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(54) **TRAMPOLINE WITH SPRING ZONES**

(57) The present invention concerns a gymnastic appliance (1) of the type typically used in connection with performing jumping, trampoline or tumbling, wherein the gymnastic appliance (1) includes a trampoline canvas (3) with a periphery and a frame (2) around the periphery of the trampoline canvas (3), wherein the trampoline canvas (3) and the frame (2) are substantially extending in the same plane, and wherein between the periphery and the frame (2) of the trampoline canvas (3) there are arranged a number of spring elements (4). The new feature of the gymnastic appliance according to the invention is

that the spring elements (4) are arranged in at least two zones (6), where one zone (6) includes at least one first individual spring element (4), where at least one first spring element (4) has one total individual spring characteristic, and where at least one second zone (6) includes at least one second individual spring element (4), where at least one second spring element (4) has at least one second total individual spring characteristic. Hereby is achieved the advantage that the gymnastic appliance/trampoline can be arranged with different properties at different areas along the periphery.

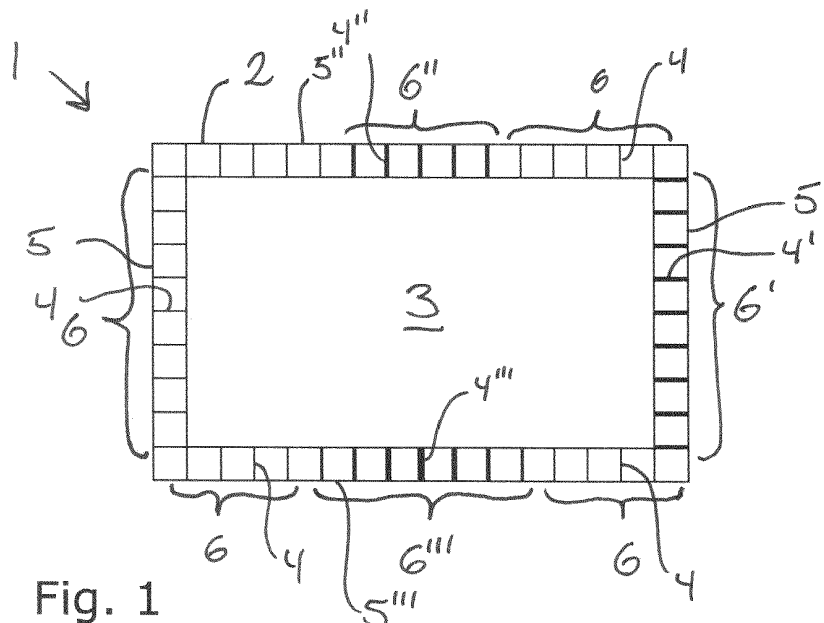


Fig. 1

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## Description

### Field of the Invention

[0001] The present invention concerns a gymnastic appliance of the type typically used in connection with performing jumping, trampoline or tumbling, wherein the gymnastic appliance includes a trampoline canvas with a periphery and a frame around the periphery of the trampoline canvas, wherein the trampoline canvas and the frame are substantially extending in the same plane, and wherein between the periphery and the frame of the trampoline canvas there are arranged a number of spring elements.

### Background of the Invention

[0002] In connection with performing jumping, trampoline or tumbling it is common to use gymnastic appliances, also known by the term trampolines, of many different kinds, including so-called mini-trampolines or take-off trampolines which are typically used in connection with floor gymnastics, and big trampolines which are typically used as independent gymnastic appliances. In the following, the terms gymnastic appliance and trampoline will both be used with regard to description of prior art and of the invention.

[0003] Common to the prior art gymnastic appliances/trampoline types is that they include a frame in which is extended a trampoline canvas of a resilient material. The trampoline canvas is fixed or extended in the frame under application of spring elements between the frame and the trampoline canvas.

[0004] However, what is not common to the prior art trampoline types is how they are used and not the least the weight of the various users of the trampoline. When, for example, a mini-trampoline, also known as a take-off trampoline, is used, it is for giving a gymnast an additional thrust in a certain direction in order for him to perform a given exercise better. For this application the trampoline is typically inclined, and the gymnast utilises it by running/jumping towards the trampoline canvas which then absorbs the force from the gymnast and returns the force so that he is assisted in the jump.

[0005] When speaking about e.g. big trampolines where a gymnast performs a series of jumps, the trampoline canvas is typically arranged horizontally. In certain cases with a big trampoline it may be so that the trampoline is more loaded in certain areas, in particular in the central area at the middle of the trampoline canvas, and as a consequence an increased load is also applied on the spring elements arranged between frame and trampoline canvas at the middle of the sides. When using big trampolines it has occurred many times that the trampoline canvas is pressed or stretched to such a degree that only a very modest distance to the floor is left under the trampoline. At the same time is observed that in particular the spring elements located at the middle of the frame

sides are extended appreciably more than the spring elements closer to the corners of the trampoline.

[0006] For the sake of good order it is to be mentioned that the preferred types of spring elements are extension springs of the coil spring type, but elastic ropes are e.g. used in some types of gymnastic appliances/trampolines as well.

### Object of the Invention

[0007] It is the object of the invention to indicate a solution to a gymnastic appliance/trampoline wherein the gymnastic appliance/trampoline is more optimal and efficient compared with the prior art types of gymnastic appliances/trampolines, and where allowance is made for the way in which an appliance/trampoline is used for specific exercises. At the same time it is an object to indicate how spring elements can be mounted so as to contribute to better performance of given gymnastic exercises by a gymnast on or with the gymnastic appliance/trampoline.

### Description of the Invention

[0008] As mentioned in the introduction, the present invention concerns a gymnastic appliance of the type typically used in connection with performing jumping, trampoline or tumbling, wherein the gymnastic appliance includes a trampoline canvas with a periphery and a frame around the periphery of the trampoline canvas, wherein the trampoline canvas and the frame are substantially extending in the same plane, and wherein between the periphery and the frame of the trampoline canvas there are arranged a number of spring elements.

[0009] The new feature of the gymnastic appliance according to the invention is that the spring elements are arranged in at least two zones, where one zone includes at least one first individual spring element, where the at least one first spring element has one total individual and non-adjustable spring characteristic, and where at least one second zone includes at least one second individual spring element, where at least one second spring element has at least one second total individual and non-adjustable spring characteristic.

[0010] Hereby is achieved the advantage that the gymnastic appliance/trampoline can be arranged with different properties at different areas along the periphery. A zone can in principle consist of a spring element, e.g. a coiled extension spring, having its own specific characteristic, but a zone can also consist of e.g. a series of two, three, four, five, six, seven, eight, nine or ten identical spring elements that may be arranged in a strategic way on the trampoline in relation to the points on the trampoline where the wear on the spring elements is the greatest, and/or in order to modify the total characteristic of the trampoline and thereby adapt the trampoline to a specific use, as described in more detail below. In this connection, a spring element is to be regarded as a spring

extending between frame and trampoline canvas and may in principle consist of an elastic rope which thereby constitutes a plurality of spring elements, or by other resilient devices by which the necessary elasticity/resiliency can be achieved.

**[0011]** In an embodiment of a gymnastic appliance according to the invention, the gymnastic appliance may include one type of uniform spring elements with a first spring characteristic along part of the periphery the gymnastic appliance, and along a second part of the periphery include a second type of uniform spring elements with a second spring characteristic. A trampoline can therefore have tighter springs mounted along a front edge as seen in relation to the running direction of a gymnast using a take-off trampoline, whereas there are not so tight springs at the side edges, and a spring element with a third characteristic at a rear edge. Generally speaking, the invention concerns utilisation of springs with different properties on a trampoline where the springs are arranged in zones in selected areas along the periphery of the trampoline. It may be so that e.g. a side of a mini-trampoline is provided with springs with an alternative spring characteristic compared with the springs arranged on the remainder of the trampoline. Such a mounting of spring elements may contribute positively to a gymnast's utilisation of the mini-trampoline when performing a jump. By adapting the spring characteristics in zones, e.g. along one side of a mini-trampoline, an additional thrust in a certain direction can be achieved, having a significant effect on the take-off as the gymnast "stands" for a longer time in the trampoline canvas after jumping into the trampoline and before the take-off, thereby achieving the possibility of aligning his body position and performing the subsequent take-off and the exercise itself. The additional effect is also due to the fact that the gymnast's run, which is horizontal, is more easily transformed into a thrust in the right direction, which is more precisely can be termed as "up and forward" when the spring action is not uniform at all sides of a mini-trampoline.

**[0012]** When considering a trampoline in theory and a user's use of the trampoline in relation to Newton's second law as an elastic impact, a trampoline according to the prior art - i.e. a trampoline with identical spring elements at its sides - will deliver the force applied to it in the same direction as the one the force is coming from if the force is at right angles to the surface. If, however, a trampoline is inclined, "ideal" and used as take-off trampoline for a gymnast running horizontally and jumping into the canvas of the trampoline with a horizontal force, the trampoline will transmit its force in a direction which generally corresponds to the incident angle of the force, only mirrored, and therefore onwards at a corresponding angle. In theory this corresponds to the physical situation where angle of incidence is equal to angle of reflection, of course in a theoretical and ideal situation.

**[0013]** By adapting a gymnastic appliance or a trampoline with spring elements in zones, it can be adjusted how the force applied to a trampoline (the inwardly di-

rected force) can be returned, and with regard to inclined trampolines, adjustment can be made regarding the direction of the inwardly directed force relative to the outwardly directed force. A gymnast can hereby achieve a more efficient jump as his force can be applied more optimally in the take-off. Moreover, it is achieved that the total characteristic of the trampoline is changed such that the gymnast "stands" for a longer time in the trampoline canvas after landing and before the forward jump is executed. This means that the gymnast will have possibility of adapting his body position such that the forwardly directed part of the take-off in the trampoline can be performed optimally, and such that the subsequent exercise can be performed at a higher level and with greater precision than on the prior art trampolines.

**[0014]** The general purpose of differentiating the springs is to achieve special and desired properties of a gymnastic appliance/trampoline as the trampoline then can demonstrate properties adapted to the exercise or exercises performed on the trampoline. It may also be so that the choice of spring composition is adapted to the properties of a trampoline canvas in respective directions related to e.g. the weaving of the trampoline canvas.

**[0015]** A gymnastic appliance according to the invention can be designed such that the gymnastic appliance along at least part of the periphery the gymnastic appliance includes at least two different spring elements with at least two different spring characteristics, where respective spring elements are arranged mixed and in a regular order. It may be so that every other or third spring element is different from one or more other spring elements in a trampoline. Groups of uniform spring elements can be disposed between groups of other uniform spring elements, where spring elements in respective groups can be different. It may be so that in zones of a given size/length along a periphery on a trampoline are mounted differentiated springs. Such springs can be a classic coiled extension spring, though other types of springs can be used as well, including rubber springs and elastic cords, and other suitable spring elements. A trampoline can e.g. be equipped with a plurality of spring elements along one side where the stiffness of respective spring elements increases towards the centre of the side of the trampoline, or where the stiffness/elasticity is determined to be symmetrical or asymmetrical in other ways along part of or along all of a periphery or a side of a trampoline.

**[0016]** A gymnastic appliance according to the invention can be a trampoline with a trampoline canvas where the trampoline canvas is substantially horizontal when the trampoline stands ready for use.

**[0017]** By this type of trampolines the user often has a tendency of moving away from the centre of the trampoline which in extreme cases can lead to accidents or injury if the gymnast cannot correct or is not timely correcting his jumps towards the centre point on the trampoline canvas. This "travelling" on the trampoline can be counteracted by providing zones at the corners of the trampoline canvas where the springs have a spring characteristic

different from that along the sides of the trampoline, preferably with a greater spring force. These spring zones at the corners cause the gymnast in his jumping in the big trampoline to be "thrown" in towards the middle of the trampoline canvas.

**[0018]** A gymnastic appliance according to the invention can also be a trampoline with a trampoline canvas where the trampoline canvas has an inclination relative to horizontal when the trampoline stands ready for use.

**[0019]** As mentioned above, these can be big trampolines, take-off trampolines/mini-trampolines, garden trampolines and other types of already known trampolines.

**[0020]** In a variant of a gymnastic appliance according to the invention the gymnastic appliance can have a frame and a trampoline canvas with a generally rectangular shape as seen on the plane in which frame as well as trampoline canvas extend.

**[0021]** Such a gymnastic appliance may advantageously be adapted such that along one side between frame and trampoline canvas, the gymnastic appliance includes one type of spring elements, and along at least two of the other three sides between frame and trampoline canvas, the gymnastic appliance includes a different type or several different types of with spring elements, e.g. the side in parallel with the first side, including springs with a third spring characteristic. Hereby can be achieved an adjustment of the effect and the direction at which a trampoline canvas is reflecting the force applied on it. A gymnast can therefore optimise his jump due to the fact that the above change of the total characteristic of the trampoline is changed such that the gymnast "stands" for a longer time in the trampoline canvas after landing and before the forward jump is executed.

**[0022]** A gymnastic appliance according to the invention can also be a gymnastic appliance with a frame and a trampoline canvas with a generally circular shape as seen on the plane in which frame as well as trampoline canvas extend. Along the periphery of such a frame and trampoline canvas there may, as already mentioned, be provided spring elements with several different spring characteristics which therefore can be more or less elastic/stiff.

**[0023]** The disposition of such zones of spring elements can be chosen according to general guidelines, calculations or philosophies, but may also be chosen for personal and individual reasons, including with regard to body weight, speed of running/jumping into the trampoline canvas, or due to various other reasons.

**[0024]** A gymnastic appliance according to the invention can be designed such that the gymnastic appliance includes at least one spring element constructed with at least one compression spring arranged in a spring housing, the spring housing including fixing means for fixation to the frame and to the trampoline canvas, and means for compressing the at least one compression spring when a pull is applied to the fixing means. A spring housing does not necessarily be a closed housing in which is

mounted one or more springs but may be constituted by any design or device by which it is possible to perform a compression of a spring element by a pulling action.

**[0025]** A compression spring is hereby used as an extension spring as the mentioned spring housing in principle converts the pull into a compression force on respective compression spring or springs. Such compression springs can be coiled springs, an elastomer, disc springs, any mechanical, pneumatic or gas spring, or combinations thereof. The mentioned spring types can also be used in an extension spring configuration.

**[0026]** Alternatively, one or more extension springs are arranged in a spring housing, the spring housing including fixing means for fixation to the frame and to the trampoline canvas, and means for pulling in the at least one compression spring when a tension is applied to the fixing means.

**[0027]** In a variant of a gymnastic appliance according to the invention, a gymnastic appliance may include at least one spring element designed with a progressive spring characteristic, where such a spring element is composed of several spring sub-elements. A spring element can thus be composed of e.g. two compression springs with each their spring characteristic, together forming a progressive spring element. One or more compression springs that are compressed by pulling in one or more extension springs can be applied as well, also resulting in a progressive spring characteristic. Moreover, the invention also concerns the use of springs with a specific spring characteristic and/or shape in respective zones. The shape of e.g. coiled springs can be selected such that the desired characteristics can be achieved, but such a desired spring characteristic may be achieved by other types of springs as well. A spring element can therefore be coiled with diverging diameter and/or pitch, influencing the spring characteristic and the existence of progressivity or not.

**[0028]** A spring element can, as mentioned, be any yielding and elastic element that exhibit the desired properties, and the invention as such therefore does not concern a certain type of spring elements, though it is to be mentioned that coiled springs are traditionally preferred, but elastic ropes and hence all other types of spring elements can be used according to the invention.

**[0029]** The springs applied according to the invention are therefore not normally adjustable with regard to spring force, ensuring that the desired spring characteristic cannot be varied, and thereby that the characteristic of the trampoline cannot be changed except for the changes occurring by wear on the springs during use of the trampoline. This ensures that the spring characteristic peculiar to the springs in the individual zones on the trampoline cannot be changed substantially, and thereby that the above mentioned characteristics for the trampoline are maintained.

## Description of the Drawing

**[0030]** The invention is described in the following with reference to the drawing, wherein:

- Fig. 1 shows a rectangular trampoline with spring elements in zones.  
 Fig. 2 shows a circular trampoline with spring elements in zones.  
 Fig. 3 shows a spring element in a spring housing.  
 Fig. 4 shows a second spring element in a spring housing.

**[0031]** In the explanation of the Figures, identical or corresponding elements will be provided with the same designations in different Figures. Therefore, no explanation of all details will be given in connection with each single Figure/embodiment.

### List of designations:

#### [0032]

- |    |                                 |
|----|---------------------------------|
| 1  | gymnastic appliance/trampoline  |
| 2  | frame                           |
| 3  | trampoline canvas               |
| 4  | spring element                  |
| 5  | side of frame/trampoline canvas |
| 6  | zone                            |
| 7  | compression spring              |
| 8  | spring housing                  |
| 9  | fixing means                    |
| 10 | extension spring                |

### Detailed Description of Embodiments of the Invention

**[0033]** In Fig. 1 appears a gymnastic appliance 1, here in the form of a rectangular trampoline including an external frame 2 and an internal trampoline canvas 3 fixed in the frame 2 by a number of spring elements 4 along the sides 5. In the shown variant of a gymnastic appliance 1 and for illustrating various configurations of zones 6, several configurations are shown in the same Figure, i. e. each side of the trampoline illustrates alternative configurations for trampolines.

**[0034]** By a first possible configuration showing an end side 5', the whole side 5' is provided with spring elements 4' which are different from the spring elements 4 located at the opposing other end side 5. By this configuration, the entire end side 5 and 5' constitute each their zone 6 and 6'. In a second possible configuration, on the first side 5" there is arranged a number of spring elements at the centre, here illustrated by five spring elements 4" with a characteristic different from the other spring elements 4 along this side, meaning that there are two zones 6, namely one at each side of a central zone 6". At the opposing second side 5'" on Fig. is shown a further possible

configuration where there are two zones 6, each with a number of spring elements, here four spring elements 4, and centrally there are seven zones 6"', here shown by different line thicknesses. The line thicknesses illustrate that the central spring element 4"' is the stiffest, and that the stiffness decreases in the laterally arranged spring elements 4". Each spring element 4 on this side 5'" is thus a zone in the central part which is shown here by the parenthesis 6'''.

**[0035]** It is obvious that a gymnastic appliance 1 will probably not be configured in this way, and the Figure is therefore only to be regarded as an illustration showing different options. It is thus the intention with the Figure that each side of the trampoline shows different possibilities for different divisions of zones of the trampoline. A rectangular trampoline 1 will typically be configured identically on two sides/ends 5 opposite each other.

**[0036]** Fig. 2 shows a gymnastic appliance 1 in the form of a circular trampoline where in a frame 2 is mounted a trampoline canvas 3 with a number of spring elements 4. In the shown configuration each spring element 4 is in principle a zone 6 as every other spring element 4 is with a different stiffness/spring characteristic, marked with different line thicknesses, where 6 is one type, while 6' is a spring with a different stiffness/spring characteristic.

**[0037]** In Fig. 3 is seen a spring element 4 including a compression spring 7 in a spring housing 8, where the spring housing 8 has fixing means 9 for fixing on a frame 2 and to a trampoline canvas 3, as shown in Figs. 1 and 2. This variant of a spring element 4 is different from the classic extension springs as one or more compression springs 7 are used which via a pull in the spring housing 8 in direction of the arrow display a progressive spring characteristic. In Fig. 3 this is illustrated by the pitch of the compression spring 7 being different at the two ends. Progressive springs are known from other applications but have hitherto not been used in connection with trampolines.

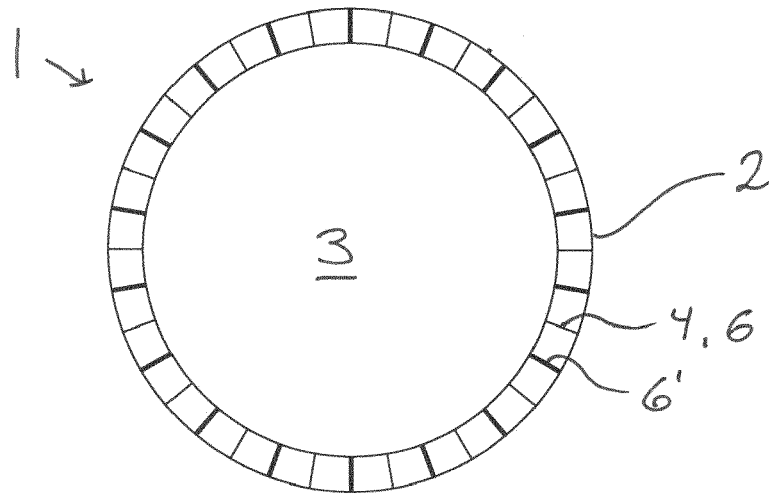
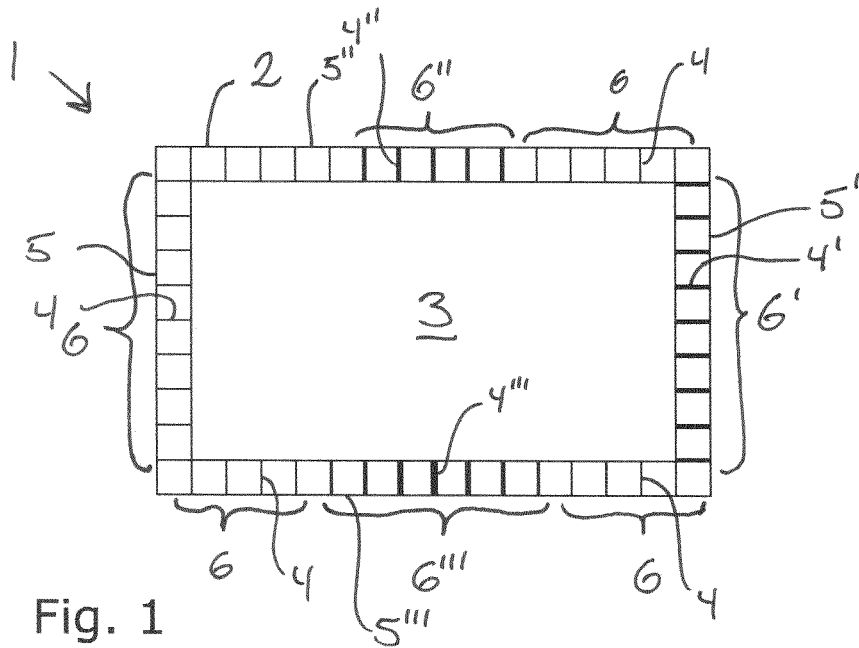
**[0038]** Finally, in Fig. 4 is seen yet a variant of a spring element 4 that includes a compression spring 7 in a spring housing 8. Here is arranged an extension spring 10 between the two fixing means 9, and this extension spring may advantageously be the stiffest of the two springs 7 and 10 as the extension spring 10 is only activated when the compression spring 7 has performed the work for which it is intended. Obviously other configurations are possible as well.

**[0039]** The shown variants of spring elements are coil springs, but other types, including elastomeric springs, gas and pneumatic springs, and any other possible type of spring and combinations thereof may be applied to a gymnastic appliance according to the invention.

### Claims

1. A gymnastic appliance (1) of the type typically used

- in connection with performing jumping, trampoline or tumbling, wherein the gymnastic appliance (1) includes a trampoline canvas with a periphery and a frame around the periphery of the trampoline canvas, wherein the trampoline canvas and the frame are substantially extending in the same plane, and wherein between the periphery and the frame of the trampoline canvas there are arranged a number of spring elements, **characterised in that** the spring elements are arranged in at least two zones, where one zone includes at least one first individual spring element, where the at least one first spring element has one total individual and non-adjustable spring characteristic, and where at least one second zone includes at least one second individual spring element, where the at least one second spring element has at least one second total individual and non-adjustable spring characteristic.
2. A gymnastic appliance according to claim 1, **characterised in that** along part of the periphery the gymnastic appliance includes one type of uniform spring elements with a first spring characteristic, and along a second part of the periphery includes a second type of uniform spring elements with a second spring characteristic.
  3. A gymnastic appliance according to claim 1, **characterised in that** along at least part of the periphery the gymnastic appliance includes at least two different types of spring elements with at least two different spring characteristics, where respective spring elements are arranged mixed and in a regular order.
  4. A gymnastic appliance according to any of claims 1 to 3, **characterised in that** the gymnastic appliance is a trampoline with a trampoline canvas where the trampoline canvas is substantially horizontal when the trampoline stands ready for use.
  5. A gymnastic appliance according to any of claims 1 to 3, **characterised in that** the gymnastic appliance is a trampoline with a trampoline canvas where the trampoline canvas has an inclination in relation to horizontal when the trampoline stands ready for use.
  6. A gymnastic appliance according to any of claims 1 to 5, **characterised in that** the gymnastic appliance has a frame and a trampoline canvas with a generally rectangular shape as seen on the plane in which frame as well as trampoline canvas extend.
  7. A gymnastic appliance according to claim 6, **characterised in that** along one side between frame and trampoline canvas the gymnastic appliance includes one type of spring elements, and at the other three sides between frame and trampoline canvas the gymnastic appliance includes one or more zones with spring elements of at least one second, preferably several other types.
  8. A gymnastic appliance according to any of claims 1 to 5, **characterised in that** the gymnastic appliance has a frame and a trampoline canvas with a generally circular shape as seen on the plane in which frame as well as trampoline canvas extend.
  9. A gymnastic appliance according to any of claims 1 to 8, **characterised in that** the gymnastic appliance includes at least one spring element constructed with at least one extension spring arranged in a spring housing, the spring housing including fixing means for fixation to the frame and to the trampoline canvas, and means for pulling in the at least one compression spring when a tension is applied to the fixing means.
  10. A gymnastic appliance according to any of claims 1 to 8, **characterised in that** the gymnastic appliance includes at least one spring element constructed with at least one compression spring arranged in a spring housing, the spring housing including fixing means for fixation to the frame and to the trampoline canvas, and means for compressing the at least one compression spring when a tension is applied to the fixing means.
  11. A gymnastic appliance according to any of claims 1 to 10, **characterised in that** the gymnastic appliance includes at least one spring element designed with a progressive spring characteristic, where such a spring element is composed of several spring sub-elements.



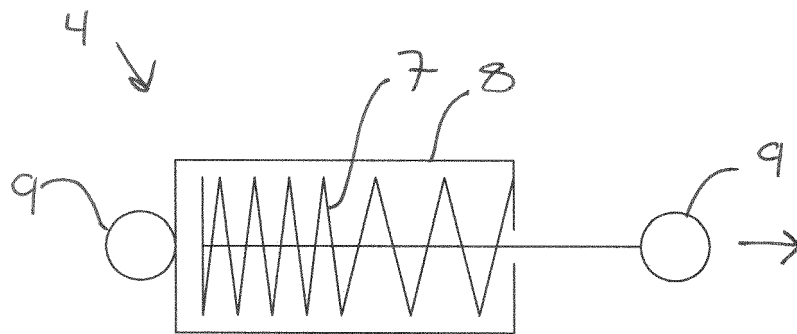


Fig. 3

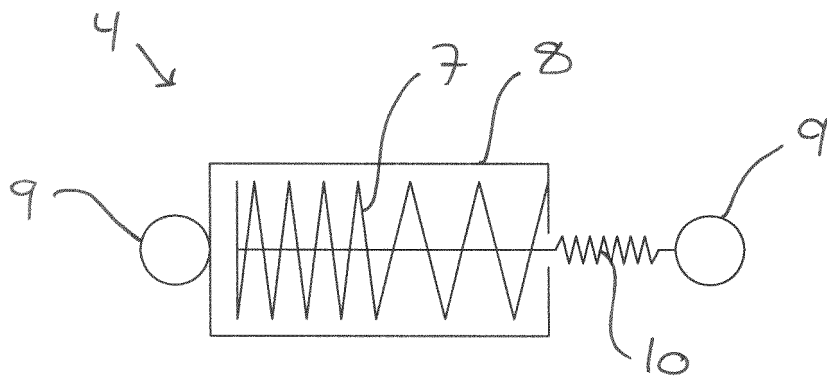


Fig. 4



EUROPEAN SEARCH REPORT

Application Number  
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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 102 26 707 A1 (KUNHARDT PHILIPP VON [DE]; SCHMAUCK HEINZ [DE] BELLICON AG BELLIKON [C] 8 January 2004 (2004-01-08) * paragraphs [0012] - [0026]; figure * *	1-11	INV. A63B5/11 A63B21/02
A	----- KR 101 285 066 B1 (RYU DO SOO [KR]) 17 July 2013 (2013-07-17) * the whole document * -----	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			A63B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 25 March 2015	Examiner Haller, E
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**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 10226707	A1	08-01-2004	NONE
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KR 101285066	B1	17-07-2013	NONE
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