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(54) **RESILIENT SEATING STRUCTURE**

**Publication Classification**

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(57) **ABSTRACT**

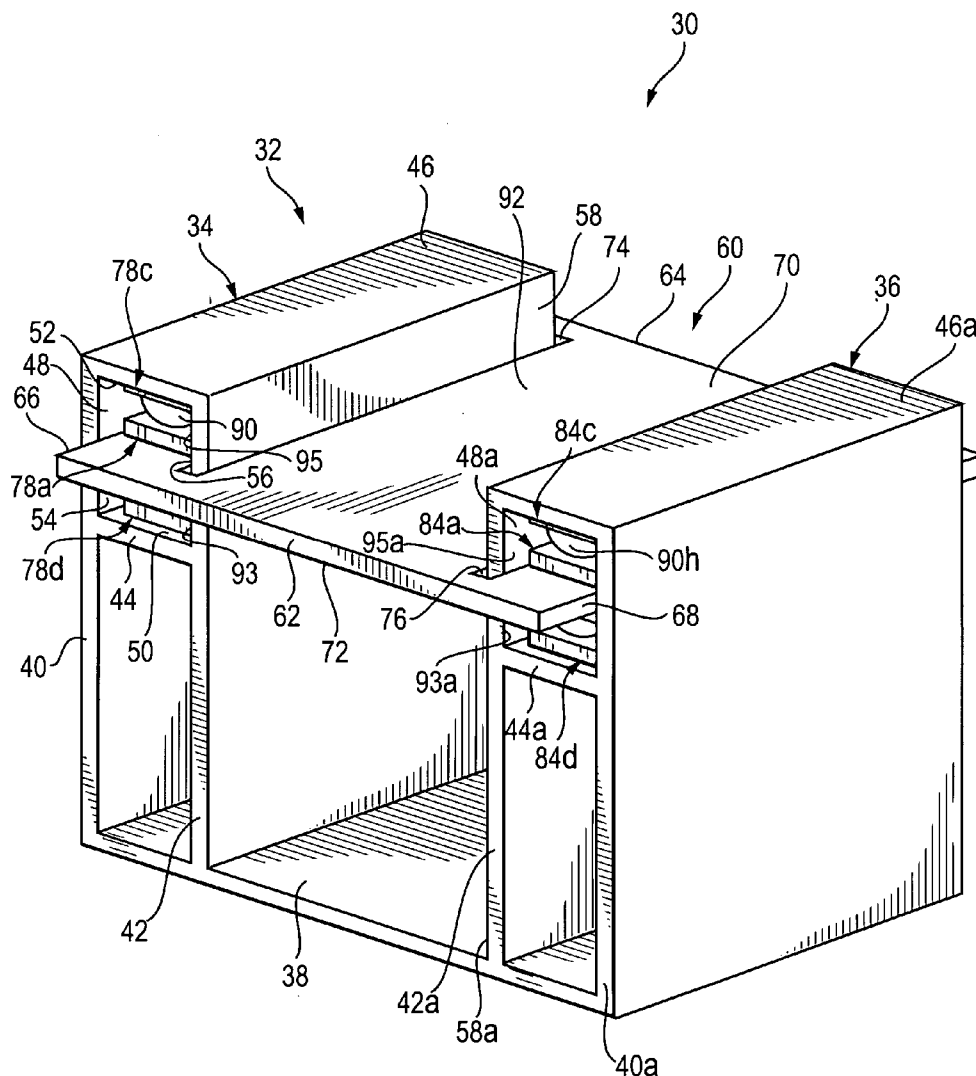
A seating structure **30** includes spaced housings **34** and **36** between which a seating portion **92** of a platform **60** is located. The platform **60** is also formed with non-seating portions **94a** and **94b** at opposite sides of the seating portion **92**, which are isolated and are within the housings **34** and **36**, respectively. The non-seating portions **94a** and **94b** engage resilient elements **90a** through **90h** above and below the non-seating portions. When a user sits on the seating portion **92**, the resilient elements **90a** through **90h** provide a buoyant and floating experience for the user. The seating portion **92** is movable relative to the housings **34** and **36** to allow for outward movement and for a rocking action.

(21) Appl. No.: **10/834,986**

(22) Filed: **Apr. 30, 2004**

**Related U.S. Application Data**

(63) Continuation-in-part of application No. 09/985,101, filed on Nov. 1, 2001.



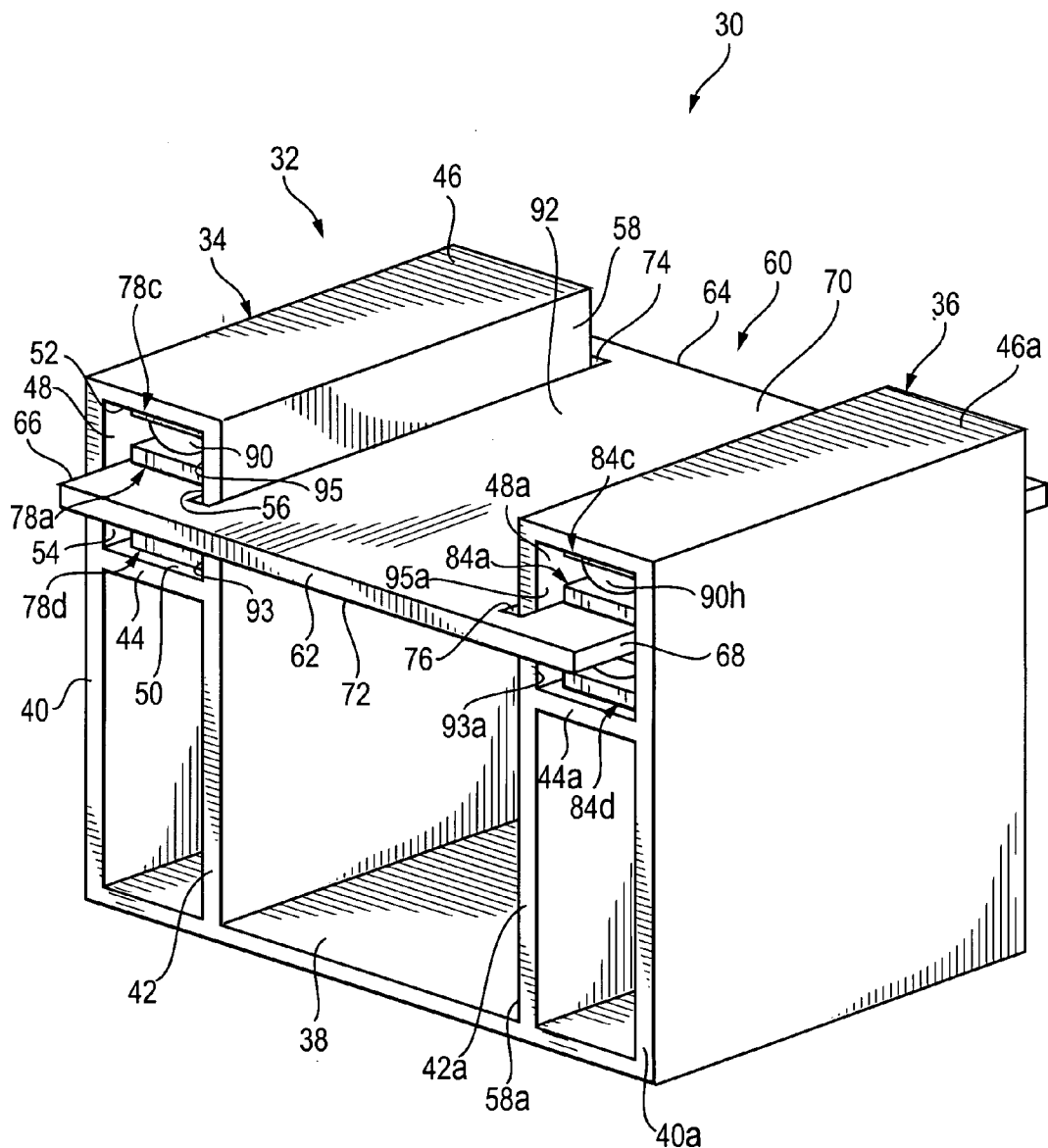


FIG. 1

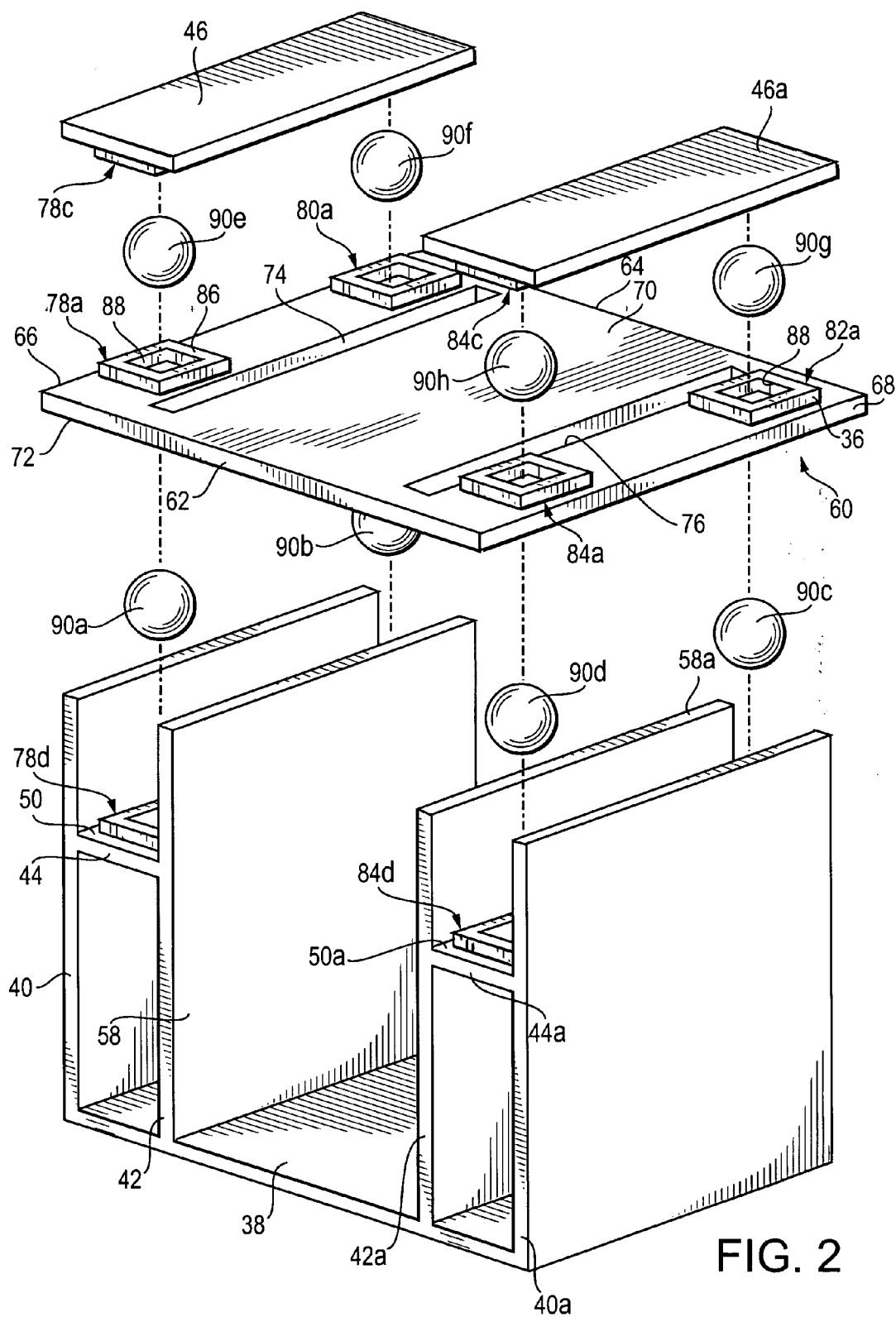


FIG. 2

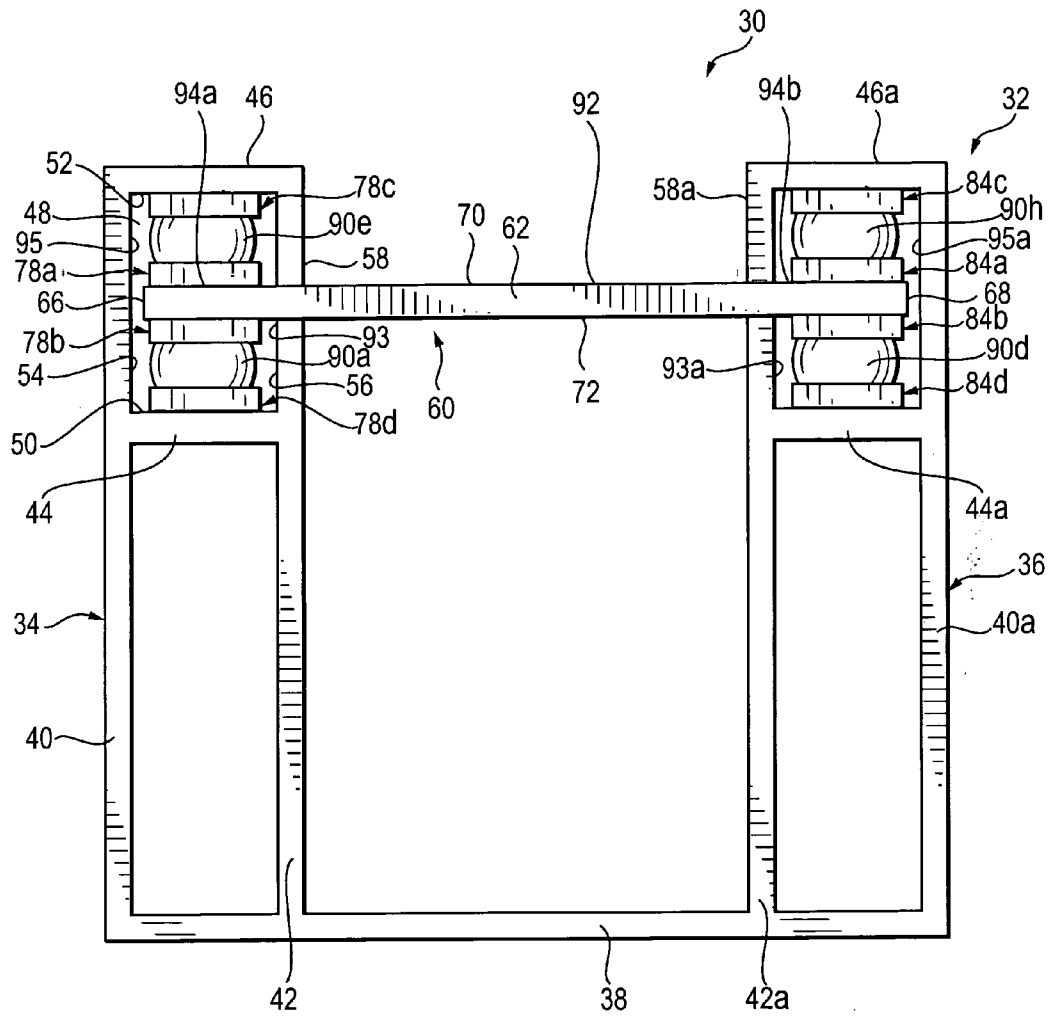


FIG. 3

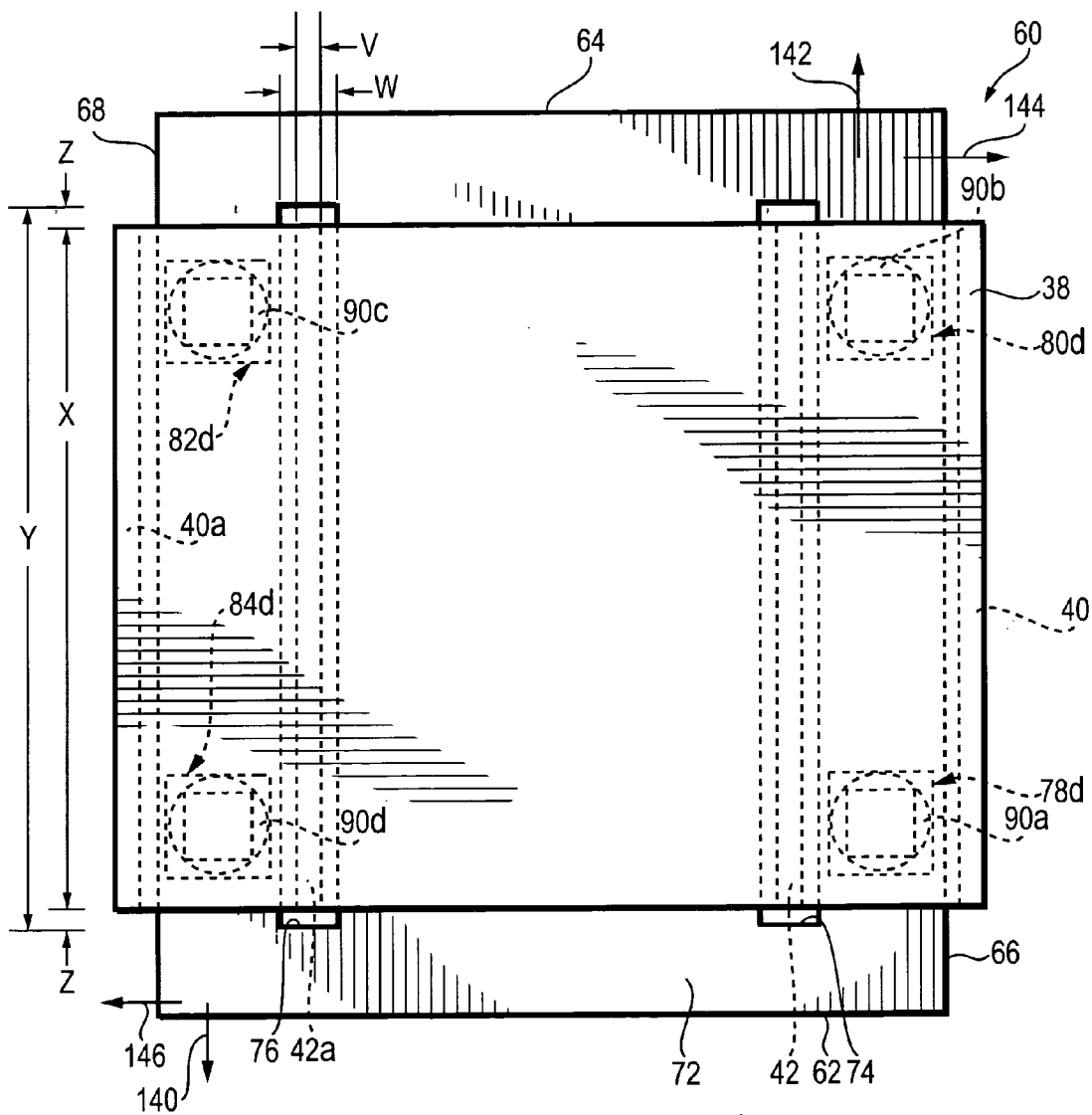


FIG. 4

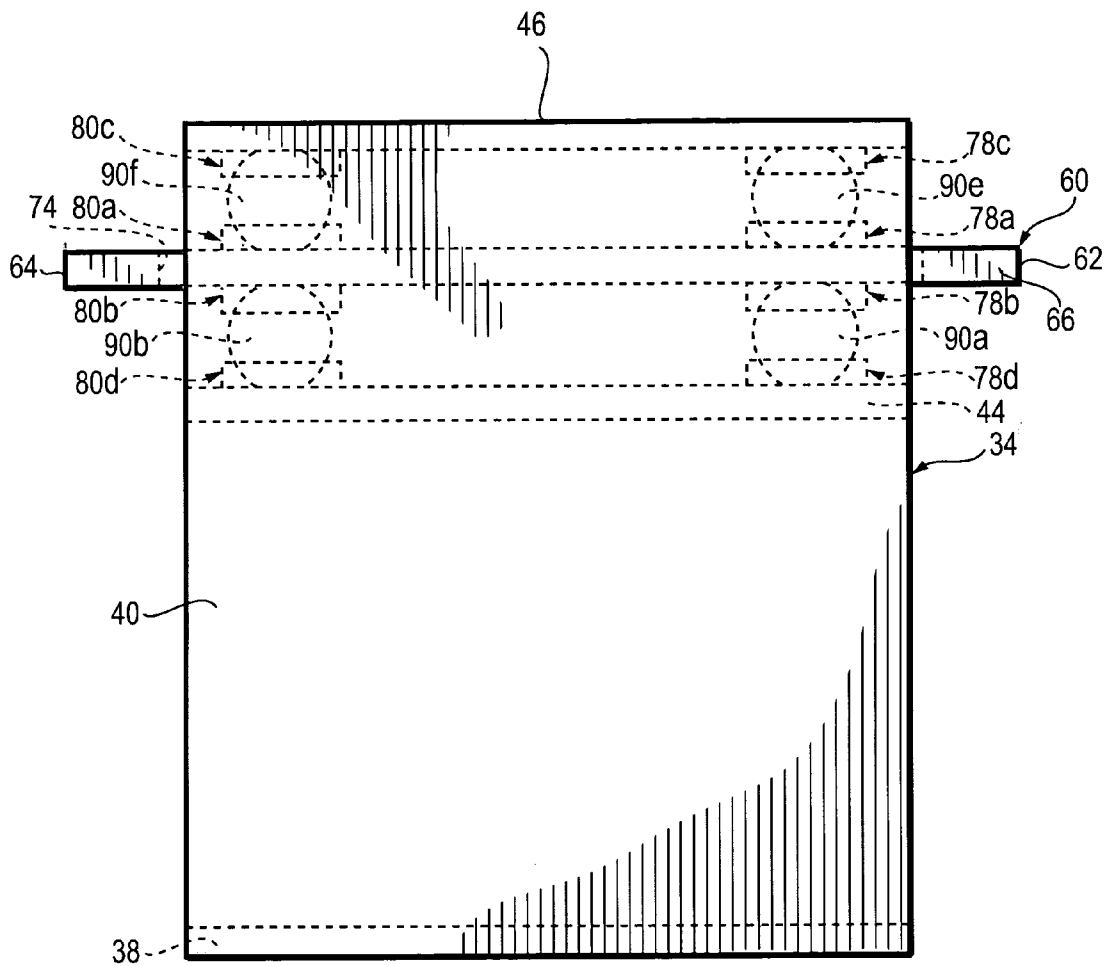


FIG. 5

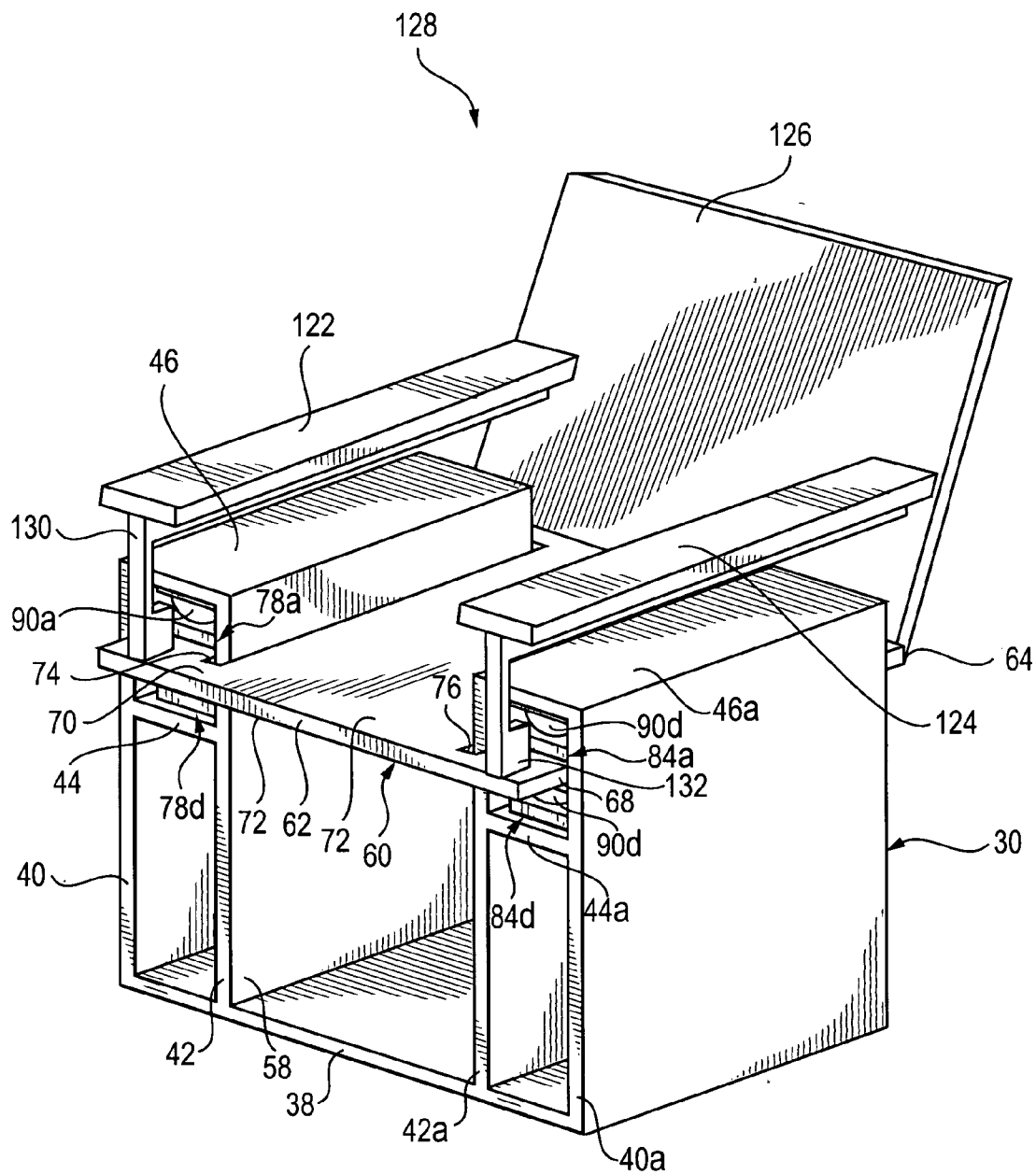


FIG. 6

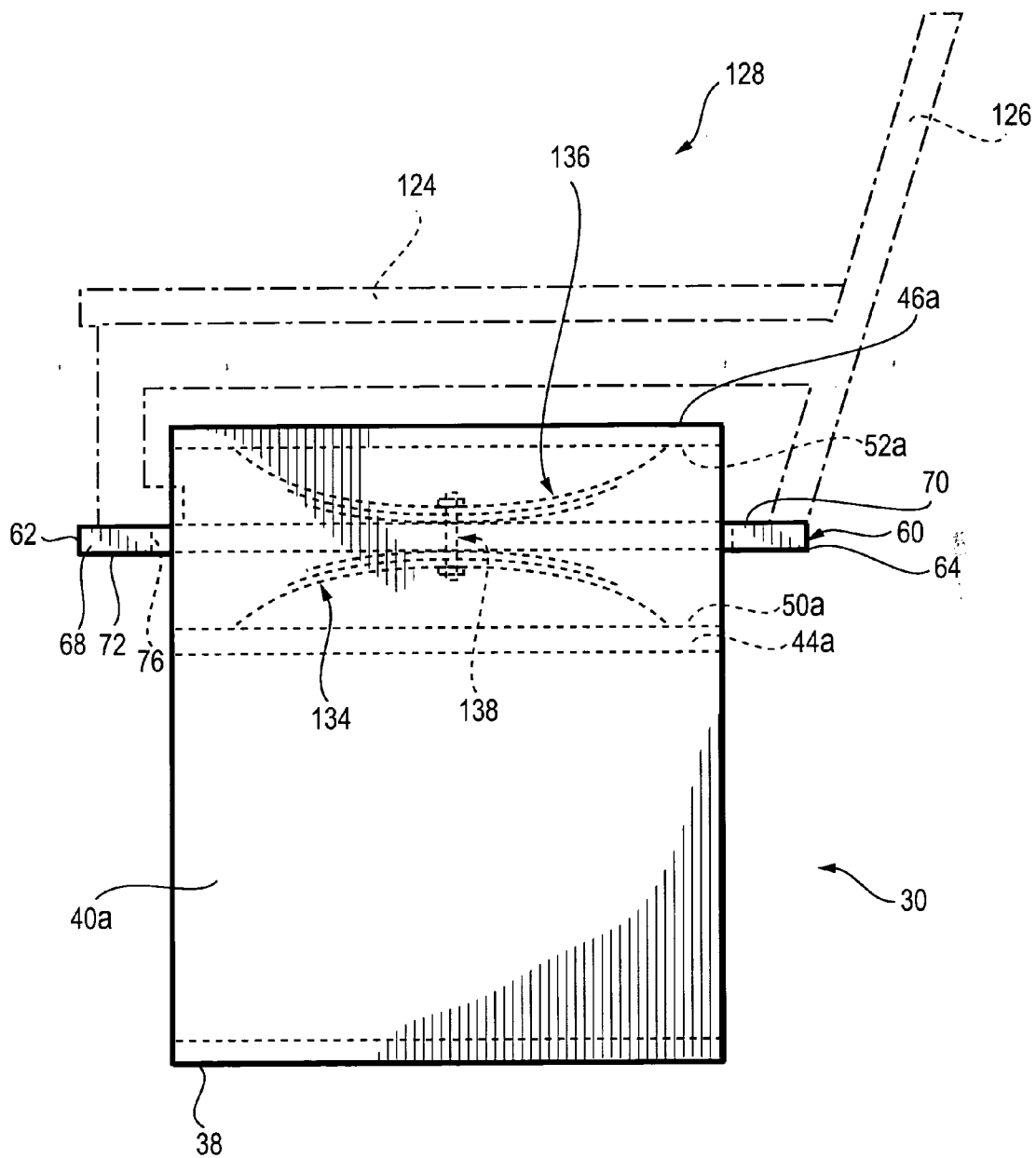


FIG. 7



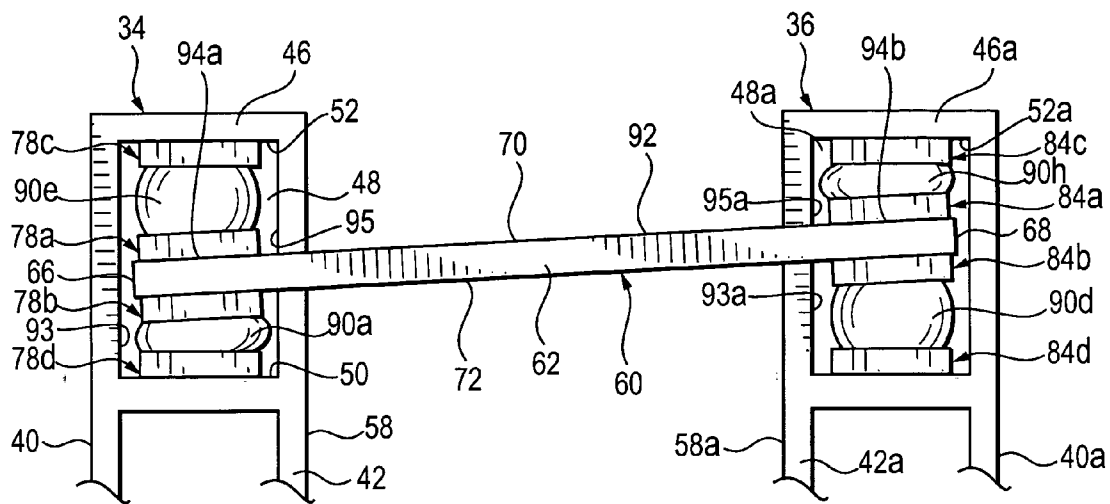


FIG. 8

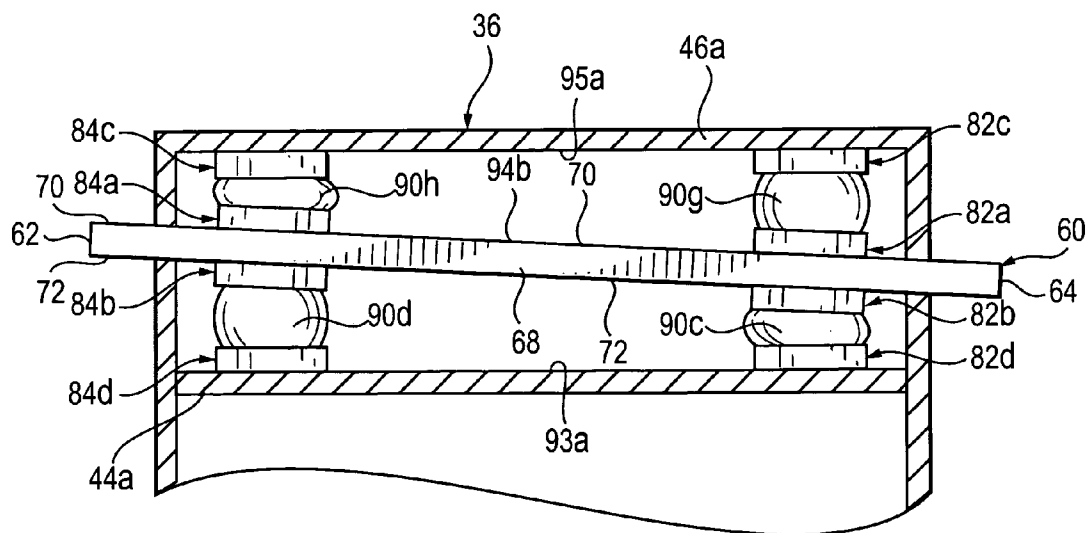


FIG. 9

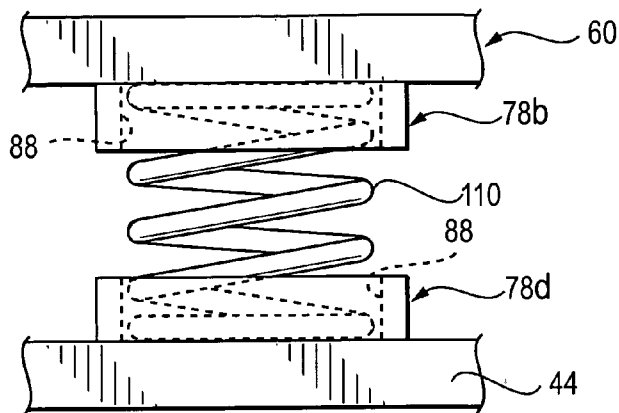


FIG. 10

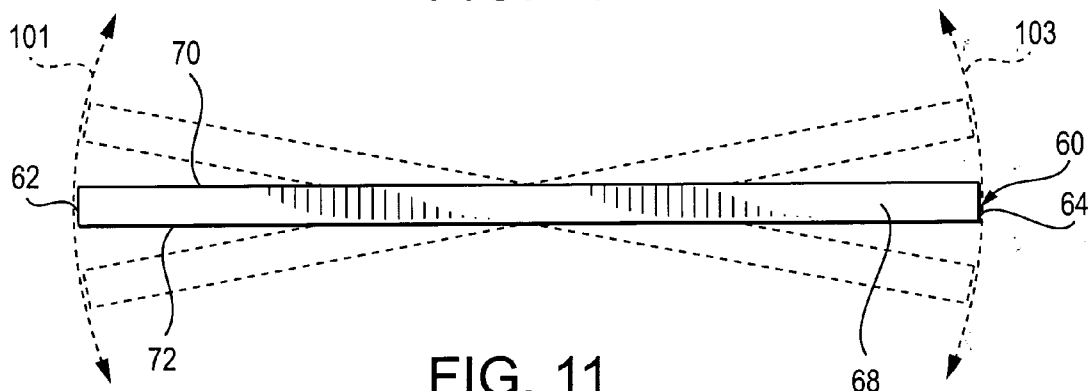


FIG. 11

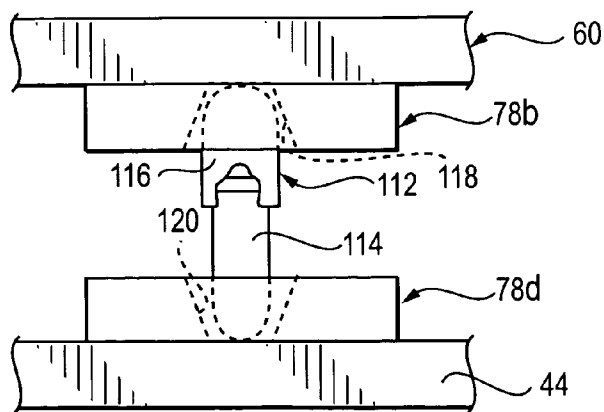


FIG. 13

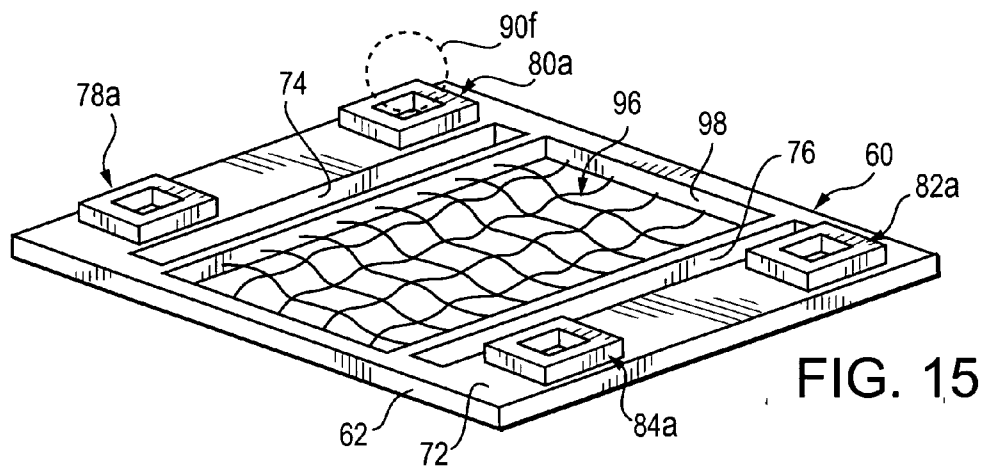


FIG. 15

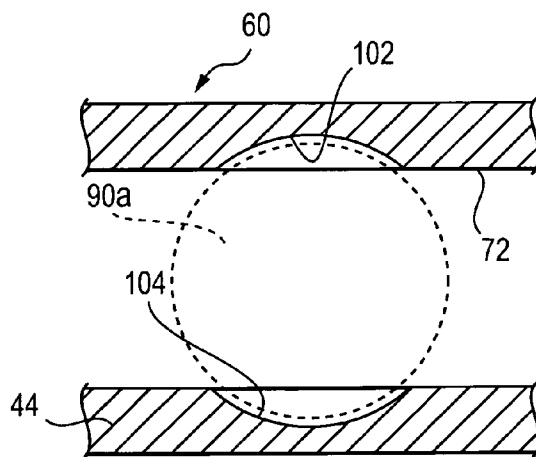


FIG. 12

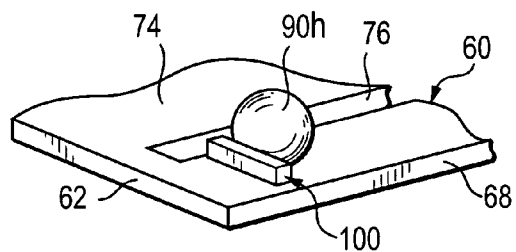


FIG. 16

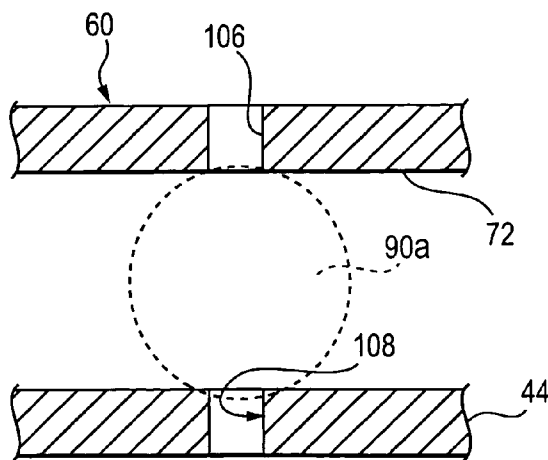


FIG. 14

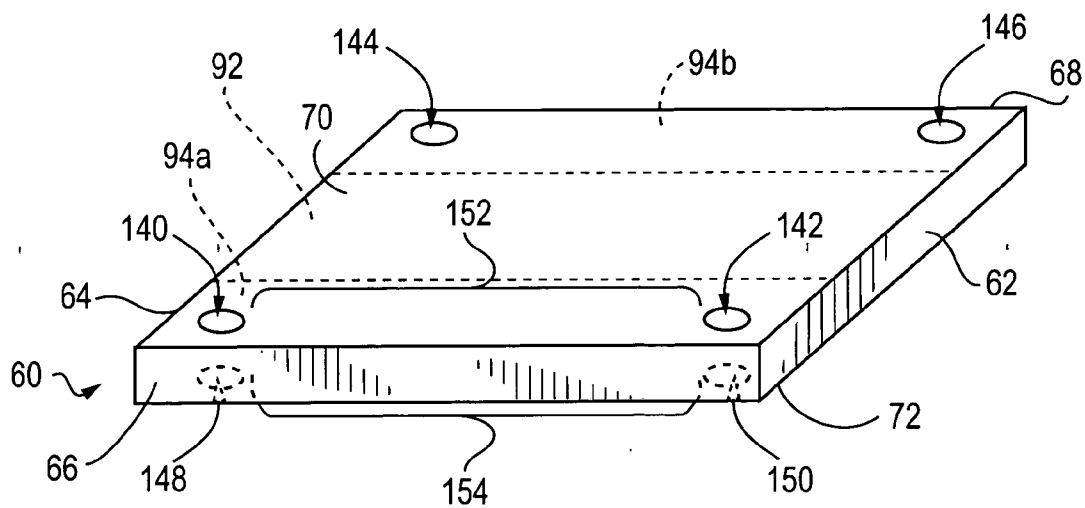


FIG. 17

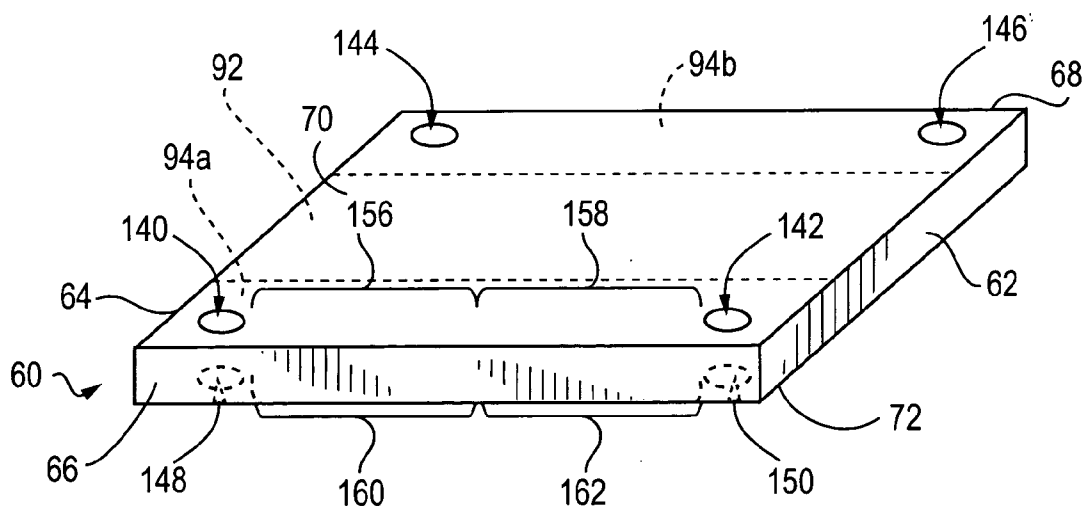


FIG. 18

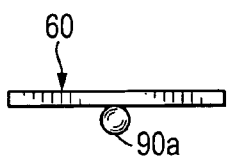


FIG. 19

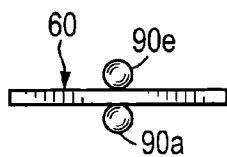


FIG. 20

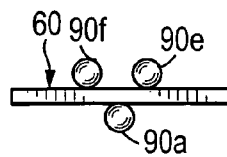


FIG. 21

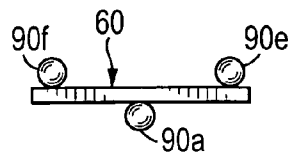


FIG. 22

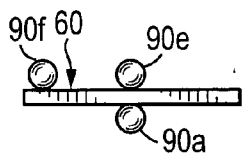


FIG. 23

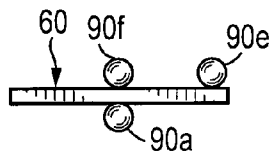


FIG. 24

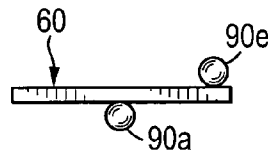


FIG. 25

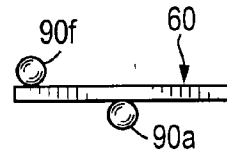


FIG. 26

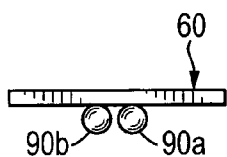


FIG. 27

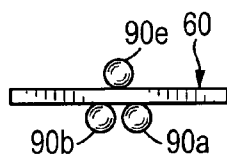


FIG. 28

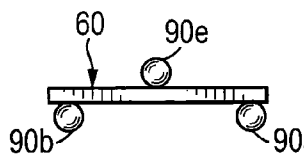


FIG. 29

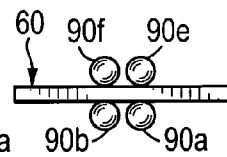


FIG. 30

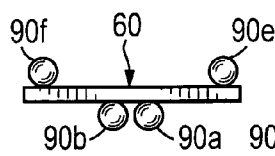


FIG. 31

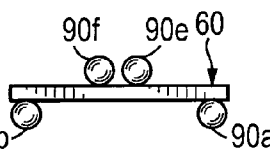


FIG. 32

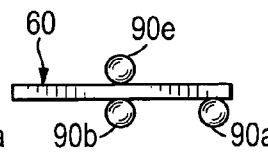


FIG. 33

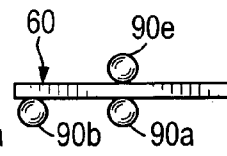


FIG. 34

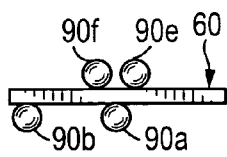


FIG. 35

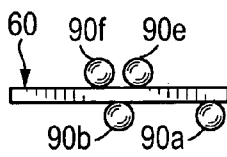


FIG. 36

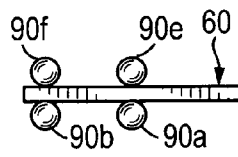


FIG. 37

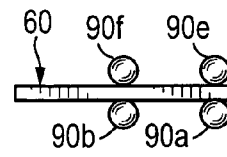


FIG. 38

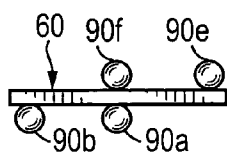


FIG. 39

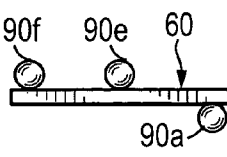


FIG. 40

## RESILIENT SEATING STRUCTURE

[0001] This application is a continuation-in-part of prior application Ser. No. 09/985,101, filed Nov. 1, 2001.

### BACKGROUND OF THE INVENTION

[0002] This invention relates to a resilient seating structure, and particularly relates to a seating structure which provides buoyant seating for a user sitting on the seating structure, and further particularly relates to a seating structure which is rockable by the user.

[0003] Many types of currently available seating structures provide a user with resilient seating accommodations. Such structures typically include some form of support, with resilient structure, directly beneath the area where the user sits. The resilient structure could include various types of springs having compressive properties, various elements having resilient properties, and the like, all of which are compressed when the user is seated on the seating structure and which return to a normal extension when the user withdraws from the seating structure. Some seating structures of the present include facility which allow the user to rock the structures.

[0004] An example of a seating structure with a resilient and a rockable seating area is disclosed and illustrated in U.S. Pat. No. 5,913,568, which issued to Stephen T. Brightbill and David W. Flesner on Jun. 22, 1999. The seating structure of this patent includes two, identical, moving seat assemblies, which are located side by side, and which, in their entirety, define a seating area of the structure. Each seating assembly includes a seat platform situated on resilient structure located only directly beneath the seating area of the seating structure. The resilient structure includes any of several types of "motion mechanisms" which could be pneumatic (e.g., air bladder), hydraulic, magnetic, or motorized mechanisms. The "motion mechanisms" could also include springs having a variety of configurations as illustrated in U.S. Pat. No. 5,913,568.

[0005] Another example of a seating structure having a resilient seating area is disclosed and illustrated in U.S. Pat. No. 6,139,095, which issued to Richard C. Robertshaw on Oct. 31, 2000. The seating structure of this patent also includes two, identical, moving seat assemblies, which are located side by side, and which, in their entirety, define a seating area. In one embodiment, each seating assembly includes a seat platform situated on a plurality of flexible rubber balls located only directly beneath the seating area of the seating structure.

[0006] Each of the seating structures described and illustrated in U.S. Pat. Nos. 5,913,568 and 6,139,095 include two platforms which form the seat area for receipt of the left and right buttocks, and portions of the respective left and right thighs, of the user of the seating structure. The resilient structure below the two platforms, in each patent, allows the raising and lowering of one platform relative to the other platform, and a tilting or rocking effect of each platform, to accommodate the leaning and shifting action of the user seated in the seat area. This accommodation results from the placement of the resilient structure only directly beneath the seat area, thereby exerting a force directly toward the buttocks and thighs of the user.

[0007] While the seating structures of U.S. Pat. Nos. 5,913,568 and 6,139,095 provide a useful function and pur-

pose, there is a need for a seating structure which does not apply a force directly toward the seated anatomy of the user. Also, there is a need for a seating structure which provides a feeling of buoyancy for the user of the seating structure. Further, there is a need for a seating structure which is rockable, while providing a feeling of buoyancy.

### SUMMARY OF THE INVENTION

[0008] Therefore, it is an object of this invention to provide a seating structure which does not apply a force directly toward the seated anatomy of the user.

[0009] Another object of this invention is to provide a seating structure which provides a feeling of buoyancy for the seated user thereof.

[0010] A further object of this invention is to provide a seating structure which is rockable, while providing a feeling of buoyancy.

[0011] With these and other objects in mind, this invention contemplates a seating structure, which includes a frame, a platform formed with a seating portion, and means for supporting the platform in a floating relation to the frame independently of engagement with the seating portion.

[0012] This invention also contemplates a seating structure wherein the platform is formed with a non-seating portion and the means for supporting the platform is captured between, and in engagement with, spaced portions of the frame and the non-seating portion of the platform.

[0013] This invention further contemplates a seating structure wherein the non-seating portion is adjacent the seating portion, has surfaces on opposite sides thereof, and the means for supporting the platform is in engagement with the surfaces on opposite sides of the non-seating portion thereof for supporting the seating portion of the platform in a floating relation to the frame.

[0014] Additionally, this invention contemplates a seating structure, which includes means, positioned adjacent the means for supporting the platform, for precluding any movement of the means for supporting in a direction of the means for precluding.

[0015] Also, this invention contemplates a seating structure which is rockable while supporting the seating portion of the platform in a floating relation to the frame.

[0016] Other objects, features and advantages of the present invention will become more fully apparent from the following detailed description of the preferred embodiment, the appended claims and the accompanying drawings.

### BRIEF DESCRIPTION OF THE DRAWINGS

[0017] In the accompanying drawings:

[0018] **FIG. 1** is a perspective view showing a seating structure with resilient elements which are spherical and compressible, in accordance with certain principles of the invention;

[0019] **FIG. 2** is an exploded perspective view of the seating structure of **FIG. 1**, in accordance with certain principles of the invention;

[0020] **FIG. 3** is a front view of the seating structure of **FIG. 1** in a static state position, and, because of the

symmetry of the seating structure, **FIG. 3** is a mirror image, and representative, of a rear view of the seating structure, all in accordance with certain principles of the invention;

[0021] **FIG. 4** is a bottom view of the seating structure of **FIG. 1**, in accordance with certain principles of the invention;

[0022] **FIG. 5** is a right side view of the seating structure of **FIG. 1**, and, because of the symmetry of the seating structure, **FIG. 5** is a mirror image, and representative, of a left side view of the seating structure, all in accordance with certain principles of the invention;

[0023] **FIG. 6** is a perspective view of a chair which includes the seating structure of **FIG. 1**, in accordance with certain principles of the invention;

[0024] **FIG. 7** is a left side view showing a seating structure with a resilient element in the form of a compound leaf spring, and chair components, all in accordance with certain principles of the invention;

[0025] **FIG. 8** is a partial front view of the seating structure of **FIG. 1**, and, because of the symmetry of the seating structure, **FIG. 8** is a mirror image, and representative, of a partial rear view of the seating structure, all showing a platform of the seating structure of **FIG. 1** in a tilted position to illustrate the side-to-side rockability of the platform, in accordance with certain principles of the invention;

[0026] **FIG. 9** is a sectional view of a portion of a left side of the seating structure of **FIG. 1**, showing the platform of **FIG. 8** in a tilted position, and, because of the symmetry of the seating structure, **FIG. 9** is a mirror image, and representative of, a sectional view of a portion of a right side of the seating structure, all to illustrate the front-to-rear rockability of the platform, in accordance with certain principles of the invention;

[0027] **FIG. 10** is a partial view of a portion of the seating structure of **FIG. 1** showing a resilient element in the form of a coil spring, which is located between the platform of **FIG. 8** and a fixed portion of a frame, in accordance with certain principles of the invention;

[0028] **FIG. 11** is a front view of the platform of **FIG. 8**, and, because of the symmetry of the seating structure, **FIG. 11** is a mirror image, and representative, of a rear view, a right side view, and a left side view of the platform, all to illustrate the front-to-rear and the right side-to-left side rockability of the platform, in accordance with certain principles of the invention;

[0029] **FIG. 12** is a partial view of a portion of the seating structure of **FIG. 1** showing the resilient element of **FIG. 1** located between the platform of **FIG. 8** and the fixed portion of the frame of **FIG. 10**, in accordance with certain principles of the invention;

[0030] **FIG. 13** is a partial view of a portion of the seating structure of **FIG. 1** showing a resilient element in the form of a spring damper, which is located between the platform of **FIG. 8** and the frame of **FIG. 10**, in accordance with certain principles of the invention;

[0031] **FIG. 14** is a partial view of a portion of the seating structure of **FIG. 1** showing the resilient element of **FIG. 1**

located between the platform of **FIG. 8** and the frame of **FIG. 10**, in accordance with certain principles of the invention;

[0032] **FIG. 15** is a perspective view showing web netting forming a seating portion of the platform of **FIG. 8**, and further showing a plurality of cribs mounted on the platform for restraining the resilient element of **FIG. 1**, in accordance with certain principles of the invention;

[0033] **FIG. 16** is a perspective view of a portion of the platform of **FIG. 8** showing a fence on the platform for restraining movement of the resilient element of **FIG. 1** in a prescribed direction, in accordance with the principles of the invention;

[0034] **FIG. 17** is a perspective representation of the platform of **FIG. 8** showing a first arrangement and location of various seating points on surfaces thereof in accordance with certain principles of the invention;

[0035] **FIG. 18** is a perspective representation of the platform of **FIG. 8** showing a second arrangement and location of various seating points on surfaces thereof in accordance with certain principles of the invention; and

[0036] **FIGS. 19 through 40** are representations of the platform of **FIG. 8** showing various arrangements of resilient elements in engagement with seating points on surfaces of the platform in accordance with certain principles of the invention.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS OF THE INVENTION

[0037] Referring to **FIGS. 1 and 2**, a seating structure **30** is formed with a frame **32** which includes a first housing **34** and a second housing **36**, spaced from the first housing. The spaced first housing **34** and the second housing **36** are attached to spaced portions of a common exposed surface of a base plate **38**. The first housing **34** is formed with an outboard side panel **40** and an inboard side panel **42**, each of which extend from, and are attached at a bottom edge thereof to, the exposed upper surface of the base plate **38**. A shelf **44**, extends between, and is attached to, spaced intermediate portions of the side panels **40** and **42**. An enclosure plate **46** extends between, and is attached to, upper edges of the side panels **40** and **42**, which are opposite the bottom edges which are attached to the base plate **38**.

[0038] A compartment **48** is formed in the housing **34** between a lower or base surface **50** of the shelf **44** and a spaced upper surface **52** of the plate **46**. Also, inboard surfaces **54** and **56** of the side panels **40** and **42**, respectively, provide opposite side enclosures of the compartment **48**. The side panel **42** is also formed with an outboard surface **58**. Further, the compartment **48** is open at front and rear ends thereof in the preferred embodiment, but could be closed without departing from the spirit and scope of the invention.

[0039] It is noted that the housing **34** could be formed without the portion of side panel **40**, which includes the surface **54**, without departing from the spirit and scope of the invention.

[0040] The housing **36** is constructed in the same manner as the housing **34**, as described above. Therefore, the various structural features and relationships of the elements of the

housing 36 will not be described herein, but will be identified by the numeral of the corresponding element of the housing 34, followed by the letter "a." For example, the inboard side panel of the housing 36 will be identified as "panel 42a."

[0041] The seating structure 30 further includes a platform 60 which is formed with a front edge 62, a rear edge 64, a right-side edge 66 and a left-side edge 68. The platform 60 is also formed with an upper surface 70 and an undersurface 72. In the preferred embodiment of the invention, the platform 60 is formed in the shape of a rectangle, with a right side-to-left side dimension being slightly greater than a front-to-rear dimension. The platform 60 could be formed dimensionally different and in many other shapes, other than rectangular, without departing from the spirit and scope of the invention. For example, the platform 60 could be, but not limited to, such shapes as round, oblong, square, etc., or one or more of the edges 62, 64, 66 and 68 could be formed with an arcuate shape.

[0042] A pair of spaced, parallel, enclosed elongated slots 74 and 76, with closed ends, are formed through the platform 60 and extend from a location near the front edge 62 of the platform to a location near the rear edge 64 thereof. In addition, the slot 74 is located inboard of the right-side edge 66 of the platform 60 by a first prescribed distance. Also, the slot 76 is located inboard of the left side edge 68 of the platform 60 by a second prescribed distance, which, in the preferred embodiment, is the same as the first prescribed distance, but could be different therefrom without departing from the spirit and scope of the invention.

[0043] Referring to FIGS. 1, 2 and 4, during assembly of the components of the seating structure, which will be described below, the slots 74 and 76 of the platform 60 are positionable over the inboard side panels 42 and 42a, respectively, prior to assembly of the enclosure plates 46 and 46a with the upper edges of the outboard side panels 40 and 40a and the inboard side panels 42 and 42a.

[0044] As shown in FIG. 4, which is a view from the underside of the base plate 38, each of the inboard side panels 42 and 42a have a prescribed side panel width "v," while the slots 74 and 76 have a prescribed slot width "w" which is greater than the width "v." Further, the inboard side panels 42 and 42a have a prescribed front-to-rear length "x," while each of the slots 74 and 76 have a prescribed slot length "y," such that when the slots are centrally positioned lengthwise over the inboard side panels, the opposite ends of the slots extend beyond the adjacent edges of the respective inboard side panels by a distance "z." Thus, a space or clearance exists between portions of the walls of the slots 74 and 76 and the adjacent portions of the inboard side panels 42 and 42a, respectively, which provides for movement of the panel 60 relative to the inboard side panels.

[0045] As shown in FIG. 2, each of a plurality of retaining wells or cribs 78a, 80a, 82a and 84a includes four rails 86 which, in the preferred embodiment, are assembled and secured in a square configuration to form an enclosure 88. The four cribs 78a, 80a, 82a and 84a are attached, at four spaced locations, to the upper surface 70 of the platform 60, near the corners thereof. The two spaced cribs 78a and 80a are located between the right-side edge 66 and the slot 74 of the platform 60. The remaining two spaced cribs 82a and 84a are located between the left-side edge 68 and the slot 76 of the platform 60.

[0046] Referring to FIGS. 3, 5 and 8, three other cribs 78b, 78c and 78d are stacked in spaced alignment with the crib 78a. The crib 78b is attached to the surface 72 of the platform 60, the crib 78c is attached to the surface 52 of the enclosure plate 46, and the crib 78d is attached to the surface 50 of the shelf 44. In like fashion, three cribs 80b, 80c, and 80d are attached to adjacent structure of the seat structure 30 in stacked, spaced alignment with the crib 80a. Also, in like fashion, three cribs 82b, 82c and 82d are attached to adjacent respective portions of the seat structure 30 in stacked, spaced alignment with the crib 82a. Further, in like fashion, three cribs 84b, 84c, and 84d are attached to adjacent structure of the seat structure 30 in stacked, spaced alignment with the crib 84a.

[0047] Each of the cribs 78a, 80a, 82a and 84a, and the corresponding alpha-numerically identified cribs (e.g., 78b) could be structured to form the enclosure 88 having a configuration other than a square configuration without departing from the spirit and scope of the invention. For example, the enclosure 88 of each crib could be round, diamond shaped, oblong, oval, triangular, or any shape which will perform the function of the crib, as described hereinbelow.

[0048] It is noted that the floors of the plurality of cribs 78a through 78d, 80a through 80d, 82a through 82d, and 84a through 84d, define prescribed portions of the respective elements to which the cribs are attached such as, for example, the shelves 44 and 44a, the platform 60, and the enclosure plates 46 and 46a.

[0049] Referring to FIG. 2, the seating structure 30 further includes eight resilient elements 90a through 90h, each of which, in the preferred embodiment, are in the form of a shell which is spherical in shape when filled with a pressurized medium, and is compressible. The resilient elements 90a through 90h could be hollow internally, with a pressurized medium such as, for example, air, or they could be formed throughout from a compressible material such as, for example, rubber or any compressible material having resilient characteristics similar to rubber. The resilient elements 90a through 90h could also be formed with a solid core surrounded with pressurized-medium-filled hollow chamber between the solid core and an outer skin of the resilient elements. Also, the resilient elements 90a through 90h could be formed in any suitable configuration other than spherical, provided that the material thereof is resilient and compressible. Examples of such suitable configurations are cubic, a mass with a rectangular and/or a triangular surface, frusto-conical, oval, oblong and the like. All of the above-described various embodiments of the resilient elements 90a through 90h could be used as components of the seat structure 30 without departing from the spirit and scope of the invention.

[0050] When assembling the components of the seat structure 30, a lower portion of each of the resilient elements 90a, 90b, 90c and 90d is positioned in the cribs 78d, 80d, 82d and 84d, respectively, and are adjacent the floor of the respective crib. Rather than being adjacent the floor of the respective crib, each of the resilient elements 90a through 90h could be in engagement with the floor of the respective crib without departing from the spirit and scope of the invention. The platform 60 is then manipulated to align the slots 74 and 76 with the inboard side panels 42 and 42a, respectively, and the platform is moved to position the slots over and about the respective inboard side panels, as described above.



[0051] It is noted that, as shown in FIGS. 1, 3 and 4, the width of the platform 60, between side edges 66 and 68 thereof, is less than the distance between the spaced inboard surfaces 54 and 54a of the outboard side panels 40 and 40a, respectively. Therefore, the platform 60 is movable to a position below a plane defined by the upper edges of the side panels 40, 40a, 42 and 42a, to locate and position the upper portions of the resilient elements 90a, 90b, 90c and 90d within the cribs 78b, 80b, 82b and 84b, respectively, which are attached to the inboard surface 72 of the platform near the four corners thereof.

[0052] In this position, the upper portions of the resilient elements 90a, 90b, 90c and 90d are adjacent, and could be in engagement with, the floors of the respective cribs 78b, 80b, 82b and 84b. Thereafter, a lower portion of each of the remaining resilient elements 90e, 90f, 90g and 90h is positioned in, and adjacent, and could be in engagement with the floor of, the cribs 78b, 80b, 82b and 84b, respectively. In this crib-nested position, an upper portion of each of the resilient elements 90e, 90f, 90g and 90h extends to a plane which is slightly above the top edges of the outboard side panels 40 and 40a, and the inboard side panels 42 and 42a.

[0053] It is further noted that, as shown in FIGS. 1, 4 and 5, the length of the platform 60, between the front edge 62 to the rear edge 64 thereof, is greater than the distance between the front and rear of the housings 34 and 36. Consequently, portions of the platform 60, which are adjacent the front edge 62 and the rear edge 64 extend beyond the front and rear of the housings 34 and 36.

[0054] Referring again to FIG. 2, the enclosure plate 46 is assembled on the upper edges of the outboard side panel 40 and the inboard side panel 42, whereby the upper portions of the resilient elements 90e and 90f nest in, and may engage the floors of, the cribs 78c and 80c, respectively. In similar fashion, the enclosure plate 46a is assembled on the upper edges of the outboard side panel 40a and the inboard side panel 42a, whereby the upper portions of the resilient elements 90g and 90h nest in, and may engage the floors of, the cribs 82c and 84c, respectively.

[0055] When the enclosure plates 46 and 46a are assembled with respective side panels, the resilient elements 90a through 90h are slightly compressed due to the vertical spacing within the respective compartments 48 and 48a. This slight compression results in the application of low-level forces to both sides of the platform 60 to thereby maintain the platform at a rest position, or static state position, as illustrated in FIG. 3. The rest, or static state, position represents the position which the platform 60 normally assumes when the seating structure 30 is not being used.

[0056] In the static state position as viewed in FIG. 3, the platform 60 is now held in a buoyant and floating position between a first set of four points on the inboard surface 72 near the four corners of the platform, and a second set of four points on the upper surface 70 near the four corners of the platform, where the first and second sets of four points are in respective alignment, all defining a four-points arrangement.

[0057] Under the four-points arrangement, as described above, on a lower level below the platform 60, the resilient elements 90a through 90d engage the floors of the respective

cribs 78b, 80b, 82b and 84b. Further, under the four-points arrangement, on an upper level above the platform 60, the resilient elements 90e through 90h engage the floors of the respective cribs 78a, 80a, 82a and 84a. In this buoyant position, the platform 60 is not touching any hard surface of the remainder of the seating structure 30 and is essentially floating due to the resiliency of the resilient elements 90a through 90h. In effect then, the platform 60 is captured between two layers of the resilient elements 90a through 90h. It is noted that the seating structure 30 could function to support a user, particularly in the centrally balanced position, with only the first set of resilient elements 90a through 90d, all of which would be in engagement with the undersurface 72 of the platform 60 in the non-seating portions 94a and 94b, without departing from the spirit and scope of the invention.

[0058] It is noted that the upper and lower portions of the resilient elements 90a through 90h, which normally engage the floors of the respective cribs as described above, may be nested sufficiently within the respective cribs to perform the functions thereof without engagement with the floors of the respective cribs, all without departing from the spirit and scope of the invention.

[0059] Referring to FIGS. 1, 3 and 8, a section of the platform 60, as an assembled component of the seating structure 30, forms a seating portion 92 of the platform and the structure, which, generally, is located between the slots 74 and 76 thereof. The width of the seating portion 92 is defined by the space between the interfacing outer surfaces 58 and 58a of the inboard side panels 42 and 42a, respectively. Therefore, the interfacing outer surfaces 58 and 58a of the panels 42 and 42a, respectively, are located in respective planes in which are located a first side edge and a second edge, respectively, of the seating portion 92. The seating portion 92 defines the area of the seating structure 30 on which a user of the structure will sit, and includes a seating or upper surface on a first major surface of the seating portion, and an undersurface on a second major surface of the seating portion opposite the first major surface thereof.

[0060] The resilient elements 90a through 90h, which contain a pressurized medium, constitute an enclosed compliant expandable shell having a prescribed amount of the pressurized medium within the shell, which expands the shell to a prescribed configuration. The compliancy of the shell then allows the shell to assume a configuration other than the prescribed configuration when a person sits on the seating portion 92 of the platform 60.

[0061] Also, as an assembled component of the seating structure 30, sections of the platform 60, outboard from the seating portion 92, form non-seating portions 94a and 94b. The non-seating portion 94a is located between the edge 66 of the platform 60 and the slot 74, and the non-seating portion 94b is located between the edge 68 of the platform and the slot 76 thereof. The non-seating portions 94a and 94b define the portions of the platform 60 which are not used by the user. It is noted that the non-seating portions 94a and 94b are located substantially within the compartments 48 and 48a, respectively, of the housings 34 and 36, respectively, which provide enclosed protective chambers for the resilient elements 90a through 90h in their mounted and functioning locations.

[0062] The platform 60 is formed with the upper surface 70 and the undersurface 72. Since the seating portion 92, and the non-seating portions 94a and 94b, are formed by the platform 60, any reference herein to an upper surface and/or an undersurface of the seating portion and the non-seating portions will be to those portions of the upper surface 70 and the undersurface 72 of the platform which form the upper surfaces and the undersurfaces of the seating portion and the non-seating portions.

[0063] Further, the terms “upper surface” and “undersurface” as used herein to identify surfaces of the platform 60, are used for descriptive purposes only, in the context of the orientation of the seating structure 30 as illustrated in the drawings and figures hereof. In practical use, the seating structure 30 could be placed in other orientations, i.e., other than the orientation illustrated in the drawings and figures hereof. With respect to such other orientations, it is to be understood that the terms “upper surface” and “undersurface” will continue to identify the surfaces 70 and 72 of the platform 60 notwithstanding that such surfaces are not an upper surface or an undersurface in such other orientations.

[0064] The non-seating portion 94a of the platform 60 separates the compartment 48 into two cells 93 and 95. Cell 93 extends between the shelf 44 and the non-seating portion 94a, and represents a first cell adjacent the undersurface 72 of the platform 60. Cell 95 extends between the non-seating portion 94a and the enclosure plate 46, and represents a second cell adjacent the upper surface 70 of the platform 60. Similar cells 93a and 95a are formed below and above, respectively, the non-seating portion 94b. Therefore, resilient elements 90a and 90b are located in cell 93, resilient elements 90e and 90f are located in cell 95, resilient elements 90c and 90d are located in cell 93a, and resilient elements 90g and 90h are located in cell 95a.

[0065] In one aspect of the invention, a user sits on the seating portion 92 of the platform 60 in a centrally balanced position with the user's legs over the front edge 62 of the platform. In this centrally balanced position, each of the lower resilient members 90a through 90d are compressed and distorted from the static state position, all generally at about the same amount, in response to the weight of the user. At the same time, the upper resilient elements 90e through 90h will relax slightly from their static state position, but will remain firmly in the platform-supporting mode to preclude a sudden upward thrust of the platform 60. A sudden upward thrust could occur when the user shifts positions on the seating portion 92, which results in the tilting thereof. In the tilted position, selected ones of the upper resilient elements 90e through 90h will be compressed such as, for example, resilient element 90h, as illustrated in FIG. 8.

[0066] During the period when the user is sitting in the centrally balanced position, the user experiences a sense of buoyancy and floating support by virtue of the resilient members 90a through 90d, which are located below the non-seating portions 94a and 94b of the platform. The buoyancy and floating sensation experienced by the user is further enhanced by the placement of the resilient members 90a through 90d under the non-seating portions 94a and 94b only, and not under the seating portion 92, whereby there are no impediments or obstructions beneath the seating portion 92 at any time, including all periods when the seating portion is occupied by the user.

[0067] It is noted that the edge 68 of the platform 60, which is an outboard edge of the non-seating portion 94b, could be attached to a vertical slide (not shown), or attached to a hinge, and a single resilient element such as, for example, the resilient element 90a, could be placed between, and nested in the respective cribs on, the shelf 44 and the undersurface 72 of the platform 60 at the non-seating portions 94a, or in engagement with the floors of the respective cribs, to provide the buoyant and floating effect for the seating portion 92, all without departing from the spirit and scope of the invention.

[0068] It is also noted that the seating structure 30 could function to support a user with only the first set of resilient elements 90a through 90d, all of which would be between, and nested in the respective cribs on, the shelves 44 and 44a, and the undersurface 72 of the platform 60 at the non-seating portions 94a and 94b, or in engagement with the floors of the respective cribs, all without departing from the spirit and scope of the invention.

[0069] In the preferred embodiment, the platform 60 is composed of a generally rigid material such as, for example, wood. However, the platform 60 could be composed of any other suitable material such as, for example, metal or plastic materials, without departing from the spirit and scope of the invention.

[0070] Also, with no impediments below the seating portion 92, the seating portion tends to droop slightly, in the context of a catenary effect, when the user is sitting thereon. The amount of the droop depends upon the thickness and rigidity characteristics of the material of which the seating portion 92 is composed. This catenary-effect property of the seating structure 30 further enhances the buoyancy and floating effect experienced by the user.

[0071] Referring to FIG. 8, which is a front view, in another aspect of the invention, when the user sits on the seating portion 92 with the user's legs over the front edge 62 of the platform 60, and the user leans to the user's right, the seating portion will tilt as illustrated. If the user leans to the user's left, the seating portion 92 will tilt in a direction opposite to the tilt direction illustrated in FIG. 8.

[0072] Referring to FIG. 4, there is a dimensional difference between the length “x” of the panels 42 and 42a, and the length “y” of the slots 74 and 76, respectively, with that difference being represented by a clearance distance (2z), which is equal to twice the value of the distance “z” at opposite ends of the panels and the slots. The clearance distance (2z), and its structural relationship with the slots 74 and 76 of the platform 60, and the panels 42 and 42a, provide a means for allowing movement of the platform, relative to the frame 32, in an arcing direction, as illustrated in FIG. 11, about the front edge 62, as represented by dashed/arrow line 101, and the rear edge 64, as represented by dashed/arrow line 103, of the platform, and thereby the seating portion 92.

[0073] Also, the clearance distance (2z), and its structural relationship with the slots 74 and 76 of the platform 60, and the panels 42 and 42a, provide a means for allowing movement of the platform 60, and thereby the seat portion 92, relative to the frame 32, in an outward direction, from the front edge 62 and the rear edge 68, as indicated by directional arrows 140 and 142, respectively.

[0074] Referring to FIG. 9, which is a left side sectional view, when the user sits on the seating portion 92 with the user's legs over the front edge 62 of the platform 60, and the user leans to the rear of the platform 60, the platform, and thus the seating portion, will tilt as illustrated. If the user leans forward, the seating portion 92 will tilt in a direction opposite from the direction illustrated in FIG. 9.

[0075] Referring to FIG. 4, there is a dimensional difference between the width "v" of the panels 42 and 42a, and the width "w" of the slots 74 and 76, respectively, with that difference being represented by a clearance distance (w-v) which is equal to value of the distance "w" minus the value of the distance "v" laterally of the panels and the slots. The clearance distance (w-v), and its structural relationship with the slots 74 and 76 of the platform 60, and the panels 42 and 42a, provide a means for allowing movement of the platform, relative to the frame 32, in an arcing direction, in a manner similar to that illustrated in FIG. 11, about the right-side edge 66, as represented by the dashed/arrow line 101, and the left-side edge 68, as represented by the dashed/arrow line 103, of the platform, and thereby the seating portion 92.

[0076] Also, the clearance distance (w-v), and its structural relationship with the slots 74 and 76 of the platform 60, and the panels 42 and 42a, provide a means for allowing movement of the platform, and thereby the seating portion 92, relative to the frame 32, in an outward direction, from the right-side edge 66 and the left-side edge 68, as indicated by directional arrows 144 and 146, respectively, in FIG. 4.

[0077] Further, the seating portion 92 can be tilted and/or moved in compound tilting directions under the control of the user. For example, the user could lean in a direction which causes the seating portion 92 to tilt forward and to tilt to the right at the same time. The tilting feature of the seating structure 30 provides a rocking effect similar to that available with conventional rocking chairs, having bowed rocking rails which are located on the floor beneath the chair.

[0078] Consequently, the combination of the clearance distances (2z) and (w-v), and their structural relationships with the slots 74 and 76 of the platform 60, and the panels 42 and 42a, provide a means for allowing movement of the platform 60 in compound arcing directions, relative to the frame 32, which include at least two vector components of the arcing directions of movement on any adjacent two of the front edge 62, the rear edge 64, the right-side edge 66 and the left-side edge 68 of the platform, and thereby the seating portion 92. For example, referring to FIG. 9, the rear edge 64 has moved downward, in an arcing direction. If the left-side edge 68, which is adjacent the rear edge 64, is also moved downward, or upward, in an arcing direction, the platform 60 is moving in a compound arcing direction.

[0079] Also, the combination of the clearance distances (2z) and (w-v), and their structural relationships with the slots 74 and 76 of the platform 60, and the panels 42 and 42a, provide a means for allowing movement of the platform 60 in compound outward directions, which include vector components of the outward directions of movement, as illustrated by directional arrows 144, 146, 140 and 142 (FIG. 4), in any two adjacent edges of the front edge 62, the rear edge 64, the right-side edge 66 and the left-side edge 68, respectively, of the platform, and thereby the seating portion 92. For example, the front edge 62 and the right-side edge

66 are adjacent edges, while the front edge and the rear edge 64 are not adjacent edges. Movement of the platform 60 in the outward direction of the front edge 62, together with movement of the platform in the outward direction of the right-side edge 66, is an example of movement of the platform in a compound outward direction.

[0080] Further, the combination of the clearance distances (2z) and (w-v), and their structural relationship with the slots 74 and 76 of the platform 60, and the panels 42 and 42a, provide a means for allowing movement of the platform in compound arcing and outward directions, which include vector components of the arcing direction and the outward direction of movement, in any of the front edge 62, the rear edge 64, the right-side edge 66 and the left-side edge 68 of the platform, and thereby the seating portion 92. For example, movement of the platform 60 in an arcing direction of the front edge 62, and in an outward direction of the front edge, is movement of the platform in a compound arcing and outward direction.

[0081] The seating portion 92 is capable of being tilted in a variety of directions as described above because the slots 74 and 76 are longer and wider than the length and width of the inboard side panels 42 and 42a, respectively, about which the slots are located, also as described above. A representation is illustrated in FIG. 11 of the rocking effect of the platform 60, and thereby the seating portion 92.

[0082] As illustrated in FIGS. 8 and 9, when the seating portion 92 is tilted left or right, or forward or rearward, or any compound combinations of such tilting, one or more of the resilient members 90a through 90h will respond to maintain the buoyancy and floating sensation, while allowing the tilting action. For example, with the seating portion 92 being tilted as shown in FIG. 8, the diagonally spaced resilient elements 90a and 90h will be compressed and distorted, to a significant extent, from the static state position described above, and the diagonally spaced resilient elements 90d and 90e will relax slightly from the static state, also described above. At the same time, the remaining resilient elements 90b, 90c, 90f and 90g, which are not visible in FIG. 8, will respond in similar fashion. For example, referring to FIG. 2, resilient elements 90b and 90g will be compressed and distorted due to the forces imposed thereon by the tilt direction of the platform 60, while at the same time forces previously imposed on resilient elements 90c and 90f will relax slightly.

[0083] Even though the individual resilient elements 90a through 90h are either compressed or relaxed during the tilting of the seating portion 92, they are maintained in their respective four-point locations by the enclosures 88 of the cribs 78a through 78d, 80a through 80d, 82a through 82d, and 84a through 84d. In this manner, the resilient elements 90a through 90h continue to provide the buoyancy and floating effect, as described above, regardless of whether they are compressed or relaxed.

[0084] As described above, the frame 32 includes the first housing 34 and the second housing 36, which form compartments 48 and 48a, respectively, for protective and secluded cover for the non-seating portions 94a and 94b of the platform 60, the resilient elements 90a through 90h, and the cribs 78a through 78d, 80a through 80d, 82a through 82d, and 84a through 84d. The frame 32 could be constructed differently without departing from the spirit and

scope of the invention. For example, the frame 32 could be constructed by the use of metal columns or rods which would replace the outboard side panels 40 and 40a and the inboard side panels 42 and 42a.

[0085] In the preferred embodiment, the seating portion 92 is formed integrally with the non-seating portions 94a and 94b as a single piece in the form of the platform 60. The seating portion 92 could be formed as a separate piece from, but attached to, the non-seating portions 94a and 94b without departing from the spirit and scope of the invention. In addition, the seating portion 92 could be formed, or covered, with softer cushioning material without departing from the spirit and scope of the invention. For example, the seat portion 92 could be made from a fabric of sufficient strength to support the user, or from a netting material 96, such as that illustrated in FIG. 15 where the netting material is attached to side walls 98 of an opening formed in the platform 60.

[0086] While the cribs 78a through 78d, 80a through 80d, 82a through 82d, and 84a through 84d are formed to provide the enclosures 88, a fence 100, as shown in FIG. 16, could be used in place of each of the cribs to preclude movement of the resilient elements 90a through 90h in a given direction. Or a pair of the fences 100 could be used on opposite sides of the resilient elements to preclude, for example, forward and rearward, or side-to-side, movement. The single fence 100, or the pair of fences, could be used in place of the cribs without departing from the spirit and scope of the invention.

[0087] Further, opposing recesses 102 and 104, as shown in FIG. 12, and openings 106 and 108, as shown in FIG. 14, can be formed in the shelves 44 and 44a, the four-point locations on the surface 70 and the surface 72 of the platform 60, and the surfaces 52 and 52a of the enclosure plates 46 and 46a, respectively, and can be used in place of the cribs for nesting the resilient elements 90a through 90h. The recesses 102 and 104, and the holes 106 and 108, can be used in place of the cribs without departing from the spirit and scope of the invention.

[0088] A coil spring 110, as shown in FIG. 10, or a spring damper 112, as shown in FIG. 13, can be used as a resilient element to function in the same manner of the resilient elements 90a through 90h, without departing from the spirit and scope of the invention. The spring damper 112 includes two capsule-like elements 114 and 116 which are relatively slidable, one over the other, and which form a sealed enclosure for receiving a spring (not shown) and a fluid such as, for example, a hydraulic fluid therein for a damping effect upon movement of the spring. When using the spring damper 112, the cribs, for example, cribs 78b and 78d, are modified with funnel-shaped openings 118 and 120, respectively, to permit movement of the spring damper during use of the seating structure 30.

[0089] Referring to FIG. 6, a pair of arm rests 122 and 124, and a back 126, are attached to the platform 60 of the seating structure 30 to form a chair 128, which provides a user with the benefits and enhancements described above with respect to the seating structure. In particular, a lower edge of the back 126 is attached to the rear edge 64 of the platform 60. Further, lower portions of a pair of forward struts 130 and 132 are attached, at spaced locations, to the upper surface 70 of the platform 60. Upper portions of the

struts 130 and 132 are attached to a forward undersurface of the pair of arm rests 122 and 124, respectively. Rearward portions of the arm rests 122 and 124 are attached to spaced intermediate portions of the back 126.

[0090] Referring to FIG. 7, the seating structure 30, with the arm rests 122 and 124 and the back 126 shown in phantom, includes resilient elements in the form of semi-elliptic springs 134 and 136. The stacked leaves of the spring 134 are located between the upper surface 50a of the shelf 44a and the undersurface 72 of the platform 60. The stacked leaves of the spring 136 are located between the upper surface 70 of the platform 60 and the undersurface 52a of the enclosure plate 46a. A stud 138, threaded at both ends, or a bolt with a head at one end and threaded at the other end, is positioned through aligned openings in the springs 134 and 136, and the platform 60, and, with one or more nuts, facilitates securance of the springs in place as illustrated. With the springs 134 and 136, the seating structure 30 will function in a manner similar to the functioning thereof with the resilient elements 90a through 90h, as described above, without departing from the spirit and scope of the invention.

[0091] It is noted that the springs 134 and 136 could each be mounted in an inverted position without departing from the spirit and scope of the invention.

[0092] When viewing the right-side edge 66 of the platform 60 in the illustration of FIG. 17, the platform includes four, upper corner seating points 140, 142, 144 and 146 located on the upper surface 70 of the platform, and in the four corners of the upper surface formed by contiguous portions of the upper surface and the edges 62, 64, 66 and 68. Also, the platform 60 includes four, lower corner seating points, two of which are identified by numerals 148 and 150, and are located on the undersurface 72 in two corners thereof, formed by portions of the side edge 68 which are contiguous with portions of the undersurface and the front and rear edges 62 and 64, respectively. The remaining two lower corner seating points, which are not visible in FIG. 17, are located adjacent the left-side edge 68 in two corners formed by portions of the left-side edge and contiguous portions of the undersurface 72 and the front and rear edges 62 and 64, respectively. It is noted that the upper surface 70 and the undersurface 72 are on opposite sides of the platform and each surface is contiguous with the right-side edge 66.

[0093] As viewed in FIG. 17, the upper corner seating points 140 and 142 are vertically aligned with the lower corner seating points 148 and 150, respectively, and are located within a portion of the seating structure 30 which also includes the non-seating portion 94a. The upper corner seating points 144 and 146 are vertically aligned with respective lower corner seating points, which are not visible in FIG. 17, and are located in a portion of the seating structure 30 which includes the non-seating portion 94b.

[0094] Referring further to FIG. 17, a plurality of upper inboard seating points are located on, and along, an upper surface space 152 on the upper surface 70 of the platform 60 between, and in alignment with, the upper corner seating points 140 and 142. Further, a plurality of lower inboard seating points are located on, and along, a lower surface space 154 on the undersurface 72 of the platform 60 between, and in alignment with, the lower corner seating points 148 and 150. The upper surface space 152 is aligned vertically with the lower surface space 154. Both surface

spaces **152** and **154** are located within the portion of the seating structure **30** which includes the non-seating portion **94a**. In similar fashion, upper and lower surface spaces are located on the upper surface **70** and the undersurface **72** within the portion of the seating structure **30** which includes the non-seating portion **94b**.

[0095] Referring to **FIG. 18**, the platform **60** includes the four upper corner seating points **140**, **142**, **144** and **146**, on the upper surface **70** thereof, as described above, and also includes the two lower corner seating points **148** and **150** on the undersurface **72** thereof, and the two lower corner seating points, which are not visible in **FIG. 18**.

[0096] As shown further in **FIG. 18**, a first upper surface segment **156**, on the upper surface **70** of the platform **60**, is adjacent to and extends from the upper corner seating point **140** toward the upper corner seating point **142**. The first upper surface segment **156** includes at least one upper inboard seating point, but could include a plurality of upper inboard seating points extending from the upper corner seating point **140** toward the upper corner seating point **142**, without departing from the spirit and scope of the invention.

[0097] Referring further to **FIG. 18**, a second upper surface segment **158**, on the upper surface **70** of the platform **60**, is adjacent to and extends from the upper corner seating point **142** toward the upper corner seating point **140**. The second upper surface segment **158** includes at least one upper inboard seating point, but could include a plurality of upper inboard seating points extending from the upper corner seating point **142** toward the upper corner seating point **140**, without departing from the spirit and scope of the invention. Thus, the first upper surface segment **156** and the second upper surface segment **158** are established by separating the upper surface space **152**.

[0098] In essence then, the combination of upper inboard seating points of the first upper surface segment **156** and the second upper surface segment **158**, which could be, but are not necessarily, equal in number, provide the total number of seating points between the upper corner seating points **140** and **142**. A similar arrangement of surface segments is provided on the undersurface **72** of the platform **60**, with a first lower surface segment **160** and a second lower surface segment **162** establishing a combined space for a total number of inboard seating points between the lower corner seating points **148** and **150** in the same manner described above.

[0099] The first and second upper surface segments **156** and **158**, and the first and second lower surface segments **160** and **162**, are located within the portion of the seating structure **30** which includes the non-seating portion **94a**. In a portion of the seating structure **30**, which includes the non-seating portion **94b**, a similar arrangement of upper and lower surface segments is provided on the platform **60**.

[0100] In **FIG. 5**, the resilient elements **90a** and **90b** are located in engagement with the two respective lower corner seating points **148** and **150** (**FIGS. 17 and 18**) of the platform **60**, and the resilient elements **90f** and **90e** are located in engagement with the two respective upper corner seating points **140** and **142** (**FIGS. 17 and 18**) of the platform. In this arrangement, the resilient elements **90a**, **90b**, **90f** and **90e** are located within the portion of the seating structure **30** which includes the non-seating portion **94a**.

While not visible in **FIG. 5**, the resilient elements **90c**, **90d**, **90g** and **90h** are located in engagement with respective lower and upper corner seating points of the platform **60** within the portion of the seating structure **30** which includes the non-seating portion **94b**.

[0101] Thus, when viewing the right-side edge **66** of the platform in **FIG. 5**, only the resilient elements **90a**, **90b**, **90e** and **90f** are visible. With this arrangement, it is to be understood that the remaining resilient elements **90c**, **90d**, **90g** and **90h**, which are not visible, are positioned along the left-side edge **68** of the platform **60** in locations which are comparable to locations of the visible resilient elements **90a**, **90b**, **90e** and **90f**.

[0102] Each of **FIGS. 19 through 40** is a representation of the platform **60** and one or more of the visible resilient elements **90a**, **90b**, **90e** and **90f**, as viewed when facing the right-side edge **66** of the platform, in a manner similar to the illustration of **FIG. 5**. With this arrangement, it is to be understood that a comparable number of the resilient elements **90c**, **90d**, **90g** and **90h**, while not visible, are positioned in a similar location along and adjacent the left-side edge **68**. For example, as viewed in **FIG. 19**, the single visible resilient element **90a** is located in engagement with one of the plurality of lower inboard seating points within the lower surface space **154** (**FIG. 17**). While not visible in **FIG. 19**, the single resilient element **90c** is located in engagement with a comparable one of the plurality of lower inboard seating points within the lower surface space adjacent the left-side edge **68**, so that the resilient elements **90a** and **90c** are in side-to-side alignment.

[0103] In the resilient-element arrangements of **FIGS. 19 through 26**, the single lower resilient element **90a** is in engagement with a selected one of the plurality of lower inboard seating points within the lower surface space **154**. In **FIG. 20**, the single upper resilient element **90e** is in engagement with a selected one of the plurality of upper inboard seating points within the upper surface space **152**, and is aligned with the single lower resilient element **90a**.

[0104] In **FIG. 21**, the upper resilient element **90e** is in engagement with a selected one of the plurality of upper inboard seating points within the second upper surface segment **158**. The upper resilient element **90f** is in engagement with any one of the upper inboard seating points within the first upper surface segment **156**, with the upper resilient elements **90e** and **90f** being on opposite sides of vertical alignment with the single lower resilient element **90a**.

[0105] As shown in **FIG. 22**, the upper resilient elements **90f** and **90e** are located in the upper corner seating points **140** and **142**, respectively. Referring to **FIG. 23**, the upper resilient element **90f** is in engagement with the upper corner seating point **140**. The upper resilient element **90e** is in engagement with a selected one of the plurality of upper inboard seating points of the upper surface space **152** and in alignment with the single lower resilient element **90a**.

[0106] In **FIG. 24**, the upper resilient element **90e** is in engagement with the upper corner seating point **142**, and the upper resilient element **90f** is in engagement with a selected one of the plurality of the upper inboard seating points of the upper surface segment **152** and in alignment with the single lower resilient element **90a**. As shown in **FIG. 25**, the single upper resilient element **90e** is in engagement with the upper

corner seating point 142. In FIG. 26, the single upper resilient element 90f is in engagement with the upper corner seating point 140.

[0107] Referring to FIGS. 27, 28, 30 and 31, the lower resilient element 90b is in engagement with a selected one of the plurality of lower inboard seating points of the lower surface segment 160, and the lower resilient element 90a is in engagement with a selected one of the plurality of lower inboard seating points of the lower surface segment 162. As shown in FIGS. 29 and 32, the lower resilient element 90b is in engagement with the lower corner seating point 148, and the lower resilient element 90a is in engagement with the lower corner seating point 150.

[0108] In FIGS. 33, 36, 38 and 40, the lower resilient element 90b is in engagement with a selected one of the plurality of lower inboard seating points of the lower surface space 154, and the lower resilient element 90a is in engagement with the lower corner seating point 150. As shown in FIGS. 34, 35, 37 and 39, the lower resilient 90b is in engagement with a selected one of the plurality of lower inboard seating points of the lower surface space 154, and the lower resilient element 90a is in engagement with the lower corner seating point 150.

[0109] Referring to FIGS. 28, 29, 33 and 34, the single upper resilient element 90e is in engagement with a selected one of the plurality of upper inboard seating points within the upper surface space 152. In FIGS. 28 and 29, the single upper resilient element 90e is aligned with a space between the lower resilient elements 90e and 90f. In FIG. 33, the single upper resilient element 90e is aligned with the lower resilient element 90b and, in FIG. 34, is aligned with the lower resilient element 90a.

[0110] As shown in FIGS. 30, 32, 35 and 36, the upper resilient element 90f is in engagement with a selected one of the plurality of upper inboard seating points within the upper surface segment 156, and the upper resilient element 90e is in engagement with a selected one of the plurality of upper inboard seating points within the upper surface segment 158. In FIG. 30, the upper resilient elements 90e and 90f are in alignment with the lower resilient elements 90a and 90b, respectively.

[0111] In FIG. 35, the upper resilient elements 90e and 90f are on opposite sides of vertical alignment with the lower resilient element 90a and, in FIG. 36, the upper resilient elements 90e and 90f are on opposite sides of vertical alignment with the lower resilient element 90b. In FIG. 31, the upper resilient elements 90f and 90e are in engagement with the upper corner seating points 140 and 142, respectively.

[0112] Referring to FIGS. 37 and 40, the upper resilient elements 90f and 90e are in engagement with the upper corner seating point 140 and a selected one of the plurality of upper inboard seating points within the upper surface space 152. In FIG. 37, the upper resilient element 90e is aligned with the lower resilient element 90a and, in FIG. 40, is aligned the lower resilient element 90b. Also, in FIG. 37, the upper resilient element 90f is aligned with the lower resilient element 90b.

[0113] As shown in FIGS. 38 and 39, the upper resilient elements 90f and 90e are in engagement with a selected one of the plurality of upper inboard seating points within the

upper surface space 152 and the upper corner seating point 142, respectively. In FIG. 38, the upper resilient element 90f is aligned with the lower resilient element 90b and, in FIG. 39, is aligned with the lower resilient element 90a. Also, in FIG. 38, the upper resilient 90e is aligned with the lower resilient element 90a.

[0114] The illustrations of FIGS. 19 through 40 of the various arrangements of the upper and lower resilient elements are representative of embodiments, in addition to the embodiments illustrated in FIGS. 1 through 16, which are within the spirit and scope of the invention. Other arrangements of the resilient elements could be used without departing from the spirit and scope of the invention. For example, with only the lower resilient elements 90a and 90b, and no upper resilient elements, the lower resilient element 90b could be in engagement with the lower corner seating point 148 and the lower resilient element 90a could be in engagement with a selected one of the lower inboard seating points within the lower surface space 154. Or, the lower resilient element 90a could be in engagement with the lower corner seating point 150 and the lower resilient element 90b in engagement with a selected one of the plurality of lower inboard seating points within the lower surface space 154.

[0115] In each embodiment described above where an upper or a lower resilient element is in engagement with a respective seating point, it is to be understood that the respective seating point can be enclosed by a retaining well or a crib such as, for example, the crib 78a, as shown in FIG. 2.

[0116] The seating structure 30, as described above, includes the platform 60 having the seating portion 92, which encounters no impediments or obstacles therebeneath at any time, including during use thereof by a user. The seating portion 92 of the platform 60 is supported at locations which are isolated from and independent of the seating portion, that is, at the non-seating portions 94a and 94b. By use of the resilient elements 90a through 90h at the non-seating portions 94a and 94b of the platform 60, the seating structure 30 provides the user with a buoyant and floating experience which is relaxing and enjoyable, regardless of whether the user is sitting or rocking.

[0117] In another embodiment, a resilient support structure includes a frame 32 and a platform 60 formed with an open portion 92 and a support portion 94a or 94b. The platform is formed with a side edge 66 and a surface 70 or 72 which is contiguous with the side edge. The platform 60 is formed with a corner at an end of the side edge 66. A corner pressure point 140, 142, 144, 146, 148 or 150 is located on the surface of the platform, and a resilient element 90 is in engagement with the corner pressure point.

[0118] In still another embodiment, a resilient support structure is formed with a frame 32 and a platform 60 which is formed with an open portion 92 and a support portion 94a or 94b. The platform is formed with a side edge 66 and a surface 70 or 72 which is contiguous with the side edge. A surface space 152 or 154 is located on the surface 70 or 72, respectively, of the platform 60 within the support portion 94a or 94b of the platform with an inboard pressure point located within the surface space. A resilient element 90 is located in engagement with the inboard pressure point. The platform 60 is formed with a corner at an end of the side edge 66, with a corner pressure point 140, 142, 144, 146, 148

or **150** located on the surface **70** or **72** adjacent the corner of the platform, between the corner and the inboard pressure point. Another, or second, resilient element **90** is in engagement with the corner pressure point **140, 142, 144, 146, 148** or **150**.

[0119] In general, the above-identified embodiments are not to be construed as limiting the breadth of the present invention. Modifications, and other alternative constructions, will be apparent which are within the spirit and scope of the invention as defined in the appended claims.

What is claimed is:

1. A seating structure, which comprises:
  - a frame;
  - a platform formed with a seating portion and an outer portion extending in a direction laterally of the seating portion; and
  - means for supporting the platform at the outer portion in a floating relation to the frame independently of engagement with the seating portion.
2. The seating structure as set forth in claim 1, wherein the means for supporting comprises at least one resilient element.
3. The seating structure as set forth in claim 1, which further comprises:
  - the platform formed with a non-seating portion adjacent the seating portion and having surfaces on opposite sides of the non-seating portion; and
  - the means for supporting the platform being adjacent the surfaces of the opposite sides of the non-seating portion of the platform for supporting the platform in a floating relation to the frame.
4. The seating structure as set forth in claim 1, which further comprises:
  - the means for supporting the platform being captured between spaced interfacing portions of the frame and the platform, exclusive of the seating portion.
5. The seating structure as set forth in claim 1, which further comprises:
  - the seating portion being formed with a front edge and a rear edge; and
  - means for allowing movement of the seating portion, relative to the frame, in an arcing direction about the front edge and the rear edge of the seating portion.
6. The seating structure as set forth in claim 1, which further comprises:
  - the seating portion being formed with a right-side edge and a left-side edge; and
  - means for allowing movement of the seating portion, relative to the frame, in an arcing direction about the right-side edge and left-side edge thereof of the seating portion.
7. The seating structure as set forth in claim 6, which further comprises:
  - the seating portion being formed with a front edge and a rear edge; and

means for allowing movement of the seating portion, relative to the frame, in an arcing direction about the front edge and the rear edge of the seating portion.

8. The seating structure as set forth in claim 7, which further comprises:
  - means for allowing movement of the seating portion, relative to the frame, in a compound arcing direction which includes a vector component of the arcing directions of movement of any adjacent two of the front edge, the rear edge, the right-side edge, or the left-side edge of the seating portion.
9. The seating structure as set forth in claim 1, which further comprises:
  - means, positioned adjacent a portion of the means for supporting the platform, for precluding any relative movement of the portion in a direction toward the means for precluding.
10. A seating structure, which comprises:
  - a frame;
  - a platform in relative movable assembly with the frame;
  - the platform formed with a seating portion on which a person may sit, and a non-seating portion extending laterally of the seating portion; and
  - a resilient element located between a portion of the frame and a portion of the non-seating portion of the platform to provide floating assembly of the seating portion of the platform relative to the frame.
11. The seating structure as set forth in claim 10, which further comprises:
  - a portion of the resilient element being located adjacent the portion of the frame, and
  - a fence attached to the portion of the frame adjacent the portion of the resilient element to preclude movement thereof in the direction of the fence.
12. The seating structure as set forth in claim 10, which further comprises:
  - a portion of the resilient element being located adjacent a portion of the non-seating portion, and
  - a fence attached to the portion of the non-seating portion adjacent the portion of the resilient element to preclude movement thereof in the direction of the fence.
13. The seating structure as set forth in claim 10, which further comprises:
  - a first portion of the resilient element being located adjacent the portion of the frame,
  - a first crib attached to the portion of the frame adjacent the first portion of the resilient element to preclude movement of the first portion in any lateral direction relative to the frame;
  - a second portion of the resilient element, spaced from the first portion thereof, being located adjacent the non-seating portion of the platform; and
  - a second crib attached to the non-seating portion of the platform adjacent the second portion of the resilient element to preclude movement of the second portion in any lateral direction relative to the non-seating portion.

14. The seating structure as set forth in claim 10, which further comprises:

the seating portion of the platform being fixedly joined with the non-seating portion only of the platform.

15. The seating structure as set forth in claim 10, wherein the platform is assembled with the frame for limited movement relative to the frame.

16. The seating structure as set forth in claim 10, wherein the resilient element is a first resilient element, the portion of the frame is a first portion thereof, and the portion of the non-seating portion is a first portion thereof, which further comprises:

a second resilient element, spaced from the first resilient element, located between a second portion of the frame, spaced from the first portion thereof, and a second portion of the non-seating portion spaced from the first portion thereof.

17. The seating structure as set forth in claim 10, wherein the seating structure is formed of a material selected from the group consisting of wood, metal and plastic.

18. A seating structure, which comprises:

a frame;

a platform having spaced portions mounted on the frame for movement relative to the frame;

each of the spaced portions of the platform formed with an undersurface on one major surface of the platform;

a set of resilient elements positioned at spaced locations adjacent the undersurface of the spaced portions of the platform to buoyantly support the platform against any external forces exerted on the platform in a direction outward from the undersurface of the spaced portions; and

the platform formed with a seating portion which extends laterally between the spaced portions thereof free of engagement with any of the resilient elements of the set.

19. The seating structure as set forth in claim 18, which further comprises:

the platform is formed with a front edge and a rear edge; and

means for allowing movement of the platform, and thereby the seating portion, in an arcing direction about the front edge and the rear edge.

20. The seating structure as set forth in claim 18, which further comprises:

the platform is formed with a right-side edge and a left-side edge; and

means for allowing movement of the platform, and thereby the seating portion, in an arcing direction about the right-side edge and the left-side edge of the platform.

21. The seating structure as set forth in claim 18, which further comprises:

the platform being formed with a front edge, a rear edge, a right-side edge and a left-side edge; and

means for allowing movement of the platform, and thereby the seating portion, in arcing directions about

the front edge, the rear edge, the right-side edge and the left-side edge of the platform.

22. The seating structure as set forth in claim 21, wherein the means for allowing movement also allows movement of the platform, and thereby the seating portion, in compound arcing directions which include a vector component of the arcing directions of movement of any adjacent two of the front edge, the rear edge, the right-side edge or the left-side edge of the platform.

23. A seating structure, which comprises:

a frame;

a platform formed with a seating portion and an extended portion which extends laterally of the seating portion;

the platform formed with a front edge and a rear edge;

means, in engagement with the extended portion of the platform, for supporting the platform in a floating relation to the frame independently of engagement with the seating portion; and

means for allowing movement of the platform, and thereby the seating portion, in an arcing direction about the front edge and the rear edge of the platform.

24. A seating structure, which comprises:

a frame;

a platform formed with a seating portion and an extended portion which extends laterally of the seating portion;

the platform being formed with a right-side edge and a left-side edge;

means, in engagement with the extended portion of the platform, for supporting the platform in a floating relation to the frame independently of engagement with the seating portion; and

means for allowing movement of the platform, and thereby the seating portion, in an arcing direction about the right-side edge and the left-side edge of the platform.

25. A seating structure, which comprises:

a frame;

a platform formed with a seating portion and an extended portion which extends laterally of the seating portion;

the platform being formed with a front edge, a rear edge, a right-side edge and a left-side edge;

means, in engagement with the laterally extended portion of the platform, for supporting the platform in a floating relation to the frame independently of engagement with the seating portion; and

means for allowing movement of the platform, and thereby the seating portion, in an arcing direction about the front edge, the rear edge, the right-side edge and the left-side edge of the platform.

26. The seating structure as set forth in claim 25, wherein the means for allowing also allows movement of the platform, and thereby the seating portion, in compound directions which include a vector component of the arcing directions of movement in any adjacent two of the front edge, the rear edge, the right-side edge and the left-side edge of the platform.



27. A seating structure, which comprises:

a frame;

a platform formed with a seating portion which extends laterally of and between spaced portions of the platform;

the platform being formed with a front edge and a rear edge;

means, located at the spaced portions, for supporting the platform in a floating relation to the frame independently of engagement with the seating portion; and

means for allowing movement of the platform, and thereby the seating portion, in an outward direction from the front edge and the rear edge of the platform.

28. A seating structure, which comprises:

a frame;

a platform formed with a seating portion which extends laterally of and between spaced portions of the platform;

the platform being formed with a right-side edge and a left-side edge;

means, located at the spaced portions, for supporting the platform in a floating relation to the frame independently of engagement with the seating portion; and

means for allowing movement of the platform, and thereby the seating portion, in an outward direction from the right-side edge and the left-side edge of the platform.

29. A seating structure, which comprises:

a frame;

a platform formed with a seating portion which extends laterally of and between spaced portions of the platform;

the platform being formed with a front edge, a rear edge, a right-side edge and a left-side edge;

means, located at the spaced portions, for supporting the platform in a floating relation to the frame independently of engagement with the seating portion; and

means for allowing movement of the platform, and thereby the seating portion, in an outward direction about the front edge, the rear edge, the right-side edge and the left-side edge of the platform.

30. The seating structure as set forth in claim 29, wherein the means for allowing also allows movement of the platform, and thereby the seating portion, in compound directions which include a vector component of the outward directions of movement in any adjacent two of the front edge, the rear edge, the right-side edge and the left-side edge of the platform.

31. A seating structure, which comprises:

a frame;

a platform formed with a seating portion which extends laterally of and between spaced portions of the platform;

the platform being formed with a front edge, a rear edge, a right-side edge and a left-side edge;

means, located at the spaced portions, for supporting the platform in a floating relation to the frame independently of engagement with the seating portion; and

means for allowing movement of the platform, and thereby the seating portion, in compound arcing and outward directions which include vector components of the arcing direction and the outward direction of movement of any of the front edge, the rear edge, the right-side edge and the left-side edge of the platform.

32. The seating structure as set forth in claim 1, which further comprises:

the platform formed with a non-seating portion adjacent the seating portion;

the non-seating portion of the platform formed with an upper surface on a first side thereof;

a first upper surface area located on the upper surface;

a second upper surface area located on the upper surface at a location separated from the first upper surface area by a defined space between the first upper surface area and the second upper surface area;

the non-seating portion of the platform formed with an undersurface on a second side thereof opposite the first side;

at least one surface area located on the undersurface at a location aligned with an intermediate portion of the defined space between the first upper surface area and the second upper surface area; and

wherein the means for supporting includes:

a first upper resilient element located adjacent the first upper surface area;

a second upper resilient element located adjacent the second upper surface area; and

a lower resilient element located adjacent the at least one surface area, and being out of alignment with the first upper resilient element and the second upper resilient element.

33. The seating structure as set forth in claim 32, wherein the at least one surface area is a first lower surface area located on the undersurface, the lower resilient element is a first lower resilient element, and the intermediate portion of the defined distance is a first intermediate portion, which further comprises:

a second surface area located on the undersurface at a location aligned with a second intermediate portion of the defined space and spaced from the first intermediate portion; and

a second lower resilient element located adjacent the second surface area on the undersurface, and being out of alignment with the first upper resilient element and the second upper resilient element.

34. The seating structure as set forth in claim 1, which further comprises:

the platform formed with an upper surface on one side thereof and having a first plurality of spaced prescribed portions;

the platform formed with an undersurface on another side thereof opposite the one side and having a second

plurality of spaced prescribed portions which are aligned with respective ones of, and correspond in number to, the first plurality of spaced prescribed portions;

each of a first plurality of resilient elements being located adjacent a respective one of the first plurality of prescribed portions of the undersurface of the platform independently of the seating portion of the platform;

each of a second plurality of resilient elements being located adjacent a respective one of the second plurality of prescribed portions of the upper surface of the platform independently of the seating portion of the platform.

the first plurality of resilient elements including four resilient elements;

the second plurality of resilient elements including four resilient elements; and

at least one of the four resilient elements of the first plurality being out of alignment with the four resilient elements of the second plurality.

**35.** The seating structure as set forth in claim 32, wherein the first means for resiliently supporting comprises:

a first pair of spaced resilient elements located in the first cell; and

a second pair of spaced resilient elements located in the second cell out of alignment with respective ones of the first pair of spaced resilient elements; and

wherein the second means for resiliently supporting comprises:

a third pair of spaced resilient elements located in the third cell; and

a fourth pair of spaced resilient elements located in the fourth cell out of alignment with respective ones of the third pair of spaced resilient elements.

**36.** The seating structure as set forth in claim 18, which further comprises:

the set of resilient elements being a first set of resilient elements;

each of the spaced portions of the platform formed with an upper surface on another major surface of the platform opposite the one major surface;

a second set of resilient elements positioned at spaced locations adjacent the upper surface of the spaced portions of the platform to buoyantly support the platform against any external forces exerted on the platform in a direction outward from the upper surface of the spaced portions; and

the spaced locations of the first set of resilient elements being out of alignment with the spaced locations of the second set of resilient elements.

**37.** A seating structure, which comprises:

a frame;

a platform formed with a seating portion and a non-seating portion extending laterally from the seating portion;

the platform being mounted on the frame for movement relative to the frame;

the non-seating portion of the platform formed with an undersurface;

a plurality of surface areas located on the undersurface of the non-seating portion, including a first-end surface area and a second-end surface area at opposite ends of the plurality of surface areas;

at least one of the plurality of surface areas forming an inboard surface area located between the first-end surface area and the second-end surface area; and

a resilient element located adjacent the inboard surface area.

**38.** The seating structure as set forth in claim 37, wherein the inboard surface area is a first inboard surface area, and the resilient element is a first resilient element, which further comprises:

the undersurface of the non-seating portion of the platform formed with a second inboard surface area included in the plurality of surface areas and located between the first-end surface area and the second-end surface area; and

a second resilient element located adjacent the second inboard surface area.

**39.** The seating structure as set forth in claim 37, which further comprises:

the non-seating portion of the platform formed with a first corner and a second corner spaced from the first corner;

the plurality of surface areas located between the first corner and the second corner; and

the first-end surface area being located adjacent the first corner and the second-end surface area being located adjacent the second corner.

**40.** The seating structure as set forth in claim 38, wherein the first resilient element is a first lower resilient element and the second resilient element is a second lower resilient element, the first-end surface area is a lower first-end surface area, the second-end surface area is a lower second-end surface area, the first inboard surface area is a first lower inboard surface area, and the second inboard surface area is a second lower inboard surface area, which further comprises:

the non-seating portion of the platform formed with an upper surface on a side of the platform opposite a side thereof on which the undersurface is formed;

a first upper surface area located on the upper surface in alignment with the lower first-end surface area;

a second upper surface area located on the upper surface in alignment with the lower second-end surface area;

a first upper resilient element located adjacent the first upper surface area;

a second upper resilient element located adjacent the second upper surface area; and

each of the first lower resilient element and the second lower resilient element being out of alignment with the first upper resilient element and the second upper resilient element.

**41.** The seating structure as set forth in claim 40, wherein the non-seating portion is a first non-seating portion, which further comprises:

the first non-seating portion located along a first edge of the seating portion;

a second non-seating portion located along a second edge of the seating portion laterally opposite and spaced from the first non-seating portion;

the second non-seating portion of the platform formed with an undersurface;

a plurality of surface areas located on the undersurface of the second non-seating portion, including a first-end surface area and a second-end surface area at opposite ends of the plurality of surface areas;

the undersurface of the second non-seating portion of the platform formed with a first inboard surface area and a second inboard surface area, each of which are included in the plurality of surface areas of the second non-seating portion of the platform, and which are located between the first-end surface area and the second-end surface area thereof;

a first lower resilient element located adjacent the first inboard surface area of the second non-seating portion;

a second lower resilient element located adjacent the second inboard surface area of the second non-seating portion;

the second non-seating portion of the platform formed with an upper surface on a side of the platform opposite a side thereof on which the undersurface of the second non-seating portion is formed;

a first upper surface area located on the upper surface of the second non-seating portion in alignment with the lower first-end surface area thereof;

a second upper surface area located on the upper surface of the second non-seating portion in alignment with the lower second-end surface area thereof;

a first upper resilient element located adjacent the first upper surface area of the second non-seating portion;

a second upper resilient element located adjacent the second upper surface area of the second non-seating portion; and

each of the first lower resilient element and the second lower resilient element, which are adjacent the undersurface first surface area and the undersurface second surface area, respectively, of the second non-seating portion, being out of alignment with the first upper resilient element and the second upper resilient element, which are adjacent the first upper surface area and the second upper surface area of the second non-seating portion, respectively.

**42.** The seating structure as set forth in claim 41, which further comprises:

the first lower resilient element and the second lower resilient element, which are adjacent the first non-seating portion, being aligned laterally respectively with the first lower resilient element and the second lower resilient element, which are adjacent the second non-seating portion; and

the first upper resilient element and the second upper resilient element, which are adjacent the first non-seating portion, being aligned laterally respectively with the first upper resilient element and the second upper resilient element, which are adjacent the second non-seating portion.

**43.** A seating structure, which comprises:

a platform formed with a non-seating portion;

the non-seating portion of the platform formed with an upper surface on a first side thereof;

a first upper surface area located on the upper surface;

a second upper surface area located on the upper surface at a location separated from the first upper surface area by a defined space between the first upper surface area and the second upper surface area;

the non-seating portion of the platform formed with an undersurface on a second side thereof opposite the first side;

at least one surface area located on the undersurface at a location aligned with an intermediate portion of the defined space between the first upper surface area and the second upper surface area;

a first upper resilient element located adjacent the first upper surface area;

a second upper resilient element located adjacent the second upper surface area; and

a lower resilient element located adjacent the at least one surface area, and being out of alignment with the first upper resilient element and the second upper resilient element.

**44.** The seating structure as set forth in claim 43, wherein the at least one surface area is a first lower surface area located on the undersurface, the lower resilient element is a first lower resilient element, and the intermediate portion of the defined distance is a first intermediate portion, which further comprises:

a second lower surface area located on the undersurface at a location aligned with a second intermediate portion of the defined space and spaced from the first intermediate portion; and

a second lower resilient element located adjacent the second lower surface area on the undersurface, and being out of alignment with the first upper resilient element and the second upper resilient element.

**45.** A seating structure, which comprises:

a frame;

a platform formed with a seating portion and a non-seating portion;

the platform formed with a side edge and a surface which is contiguous with the side edge;

a surface space located on the surface of the platform within the non-seating portion of the platform with an inboard seating point located within the surface space; and

a resilient element in engagement with the inboard seating point.

**46.** The seating structure as set forth in claim 45, wherein the resilient element is a first resilient element, and which further comprises:

- the platform formed with a corner at an end of the side edge;
- a corner seating point located on the surface of the platform adjacent the corner thereof, and between the corner and the inboard seating point; and
- a second resilient element in engagement with the corner seating point.

47. The seating structure as set forth in claim 45, wherein the inboard seating point is a first inboard seating point and the resilient element is a first resilient element, and which further comprises:

- the surface space being separated into a first surface segment and a second surface segment;
- the first inboard seating point located within the first surface segment;
- the first resilient element in engagement with the first inboard seating point;
- a second inboard seating point located within the second surface segment; and
- a second resilient element in engagement with the second inboard seating point.

48. The seating structure as set forth in claim 45, wherein the surface is a first surface contiguous with the side edge and formed on a first side of the platform, the surface space is a first surface space, the inboard seating point is a first inboard seating point, and the resilient element is a first resilient element, which further comprises:

- a second surface contiguous with the side edge formed on a second side of the platform opposite the first side thereof;
- a second surface space located on the second surface of the platform;
- a second inboard seating point located within the second surface space; and
- a second resilient element in engagement with the second inboard seating point.

49. The seating structure as set forth in claim 48, which further comprises:

- the first resilient element being aligned with the second resilient element.

50. The seating structure as set forth in claim 48, which further comprises:

- the first resilient element being out of alignment with the second resilient element.

51. The seating structure as set forth in claim 48, which further comprises:

- the platform formed with a corner at an end of the side edge and adjacent portions of the first surface and the second surface;
- a corner seating point located on the second surface of the platform adjacent the corner thereof, and between the corner and the inboard seating point; and
- the second resilient element out of engagement with the second inboard seating point and in engagement with the corner seating point.

52. The seating structure as set forth in claim 48, wherein the inboard seating point is a first inboard seating point and the resilient element is a first resilient element, and which further comprises:

- the second surface space being separated into a first surface segment and a second surface segment;
- the first inboard seating point of the second surface space located within the first surface segment;
- the second resilient element in engagement with the first inboard seating point of the first surface segment;
- a second inboard seating point located within the second surface segment; and
- a third resilient element in engagement with the second inboard seating point of the second surface segment.

53. A resilient support structure, which comprises:

- a frame;
- a platform formed with an open portion and a support portion;
- the platform formed with a side edge and a surface which is contiguous with the side edge;
- a surface space located on the surface of the platform within the support portion of the platform with an inboard pressure point located within the surface space; and
- a resilient element in engagement with the inboard pressure point.

54. The resilient support structure as set forth in claim 53, wherein the resilient element is a first resilient element, and which further comprises:

- the platform formed with a corner at an end of the side edge;
- a corner pressure point located on the surface of the platform adjacent the corner thereof, and between the corner and the inboard pressure point; and
- a second resilient element in engagement with the corner pressure point.

55. A resilient support structure, which comprises:

- a frame;
- a platform formed with an open portion and a support portion;
- the platform formed with a side edge and a surface which is contiguous with the side edge;
- the platform formed with a corner at an end of the side edge;
- a corner pressure point located on the surface of the platform adjacent the corner thereof; and
- a resilient element in engagement with the corner pressure point.

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