US 20150045188A1

(19) **United States**

(12) **Patent Application Publication**

Allen et al.

(10) **Pub. No.: US 2015/0045188 A1**

(43) **Pub. Date: Feb. 12, 2015**

(54) **TRAMPOLINE SYSTEM HAVING ARCUATED JUMPING SURFACES**

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(21) Appl. No.: **14/268,971**

(22) Filed: **May 2, 2014**

Related U.S. Application Data

(63) Continuation-in-part of application No. 14/014,294, filed on Aug. 29, 2013.

(60) Provisional application No. 61/864,980, filed on Aug. 12, 2013.

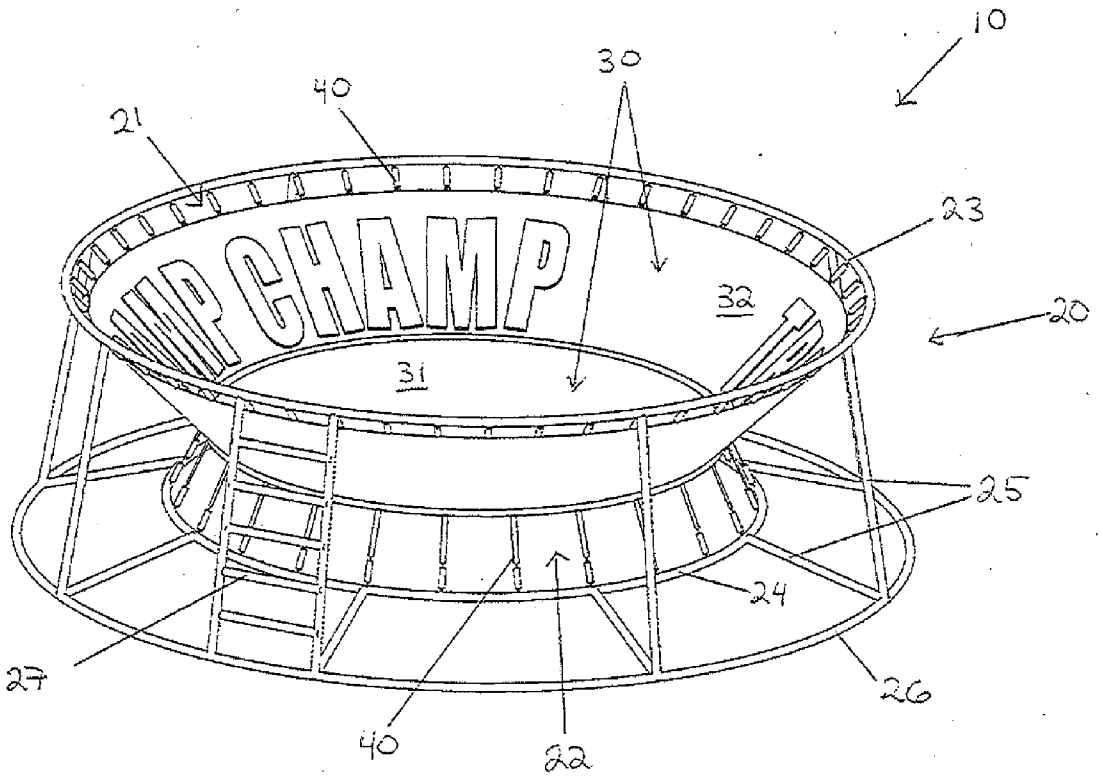
Publication Classification

(51) **Int. Cl.**
A63B 5/11 (2006.01)

(52) **U.S. Cl.**
CPC *A63B 5/11* (2013.01)
USPC **482/27**

(57) **ABSTRACT**

A trampoline system is described. The trampoline includes a frame, a jumping mat and elastic means for connecting the jumping mat to the frame. The jumping mat includes a substantially horizontal jumping region between two arcuated shaped jumping regions at opposing ends of the horizontal jumping region when connected to the frame. The frame may include two opposing ends formed from a pair of substantially parallel arcuated tubes each having a substantially vertical end, a substantially horizontal end, and a mid-point along its curved length, a support bar connecting the arcuated tubes at their substantially vertical ends, a pair of end footings, wherein each end footing is connect to the support bar and to the mid-point of one of the arcuated tubes, and a pair of side footings, wherein each side footing is connected to a leg of one of the end footings and to one of the arcuated tubes at its substantially horizontal end.



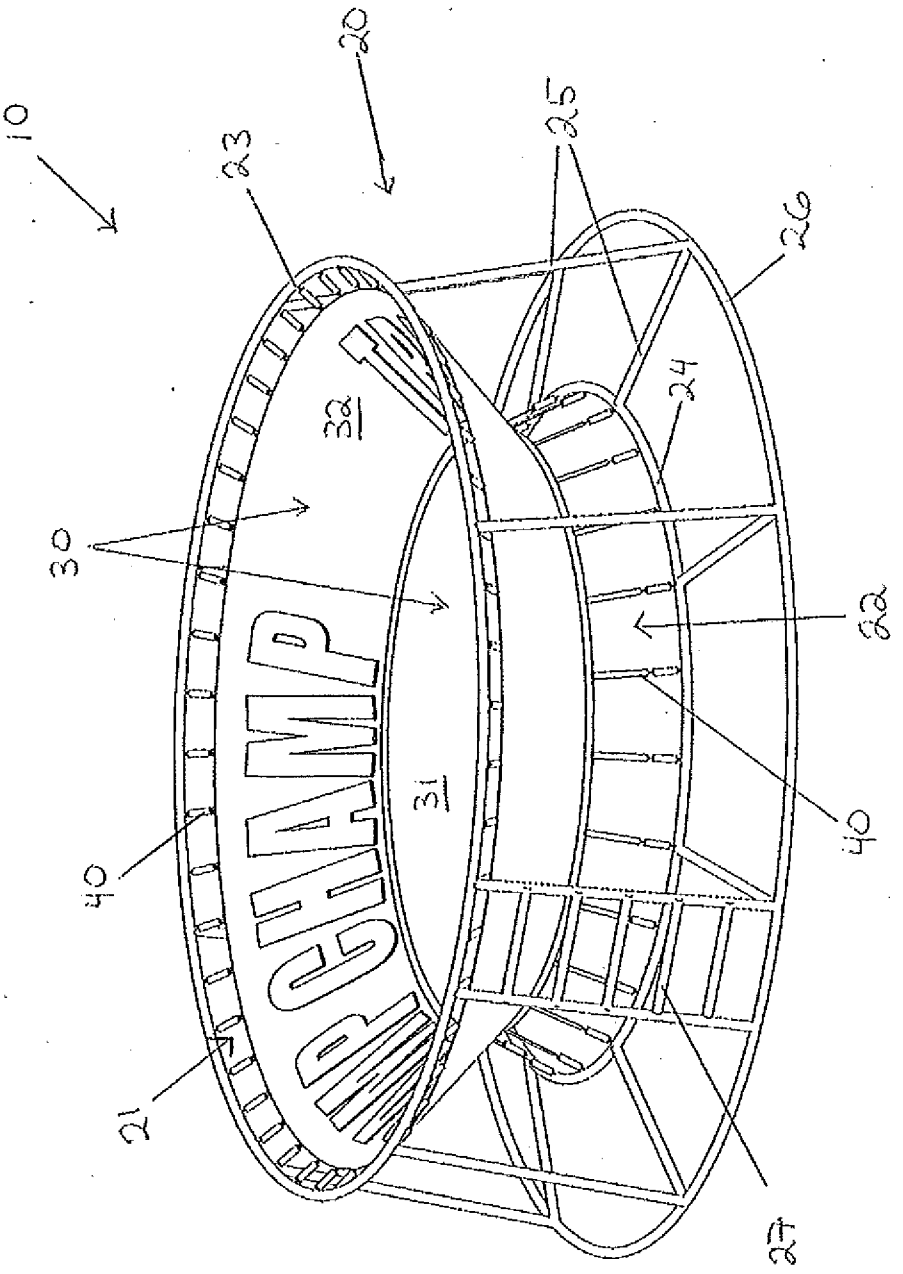


FIGURE 1A

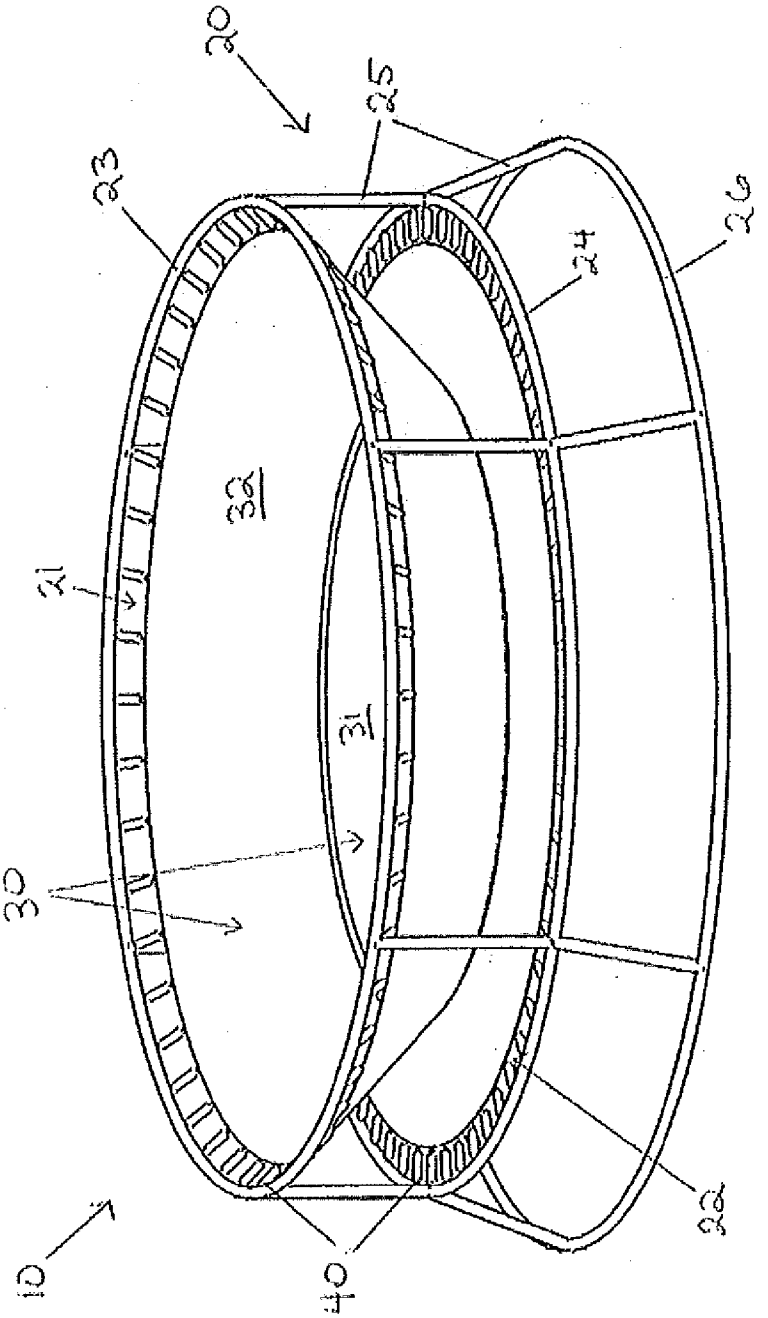


FIGURE 1B

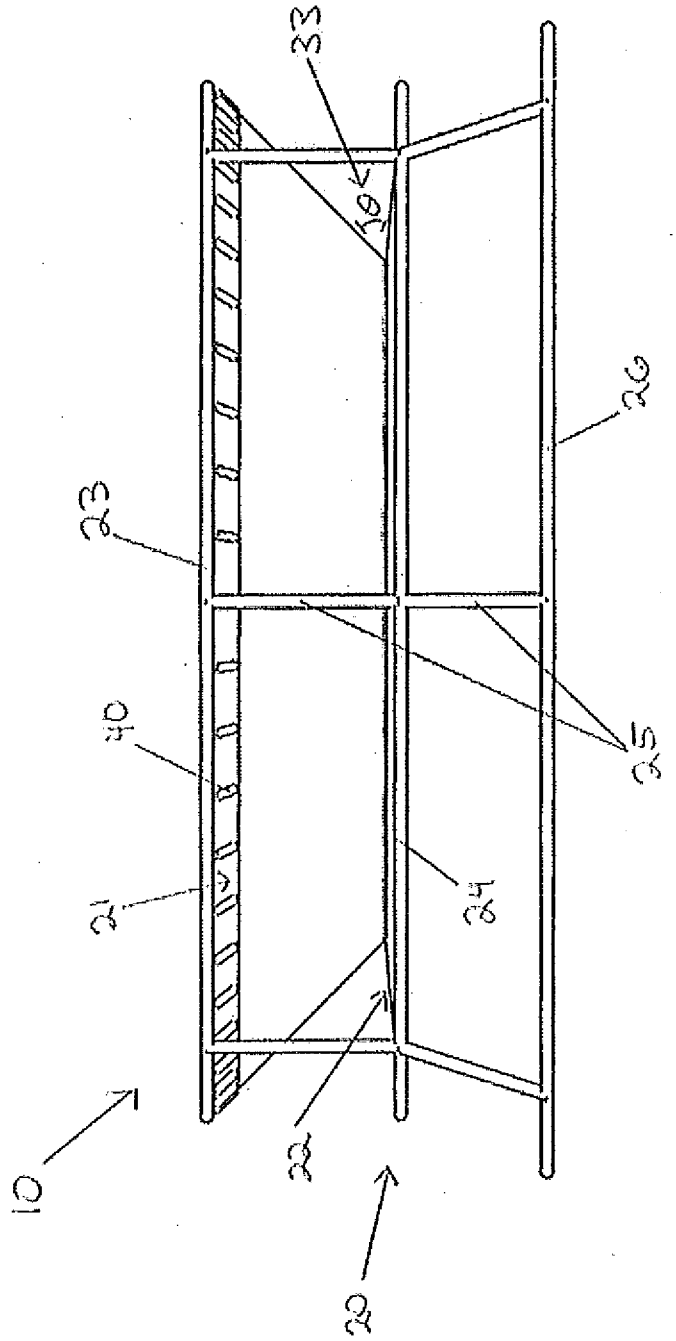


FIGURE 1C

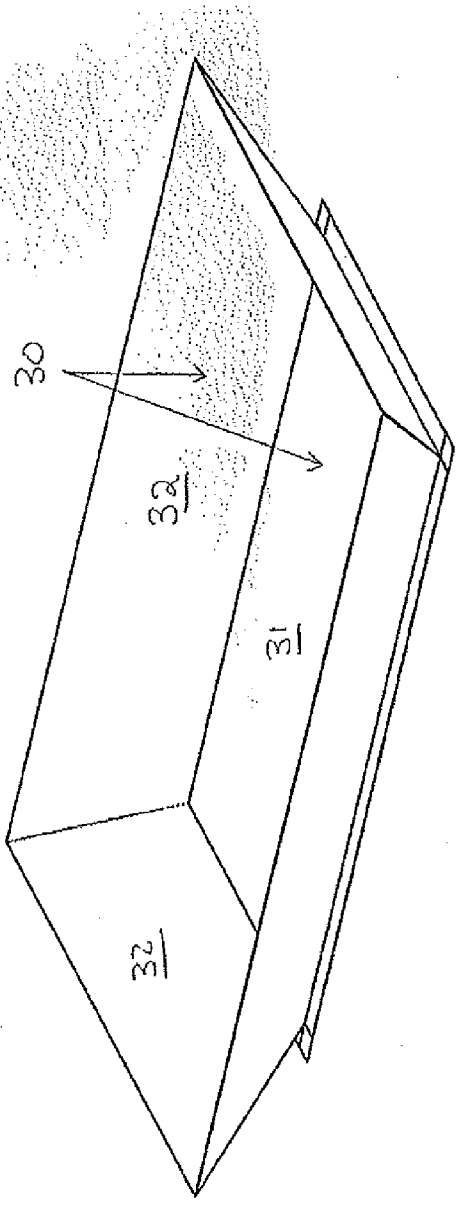


FIGURE 2A

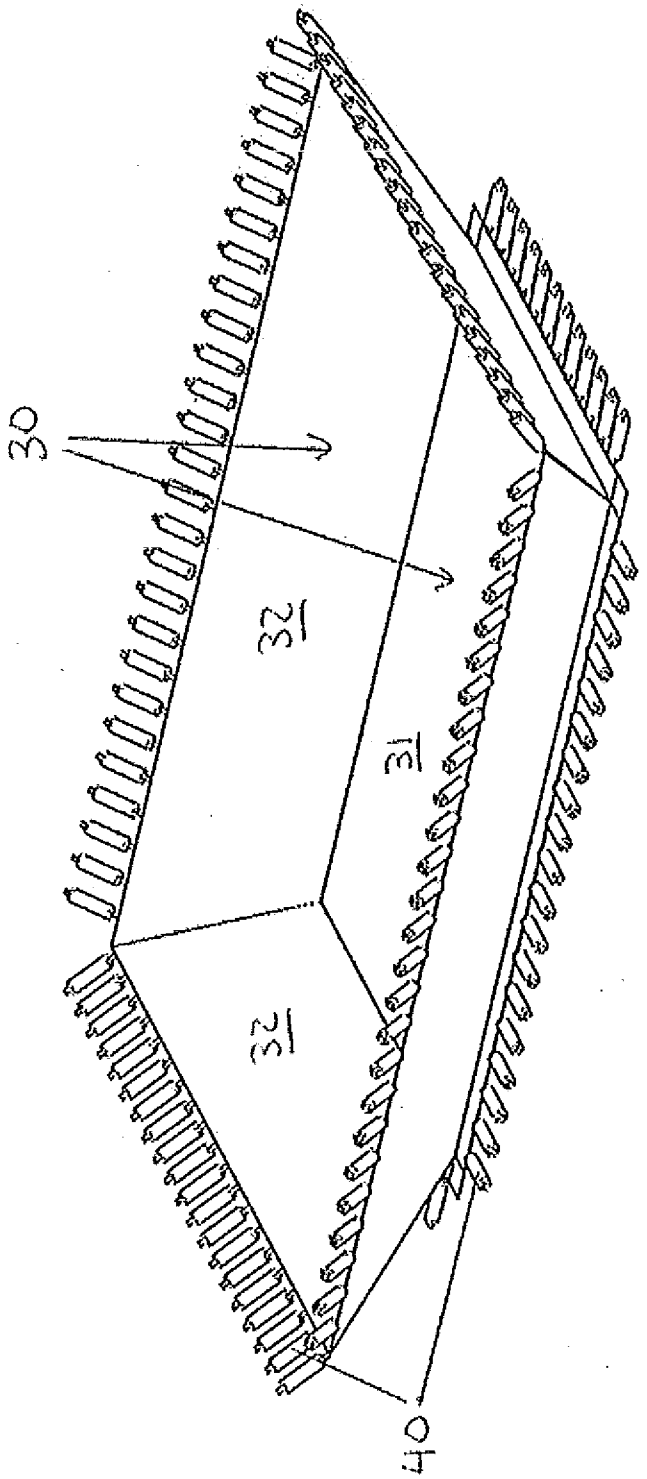


FIGURE 2B

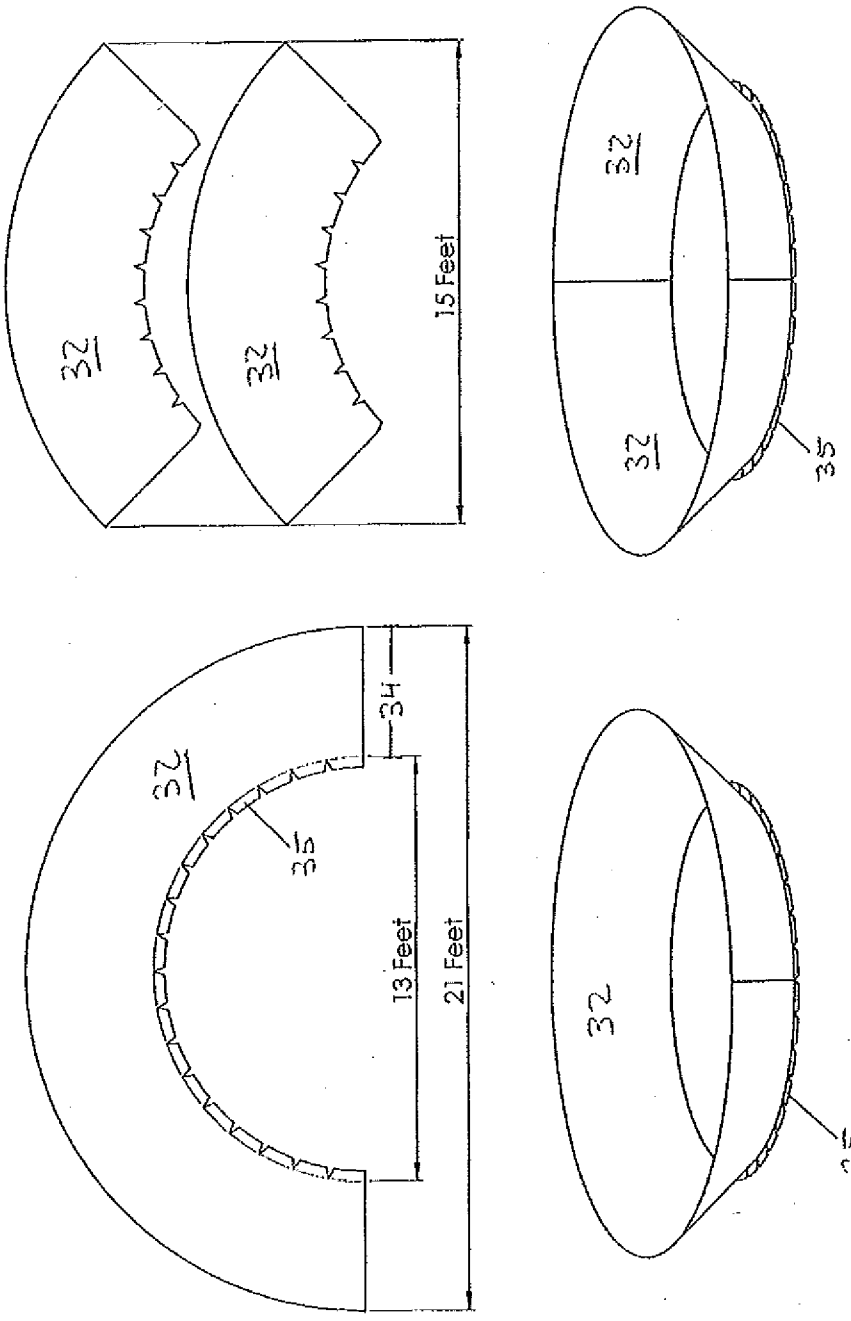


FIGURE 3A

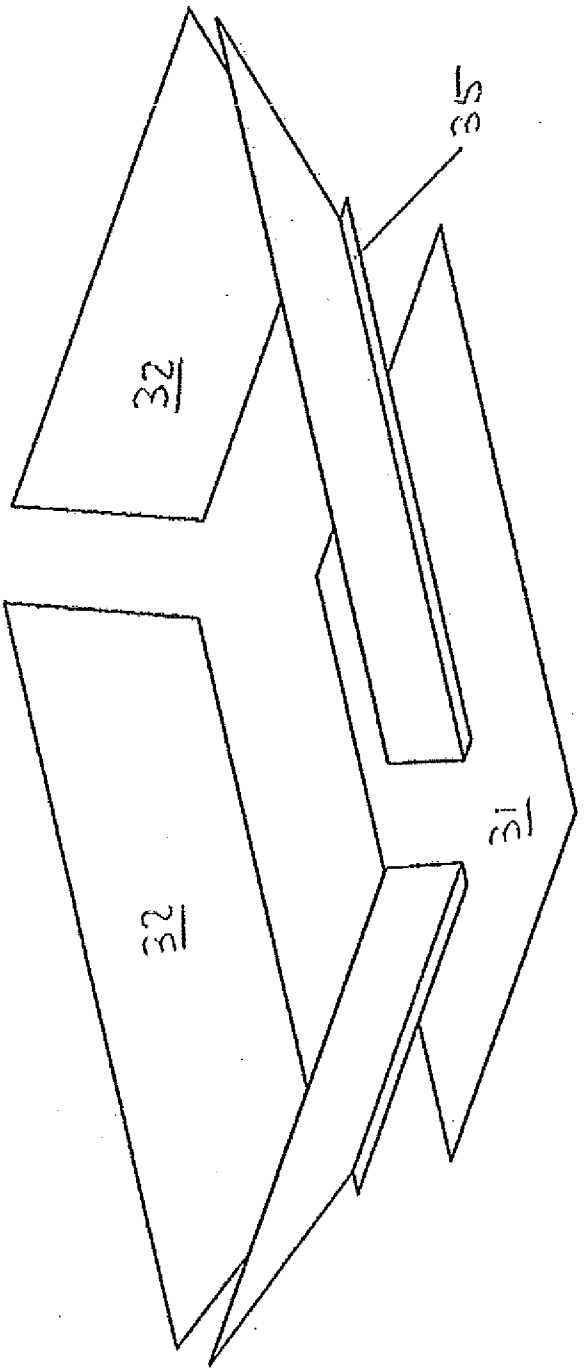


FIGURE 3B

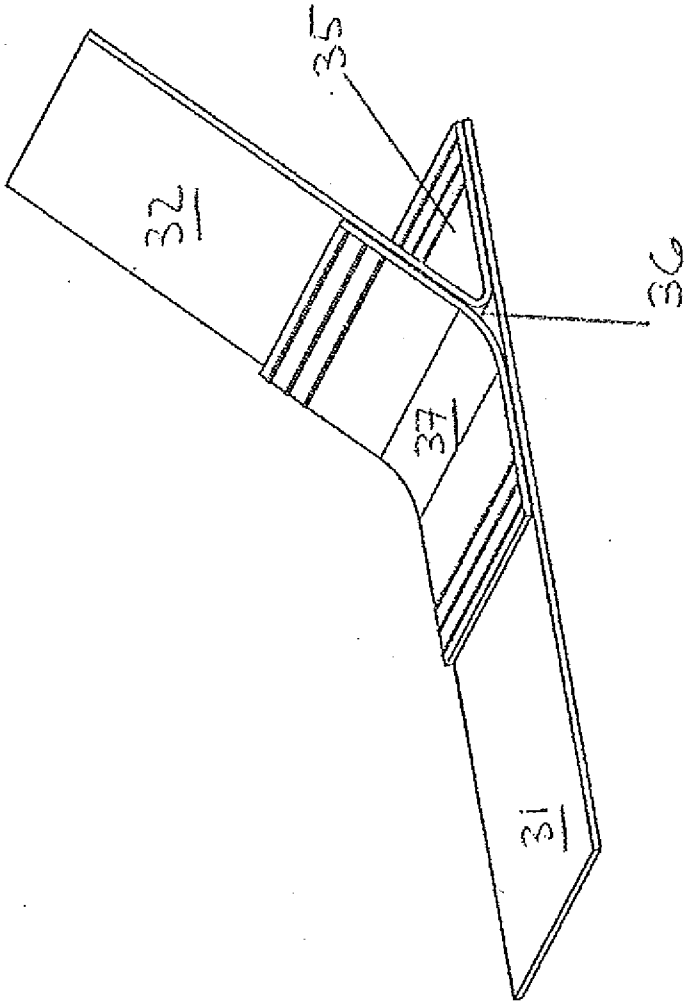


FIGURE 4

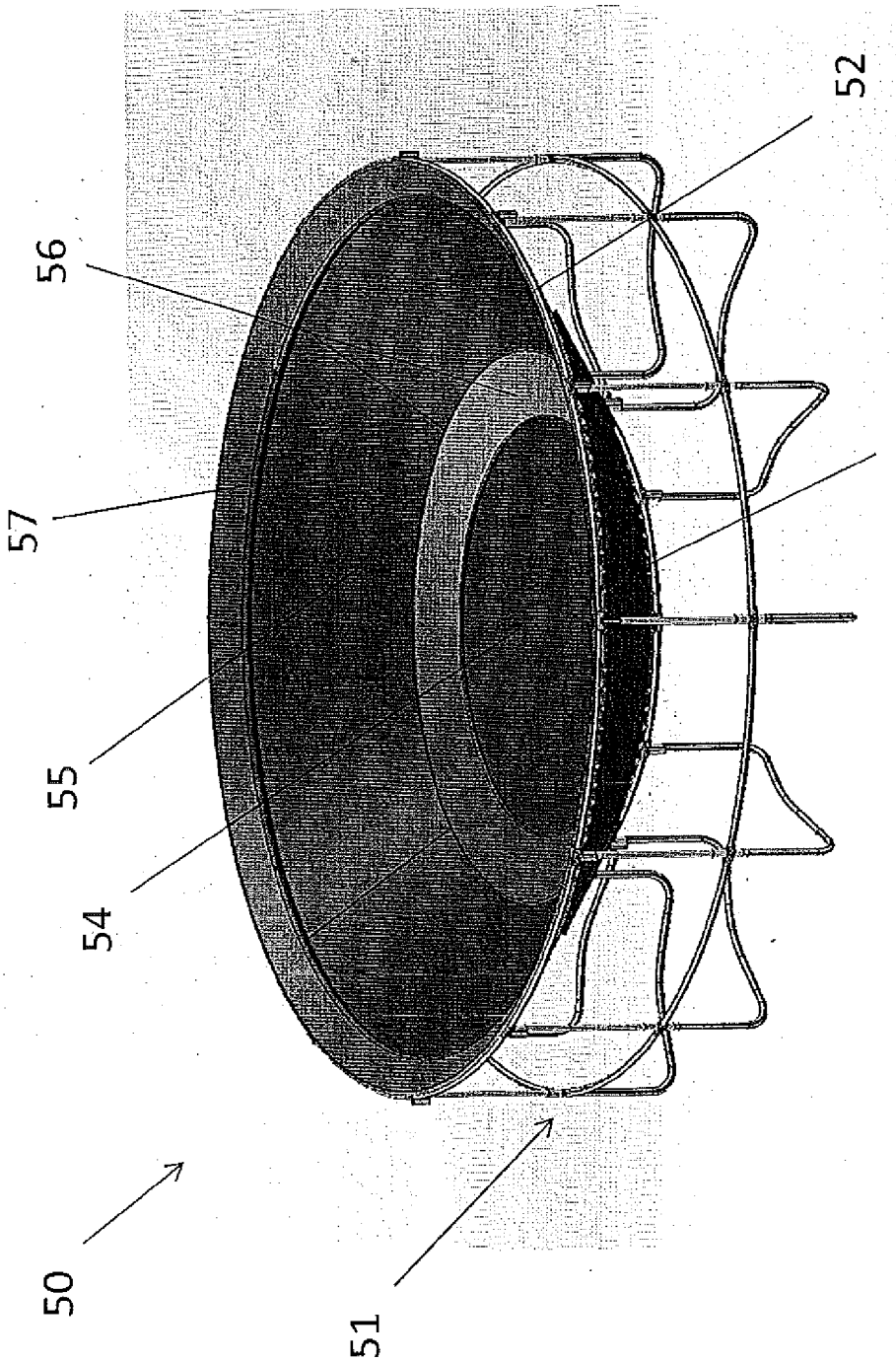


Figure 5

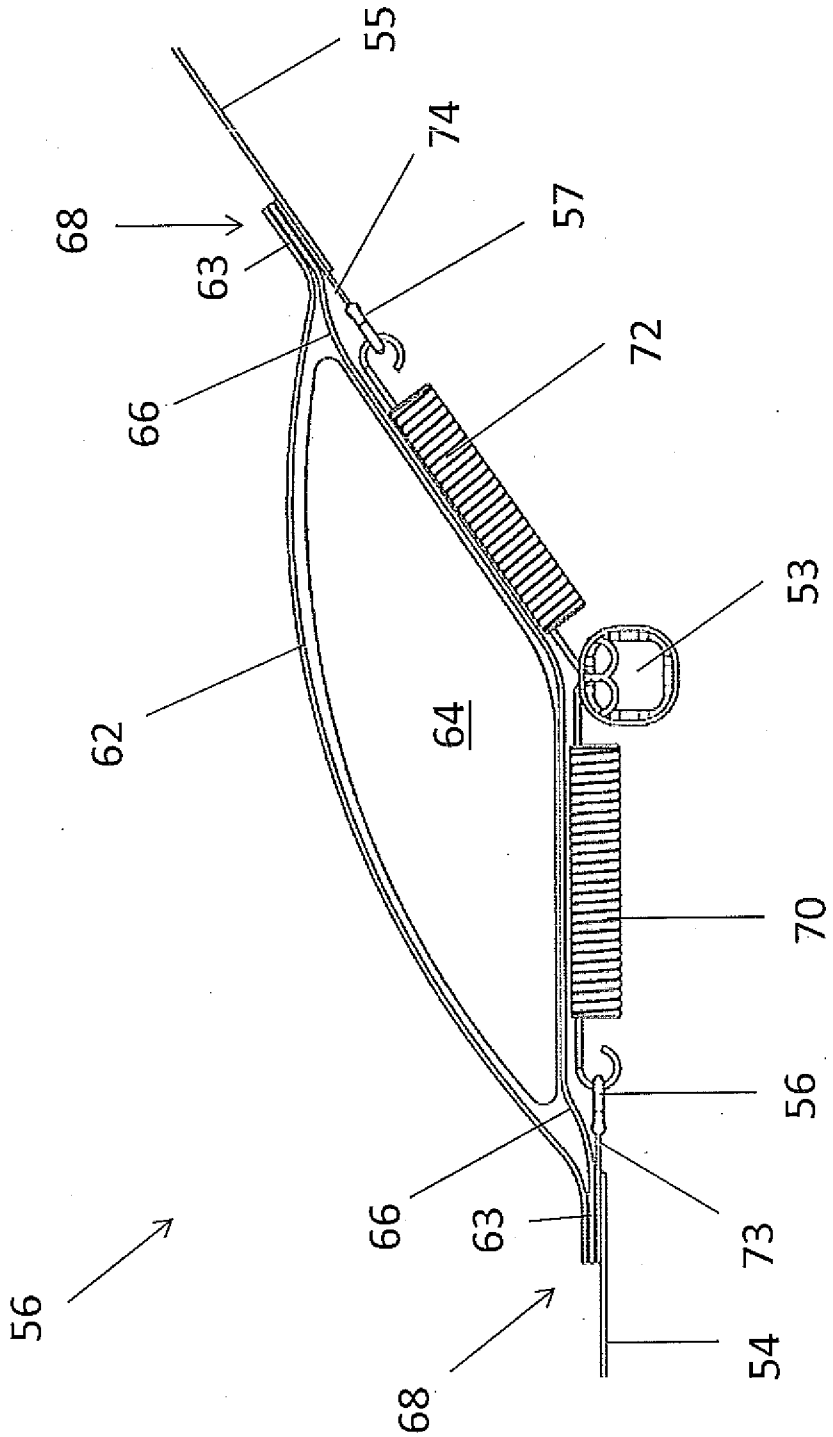


Figure 6

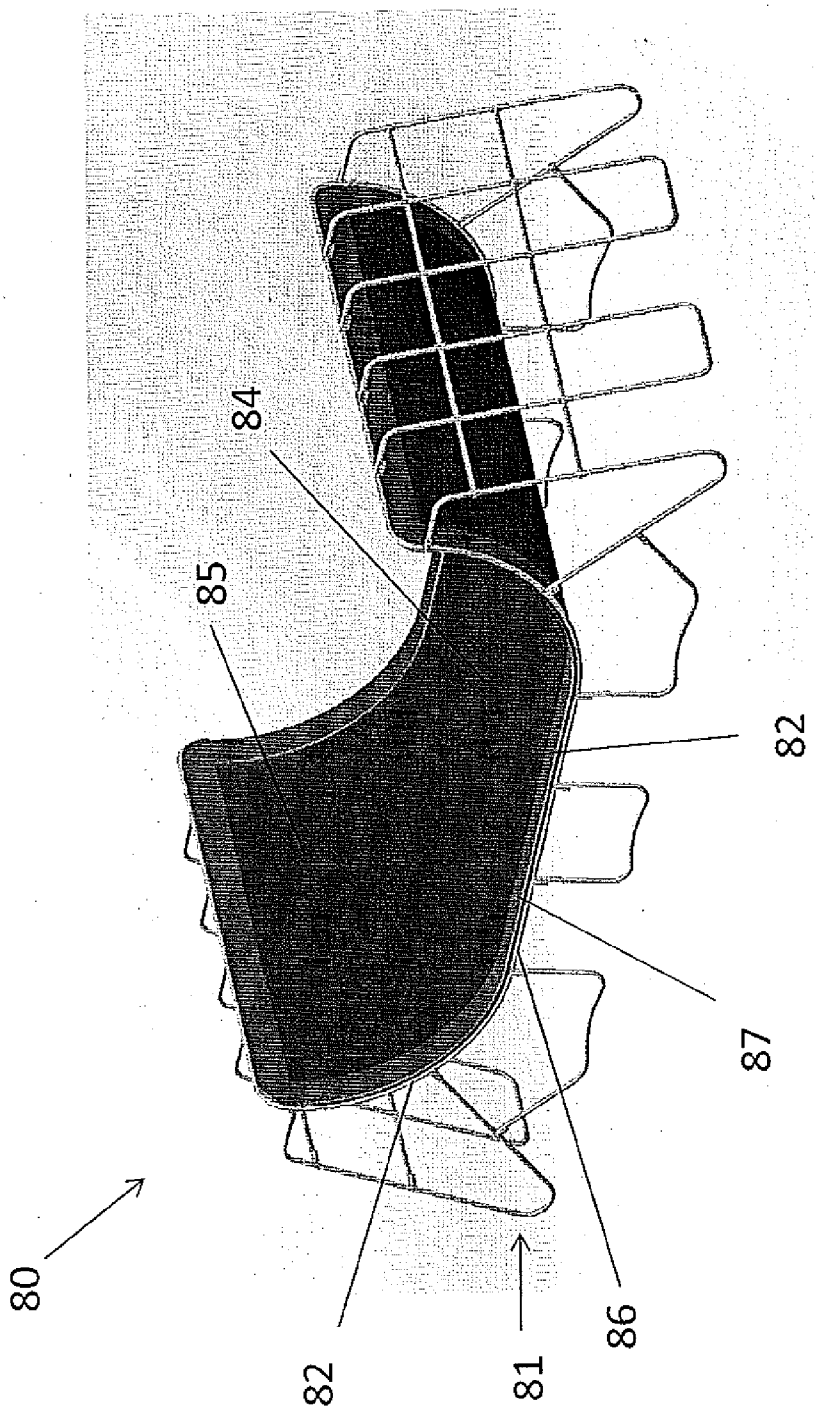


Figure 7

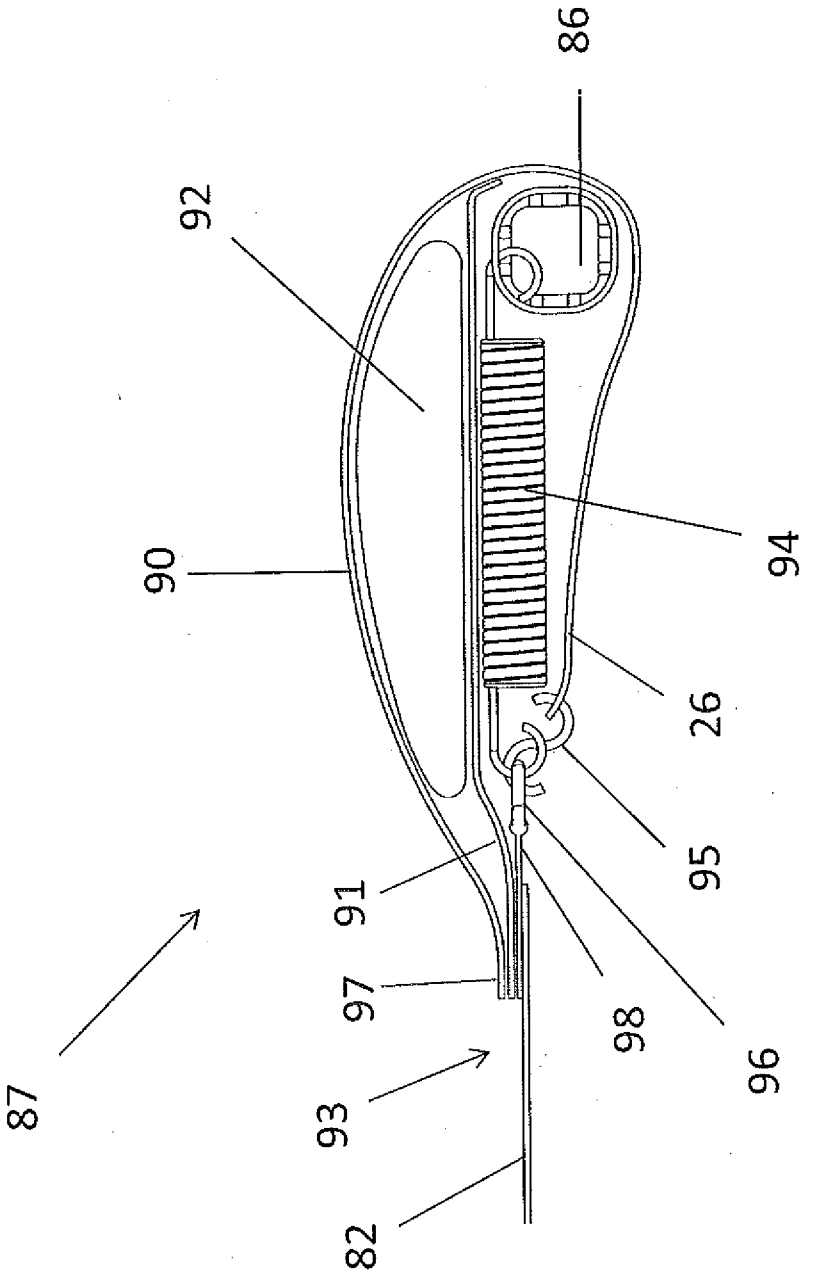


Figure 8

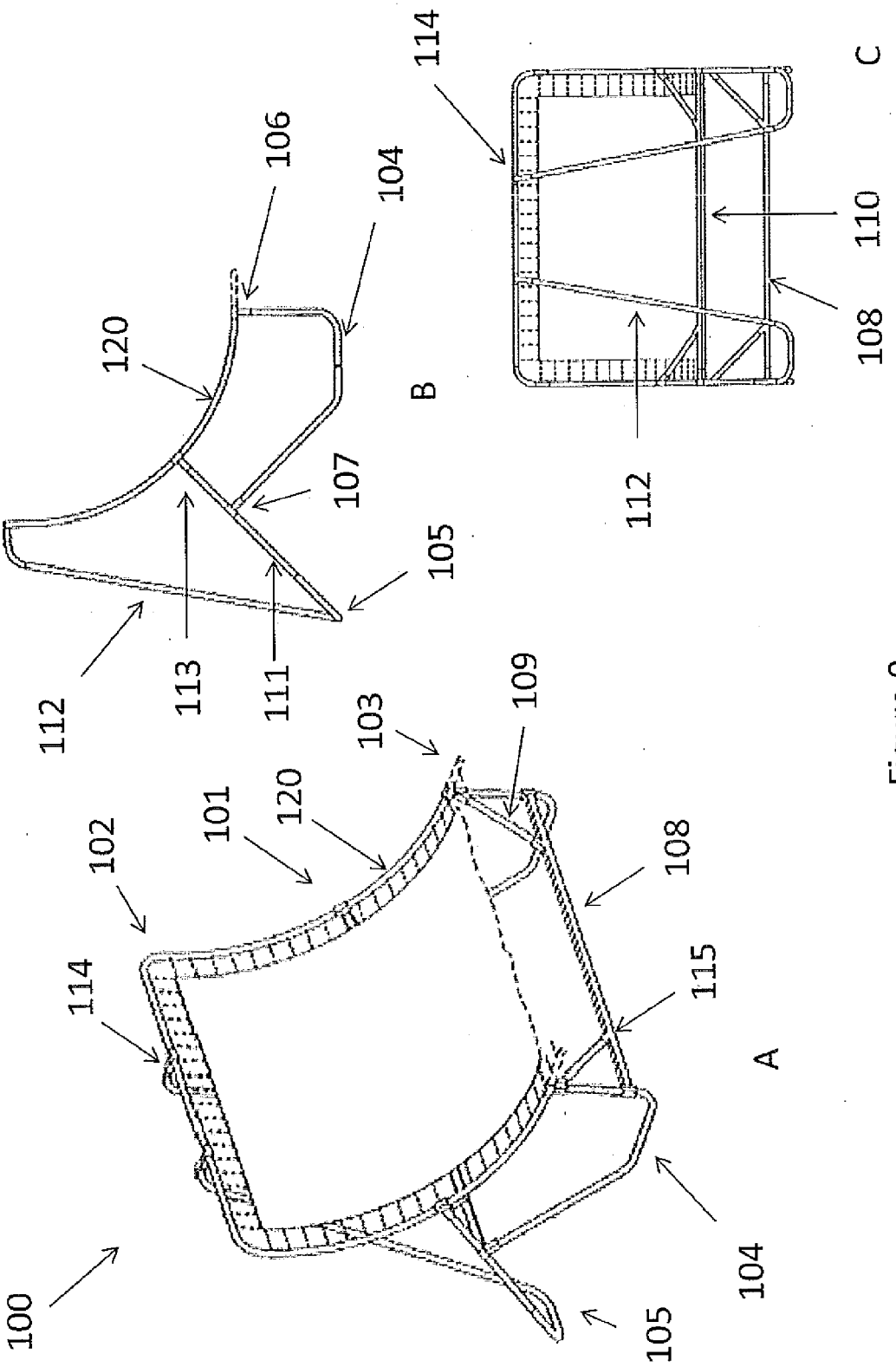

100
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107
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109
110
111
112
113
114
115
120
A
B
C

Figure 9

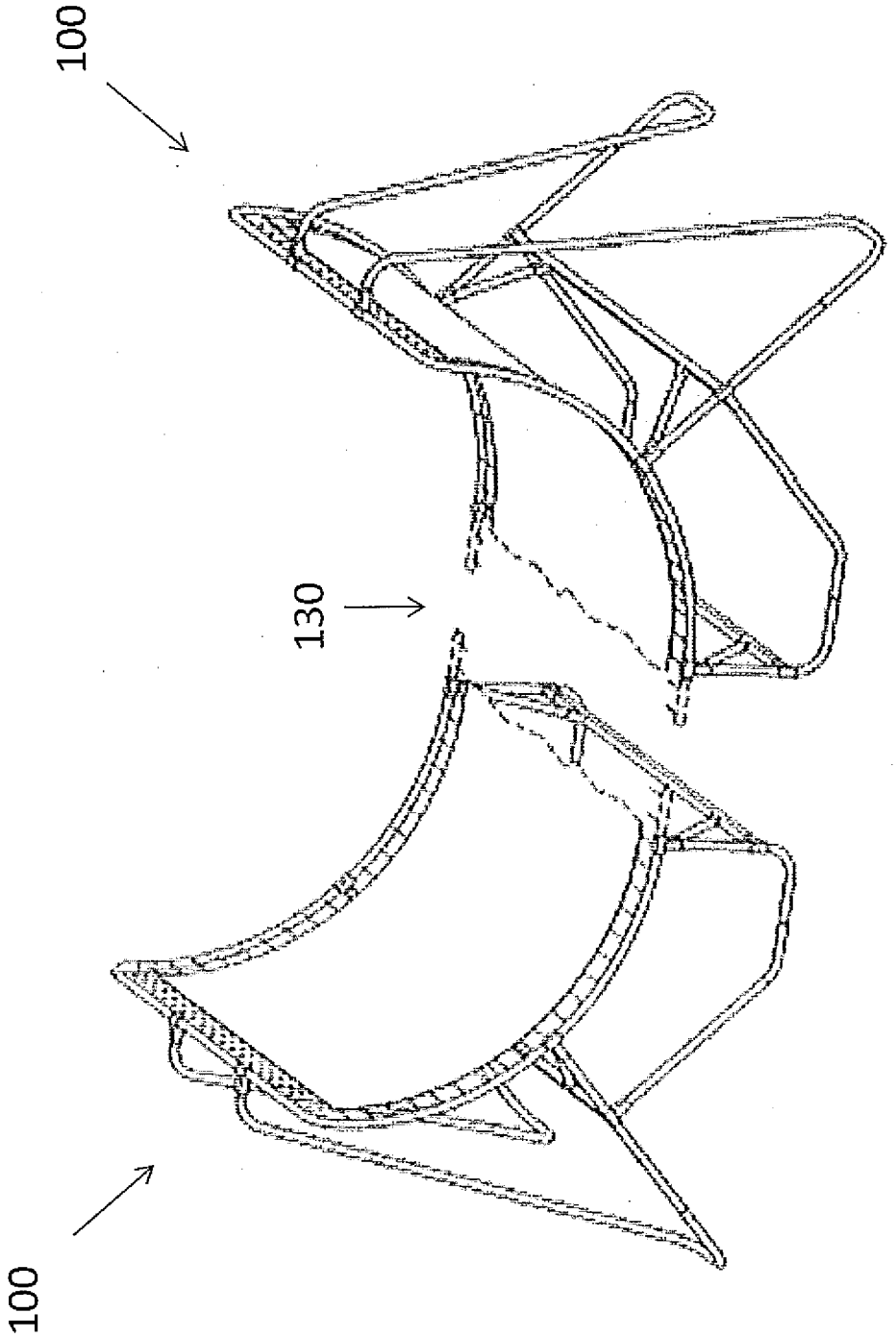


Figure 10

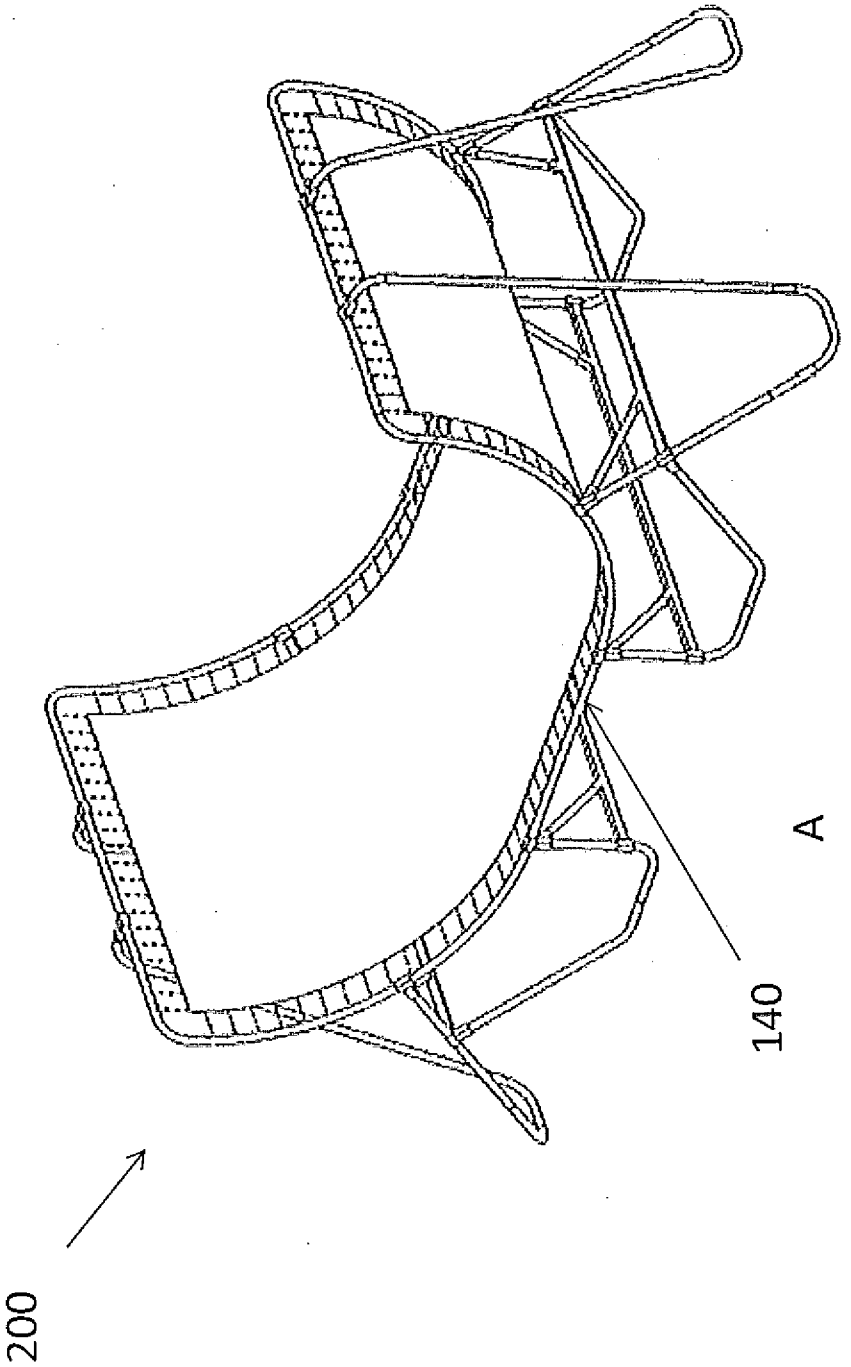


Figure 11

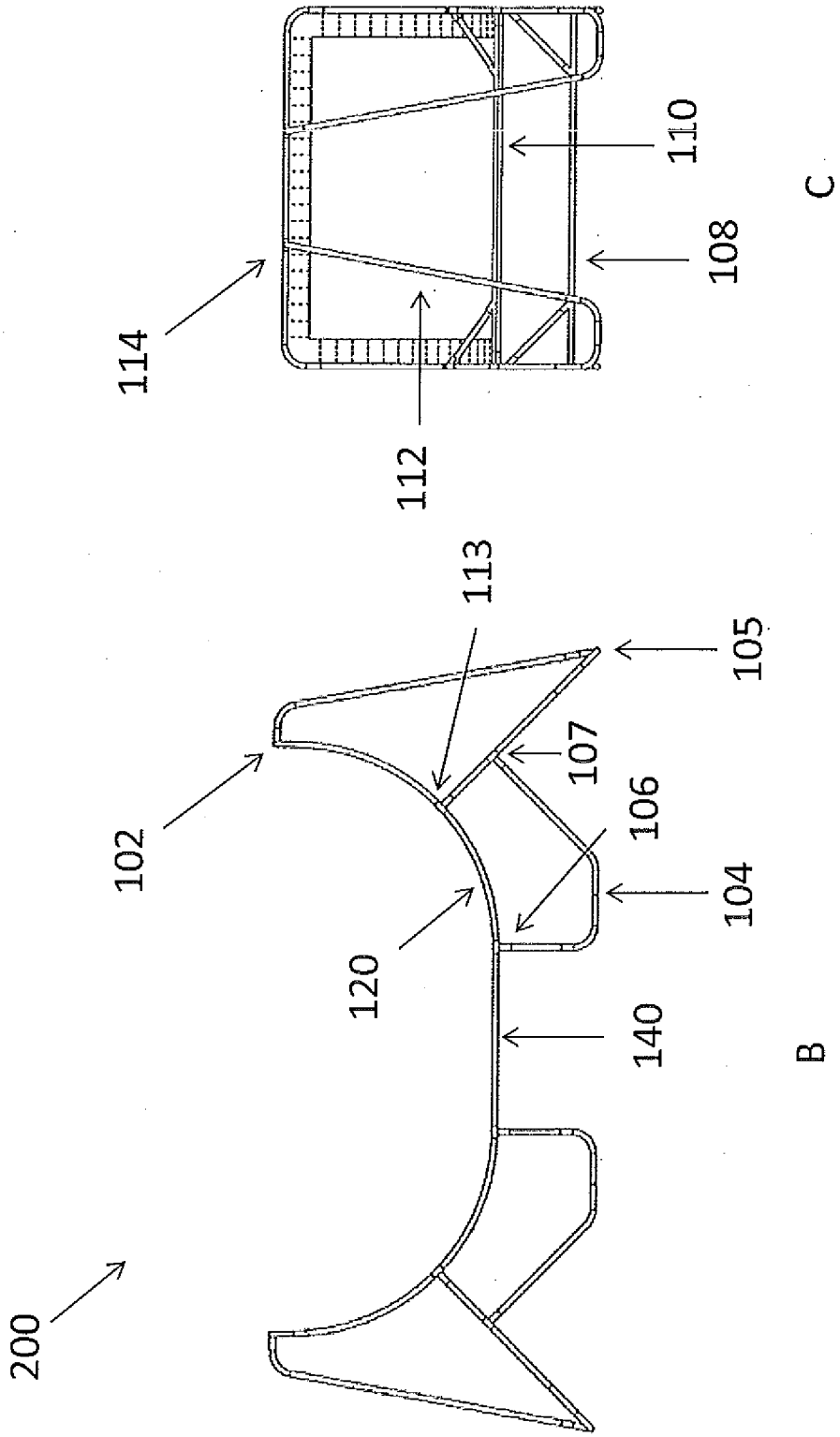


Figure 11

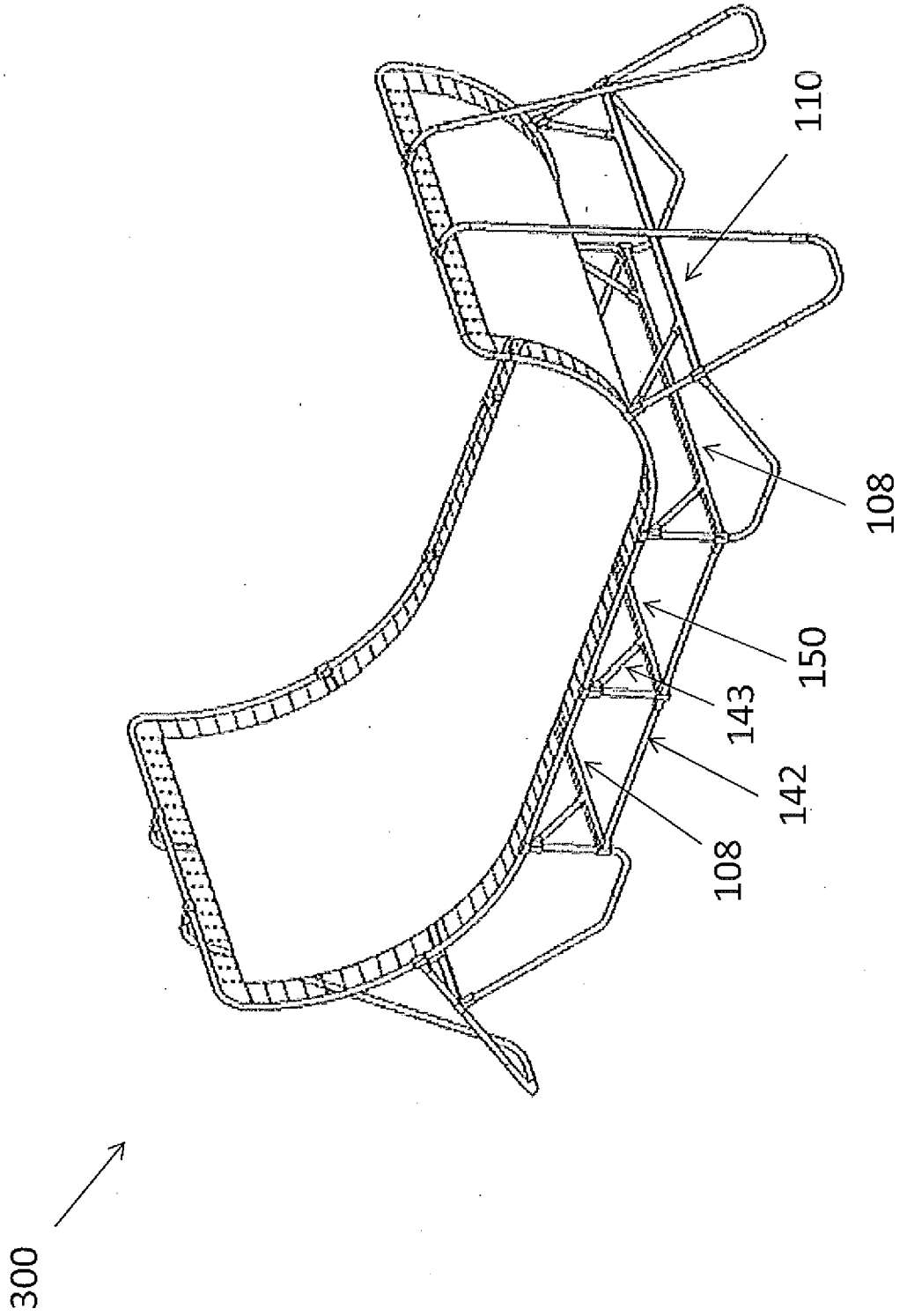


Figure 12 A

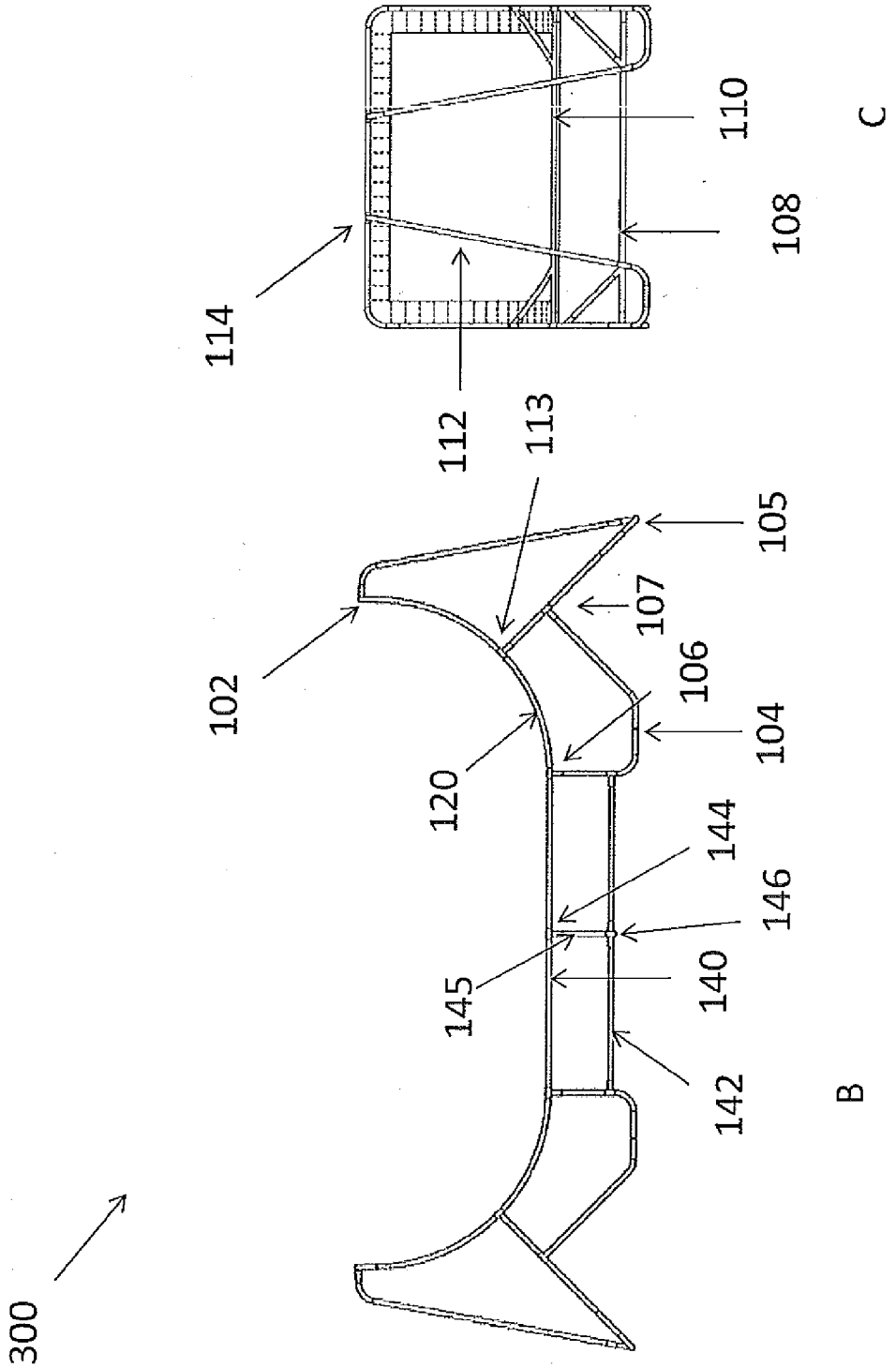

300
102
114
112
113
120
105
107
106
104
144
146
145
140
142
110
108
C
B

Figure 12

TRAMPOLINE SYSTEM HAVING ARCUATED JUMPING SURFACES

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a Continuation-in-Part of U.S. patent application Ser. No. 14/014,294, filed Aug. 29, 2013, which claims priority to U.S. Provisional Application Nos. 61/694,624 filed Aug. 29, 2012, and 61/864,980 filed Aug. 12, 2013, the entire contents of which are each incorporated by reference herein as if each is being set forth in its entirety.

BACKGROUND OF THE INVENTION

[0002] Presently, trampolines have consisted of a single, flat jumping mat attached under the tension of elastic springs or cords to a rigid frame, such that a subject can bounce up and down on the jumping mat. While there have been many improvements to the design and quality of materials of trampolines, all these advancements have retained the general design of the jumping mat surface being on a single plane.

[0003] It is well known that trampolines introduce a risk of injury to the subject or subjects jumping on them. For example, subjects can inadvertently launch towards the perimeter of the trampoline, possibly falling into the trampoline framework, or even falling entirely off the trampoline, resulting in injury. In other examples, a subject can inadvertently slip through the trampoline in the region of the elastic springs or cords connecting the jumping mat to the frame, also resulting in injury.

[0004] To combat this, padding is typically used to cover the springs and frame components at the perimeter of the jumping mat. Additionally, netting is often suspended by poles extending generally upward from the trampoline frame to stop a subject from falling outside of the framework. Unfortunately, while these safety measures help to decrease the number of injuries, they significantly detract from the experience of trampoline use.

[0005] Thus, there is a need in the art for a trampoline system that enhances the trampoline experience while still improving safety of use. The present invention satisfies this need.

SUMMARY OF THE INVENTION

[0006] The present invention relates to a trampoline system. The trampoline includes a frame, a jumping mat and elastic means for connecting the jumping mat to the frame, wherein the jumping mat includes a substantially horizontal jumping region between two arcuated shaped jumping regions at opposing ends of the horizontal jumping region when connected to the frame. In one embodiment, the frame includes four side footings and two end footings. In another embodiment, the frame includes at least two cross-bar supports running substantially perpendicular to the length of the jumping mat. In another embodiment, the frame includes at least four cross-bar supports running substantially perpendicular to the length of the jumping mat. In another embodiment, the frame includes at least five cross-bar supports running substantially perpendicular to the length of the jumping mat. In another embodiment, at least one of the cross bar supports runs substantially perpendicular to the length of the jumping mat and underneath about the middle of the substantially horizontal jumping region. In another embodiment, the substantially horizontal jumping region is between 1 and 10 feet in length. In another embodiment, the substantially horizontal jumping region is between 2 and 20 feet in length. In another embodiment, the substantially horizontal jumping region is about 5 feet in length. In another embodiment, the substantially horizontal jumping region is about 10 feet in length.

[0007] The present invention also relates to a curved trampoline frame end structure. The frame end includes a pair of substantially parallel arcuated tubes each having a substantially vertical end, a substantially horizontal end, and a mid-point along its curved length, a support bar connecting the arcuated tubes at their substantially vertical ends, a pair of end footings, wherein each end footing is connect to the support bar and to the mid-point of one of the arcuated tubes, and a pair of side footings, wherein each side footing is connected to a leg of one of the end footings and to one of the arcuated tubes at its substantially horizontal end. In an alternative embodiment, the frame end includes a pair of substantially parallel arcuated tubes each having a substantially vertical end, a substantially horizontal end, and a mid-point along its curved length, a support bar connecting the arcuated tubes at their substantially vertical ends, a pair of end footings, wherein each end footing is connect to the mid-point and to the substantially vertical end of one of the arcuated tubes, and a pair of side footings, wherein each side footing is connected to a leg of one of the end footings and to one of the arcuated tubes at its substantially horizontal end. In one embodiment, the frame end further includes a cross-bar connecting the pair of side footings. In another embodiment, the frame end further includes a cross-bar connecting the pair of end footings. In another embodiment, the leg of the end footing to which the side footing is connected to forms the connection to the mid-point of one of the arcuated tubes.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] The following detailed description of preferred embodiments of the invention will be better understood when read in conjunction with the appended drawings. For the purpose of illustrating the invention, there are shown in the drawings embodiments which are presently preferred. It should be understood, however, that the invention is not limited to the precise arrangements and instrumentalities of the embodiments shown in the drawings.

[0009] FIGS. **1**A-**1**C, are schematics of exemplary embodiments of the trampoline system having a generally circular first jumping surface and conical side walls forming a second jumping surface.

[0010] FIGS. **2**A and **2**B are schematics of alternative exemplary jumping mat shapes and configurations, according to an aspect of the present invention.

[0011] FIGS. **3**A and **3**B are schematics of exemplary cut patterns of the second jumping surface material. FIG. **3**A is exemplary cut patterns of the embodiments of FIGS. **1**A-**1**C, while FIG. **3**B is exemplary cut patterns of the embodiment of FIGS. **2**A and **2**B.

[0012] FIG. **4** is a schematic of an exemplary attachment of the first and second jumping surfaces of the jumping mat suitable for any jumping mat shape or configuration, according to an aspect of the present invention.

[0013] FIG. **5** is a schematic of an exemplary trampoline having a generally circular first jumping surface and conical side walls forming a second jumping surface.

[0014] FIG. **6** is a schematic of a padding system covering the frame and spring components between the first jumping surface and second jumping surface of the trampoline of FIG. **5**.

[0015] FIG. **7** is a schematic of an exemplary trampoline having curved sidewalls, creating an arcuated shaped, multiple plane jumping surface.

[0016] FIG. **8** is a schematic of a padding system covering the frame and spring components around the perimeter of the jumping mat.

[0017] FIG. **9**, comprising FIGS. **9**A-**9**C, is a schematic of an exemplary trampoline end having a curved sidewall. FIG. **9**A is an isometric view, FIG. **9**B is a side view and FIG. **9**C is an end view.

[0018] FIG. **10** is a schematic of two exemplary curved wall trampoline ends facing each other, to form a halfpipe design of variable length between the curved wall trampoline ends.

[0019] FIG. **11**, comprising FIGS. **11**A-**11**C, is a schematic of an exemplary halfpipe trampoline and support framing. FIG. **11**A is an isometric view, FIG. **11**B is a side view and FIG. **11**C is an end view.

[0020] FIG. **12**, comprising FIGS. **12**A-**12**C, is a schematic of an exemplary halfpipe trampoline and support framing of a larger size. FIG. **12**A is an isometric view, FIG. **12**B is a side view and FIG. **12**C is an end view.

DETAILED DESCRIPTION

[0021] It is to be understood that the figures and descriptions of the present invention have been simplified to illustrate elements that are relevant for a clear understanding of the present invention, while eliminating, for the purpose of clarity, many other elements found in typical trampoline systems. Those of ordinary skill in the art may recognize that other elements and/or steps are desirable and/or required in implementing the present invention. However, because such elements and steps are well known in the art, and because they do not facilitate a better understanding of the present invention, a discussion of such elements and steps is not provided herein. The disclosure herein is directed to all such variations and modifications to such elements and methods known to those skilled in the art.

[0022] Unless defined otherwise, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this invention belongs. Although any methods and materials similar or equivalent to those described herein can be used in the practice or testing of the present invention, the preferred methods and materials are described.

[0023] As used herein, each of the following terms has the meaning associated with it in this section.

[0024] The articles "a" and "an" are used herein to refer to one or to more than one (i.e., to at least one) of the grammatical object of the article. By way of example, "an element" means one element or more than one element.

[0025] "About" as used herein when referring to a measurable value such as an amount, a temporal duration, and the like, is meant to encompass variations of ±20% or ±10%, more preferably ±5%, even more preferably ±1%, and still more preferably ±0.1% from the specified value, as such variations are appropriate to perform the disclosed methods.

[0026] As used herein, the term "continuous" or "continuously" when referring to the connection of a first and second jumping surface, means that the first and second jumping surface materials (i.e. the jumping mat or mats) are connected via stitching, snaps, hooks, ties, adhesives, reinforcement strips and/or other connecting mechanisms that do not include any portion of the frame or elastic attachment means positioned between the connection point of the first and second jumping surface areas.

[0027] As used herein, the term "frame" refers to any sturdy structure suitable for supporting the jumping mat when attached by the elastic attachment means.

[0028] As used herein, the term "elastic attachment means" refers to any mechanical attachment component composed of an elastic material for attaching the jumping mat to the frame. Non-limiting examples of elastic attachment means includes metal springs, rubber cords and straps, and the like.

[0029] Throughout this disclosure, various aspects of the invention can be presented in a range format. It should be understood that the description in range format is merely for convenience and brevity and should not be construed as an inflexible limitation on the scope of the invention. Accordingly, the description of a range should be considered to have specifically disclosed all the possible subranges as well as individual numerical values within that range. For example, description of a range such as from 1 to 6 should be considered to have specifically disclosed subranges such as from 1 to 3, from 1 to 4, from 1 to 5, from 2 to 4, from 2 to 6, from 3 to 6 etc., as well as individual numbers within that range, for example, 1, 2, 2.7, 3, 4, 5, 5.3, 6 and any whole and partial increments therebetween. This applies regardless of the breadth of the range.

[0030] The present invention includes a trampoline system that allows a subject to bounce on both a central, substantially horizontal surface area, and a surrounding wall that is continuous with the central surface area and positioned at an angle about the perimeter of the central surface area.

[0031] As shown in FIGS. **1**A-**1**C, a trampoline system **10** of the present invention may include three primary components: a frame **20**, a jumping mat **30** and elastic attachment means **40** for attaching the jumping mat to the frame.

[0032] As contemplated herein, jumping mat **30** includes at least two primary jumping surfaces. The first jumping surface **31** is substantially horizontal and resembles the basic, single plane mat of a typical trampoline assembly. The second jumping surface **32** forms a wall positioned at an upward angle **33** from first jumping surface **31**. Second jumping surface **32** extends generally from the perimeter of first jumping surface **31** at angle **33** suitable for propelling a subject generally upward and/or back into the vicinity of first jumping surface **31**. For example, in one embodiment, angle **33** may be any angle between substantially horizontal and substantially vertical. In another embodiment, angle **33** may be between 1° and 90°. Preferably, angle **33** is between 25° and 50°, more preferably between 30° and 40° and even more preferably, angle **33** is about 35°. It should be appreciated that there is no limitation to angle **33**, provided that it allows second jumping surface **32** to be positioned tangentially from the plane of first jumping surface **31**.

[0033] While FIGS. **1**A-**1**C depict a circular trampoline system **10**, there is no restriction to the general shape of trampoline system **10**. For example, first jumping surface **31** may be circular, oval, square, rectangular, octagonal, or any other geometric or custom configuration having any number of sides and/or curved regions, examples of which are illustrated in FIGS. **2**A-**2**B. Further, there is no limitation to the radius, diameter, length, width, circumference or other measure of the size of first jumping surface **31**. Accordingly, the

dimensions of first jumping surface **31** may resemble any standard trampoline as understood by those skilled in the art, or it may be a customized dimension. Similarly, second jumping surface **32** may be of any length **34** desired. For example, length **34** may be between 2 and 10 feet. Preferably, length **34** may be between 4 and 8 feet, more preferably between 5 and 7 feet, and even more preferably, about 6 feet. Preferably, length **34** should provide enough surface area such that a subject can comfortably jump or fall into or away from second jumping surface **32**.

[0034] In other embodiments, first jumping surface **31** is not fully surrounded by second jumping surface **32**, but instead simply includes one or more jumping surfaces **32** that are continuous with jumping surface **31**, or alternatively, adjacent to jumping surface **31**. For example, jumping surface **31** may be substantially rectangular, and include two jumping surfaces **32** located at opposing ends of jumping surface **31**. In such embodiments, the trampoline system may resemble a "half-pipe" with two walls tangentially angled upward from jumping surface **31**. In such embodiments, frame **20** can be constructed such that the angle **33** of one or more jumping surfaces **32** can be adjustable, for example, such as by using telescoping frame tubing, sliding clamps, locking spring pins or rigid pins, sliding rails, and any combination thereof.

[0035] Depending on the desired shape and positioning of first and second jumping surfaces **31** and **32**, jumping mat **30** can be constructed from a single piece of jumping mat material, or it can be constructed from multiple pieces of jumping mat material attached together to form a continuous jumping mat surface. For example, when trampoline system **10** is circular, as illustrated in FIGS. **1**A-**1**C, one way to construct jumping mat **30** would be to cut a first, circular piece and stitch it to one or more "C" shaped pieces as shown in FIG. **3**A, where the circular piece will become first jumping surface **31** and the "C" shaped piece(s) will become second jumping surface **32** when stitched together. In another example, such as when the trampoline system is rectangular (see jumping mat **30** of FIGS. **2**A and **2**B), a first, rectangular piece can be cut and stitched to four trapezoid shaped pieces as shown in FIG. **3**B, where the rectangular piece will become first jumping surface **31** and the trapezoid shaped pieces will become second jumping surface **32** when stitched together.

[0036] As shown in FIG. **4**, first and second jumping surfaces **31** and **32** are joined together to form jumping mat **30** as a continuous surface. For example, the mat material of second jumping surface **32** can include an overlay region **35** that is stitched onto the top of the mat material of first jumping surface **31**. As the remainder of the mat material of second jumping surface **32** extends away from first jumping surface **31**, a fold or joint region **36** is created at the interface of first and second jumping surfaces **31** and **32**. Optionally, a reinforcement strip **37** of material can be used to overlay joint region **36** and stitched into each of first and second jumping surfaces **31** and **32** to provide a stronger attachment. There is no limitation to the mechanism of attaching first and second jumping surfaces **31** and **32**, meaning that any use of stitching, snaps, hooks, ties, adhesives, reinforcement strips and/or other connecting mechanisms may be used, provided that the attachment of surfaces **31** and **32** does not include any portion of the frame or elastic attachment means positioned between the connection point of the first and second jumping surface areas. In alternative embodiments, the first and second jumping mats can be adjacent, instead of continuous. In such embodiments, the second jumping surface may fully surround the perimeter of the first jumping surface, or in other words, the second jumping surface is adjacent to the entire perimeter edge of the first jumping surface mat. An example of this embodiment can be seen in FIGS. **5** and **6**, described in greater detail hereinbelow.

[0037] The mat material of first and/or second jumping surfaces **31** and **32**, as well as reinforcement strip **37**, may be any standard trampoline mat material as would be understood by those skilled in the art, such as polypropylene or nylon or other durable fabric materials, which may also have UV resistant properties or coatings.

[0038] As shown in FIGS. **1**A-**1**C, frame **20** generally includes an upper mat attachment area **21** and lower mat attachment area **22**, where elastic attachment means **40** connects jumping mat **30** to frame **20**. For example, when trampoline system **10** is generally circular shaped, upper mat attachment area **21** may include an upper support ring **23** anchored by a plurality of support arms **25** ultimately connecting support ring **23** to a base component **26** positioned on the ground. Also connected to support arms **25** is a lower support ring **24** which forms lower mat attachment area **22**. Frame **20** may optionally include one or more ladders **27** either integrated into frame **20** or releasably attached to frame **20**, such that a subject can easily climb into and access first and second jumping surfaces **31** and **32**. Frame **20** may be composed of any solid and/or sturdy material suitable for withstanding a subject jumping on trampoline system **10**, such as galvanized metal tubing, sturdy polymer or any other framing materials understood by those skilled in the art. In a preferred embodiment, the frame is composed of 14 gauge galvanized steel tubes. It should be appreciated that frame **20** can be constructed in any number of ways, and therefore there is no restriction to the particular design or manner frame **20** is constructed.

[0039] Alternatively, frame **20** may be designed to attach to an existing, standard trampoline. For example, frame **20** may include upper support ring **23**, support arms **25** and base component **26**, and further include clamps or other attachment components attaching some of support arms **25** to the existing trampoline framework, such that the existing trampoline framework effectively becomes or replaces lower support ring **24**. Then by replacing the existing standard trampoline mat with jumping mat **30** of the present invention, a subject can effectively convert their existing trampoline into the trampoline system of the present invention. Accordingly, trampoline system **10** of the present invention may be provided as an all-inclusive trampoline system, or it may be provided as a "conversion kit" for transforming an existing trampoline into the trampoline system of the present invention.

[0040] Elastic attachment means **40** are used at both upper and lower mat attachment areas **21** and **22**, and may include any mechanical component or mechanism that provides an elastic attachment of jumping mat **30** to frame **20** at upper and lower mat attachment areas **21** and **22**. For example, elastic attachment means **40** may include the use of metal springs, rubber cords or straps such as bungee cords, and the like, as would be understood by those skilled in the art. For example, jumping mat **30** may include a series of loops and/or secured metal rings at its perimeter that springs can hook on to. Similarly, upper and lower support rings **23** and **24** may include holes or knobs for the springs to also hook into or onto to provide the proper tension and spring bounce to jumping mat **30** when a subject is jumping on it.

[0041] In yet another exemplary embodiment of the present invention, the trampoline system may include two adjacent jumping mats, wherein the mats are at different planes and the second mat surrounds the entire perimeter edge of the first mat. For example, FIG. **5** shows a trampoline system **50**, having a frame **51**, a first jumping mat **54** and a second jumping mat **55**, each connected to frame **51** via springs or other elastic attachment means. For example, frame **51** may include an upper support ring **52** and lower support ring **53**, to which the springs attach and further connect to the jumping mats as described elsewhere herein. Specifically, first jumping mat **54** may be connected to lower support ring **52** via a first set of springs. Second jumping mat **55** may be connected to lower support ring **53** and upper support ring **52** via a second and third set of springs. Second jumping mat **55** may be set at an angle anywhere between 1° and 90° relative to first jumping mat **54**. Non-limiting exemplary angles may be 30°, 35°, 40° and 45°. Preferably, the angle is between 25° and 50°, more preferably between 30° and 40° and even more preferably, is about 35°. It should be appreciated that there is no limitation to the angle of reference between the first and second jumping mats, provided that it allows the second jumping mat surface to be positioned tangentially from the plane of first jumping mat surface.

[0042] Trampoline **50** may include a padding system **57** at the top perimeter edge, covering the springs connecting second jumping mat **55** to upper support ring **52**. This padding system may be a standard padding, or it may be a padding wrap system as illustrated in FIG. **8** and described in more detail hereinbelow. Trampoline **50** may further include a padding system **56**, shown in greater detail in FIG. **6**. For example, as shown in FIG. **6**, padding system **56** may generally include a cover **62**, liner **66** and cushion **64**. Liner **66** may be used (if desired) to cover the first set of springs **70** and the second set of spring **72** and lower support ring **53** between adjacent jumping mats **54** and **55**. Cushion **64** is placed on top of liner **66**, and cover **62** overlays cushion **64**, with attachments to each of jumping mats **54** and **55** at attachment regions **68**. Attachment regions **68** serve to securely anchor cover **62** and optionally liner **66** of padding system **56** to jumping mats **54** and **55**. Attachment regions **68** may be permanently secured or they may be detachably secured. In one embodiment, cover **62** is permanently attached to jumping mats **54** and **55** via stitching cover **62** at regions **63** to the perimeter of jumping mats **54** and **55**, such that regions **63** of cover **62** overlay V-ring straps **73** and **74**. In another embodiment, regions **63** of cover **62** may be detachably secured to the perimeter of jumping mats **54** and **55** via Velcro®, snaps, buttons, zippers, ties or any other mechanism that allows for cover **62** to be securely attached and subsequently detached to jumping mats **54** and **55**.

[0043] In yet another exemplary embodiment of the present invention, the trampoline system may include a single jumping mat, wherein the jumping mat is curved at one or more ends, creating an arcuated shaped surface that present multiple jumping planes. For example, as shown in FIG. **7**, trampoline **80** may include a frame **81** and a substantially rectangular jumping mat **82**, and a set of springs (not shown) connecting the perimeter of jumping mat **82** to a support ring **86** of frame **81**. Support ring **86** may include 1 or more regions **83** that are curved, thereby creating an arcuated shaped end of frame **81**. As illustrated in FIG. **7**, when opposing ends of frame **81** are arcuated shaped, trampoline **80** takes the form of a "half pipe." In this embodiment, jumping mat **82** is also curved, or arcuated shaped, thereby creating an arcuate jumping surface region **85** to complement the substantially horizontal surface region **84** of jumping mat **82**.

[0044] It should be appreciated that the framing for a standalone halfpipe trampoline system must be structured to withstand not only the force of a jumper jumping on the mat, but also the force of the spring tension pulling the framing inwardly into the jumping regions when the mat is assembled onto the frame via the springs. Such framing is particularly challenging due to the need to keep a sufficient space underneath the mat free of any framing components that could interfere with a jumper applying a downward force against the jumping mat. As shown in FIGS. **9**A-**9**C, an arcuated halfpipe end **100** may include a curved region **101** starting from a substantially vertical end **102** to a substantially horizontal extension **103** forming a substantially horizontal jumping region of variable length. There is no limitation to the degree of the arc or the length of the arc. The framing generally includes two side footings **104** and end footings **105** that are in contact with the ground surface. End footings **105** include extensions **111** and **112** that are connected to the mat framing ring **120** at connectors **113** and **114**, respectively. Side footings **104** are connected to mat framing ring **120** at connectors **106** and **107**, where connector **107** is positioned on extension **111** in a substantially perpendicular fashion. As contemplated herein, connectors **106**, **107**, **133** and **114** may simply be welded joints, or they may be framing brackets suitable for bolting to a framing bar, or suitable for receiving a reduced or swaged frame bar end for engagement. Frame end **100** may be further supported by a cross-bar **108** underneath the end of curved region **101** leading into substantially horizontal extension **103** of the trampoline. Cross-bar **108** includes a pair of a triangle supports or trusses **109**, which engage mat framing ring **120** at connector **106** and connector **115**. Connector **115**, like connectors **106**, **107**, **133** and **114** may simply be a welded joint, or it may be a framing bracket suitable for bolting to a framing bar, or suitable for receiving a reduced or swaged frame bar end for engagement. Frame end **100** may also be supported by a second cross-bar **110**. Cross-bar **110** may be constructed in a similar manner as cross-bar **108**, in that it may include any form of triangular support or truss. Cross-bar **110** engages mat framing ring **120** at connector **113** and is further engaged to extension **111** via connector **107**.

[0045] As shown in FIG. **10**, the frame ends may be facing each other so as to form a halfpipe trampoline of any length **130** therebetween. For example, as shown in FIGS. **11**A-**11**C, halfpipe trampoline **200** may include a framing bar **140** forming part of the mat framing ring **120** having a length of between 1-10 ft. In certain embodiments, framing bar **140** may be about 1 ft, about 2 ft, about 3 ft, about 4 ft, about 5 ft, about 6 ft, about 7 ft, about 8 ft, about 9 ft, or about 10 ft in length. It should be appreciated that there is no limitation to the actual length of framing bar **140**. In another example, as shown in FIGS. **12**A-**12**C, halfpipe trampoline **300** may include one or more additional cross-bar supports **150** along the length of substantially horizontal framing bar **140**. One or more cross-bar supports **150** are constructed in the same manner as cross-bars **108**. Cross-bar **150** includes a pair of triangular supports or trusses that engage framing bar **140** at a connector **144** via a triangular support or truss arm **143**, and a separate substantially vertical bar **145** that extends down from connector **144** to connector **146** to complete the triangle support structure. As before, connectors **144** and **146** may

simply be welded joints, or they may be framing brackets suitable for bolting to a framing bar, or suitable for receiving a reduced or swaged frame bar end for engagement. For added support, the frame may include additional support bars **142**, connecting the extensions of side footings **104** to connector **146**. In such embodiments, framing bar **140** may be a plurality of bar segments connected together along the total length between the curved wall framing ends. Such segments may be connected via welding, by bolting or bracketing, and/or by engagement of a reduced or swaged end of one bar segment fitting within the end of a second bar segment. In certain embodiments, framing bar **140** or combined bar segments, may have a length of between 2-20 ft. In certain embodiments including additional cross-bar support **150**, framing bar **140** may be about 2 ft, about 4 ft, about 6 ft, about 8 ft, about 10 ft, about 12 ft, about 14 ft, about 16 ft, about 18 ft, or about 20 ft in length. It should be appreciated that there is no limitation to the actual length of framing bar **140** when one or more cross-bar supports **150** are included in the halfpipe frame design.

[0046] Any of the trampolines described herein may further include a standard padding system to cover the springs, or they may include a wrapping padding system **87**, shown in greater detail in FIG. **8**. For example, as shown in FIG. **8**, padding system **87** may generally include a trampoline cover **90**, a liner **91** and a cushion **92**. Cover **90** is securely attached to the trampoline jumping mat **82** at an attachment region **93**, and wraps over cushion **92** and around the outermost frame ring **86** to which the trampoline springs **94** are anchored, such that cover **90** can be secured by a hook **95** or other attachment means to the D-rings or V-rings **96** of jumping mat **82** from underneath. In some embodiments, cushion **92** is not included in wrapping padding system **87**. In some embodiments, liner **91** is not included in system **87**.

[0047] Cushion **92** may be any cushioning material understood by those skilled in the art. In one embodiment, cushion **92** is a foam material. In another embodiment, cushion **92** is a balloon composed of PVC, nylon or an elastic material that can be filled with a gas, such as air, or even water. Cushion **92** may come in multiple pieces or sections. The actual number of cushion **92** sections will be dependent on the particular shape and size of the trampoline jumping mat perimeter needing the padding system of the present invention.

[0048] Liner **91** may provide a protective layer between the springs and/or frame components of the trampoline and cushion **92**, if desired. Liner **91** may be a single layer or a multi-layer, and may be composed of any material desired. Preferably, liner **91** is composed of PVC, nylon or other lightweight material that resists puncture. In some embodiments, liner **91** lays on top of the springs and/or framing components of the trampoline. In other embodiments, liner **91** is at least partially attached to at least one region of the springs and/or framing components of the trampoline. In other embodiments, liner **91** is attached to cover **90**, such that cushion **92** is encased within an interior region formed between cover **90** and liner **91**. In still other embodiments, liner **91** is attached to jumping mat **82** and cover **90** at attachment region **93**.

[0049] Attachment region **93** serves to securely anchor cover **90** and optionally liner **91** of wrapping padding system **87** to jumping mat **82**. Attachment region **93** may be permanently secured or it may be detachably secured. In one embodiment, cover **90** is permanently attached to jumping mat **82** via stitching cover **90** at region **97** to the perimeter of jumping mat **82**, such that region **97** of cover **90** overlays V-ring straps **98**. In another embodiment, region **97** of cover **90** may be detachably secured to the perimeter of jumping mat **82** via Velcro®, snaps, buttons, zippers, ties or any other mechanism that allows for cover **90** to be securely attached and subsequently detached to jumping mat **82**.

[0050] As contemplated herein, the trampoline systems of the present invention not only increases the user experience of multiple jumping surfaces on two or more planes, but it also enhances safety of use. For example, when a subject inadvertently launches towards the perimeter of the first jumping surface, the subject may "bounce" off the second jumping surface and be propelled back into the vicinity of the first jumping surface, instead of falling into the trampoline framework, the springs or even falling entirely off the trampoline. As the length of the wall of the second jumping surface is increased, the likelihood of a subject being able to bounce over the second jumping surface wall decreases, thereby reducing the likelihood that a subject will inadvertently contact the framing material, attachment springs, or even fall all the way out of the trampoline.

[0051] Further, the trampoline system of the present invention may additionally include any standard safety components as understood by those skilled in the art, such as soft mat coverings to cover the springs or cords, or netting extending above the upper ring of the frame. For example, because upper support ring is positioned above the height of the first substantially horizontal jumping surface, such netting would not need to extend very far beyond the height of the upper support ring of the frame. Alternatively, the netting can be shaped as a dome over the jumping mat, where the dome is formed by sturdy or flexible poles anchored to the upper support ring and arching overtop the jumping mat.

[0052] The disclosures of each and every patent, patent application, and publication cited herein are hereby incorporated herein by reference in their entirety.

[0053] While this invention has been disclosed with reference to specific embodiments, it is apparent that other embodiments and variations of this invention may be devised by others skilled in the art without departing from the true spirit and scope of the invention. The appended claims are intended to be construed to include all such embodiments and equivalent variations.

1. A trampoline, comprising:

a frame, a jumping mat and elastic means for connecting the jumping mat to the frame;

wherein the jumping mat includes a substantially horizontal jumping region between two arcuated shaped jumping regions at opposing ends of the horizontal jumping region when connected to the frame.

2. The trampoline of claim **1**, wherein the frame includes four side footings and two end footings.

3. The trampoline of claim **1**, wherein the frame includes at least two cross-bar supports running substantially perpendicular to the length of the jumping mat.

4. The trampoline of claim **1**, wherein the frame includes at least four cross-bar supports running substantially perpendicular to the length of the jumping mat.

5. The trampoline of claim **1**, wherein the frame includes at least five cross-bar supports running substantially perpendicular to the length of the jumping mat.

6. The trampoline of claim **5**, wherein at least one of the cross bar supports runs substantially perpendicular to the length of the jumping mat and underneath about the middle of the substantially horizontal jumping region.

7. The trampoline of claim 1, wherein the substantially horizontal jumping region is between 1 and 10 feet in length.

8. The trampoline of claim 1, wherein the substantially horizontal jumping region is between 2 and 20 feet in length.

9. The trampoline of claim 1, wherein the substantially horizontal jumping region is about 5 feet in length.

10. The trampoline of claim 1, wherein the substantially horizontal jumping region is about 10 feet in length.

11. A curved trampoline frame end, comprising:

a pair of substantially parallel arcuated tubes each having a substantially vertical end, a substantially horizontal end, and a mid-point along its curved length;

a support bar connecting the arcuated tubes at their substantially vertical ends;

a pair of end footings, wherein each end footing is connect to the support bar and to the mid-point of one of the arcuated tubes; and

a pair of side footings, wherein each side footing is connected to a leg of one of the end footings and to one of the arcuated tubes at its substantially horizontal end.

12. The trampoline frame end of claim 11, further comprising a cross-bar connecting the pair of side footings.

13. The trampoline frame end of claim 11, further comprising a cross-bar connecting the pair of end footings.

14. The trampoline frame end of claim 11, wherein the leg of the end footing to which the side footing is connected to forms the connection to the mid-point of one of the arcuated tubes.

15. A curved trampoline frame end, comprising:

a pair of substantially parallel arcuated tubes each having a substantially vertical end, a substantially horizontal end, and a mid-point along its curved length;

a support bar connecting the arcuated tubes at their substantially vertical ends;

a pair of end footings, wherein each end footing is connect to the mid-point and to the substantially vertical end of one of the arcuated tubes; and

a pair of side footings, wherein each side footing is connected to a leg of one of the end footings and to one of the arcuated tubes at its substantially horizontal end.

16. The trampoline frame end of claim 15, further comprising a cross-bar connecting the pair of side footings.

17. The trampoline frame end of claim 15, further comprising a cross-bar connecting the pair of end footings.

18. The trampoline frame end of claim 15, wherein the leg of the end footing to which the side footing is connected to forms the connection to the mid-point of one of the arcuated tubes.

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