



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
28.10.2020 Bulletin 2020/44

(51) Int Cl.:
A63B 5/11 (2006.01) A63B 71/02 (2006.01)

(21) Application number: **19216486.1**

(22) Date of filing: **16.12.2019**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(71) Applicant: **Highten (Suzhou) Sports Equipment Co., Ltd**
Zhangjiagang City, Jiangsu 215600 (CN)

(72) Inventor: **Zhou, Jie**
Zhangjiagang City, Jiangsu 215600 (CN)

(74) Representative: **Murgitroyd & Company**
Murgitroyd House
165-169 Scotland Street
Glasgow G5 8PL (GB)

(30) Priority: **22.04.2019 CN 201910321590**

(54) **TRAMPOLINE FRAME WITH INTEGRATED SIDE FRAME MEMBERS AND TRAMPOLINE EMPLOYING SUCH FRAME**

(57) A trampoline frame structure includes a side frame (1) and a number of support legs (2). The side frame (1) includes a number of side frame tube sections (10), where each side frame tube section (10) and two support legs (2) are formed integrally into an up-side-down U shaped side frame member (3). Each pair of adjacent side frame members (3) are connected to-

gether by fasteners (2, 4) that connect adjacent support legs (2) of the two side frame members (3), and the multiple side frame member (3) collectively form a closed shape in the top view. The entire trampoline frame can be formed without welding, which simplifies the manufacturing process and accomplishes a trampoline frame having high strength and low manufacturing cost.

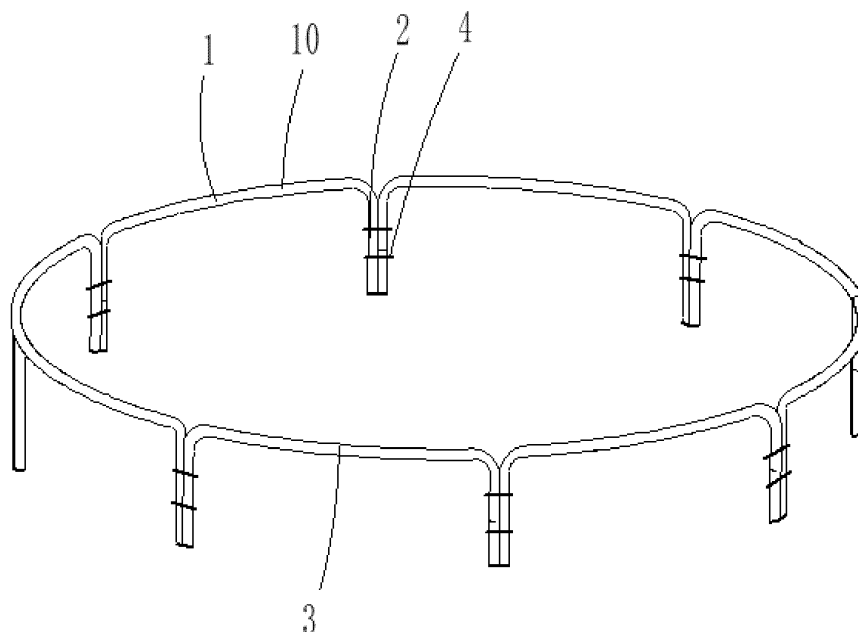


Fig. 1

Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] This invention relates to sports equipment. In particular, it relates to a frame structure of a trampoline.

Description of Related Art

[0002] Conventional trampoline frames typically includes a side frame member and a number of support legs. For example, Chinese patent application CN 201620440766.6 describes a trampoline frame structure where the side frame is directly welded to the support legs. Chinese patent application CN 201710926507.3 describes another trampoline frame structure where the side frame and the support legs are joined together by T-shaped connectors. Each T-shaped connector includes a horizontal tube and a vertical tube joined to each other perpendicularly. T-shaped connectors made of plastic tubes typically have relatively low strength and short life. T-shaped connectors made of metal tubes require welding between the horizontal and vertical tubes. Because trampolines are typically used outdoors, to prevent rusting and corrosion at the welding sites, the welding sites typically needs to be galvanized, which increases the manufacturing process complexity and cost.

SUMMARY

[0003] Accordingly, the present invention is directed to a trampoline frame structure and related manufacturing method that substantially obviates one or more of the problems due to limitations and disadvantages of the related art.

[0004] An object of the present invention is to provide a trampoline frame structure that has high strength and low manufacturing cost.

[0005] To achieve the above objects, the present invention provides a trampoline frame structure, which includes: a side frame; a plurality of support legs; wherein the side frame includes a plurality of side frame tube sections, wherein each side frame tube section and two corresponding support legs are formed integrally into an upside-down U shaped side frame member, and wherein the plurality of upside-down U shaped side frame members are spatially arranged relative to each other in a closed shape in a top view; and a plurality of fasteners, configured to connect adjacent support legs of each pair of adjacent upside-down U shaped side frame members.

[0006] Preferably, the trampoline frame structure further includes a plurality of connecting tubes, each connecting tube being disposed to connect two free ends of the two support legs of one of the upside-down U shaped side frame members.

[0007] Preferably, each connecting tube is formed in-

tegrally with the corresponding upside-down U shaped side frame member.

[0008] Preferably, the side frame tube sections, the support legs, and the connecting tubes are square tubes.

5 **[0009]** Preferably, the side frame tube sections, the support legs, and the connecting tubes are round tubes.

[0010] Preferably, the side frame tube sections, the support legs, and the connecting tubes are D-shaped tubes.

10 **[0011]** Preferably, the plurality of fasteners including a plurality of bolts and a corresponding plurality of nuts.

[0012] Preferably, each side frame tube section has an arc shape in the top view, and wherein the side frame formed by the plurality of side frame tube sections has a circular shape.

15 **[0013]** Preferably, each side frame tube section has a curved shape in the top view, and wherein the side frame formed by the plurality of side frame tube sections has an oval shape.

20 **[0014]** Preferably, each side frame tube section has a straight shape in the top view, and wherein the side frame formed by the plurality of side frame tube sections has a polygonal shape.

25 **[0015]** Compared to conventional technologies, the trampoline frame structures according to embodiments of the present invention have the following advantages: By forming each side frame tube section and two support legs integrally into an upside-down U shaped side frame member, any connecting each pair of adjacent upside-down U shaped side frame members by using nuts and bolts to connect their adjacent support legs, the entire trampoline frame may be formed without welding. This simplifies the manufacturing process, and accomplishes a trampoline frame having high strength and low manufacturing cost.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016]

40 Figure 1 illustrates a trampoline frame structure according to a first embodiment of the present invention.

45 Figure 2 illustrates a side view of two upside-down U shaped frame members joined together in the trampoline frame structure of the first embodiment. Figure 3 illustrates a top view of the two upside-down U shaped frame members joined together in the trampoline frame structure of the first embodiment. Figure 4 illustrates a trampoline frame structure according to a second embodiment of the present invention.

50 Figure 5 illustrates a side view of two closed-loop shaped frame members joined together in the trampoline frame structure of the second embodiment. Figure 6 illustrates a top view of the two closed-loop shaped frame members joined together in the trampoline frame structure of the second embodiment.

Figure 7 illustrates a perspective view of a trampoline frame structure according to a third embodiment of the present invention.

Figure 8 illustrates a top view of the trampoline frame structure of the third embodiment.

Figure 9 illustrates a perspective view of a trampoline frame structure according to a fourth embodiment of the present invention.

Figure 10 illustrates a top view of the trampoline frame structure of the fourth embodiment.

Figures 11 and 12 illustrates two trampolines incorporating the trampoline frame structure of embodiments of the present invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0017] Embodiments of the present invention are described below with reference to the drawings.

First embodiment

[0018] Referring to Figs. 1-3, a trampoline according to a first embodiment of the present invention includes a side frame 1 and a number of support legs 2. The side frame 1 includes a number of side frame tube sections 10. Each side frame tube section 10 and two corresponding support legs 2 are formed integrally into an upside-down U shaped side frame member 3. Each upside-down U shaped side frame member 3 is positioned with the support legs 2 being vertical and the side frame tube section 10 located at the top, and the multiple upside-down U shaped side frame members 3 are spatially arranged relative to each other such that they form a closed shape in the top view. Each pair of adjacent upside-down U shaped side frame members 3 are connected together by connecting their adjacent support legs 2 using nuts and bolts 4, screws, or other suitable fasteners. To connect them, the two adjacent support legs are disposed in parallel to each other and in close proximity (e.g., either in contact with each other, or with a thin spacer in between), and the bolts extend in horizontal directions and pass through the two legs to join them together. In a preferred embodiment, the side frame tube sections 10 and the support legs 2 are round tubes, and washers are used with the nuts and bolts 4. In alternative embodiments, the side frame tube sections 10 and support legs 2 may be square tubes, D-shaped tubes, etc., which may provide more stable connections when two tubes are connected by nuts and bolts 4.

[0019] The side frame tube sections 10 and the support legs 2 are preferably made of steel, but may also be made of aluminum, copper, plastic, or other suitable materials. In this disclosure, "formed integrally" means that the entire structure is one integrated piece instead of different parts welded together or connected together by other means. For example, when an integrally formed piece is formed of metal, it is formed from one piece of metal by

bending, etc.; when an integrally formed piece is formed of plastic, it is formed by one molding process.

[0020] In the illustrated embodiment, each side frame tube section 10 has an arc shape in the top view, and the multiple side frame tube sections 10 collectively form a side frame 1 having a circular shape in the top view. In alternative embodiments, the side frame tube sections 10 may be straight, or have other shapes in the top view, and the side frame 1 may correspondingly have a polygonal, oval, or other shape, depending on practical needs. Preferably, when the side frame 1 is a circular shape in the top view, each pair of connected support legs 2 are arranged so that in the top view, an imaginary line connecting their centers is in the tangential direction of the circle, and each bolt 4 extends in the tangential direction, preferably along the above-mentioned imaginary line. Similarly, for other top-view shapes of the side frame 1, the imaginary line connecting the centers of two connected support legs is in the tangential direction, or in the case of a polygon, in a direction perpendicular to the bisector of the angle between the two sides of the polygon. The bolts extend in the tangential direction, preferably along the above-mentioned imaginary line.

Second embodiment

[0021] Referring to Figs. 4-6, a trampoline according to a second embodiment of the present invention includes a side frame 1 and a number of support legs 12. The side frame 1 includes a number of side frame tube sections 10. Each side frame tube section 10, two corresponding support legs 12, and a corresponding connecting tube 5 are formed integrally into a closed-loop shaped side frame member 6. Each pair of adjacent closed-loop shaped side frame members 6 are connected together by connecting their adjacent support legs 12 with nuts and bolts 4, screws, or other suitable fasteners. Compared to the upside-down U shaped side frame members 3 of the first embodiment, the closed-loop shaped side frame members 6 of the second embodiment allow the trampoline to rest on the ground more stably. In alternative embodiments, the connecting tube 5 is not formed integrally with the corresponding support legs 12 and side frame tube section 10; rather, the support legs 12 and the side frame tube section 10 are formed integrally first, and the connecting tube 5 is then connected to the free ends of the two corresponding support legs 12.

[0022] The side frame tube sections 10, the support legs 12 and the connecting tubes 5 are preferably made of steel, but may also be made of aluminum, copper, plastic, or other suitable materials.

[0023] In a preferred embodiment, the side frame tube sections 10, the support legs 12 and the connecting tubes 5 are round tubes, and washers are used with the nuts and bolts 4. In alternative embodiments, the side frame tube sections 10, the support legs 12 and the connecting tubes 5 may be square tubes, D-shaped tubes, etc.,

which may provide more stable connections when two tubes are connected by nuts and bolts 4.

[0024] Other aspects of the second embodiment are similar to the first embodiment.

Third embodiment

[0025] A trampoline according to a third embodiment of the present invention is shown in Figs. 7 (perspective view) and 8 (top view). The trampoline of this embodiment is similar to that of the first embodiment, except that the two support legs 14 (corresponding to the support legs 2) of each side frame members 15 are bent outwardly at their lower ends 14a, so that the lower ends 14a are located outside of the circle formed by the side frame tube sections 10 in the top view Fig. 8.

Fourth embodiment

[0026] A trampoline according to a fourth embodiment of the present invention is shown in Figs. 9 (perspective view) and 10 (top view). The trampoline of this embodiment is similar to that of the first embodiment, except that the two support legs 16 (corresponding to the support legs 2) of each side frame members 17 are bent in a circumferential direction toward each other at their lower ends 16a, so that the lower ends 16a are located along the circle formed by the side frame tube sections 10 in the top view Fig. 10 (where the lower ends 16a are under the side frame tube sections 10 and not visible).

[0027] In embodiments of the present invention, by integrally forming the side frame tube sections and the support legs into the upside-down U shaped side frame member 3 or the closed-loop shaped side frame member 6 (or its upper part) or the side frame members 15 and 17, the entire trampoline frame may be formed without welding. This simplifies the manufacturing process, and accomplishes a trampoline frame having high strength and low manufacturing cost.

[0028] Fig. 11 illustrates a trampoline which incorporates a side frame of the first embodiment described above, and further includes a plurality of safety net support posts 18 which are affixed to the side frame, and a safety net 19 fastened to the plurality of safety net support posts. In the illustrated embodiment, each safety net support post is affixed to two support legs 2 that are joined together. Similarly, Fig. 12 illustrates another trampoline which incorporates the side frame of the second embodiment. Of course, a trampoline can also incorporate a side frame of the third or fourth embodiment described above.

[0029] It will be apparent to those skilled in the art that various modification and variations can be made in the trampoline frame structure of the present invention without departing from the spirit or scope of the invention. Thus, it is intended that the present invention cover modifications and variations that come within the scope of the appended claims and their equivalents.

Claims

1. A trampoline frame structure, comprising:

- 5 a side frame;
a plurality of support legs;
wherein the side frame includes a plurality of side frame tube sections, wherein each side frame tube section and two corresponding support legs are formed integrally into an upside-down U shaped side frame member, and wherein the plurality of upside-down U shaped side frame members are spatially arranged relative to each other in a closed shape in a top view; and
10 a plurality of fasteners, configured to connect adjacent support legs of each pair of adjacent upside-down U shaped side frame members.
2. The trampoline frame structure of claim 1, further comprising a plurality of connecting tubes, each connecting tube being disposed to connect two free ends of the two support legs of one of the upside-down U shaped side frame members.
- 25 3. The trampoline frame structure of claim 2, wherein each connecting tube is formed integrally with the corresponding upside-down U shaped side frame member.
- 30 4. The trampoline frame structure of claim 2, wherein the side frame tube sections, the support legs, and the connecting tubes are square tubes.
- 35 5. The trampoline frame structure of claim 2, wherein the side frame tube sections, the support legs, and the connecting tubes are round tubes.
6. The trampoline frame structure of claim 2, wherein the side frame tube sections, the support legs, and the connecting tubes are D-shaped tubes.
- 40 7. The trampoline frame structure of claim 1, wherein the plurality of fasteners including a plurality of bolts and a corresponding plurality of nuts.
- 45 8. The trampoline frame structure of claim 1, wherein each side frame tube section has an arc shape in the top view, and wherein the side frame formed by the plurality of side frame tube sections has a circular shape.
- 50 9. The trampoline frame structure of claim 1, wherein each side frame tube section has a curved shape in the top view, and wherein the side frame formed by the plurality of side frame tube sections has an oval shape.
- 55 10. The trampoline frame structure of claim 1, wherein

each side frame tube section has a straight shape in the top view, and wherein the side frame formed by the plurality of side frame tube sections has a polygonal shape.

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11. The trampoline frame structure of claim 1, wherein each support leg is bent outwardly at its lower end.

12. The trampoline frame structure of claim 1, wherein the two support leg of each side frame member are bent in a circumferential direction toward each other at their lower ends.

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13. A trampoline, comprising:

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the trampoline frame structure of claim 1;
a plurality of safety net support posts affixed to the side frame structure; and
a safety net fastened to the plurality of safety net support posts.

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14. The trampoline of claim 13, wherein each safety net support post is affixed to two adjacent support legs that are joined together.

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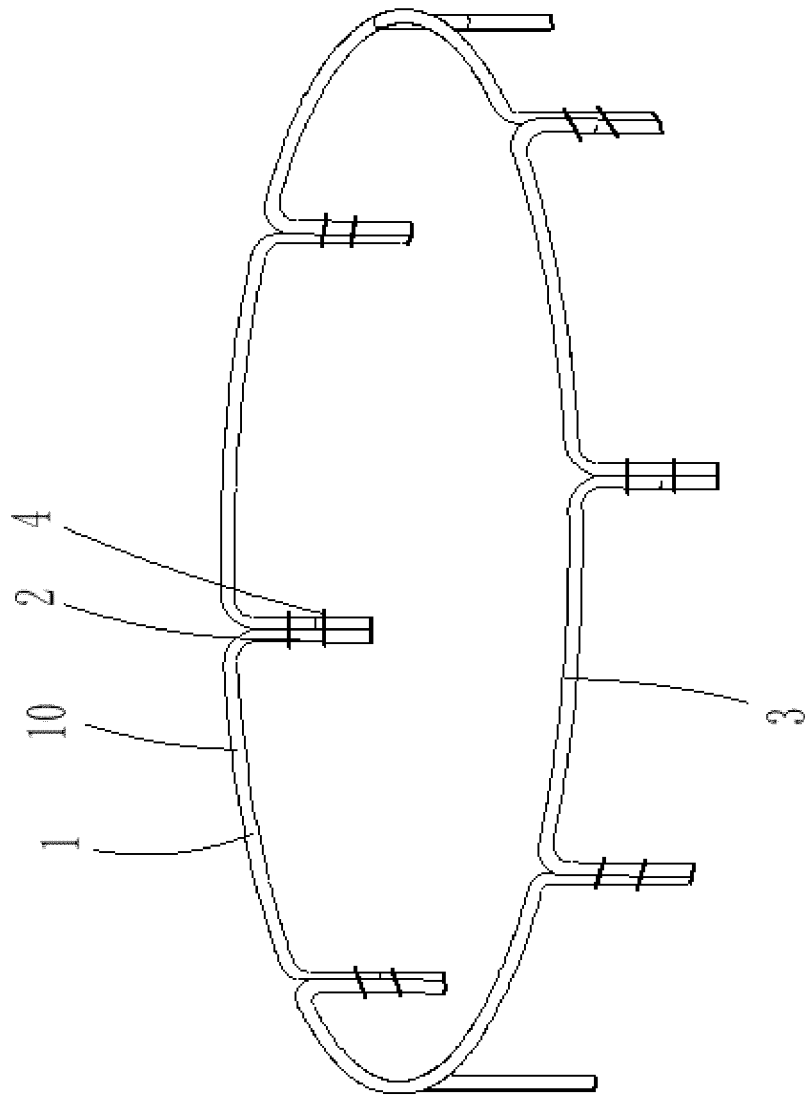


Fig. 1

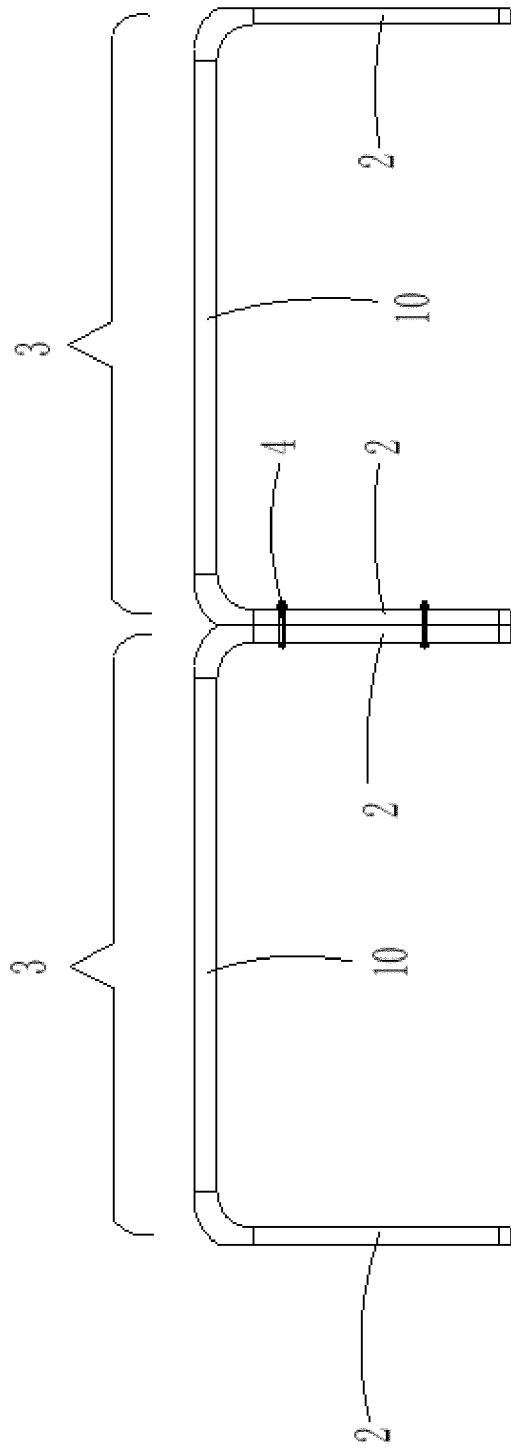


Fig. 2

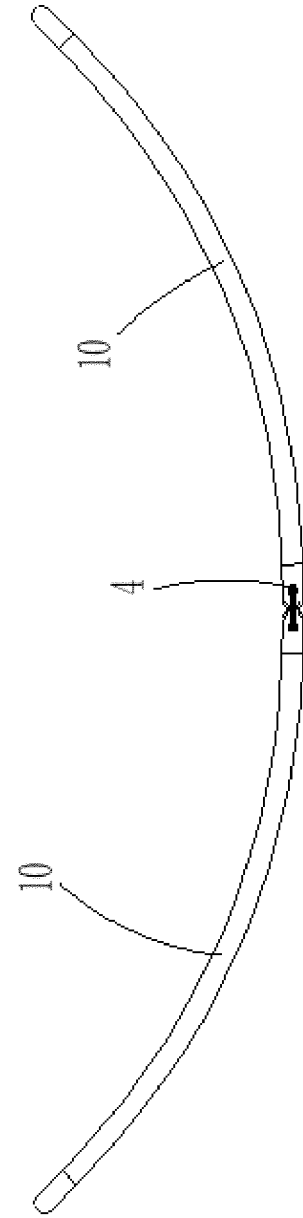


Fig. 3

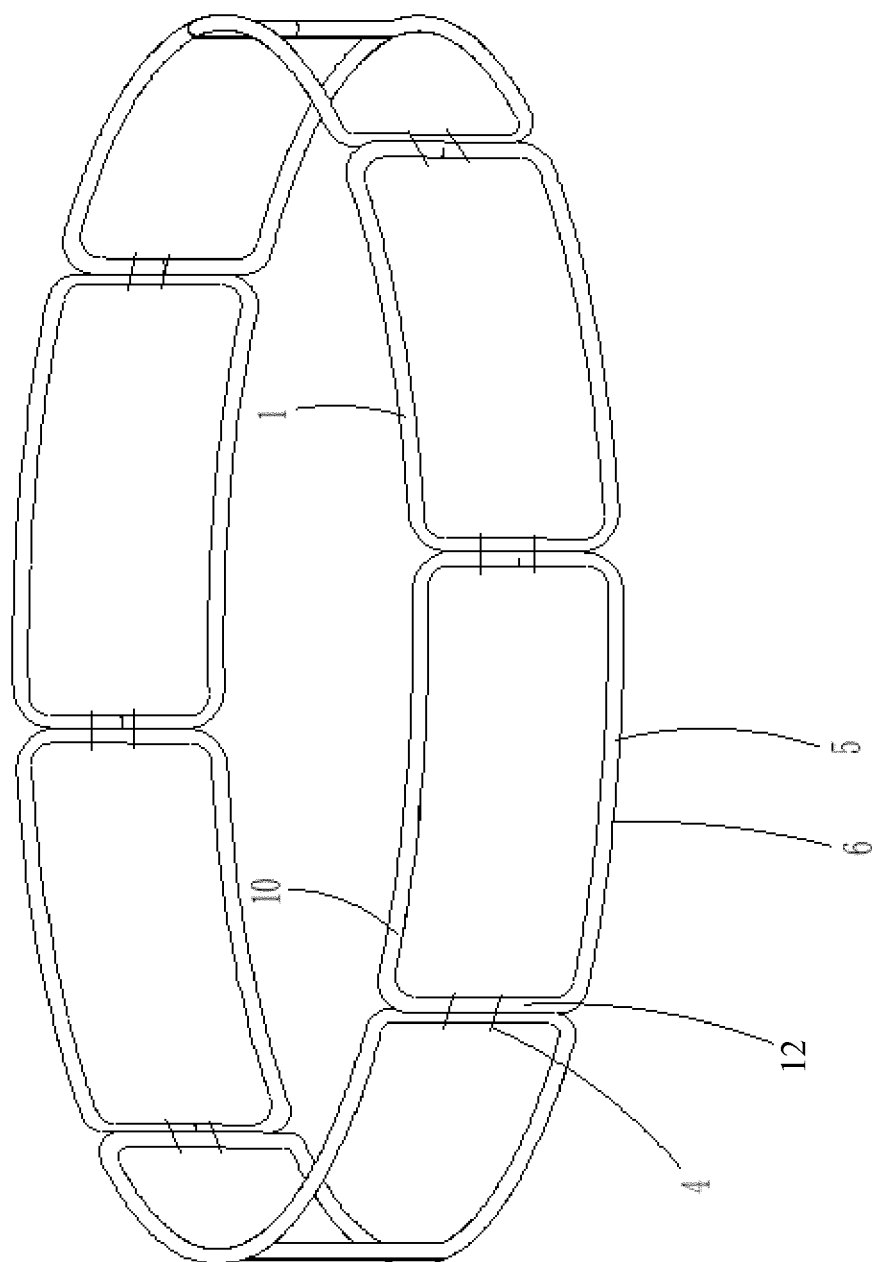


Fig. 4

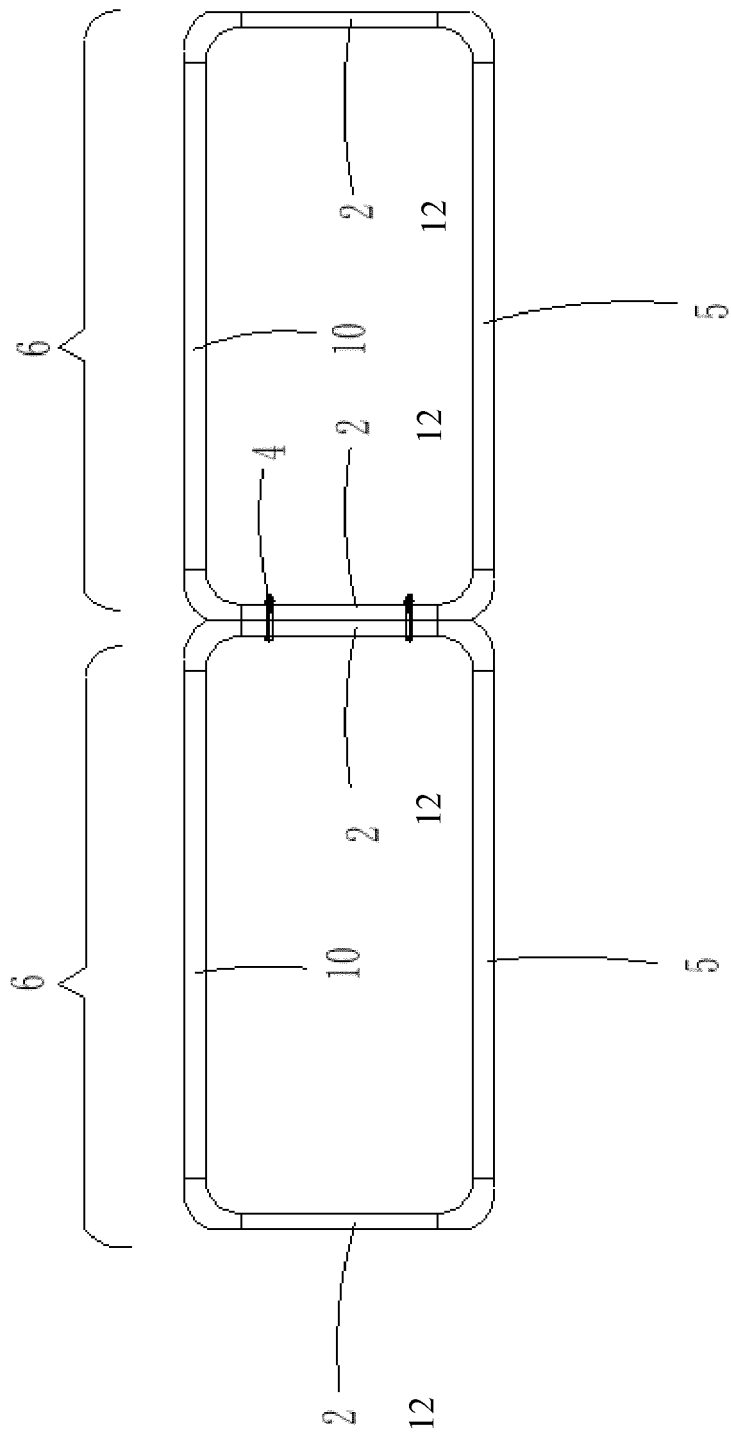


Fig. 5

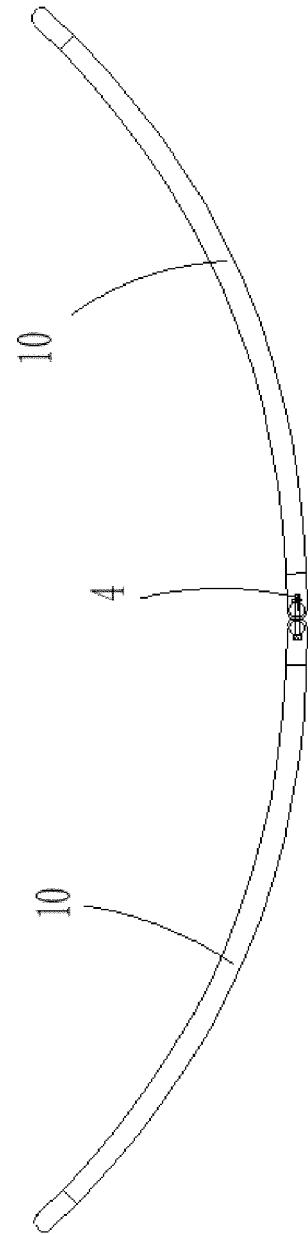


Fig. 6

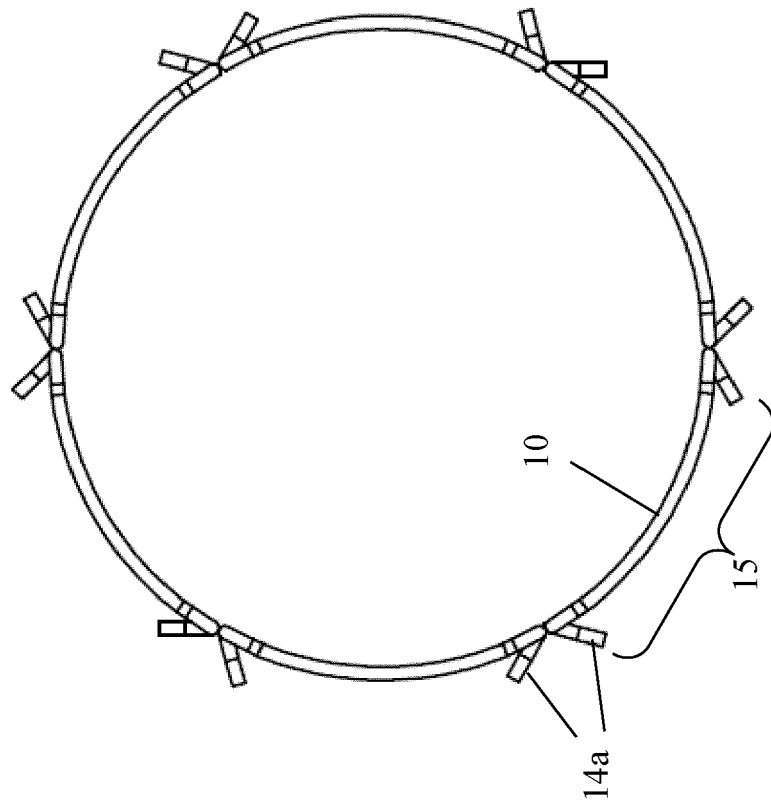


Fig. 8

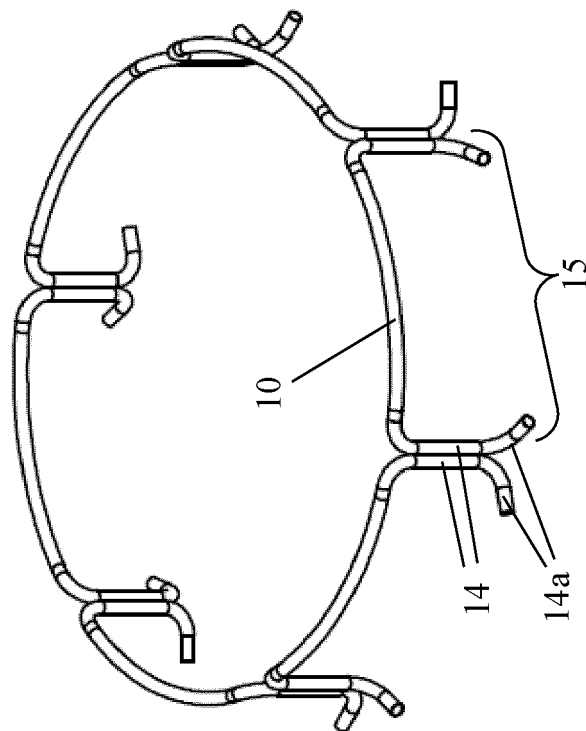


Fig. 7

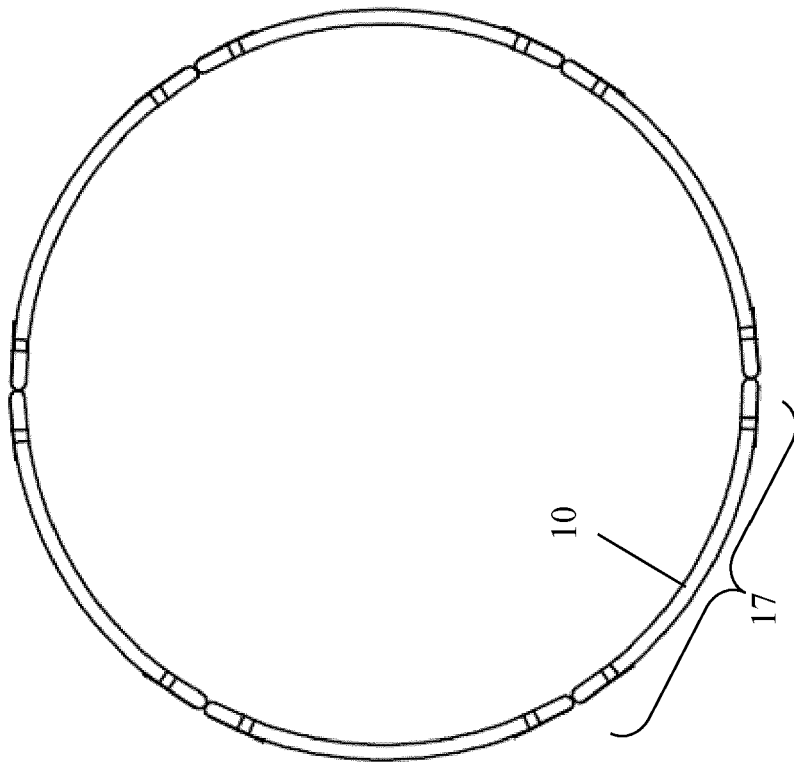


Fig. 10

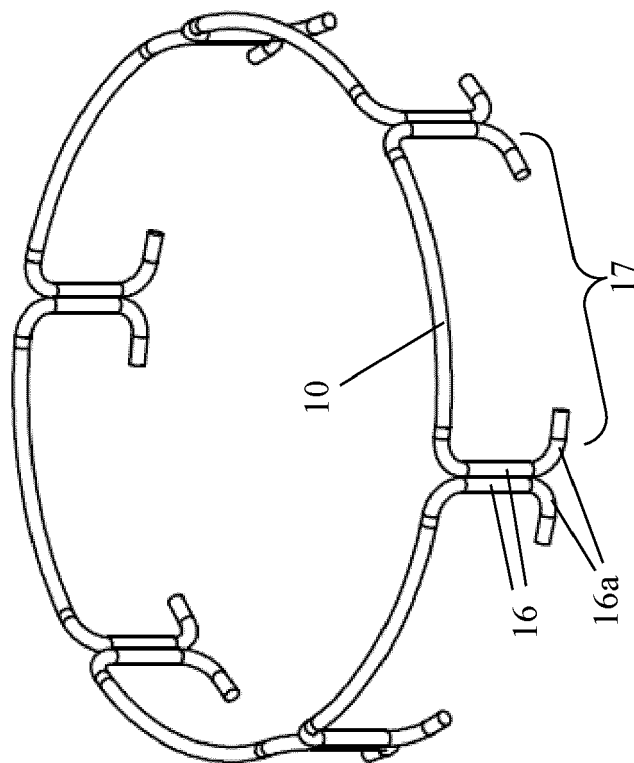


Fig. 9

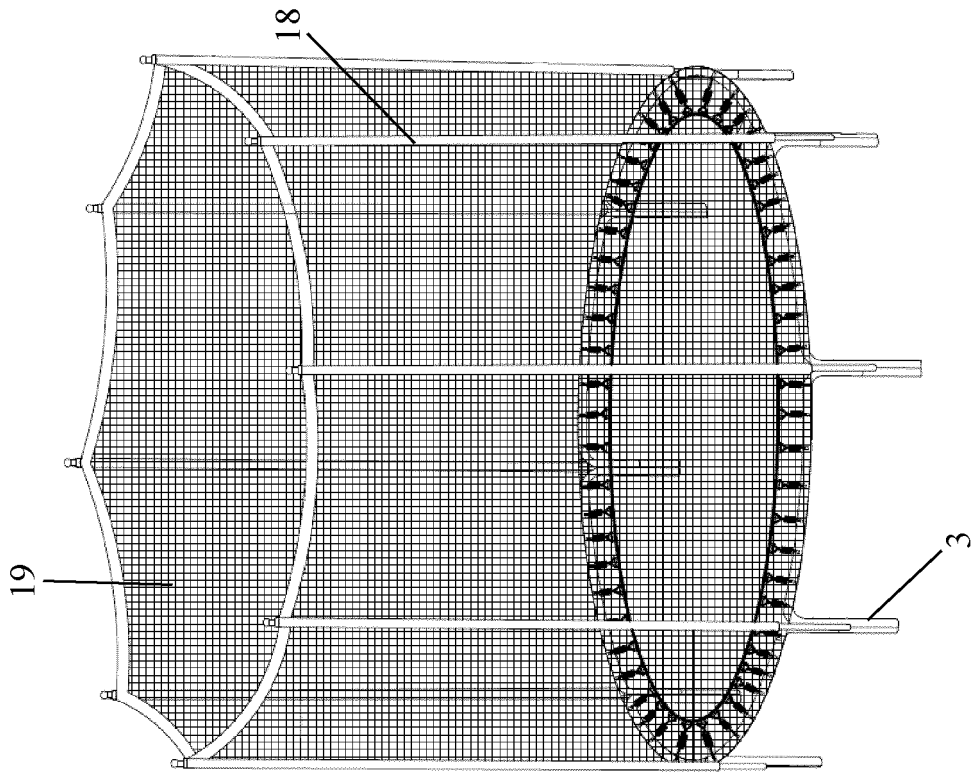


Fig. 12

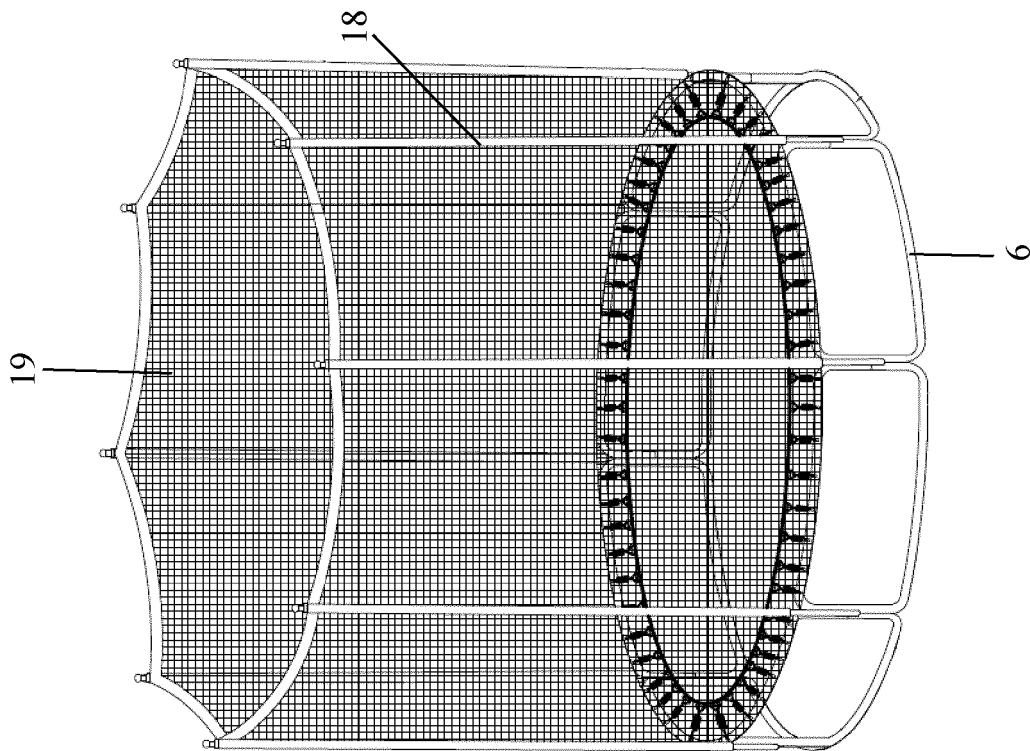


Fig. 11



EUROPEAN SEARCH REPORT

Application Number
EP 19 21 6486

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 5 June 2020	Examiner Vesin, Stéphane
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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REFERENCES CITED IN THE DESCRIPTION

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