and 3 there is shown a trampoline assembly which has a rigid peripheral frame structure 116 comprising three sides 116a, 116b and 116c of similar construction. A fourth side 16d is of a different construction to be described in detail below. A trampoline pad 118 is situated centrally in the frame 16. The pad 118 is held in place by springs 120 distributed around the pad 118 between the pad 118 and the frame 116. Side 116b defines an inner edge of the trampoline and side 116d defines an outer edge of the trampoline. The inner edge 116b is seated on the slope as schematically shown at 22 in Figure 1.

The outer edge 116d has a flexible, resilient biased suspension assembly 124 which comprises support beams 126 and 128, a spring assembly 130 on support beam 126, and a wire 134 extending between the spring assemblies 130 and 132. Referring to Figures 4A and 4B, the spring assemblies 130 and 132 are identical and mounted oppositely on their respective support beams 126 and 128. The spring assemblies 130 and 132 comprise a tube 136 having flanges 138 which facilitate bolting to the support beams 126 and 128. Each tube is capped by a removable cap 140. Inside the tube 136 is a coil spring 142 which bears at its inner end 144 against the floor 148 inserted in the tube 136 and at its outer end 148 against a rider 150. The rider 150 has a central hole 152 though which is mounted a threaded hook 154. Threaded to the threaded hook 154 is a nut 156 on the outside of the rider 150. The wire 134 passes through a hole 158 in the

support beams 126 and 128 and through a hole 160 in the floor 148 of the respective spring assemblies 130 and 132. The wire 134 then passes centrally through the tube 136 and the coil spring 142 and is hooked over the hook portion 162 of the threaded hook 154 by means of a bight 164 and clamp 166.

Therefore the outer edge 116d has the additional feature, not available on edges 116a, 116b and 116c, that is can flex downwardly as show by arrow A in Figure 3 and inwardly as shown by arrow B in Figure 2. Further, by overcoming the biasing force of the spring assemblies 130 and 132, the outer edge 116d can move inwardly as shown by arrows B in Figure 2. In normal use a combined inward and downward force vector will occur, causing partial inward and downward flexure. At some level of force the springs 142 will contract, depending on each pre-selected spring rate. This will allow the total displacement of the wire 134 to be greater. The greater the displacement, the more force can be absorbed. When the force is removed, the spring assemblies 130,132 resiliently restore to the ready position. These flexure modes provide safety if a user hits or comes too close to the edge 116d. In particular if the wire is as shown by arrows A and B, the spring 142 contracts from the expanded position shown in Figure 4A to a more stressed position as shown in Figure 4B. This permits the wire 134 to also move as shown by arrows B, absorbing energy as it does so. When force on the wire 134 is released and it is free to return to the more relaxed position, the spring 142 will relax and return to its expanded position.

Tension on the wire 134 can be adjusted through the threaded hook 154 and the nut 156 by tightening or loosening the nut 156. The initial tension on the wire 134, and therefore the initial contraction of the springs 142 will be in a first position to establish good support for the trampoline pad 118 putting the wire

under a predetermined tension. When a user jumps on the trampoline pad 118, the wire 134 will deflect downward as shown in arrow A and the springs will increase their bias, contracting to some extent as in Figure 4B, thereby allowing the wire 134 to both downwardly deflect (arrow A) aided by the contraction of the springs (arrows B). In normal use this deflection or flexing will be slight, so as to not absorb much energy; thereby allowing a good trampoline effect. But, if the user is too close to the wire 134, the deflection and flexing of the wire 134, controlled by the springs 142 will prevent injury and absorb the shock. If a user jumps close to or onto the wire 134, the deflector will be greater and the contraction or biasing of the springs 142 will be greater.

In construction of the device, the tension is set and the spring rate of the springs 142 preferably establish a first mode of deflection of the wire 134 responsive to a normal range of forces from proper use of the trampoline. In this first mode the springs 142 will not contract, or will contract only slightly, the deflection of the wire 134 occurring due to its own ability to stretch and also due to its not being overly taught. The second mode will occur when a higher range of force is imposed on the wire such as by a user jumping too close, or directly onto the wire. In this mode the springs 142 will contract in response to the higher transmitted to the ends of the wire 134. Even where two distinct modes are designed there will be anomalies such as proper use by a heavy user which will cause the springs to contract. Also, the design could be made to allow the second mode to occur even in proper use, for example in order to control overly enthusiastic users to absorb energy from the trampoline pad.

While two springs assemblies 130, 132 are shown the device could be constructed with only one, on one side, the other end of the wire being solidly anchored to

the support beam. The entire support structure, and especially the spring assemblies 130,132, are preferably protected by a soft padding such as foam in case a user should strike it.

A further alternative to the embodiment of Figures 2-5 the inner boundary (or edge) 116b could be constructed as is the outer boundary (or edge) with the support assembly described in Figures 3-5. In such cases the overall height of the support structure would be shorter in order to accommodate to the uphill slope, that is for example the support beams 126 and 128 would be shorter in their respective assemblies.

Although particular embodiments of the invention have been described and illustrated herein, it is recognized that modifications and variations may readily occur to those skilled in the art, and consequently it is intended that the claims be interpreted to cover such modifications and equivalents.

CLAIMS

What is claimed is:

1. A trampoline type amusement device comprising a plurality of at least two trampoline assemblies arranged serially laterally adjacent and vertically offset from an uppermost first one of said trampoline assemblies to successive laterally adjacent lower trampoline assemblies to a lowest last one of said trampoline assemblies.

2. The device of Claim 1 wherein each trampoline assembly has a lateral inner boundary and a lateral outer boundary, the lateral inner boundary of each trampoline assembly, except for the uppermost first trampoline assembly, being in a position generally vertically below the lateral outer boundary of the next higher adjacent trampoline assembly.

3. The device of Claim 2 wherein each trampoline assembly comprises a trampoline pad and a support structure and connecting means to suspend said trampoline pad from said support structure, a deflectable portion of said support structure being deflectable from a first ready to use position in a first mode upon imposition of a first force range and being further deflectable in a second mode upon imposition of a second force range, greater than the first force range, said deflectable portion being resilient to restore to its first position when said forces are removed.

4. The device of Claim 1 further comprising an apparatus for carrying a person from a lower point proximate the vertical position of the lowermost trampoline to a higher point proximate the vertical position of the uppermost trampoline.

5. A trampoline type amusement device comprising;

a support structure;

a trampoline pad supported by said support structure; at least a portion of said support structure comprising a deflectable and resilient biased assembly constructed to a portion of the trampoline pad in a ready to use position and capable of deflection in response to applied force; at least a portion of said support structure comprising a deflectable and resiliently biased assembly constructed to a portion of the trampoline pad in a ready to use position and capable of deflection in response to applied force;

at least a portion of said support structure comprising a deflectable and resiliently biased structure capable of being placed in a first ready to use position for orienting the trampoline pad for use and capable of deflection from said first position in response to applied force and further capable of resilient force absorption and restorable to the first position when the force is removed.

6. The device of Claim 5 wherein the deflectable and resiliently biased assembly comprises;

a flexible elongate member adjacent at least a portion of the trampoline pad and having ends, at least a portion of the trampoline pad being attached to the said elongate member;

a resilient biasing assembly attached to at least one of said ends having a biasing element which places said elongate member in predetermined tension to establish said first position and capable of allowing movement of said end in response to increased tension due to force application to allow greater deflection of said elongate member and capable of resilient restoring to the first position when the force is removed.

7. The device of Claim 6 wherein said resilient biasing assembly comprises a spring holding one end of said elongate member under predetermined tension in said first position to maintain said trampoline pad in ready to use position, and which will allow said end to move in response to force on said elongate member which overcomes the spring biasing resistance of said spring.

8. The device of Claim 7 wherein each end of said elongate member is attached to said resilient biasing assembly.

9. The device of Claim 8 wherein said trampoline pad has at least one straight edge portion and said elongate member extends adjacent said straight portion and said trampoline pad is attached to said elongate member.

10. A trampoline type amusement device comprising a trampoline pad,
a support structure having a rigid portion for rigidly supporting said trampoline pad and also having a deflectable portion;

a support structure adjacently surrounding said trampoline pad;

connection elements connecting the trampoline pad to the support structure;

the support structure having a rigid portion rigidly supporting said trampoline pad;

a trampoline pad having edges defining a periphery;

a support structure adjacent said edges of said trampoline pad;

connecting elements connecting said trampoline pad edges to support structure;

said support structure having rigid portions and a delectable portion said deflectable portion being delectably responsive to downward force upon said trampoline pad.

11. The device of Claim 10 wherein said trampoline periphery is rectangular and said rigid portions are adjacent and connected to three sides of said periphery, and said deflectable portion is connected to the fourth side of said periphery.

12. The device of Claim 11 wherein said deflectable portion comprises a flexible elongate member having ends, said ends being held in at least one position.

13. The device of Claim 12 further comprising a spring biasing element attached to at least one end of said elongate member the point of attachment having a first position to place said elongate ember under predetermined tension due to said

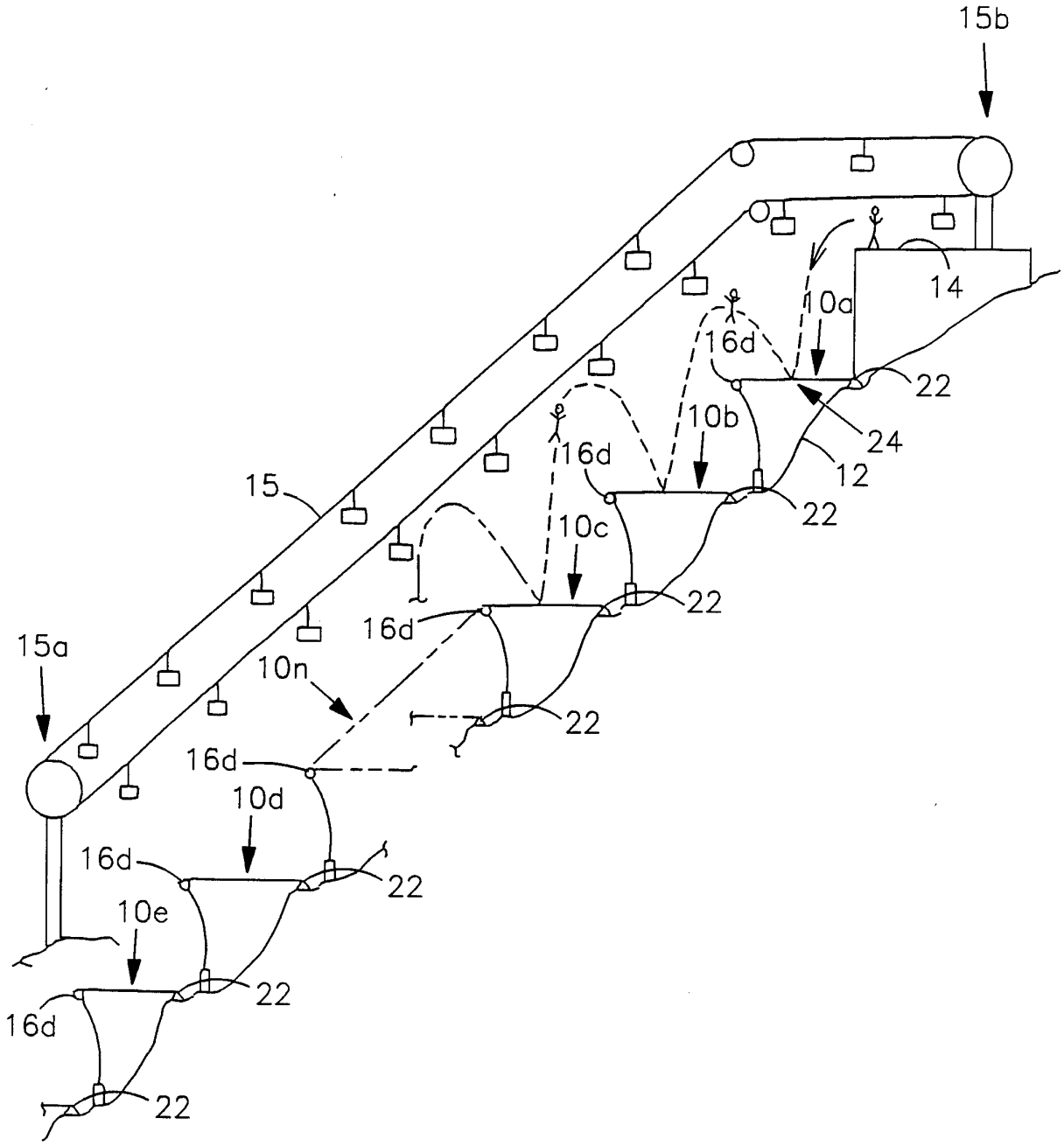
spring biasing element and said spring biasing element providing a range of movement for said end upon increased tension of said elongate member overcoming the spring restraining force of said spring biasing element, and said spring biasing element restraining the end of the elongate member to the first position upon removal of the increased tension.

14. The device of Claim 12 wherein the predetermined tension is adjustable.

15. The device of Claim 13 wherein the spring biasing element is a coil spring having one end fixed and having the end of the elongate member attached to the other end of the coil spring and oriented to allow movement of said end of the elongate member generally along the axis of the coil spring.

16. The device of Claim 13 wherein the elongate member extends into the coil spring past its fixed end and is attached at the other end of the coil spring whereby increased tension on the elongate member causes contraction of the coil spring.

17. The device of Claim 13 wherein there is a said spring biasing element at each of the ends of the elongate member.


15b
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10a
16d
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12
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16d
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16d
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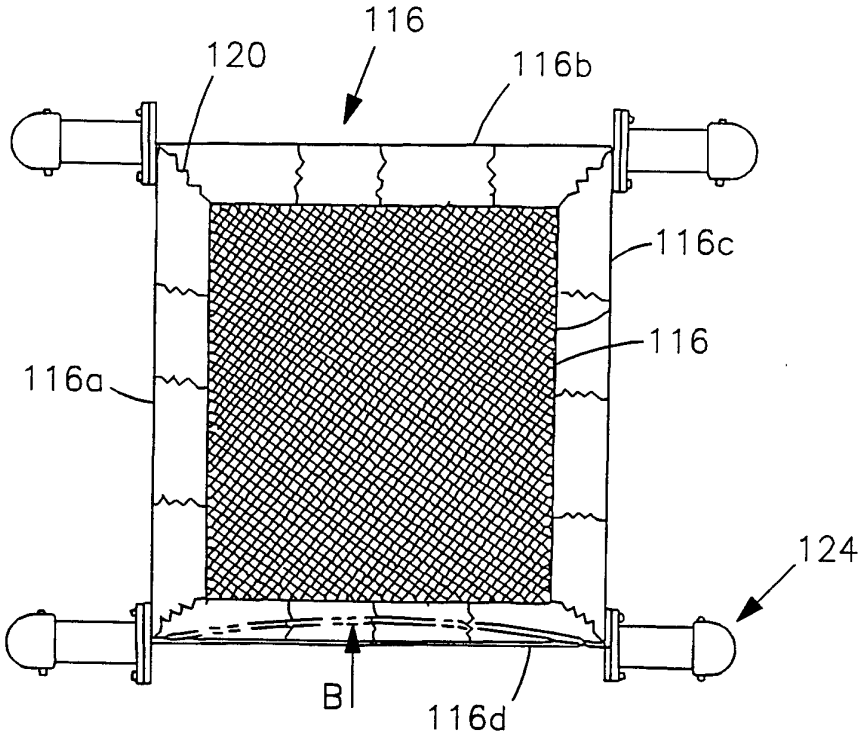
FIG 1


116
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116b
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116d

FIG 2

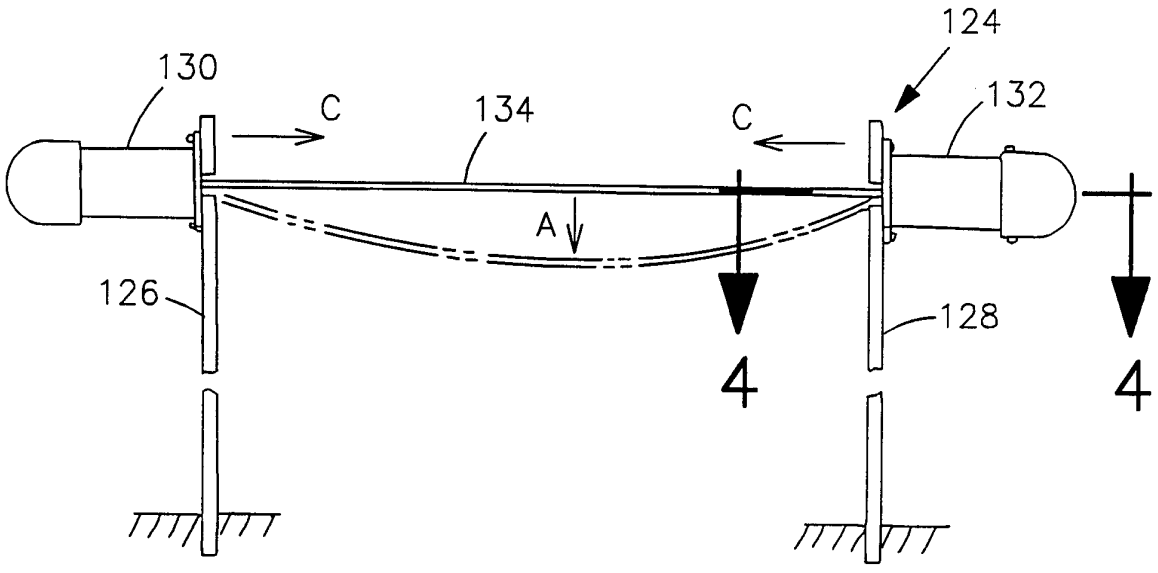
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FIG 3

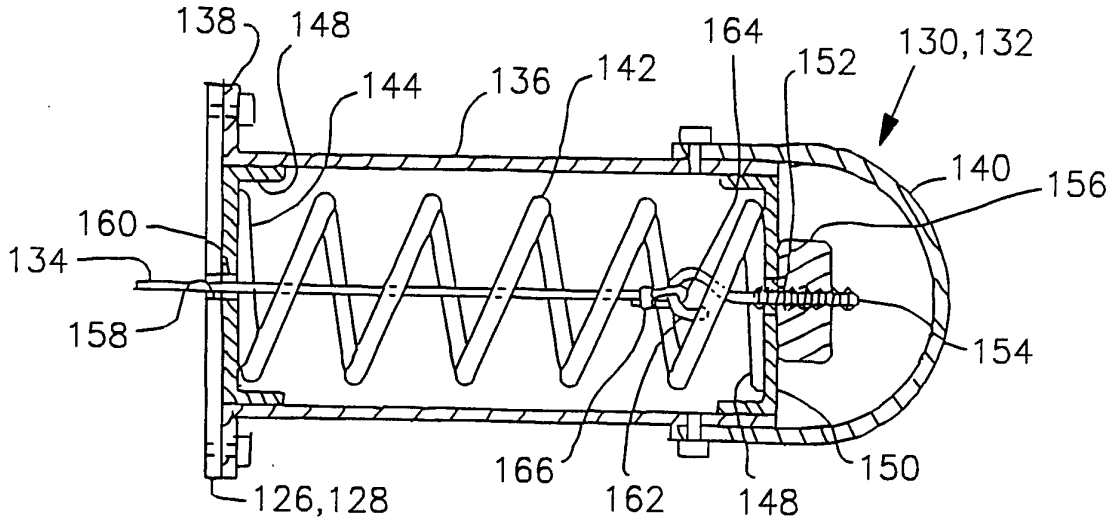
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FIG 4A

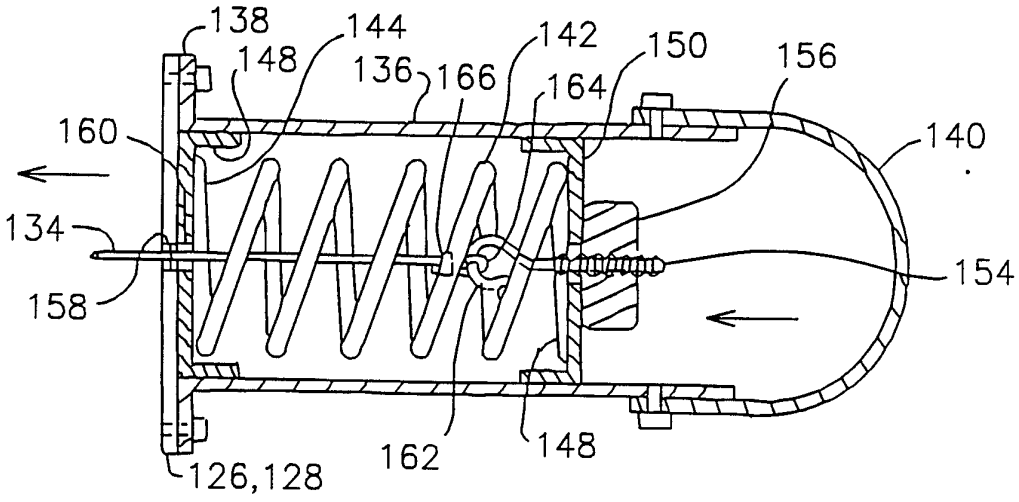
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FIG 4B

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US93/09028

A. CLASSIFICATION OF SUBJECT MATTER

IPC(5) :A63B 23/06
US CL :472/137; 482/27
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 472/137; 482/27

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US,A 4,938,473 (Lee et al) 03 July 1990, Figure 2.	11-17
A	US,A 4,381,861 (Howell, Jr. et al) 03 May 1983, entire document.	5-17
A	US,A 4,331,329 (Mirkovich et al) 25 May 1982, entire document.	5-17
A	US,A 4,535,983 (De-La-Concha-Caceres) 20 August 1985, entire document.	5-17
A	US,A 3,983,585 (Sidlinger) 05 October 1976, entire document.	5-17

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