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(54) A METHOD FOR MANUFACTURING MATTRESSES FOR SPORTS USES

(57) The present invention refers to a method for the manufacturing of double-layer polyvinylchloride (PVC) mattresses, where the lower and the upper layer are bound to each other by spacing filaments. The mattresses of the present invention are particularly suitable for uses as sporting fixtures for gymnastics.

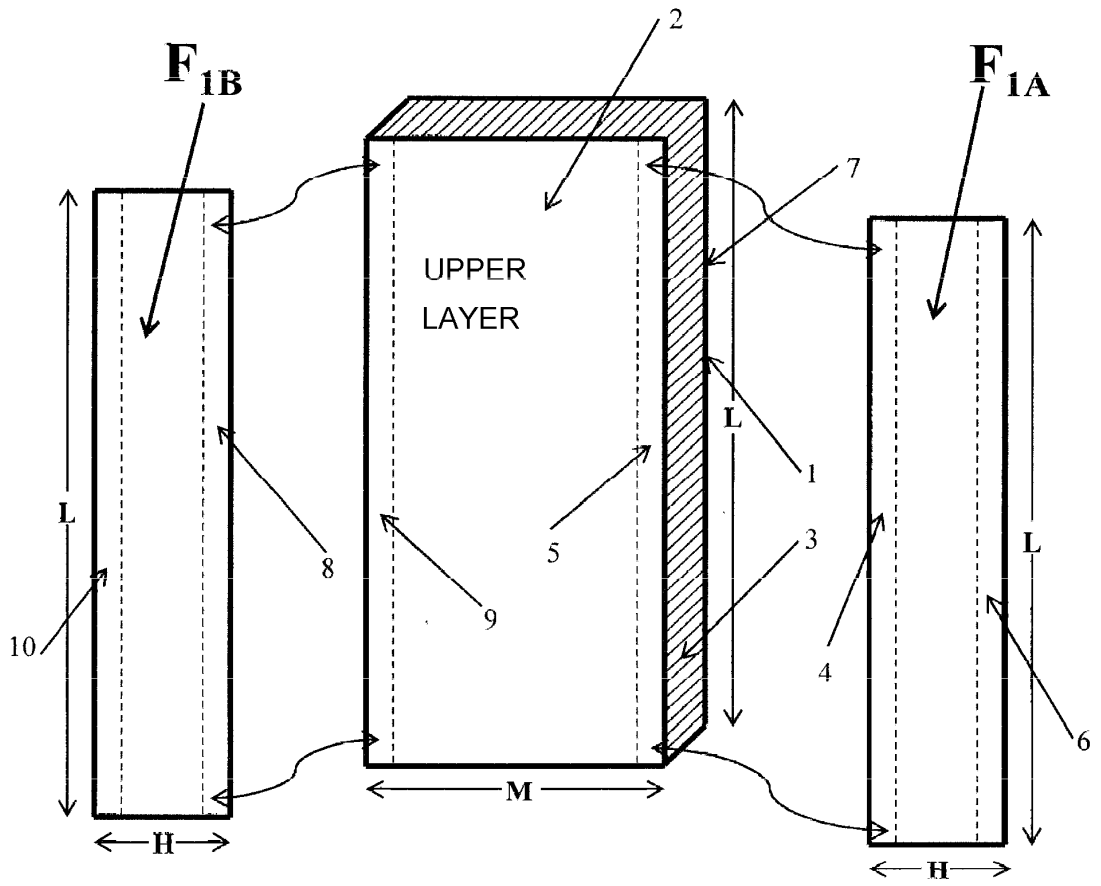

FIG. 2

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Description

[0001] The present invention refers to an innovative method for the manufacturing of inflatable mattresses for sporting uses. Specifically, the invention refers to a method for the manufacturing of double-layer polyvinylchloride (PVC) mattresses, where the lower and the upper layer are bound to each other by spacing filaments. The mattresses of the present invention are particularly suitable for uses as sporting fixtures for gymnastics.

[0002] The use of small mattresses or foam rubber mats for sport training exercises of various kinds in gymnasiums is already known. "Air foam" or "sponge rubber" is a general term for commonly describing elastic expanded polyurethane, a spongy material derived from polymerizing toluene diisocyanate, a petroleum derivative.

[0003] The sponge mattresses must, depending on their destination of use, have various dimensions and densities. As regards the mats employed in various kinds of gymnastics, they must, apart from different sizes, also possess varying elasticity, depending on whether they're used for dampening a fall or acquiring a pushing action and impulse. In this specific usage, the foam rubber mattresses present the great disadvantage of being cumbersome and poorly flexible, with the consequence of being poorly suitable for manually moving about after their use.

[0004] In order to pursue gymnastic activities in general, including such of an artistic or acrobatic nature, the usage of inflatable mattresses made of layers of polyvinyl (PVC) material are likewise already known. Specifically, double-layer tissues made of PVC (HEYTex®) have proved to be particularly suited for the manufacturing of inflatable mattresses for sporting uses.

[0005] The HEYTex® double layer tissue is a tridimensional structure composed of two PVC layers bound to each other by numerous spacing filaments. Because each spacing filament has the same length, they define the maximum distance between the two upper and lower base tissues. The spacing filaments thus produce a stable tridimensional bond between the two PVC layers. The resulting hollow space between the two base layers may be filled with compressed air, so as to obtain the desired elasticity of the tridimensional structure formed by the two PVC layers, and consequently a more or less rigid final mattress.

[0006] One known art for achieving an inflatable mattress from a double layer HEYTex® tissue consists in gluing together the outer flaps of the upper and lower tissue layer, while utilizing for their bonding a single junction band of a length equaling the entire outer rim of the two base layers. This junction band is glued onto the entire perimeter of the double layer PVC tissue, and a subsequent introduction of compressed air into the structure allows obtaining a mattress suitable for sporting uses.

[0007] A drawback of the abovementioned art derives from the fact that the simple seamless gluing of the junction band to the outer flaps of the double layer HEYTex® tissue leads to obtaining a mattress that turns out to be not particularly resistant to impacts and stresses in the event of its use as a sporting mattress for gymnastics. In this case, especially as regards the short side of the mattress representing the most critical area and in case of violent impacts, the gluing technique described above may not guarantee the resistance of the tridimensional structure.

[0008] Another drawback related to the method of manufacturing the mattresses for sporting uses described above resides in the fact that after a certain period of usage the rims of the mattress may break up because of the wearing out of the gluing bond between the various parts the mattress.

[0009] The aim of the present invention is to solve the mentioned drawbacks of the known art, by making available a method for manufacturing a mattress for sporting uses based on a high-frequency welding technique between the various parts constituting the mattress.

[0010] The mattress achieved by the innovative method of the present invention turns out to be easy transported manually and endowed of a greater elasticity and resistance on its short side, which is the area most subject to external stresses.

[0011] The abovementioned and other advantages of the invention, as will be revealed in the following part of the description, are achieved by a method as described in claim 1. Embodiments and non-trivial variants of the present invention form the object of the subordinate claims. It is understood that all the enclosed claims form an integral part of the present description.

[0012] A first object of the present invention is thus a method for manufacturing mattresses for sporting uses based on a double-layer polyvinylchloride (PVC) tissue, where said tissue comprises a lower and an upper layer bound to each other by spacing filaments of a height H, comprising the following phases:

1) Manufacturing the rims of a mattress on each side L by using two junction bands F1, where said junction bands F1 are bonded to each other by welding to the upper and lower flaps of each side of the length L of the mentioned double-layer tissue;

2) Manufacturing the rims of the mattress on each short side M by using two junction bands F2, where said junction bands F2 are ring-welded to each lower and upper flap of each short side M of said double-layer tissue;

3) Closing the junction rings obtained in phase 2) by welding the lower flap to the upper flap of each short side M.

[0013] The method for manufacturing mattresses of the present invention turns out to be easily applied and allows obtaining inflatable mattresses for sporting uses. Depending on the pressure of the air inserted into the structure by a valve, the rigidity of the mattress itself and

consequently its possible destination of use can be determined and regulated.

[0014] The method for manufacturing mattresses of the present invention is made by starting from a double-layer tissue made of PVC (polyvinylchloride) and comprises 3 successive phases.

[0015] In the first phase outlined above, the outer rims of the mattress on each long side L are manufactured by using two junction bands F1, which preferably have a length equal to the long side L of the original double layered tissue, and a width equal to the height H of the spacing filaments connecting the upper layer to the lower PVC layer.

[0016] In the subsequent phase 2, the outer rims of the mattress on each short side M are manufactured by using two junction bands F2, which are ring-welded to the upper and lower flaps of each short side M of the PVC tissue. The junction bands F2 are designed to achieve a junction ring on each short side M of the double layered tissue, and preferably have a length equivalent to the sum 2M+2H, where M is the length of the short side of said double layered tissue, while H is the height of the spacing filaments connecting the upper to the lower layer.

[0017] As will be described in the following embodiment of the invention, before proceeding to the welding both during the phase 1) relating to the long side L as well as during the phase 2) relating to the short side, it is preferable to eliminate the excess spacing filaments present along the rims of the upper and lower layers of the double-layer tissue. Moreover, in order to avoid the welding of the spacing filaments, the welds of both phases 1) and 2) are preferably made by employing an aluminum bar inserted between the flap of the lower and of the upper layer during the welding process.

[0018] The welding of the phases 1) and 2) described above is preferably made by using a high frequency welding machine with an electrode of 2 cm thickness.

[0019] In the subsequent phase 3) of the method for manufacturing mattresses according to the invention, the two junction rings achieved along the short sides M during the phase 2) are closed by welding the lower flap to the upper flap of each short side M. This weld is preferably performed by using a hot-air blower and a roller.

[0020] Following the phase 3, a reinforcing band F_R is preferably applied over the entire length M of each short side, so as to protect the welds described in the phases 2) and 3) and the corners of the mattress thus produced. This reinforcing band is preferably applied by using a roller and a hot air blower.

[0021] The method for manufacturing mattresses of the invention comprises welding techniques of a type unable to damage or alter the structure of the internal filaments of the double-layer PVC tissue. A further advantage of the manufacturing method described derives from the fact that 3 welds are effected along each of the short sides of the mattress, two of which are derived from the phases 2) and 3) of the method described, while a third reinforcing weld along the short side is performed after phase 3), by attaching a reinforcing band F_R over the entire length M.

[0022] Compared to the mattresses of the known art obtained by simple gluing without any welding of the junction bands on the outer rims of the HEYTex® tissue, the mattresses of the present invention offer a better resistance against stresses and impacts on both sides of the mattress.

[0023] By inserting an air inlet valve and a blower, the mattress of the present invention can be rapidly inflated and after its usage deflated and folded up upon itself; the mattress manufactured by using the method of the invention thus proves to be easily handled and transported to the location where mattresses are stored after their usage.

[0024] A second object of the present invention is a double-layer polyvinylchloride (PVC) mattress comprising a lower layer and an upper layer bound to each other by spacing filaments, characterized in that the outer rims of said mattress are manufactured by the method comprising the phases 1), 2) and 3) described above.

[0025] The mattress manufactured by the method of the invention turns out to be particularly suitable for sporting uses, especially as a sporting fixture for gymnastics. A further object of the present application is consequently the use the mattress obtained by the method of the invention as a sports fixture for gymnastics.

[0026] It will be immediately obvious that countless variants and modifications may be applied to this description (referring, for instance, to the form, dimensions, layout and parts having equivalent functions), without abandoning the realm of protection of the invention, at it appears in the enclosed claims.

[0027] The present invention will be better described by a few preferred embodiments, provided for exemplifying and no-limiting purposes, with reference to the enclosed drawings in which:

- Fig. 1 shows a perspective view of a double-layer polyvinylchloride HEYTex® tissue;
- Fig. 2 pertains to the phase 1) of the method of the invention, by which two junction bands F1 are welded onto both long sides of the double-layer HEYTex® tissue;
- Fig. 3 pertains to the phase 2) of the method of the invention, by which the junction bands F2 are ring-welded to each upper and lower flap of each short side M of the double-layer tissue M;
- Fig. 4 describes the junction ring obtained in the previous phase 2), and shows the junction band F2 that surrounds the short side M of the double layered tissue in a ring type fashion;
- Fig. 5 shows the closing of the junction ring made by welding the lower flap to the upper flap (phase 3) and the subsequent inserting of a reinforcing band F_R applied over the entire length of the short side.

[0028] The Fig. 1 shows a perspective view of a double-

layer PVC HEYTex® tissue used as a starting material for realizing the method of the invention. Said tissue has a tridimensional structure composed of a lower layer 1 and an upper layer 2, both made of PVC and bound to each other by numerous spacing filaments 3. The spacing filaments have the same length H, thus defining the maximum distance between the two lower layers 1 and upper layers 2 of the tissue shown in Fig. 1. The double-layer tissue has a greater side of length L and a smaller side of length M.

[0029] The Fig. 2 describes the phase 1 of the method claimed, wherein two junction bands F_{1A} and F_{1B} are both welded along the long sides L of the double-layer HEYTex® tissue. This manufactures the outer rims of the mattress on each long side L of both the upper layer 2 and the lower layer 1 of the tissue. The two junction bands F_{1A} and F_{1B} have a length equal to the long side L of the double-layer tissue, and a width equal to the height H of the spacing filaments 3.

[0030] With reference to Fig. 2, the rectangular welding area 4 on the band F_{1A} is coupled and welded to the welding area 5 present on the right flap of the upper layer 2, while the rectangular welding area 6 on the right of the band F_{1A} is coupled and welded to the lower left flap 7 of the lower layer 1. In a similar manner, the rectangular welding area 8 on the band F_{1B} is coupled and welded to the welding area 9 present on the left flap of the upper layer 2, while the welding area 10 on the left part of the band F_{1B} is coupled and welded to the left lower flap of the lower band 1. By these welds the outer rims of the future mattress along its greater side L are achieved.

[0031] The Fig. 3 describes the phase 2 of the method claimed, wherein the outer rims of the mattress on each short side M are manufactured by using two junction bands F2. Figure 3 shows, for exemplifying purposes, the welding of a band F2 on the short side M of the double-layer tissue. The band F2 is ring-welded to the lower flap 11 and to the upper flap 12 of the short side M of the PVC tissue.

[0032] As shown in Fig. 3, the junction band F2 has a length equal to the sum 2M+2H, where M is the length of the short side of the double-layer tissue, while H is the height of the spacing filaments 3 that connect the upper layer 1 with the lower layer 2. The rectangular welding area 13 on the left side of the band F2 is coupled and welded along the entire outer perimeter of the short side M, as can be intuited from the double arrows shown in Fig. 3. These arrows indicate the superimposing and welding sequence between the first portion of the welding area 13 with the lower flap 11, and the subsequent superimposing and welding sequence between the second portion of the welding area 13 with the upper flap 12 of the PVC tissue.

[0033] The Fig. 4 shows the junction ring 14 obtained in the former phase 2, meaning by the welding of the band F2 to the lower flap 11 and the upper flap 12 of the short side M of the double-layer tissue. The junction ring 14 surrounds the entire outer perimeter of the short side M and extends from the lower flap 11 and the upper flap of the double-layer tissue.

[0034] The Fig. 5 shows the short side M of the double-layer tissue once the junction ring 14 shown in Fig. 4 is closed by welding, while joining the lower flap to the upper flap 12. The Fig. 5 also shows a reinforcing band F_R which is, after closing the junction ring 14, applied over the entire length M of each short side of the double-layer tissue. The reinforcing band F_R serves to protect the welds described in the phase 2) and 3) of the method of the invention, and serves moreover to protect the corners 15 of the mattress thus obtained.

[0035] Further advantages and features of the method of the present invention will become evident from the following example of embodiment, which has a simply illustrative and non-limiting meaning for the scope of the method claimed.

EXAMPLE

[0036] The method of the invention is used for manufacturing a mattress for sporting uses, based on a double-layer PVC HEYTex® tissue having a length of 808 cm, a width of 140 cm and a height of 20 cm.

EQUIPMENT

[0037]

- High frequency "C" type welding machine heated from above by an electrode of 2 cm thickness and 100 cm length;
- Hot air and roller welding machine;
- Compressor for inflating the mattress;
- MEHLER PVC tissue for the junction bands F1, F2 and FR used for creating the mattress rims.

PRELIMINARY PHASE

[0038] A double layered HEYTex® tissue available on the market and having the dimensions mentioned above is cut into two parts at about half of its length. The two pieces of double-layer tissue thus obtained (404 cm x 140 cm) are subsequently united by welding them along their long side L. The welds are made by superimposing the upper flap of the first piece of tissue on the second piece over a welding area of 2 cm (thickness of the electrode) and employing a MEHLER tissue band of a length of 404 cm and a width of 4 cm for welding. The same operation is performed for welding the lower flaps of the 2 pieces of double-layer tissue, while always employing a MEHLER tissue band of 404 cm x 4 cm for the welding.

[0039] The welding operation outlined above thus achieves a double-layer PVC tissue having the dimensions of 404 cm x 280 cm.

PHASE 1)

[0040] With reference to Fig. 2, the outer rims of the mattress are manufactured on each long side L of the double-layer tissue L. Two junction bands F_{1A} and F_{1B} are used for this purpose, which are welded along both long sides of the double-layer tissue L. The two junction bands F_{1A} and F_{1B} have a length equal to the long side L (404 cm) and a width equal to the height H (20 cm) of the spacing filaments connecting the upper layer with the lower layer of the HEYTex® tissue.

[0041] Before proceeding to the welding, the excess spacing filaments present along the rims of the two lower and upper layers of the HEYTex® tissue are eliminated. Moreover, in order to avoid the welding of the spacing filaments, the welding is realized by employing an aluminum bar, which is inserted between the flap of the lower layer and that of the upper layer during the welding process. A high frequency welding machine with an electrode of 2 cm thickness is used to weld the junction bands F_{1A} and F_{1B} to the flaps of the double-layer tissue.

[0042] With reference to Fig. 2, the rectangular welding area 4 on the band F_{1A} is coupled and welded to the welding area 5 present on the right flap of the upper layer 2, while the rectangular welding area 6 on the right part of the band F_{1A} is coupled and welded to the right lower flap 7 of the lower layer 1. This similarly occurs with the welding areas 8 and 10 on the junction band F_{1B}, which are welded to the flaps of the double-layer tissue on its right side, as shown in Fig. 2.

PHASE 2)

[0043] With reference to Fig. 3, the outer rims of the mattress are manufactured on each short side M of the double-layered tissue. Two junction bands F2 are used for this purpose. Each band F2 is ring-welded to the lower flap 11 and to the upper flap 12 of the short side M of the PVC tissue. A junction band F2 with a length of 600 cm (2M+2H) and a width of 14 cm is used for this purpose.

[0044] Even in this phase 2) of the method of the invention, before proceeding to the welding the excess spacing filaments present along the rims of the two lower and upper layers of the HEYTex® tissue. Moreover, the welding is made by employing an aluminum bar, which is inserted between the flap of the lower and the upper layer during the welding process.

[0045] In this manner, the rectangular welding area 13 on the left side of the band F2 is coupled and welded on the entire outer perimeter of the short side M, as can be intuited from the double arrows shown in Fig. 3. At the end of the welding, a double junction ring is obtained as shown in Fig. 4, which surrounds the entire outer perimeter of the short side M and extends from the lower flap 11 and the upper flap 12 of the double-layer tissue.

PHASE 3)

[0046] In this phase, the two junction rings obtained along the short sides M during the phase 2) are closed by welding the lower flap to the upper flap of each short side M. This weld is performed by using a hot air blower and a roller. With reference to Fig. 5, the junction ring 14 is closed by welding, while uniting the lower flap 11 with the upper flap 12.

[0047] Once the junction ring 14 is closed, the inflating of the mattress thus obtained is initiated. After inflating the mattress, a reinforcing band F_R is applied to each short side of the mattress by using a hot air blower. This band serves to protect the former welds made on the short side and on the corners of the mattress obtained.

Claims

1. A method for manufacturing mattresses for sports uses, based on a double-layer tissue made of polyvinyl chloride (PVC), said tissue comprising a lower and an upper layer connected to each other by spacing filaments of a height H, said method comprising the following phases:

   1) Manufacturing the mattress borders on the long side L by using two joining strips F1, where said joining strips F1 are joined by bonding them to the lower and upper edges of each side along the length L of said double-layer tissue;
   2) Manufacturing the mattress borders on the short side M by using two joining strips F2, where said joining strips F2 are bonded in a ringshaped fashion to each lower and upper edge of each short side M of said double-layer tissue;
   3) Closing the joining rings obtained in phase 2) by bonding the lower edge to the upper edge of each short side M.

2. The method, according to claim 1, wherein said joining strips F1 have a length equal to the long side L of the double-layer tissue, and a width equal to the height H of said spacing filaments.

3. The method, according to claim 1, wherein said joining strips F2 have a length equal to the sum of 2M+2H, where M is the length of the short side of said double-layer tissue, while H is the height of said spacing filaments.

4. The method, according to claims 1-3, wherein prior to initiating the bonding both in the phase 1) bearing on the long side L and in the phase 2) bearing on the short side M, the spacing filaments present in excess along the edges of the upper and lower layers of said tissue are eliminated.

5. The method, according to claims 1-4, wherein the bonding in both the mentioned phases 1) and 2) are made by employing an aluminium bar, said aluminium bar being introduced, during the bonding step, between the edge of the lower layer and that of the upper layer of said tissue.

6. The method, according to claim 1, wherein the bonding of the mentioned phases 1) and 2) is made by using a high frequency bonding machine with an electrode of 2 cm thickness.

7. The method, according to claim 1, wherein the bonding of phase 3) is made by using a roller and a hot air blower.

8. The method, according to claim 1, wherein after phase 3) a reinforcing strip F_R is applied over the full length M of each short side.

9. The method, according to claim 8, wherein said reinforcing strip F_R is applied by using a roller and a hot air blower.

10. A mattress made of a double layer of polyvinyl chloride PVC, comprising a lower layer and an upper layer connected to each other by spacing filaments, **characterized in that** the outer edges of said mattress are manufactured by a method according to claims 1-9.

11. A usage of the mattress according to claim 10 as an item of sports equipment for gymnastics.

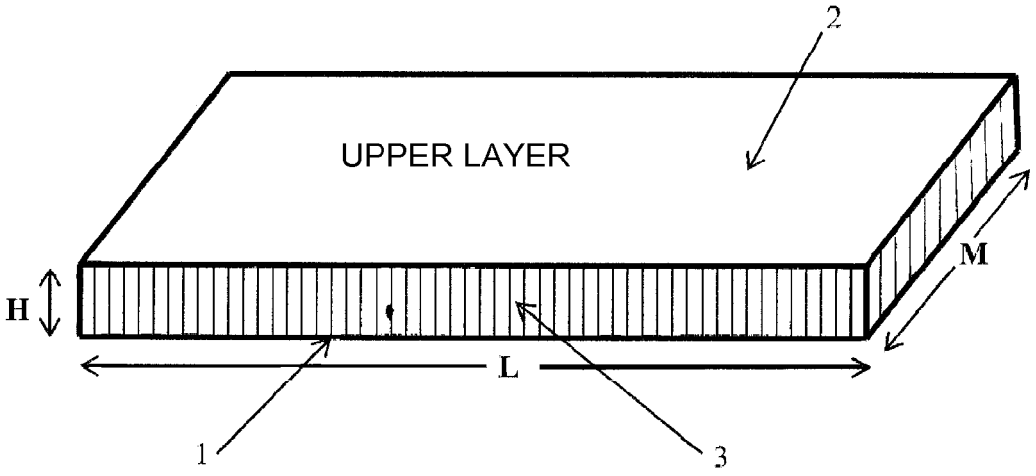

FIG. 1

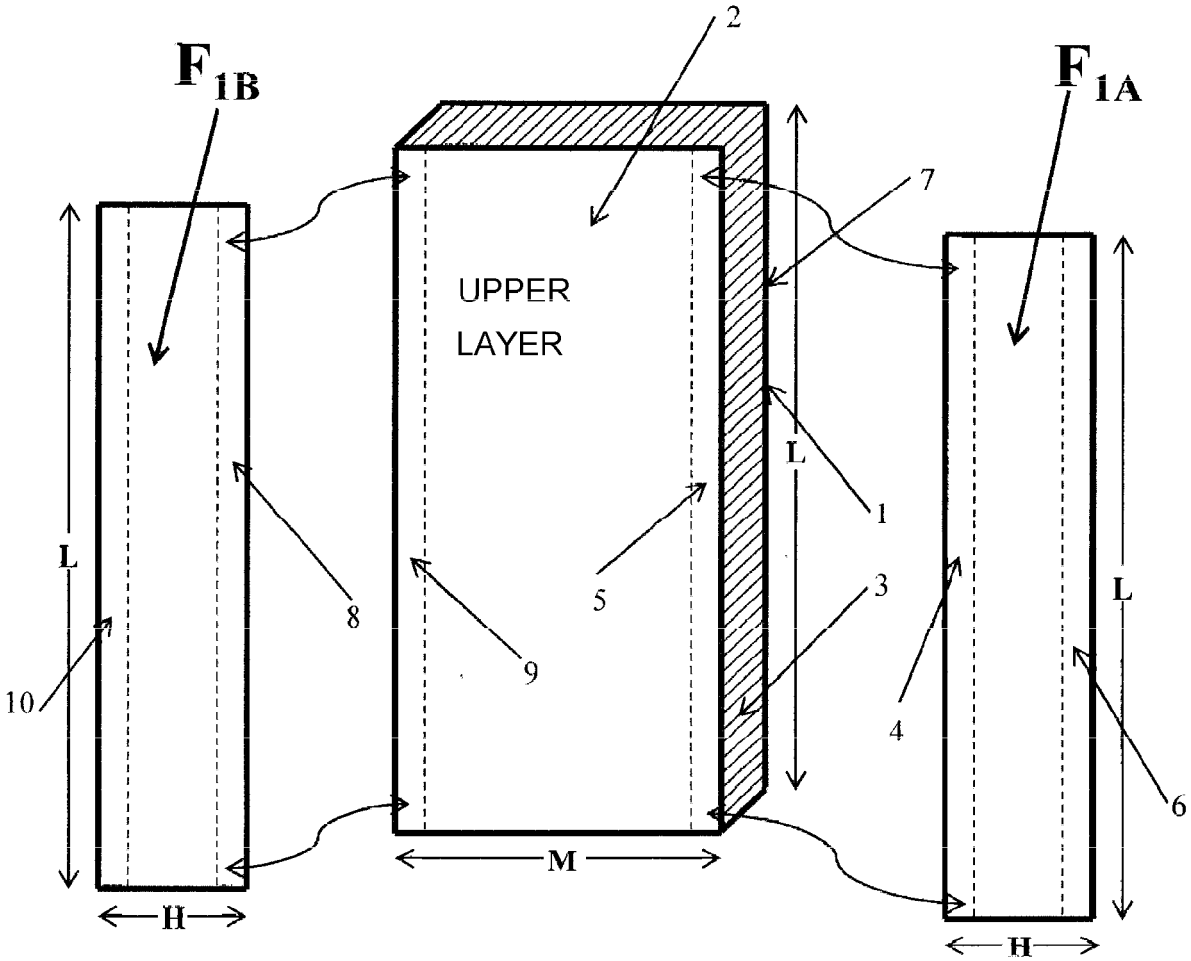

FIG. 2

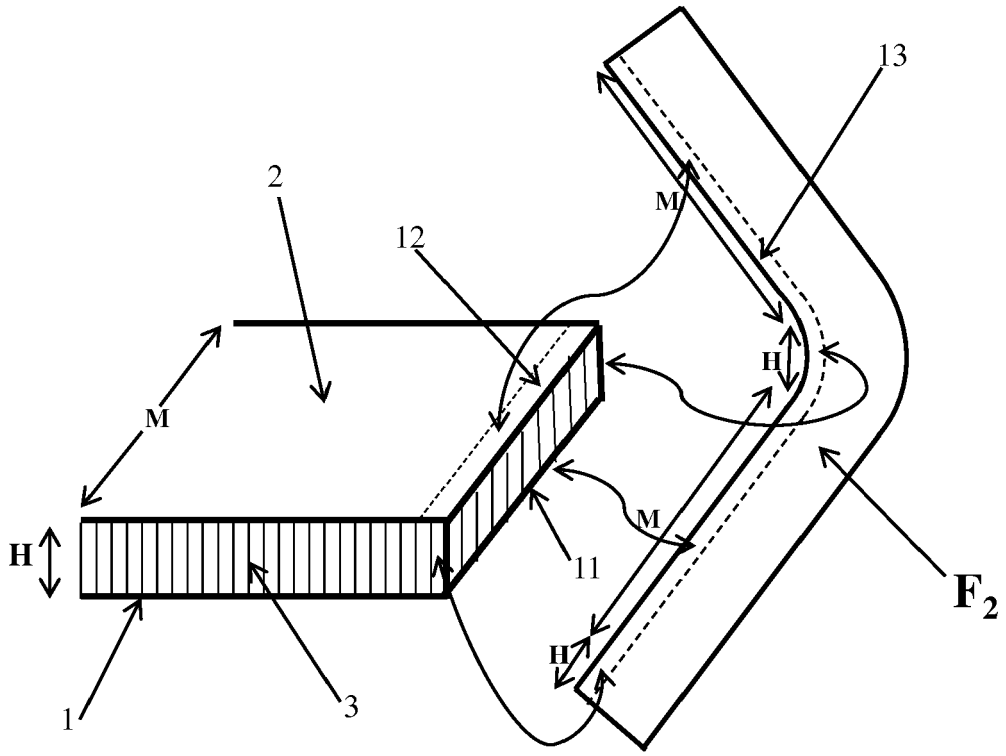

FIG. 3

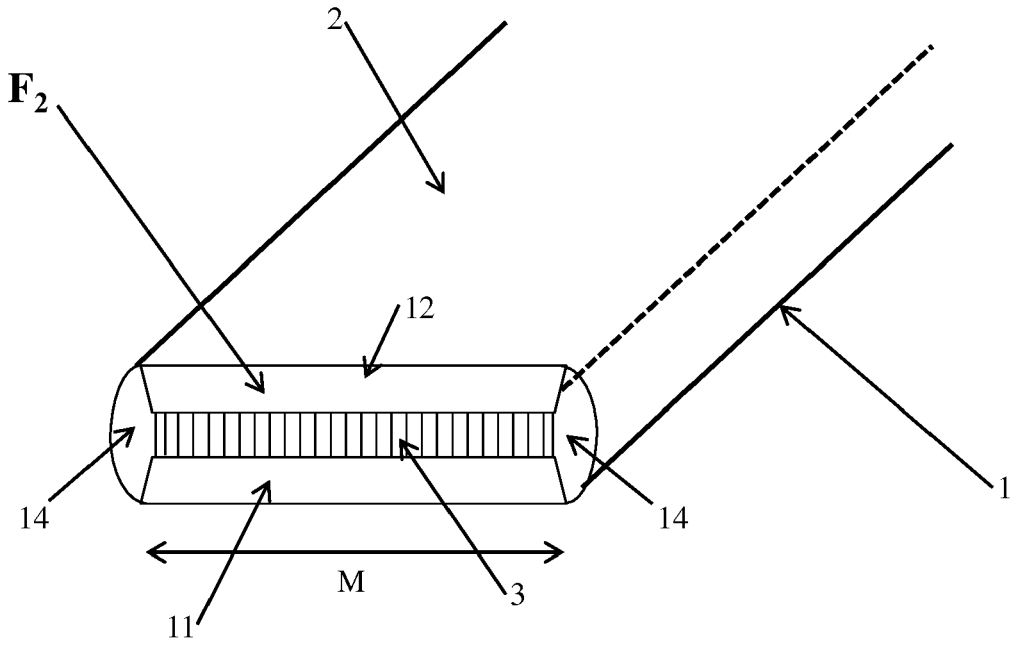

FIG. 4

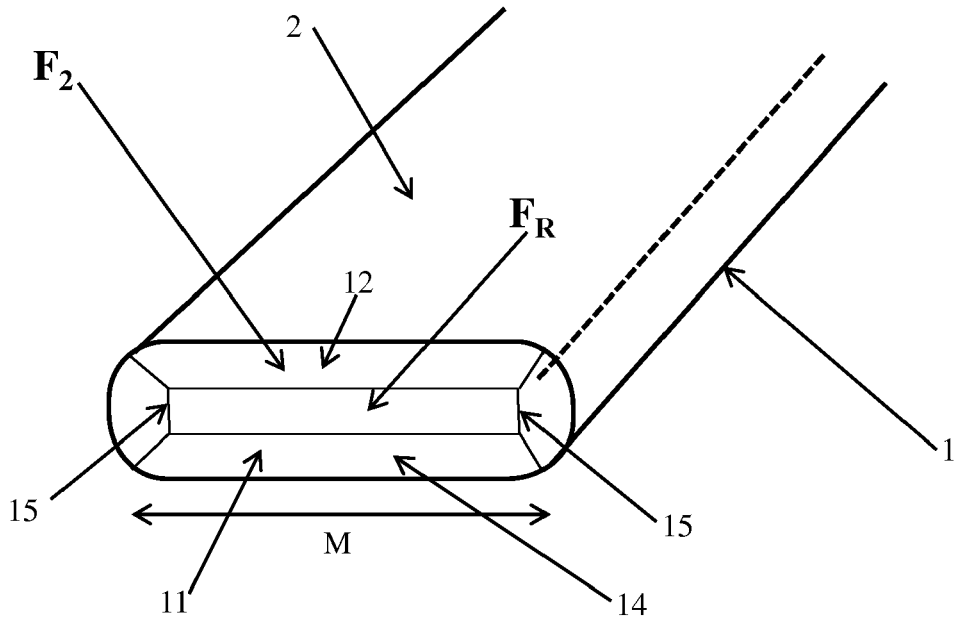

FIG. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 16 02 0218

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	19 October 2016	Jekabsons, Armands

CATEGORY OF CITED DOCUMENTS

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