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(54) **STRING TRANSPORT SYSTEM**

(57) The invention relates to the area of transport communications, in particular, to the integrated above-ground transport systems of a string type, with transport infrastructure providing speed cargo and passenger traffic.

The string transport system by Yunitski represents end (2) and intermediate (3) supports mounted on foundation (1), and at least one rail cord (4) fastened in spans (L) between them, and at least one wheeled vehicle (7) guided thereon. Hereby, load-bearing elements (5) of load-bearing member (6) of rail cord (4) are tensioned and anchored, according to design option, both on end (2) and intermediate (3) anchor supports, which allows to redistribute, between end (2) and intermediate (3) anchor supports, the effect of axial forces which create pre-stressing of load-bearing elements (5) of rail cord (4).

Partial anchoring of load-bearing elements (5) on intermediate (3) anchor supports allows to evenly distribute combined tension force of load-bearing member (6), transferred to intermediate (3) anchor supports, and thereby ensure their load relief, in order to increase stability of end (2) supports, reliability of rail-string transport overpass and achieve "velvet-smooth track" effect, with decrease in material capacity and cost of both supports and load-bearing member (6), alongside with load-bearing elements (5) and rail cord (4) as a whole.

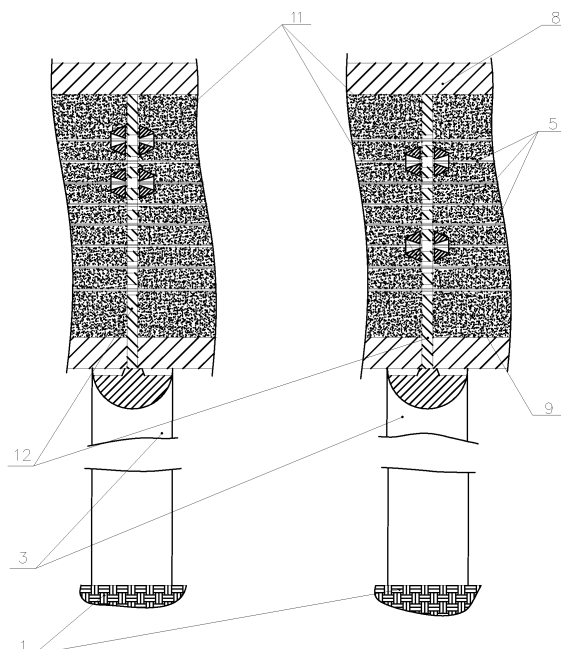


Fig.4

Description

Technical field

[0001] The invention relates to the area of transport communications, in particular, to the integrated above-ground transport systems of a string type, with transport infrastructure providing speed cargo and passenger traffic.

Background Art

[0002] Overpass-type transport systems by Yunitski based on string track structure are well-known, for instance, track structure of transport system by Yunitski [1] is known, comprising at least one fastened on supports rail cord in the form of prestressed load-bearing member (string), encased in body with conjugated working surface for moving of vehicles. In such transport system, string rail cord, in span between adjacent supports, forms span sections of single-rail or multi-rail track structure. In order to equalize the natural sagging of load-bearing member of rail cord in span between adjacent supports, the track structure of this type uses inserts (gaskets) of variable height increasing towards the middle of span, which, however, complicates the technology of manufacturing and installation of rail cords in field conditions and does not allow to achieve the straightness of track structure and "velvet-smooth track" effect.

[0003] String transport system by Yunitski [2] is also known, comprising fastened on foundation on different levels in spans between adjacent supports and interconnected at least one main cord in the form of prestressed load-bearing member, encased in body with rolling surface for vehicles conjugated therewith, and at least one auxiliary cord with prestressed load-bearing member. Main cord is connected with auxiliary cord by the system of supporting elements of various height, embodied in the form of suspensions and/or pillars, spaced along the span between adjacent supports at certain intervals therebetween. In the interval between two adjacent supports, the rolling surface conjugated with body of main cord is located with excess, increasing towards the middle of the span, over straight line passing through the points of this surface in the points of connecting main cord with adjacent supporting elements.

[0004] Additionally, rolling surface conjugated with body of main cord may be disposed on liners of variable thickness installed inside or outside body of the cord, between the rolling surface and load-bearing member, at intervals between adjacent supporting elements or/and in span between adjacent supports, wherein body of main cord may be integrally formed with variable thickness liners.

[0005] Selection of ratio of interval between supporting elements ensures such interaction of vehicle with track structure, during which in each specified interval, strain-stress state of main cord will remain optimum.

[0006] The known transport system provides sufficient bearing capacity and rigidity of string track structure, however, is not high-tech and complicates the process of manufacturing rail cords in field conditions and at height of up to tens and hundreds of meters, and, moreover, does not allow to achieve the straightness of track structure and "velvet-smooth track" effect.

[0007] Accepted as prototype, transport system by Yunitski [3] is known, which includes, at least, one tensioned above foundation, in spans between supports, track structure in the form of extended body, forming rail track with rolling surface and vehicle mounted thereupon. The body of such track structure is made hollow and equipped with prestressed extended load-bearing elements positioned therein, concreted with hardening material distributed in volume of cavity free of load-bearing elements. Those prestressed extended load-bearing elements are positioned in body in such way that the height of their position level can vary within limits of height of internal volume of body along the span between supports, decreasing towards the middle of span and increasing in directions towards supports forming it. The hardening material used represents materials based on polymer binders, composites and/or cement mixtures, whereas extended load-bearing elements of the structure are made of wire, and/or rods, and/or twisted or non-twisted ropes, and/or cords, strips, strands, tapes, pipes, and/or from different combinations of the above-mentioned variants of high-strength materials.

[0008] The rail cord in the known transport systems is formed by string-type rails tensioned between anchor supports, the common feature of which is the presence of extended body with rolling surface conjugated therewith, and with prestressed longitudinal load-bearing member enclosed therein. The basis of work of the known transport system is that the rolling surfaces conjugating with bodies of rail cords form a track for supporting wheels of vehicles, the movement of which can be organized by any of the known types of drive.

[0009] Moreover, in the structures of rail cords and the track structure on the whole, of the known transport systems, end anchor supports, enduring maximum loads from load-bearing elements of rail cords, possess increased materials intensity and cost. In addition, such transport systems do not provide the required rigidity and straightness of the track, which does not allow, during operation thereof with non-stop traffic, to achieve smoothness and softness of the vehicle motion throughout the track structure.

[0010] The task of achieving the following engineering purposes lies at the heart of the invention:

- load relieving thanks to redistribution of stresses in anchor supports of the string transport system;
- enhancing reliability of the transport system;
- stabilizing longitudinal flatness, ensuring presence of vertical operating flatness of rolling surfaces of rail cord throughout its entire length, with "velvet-smooth

track" effect.

Summary of invention

[0011] The required technical tasks and desired aims of the present invention are achieved by using string transport system by Yunitski, which comprises end and intermediate supports mounted on foundation, and at least one rail cord stretched in the spans between them, which includes a plurality of prestressed load-bearing elements tensioned between the supports, combined, at least, in one load-bearing member coupled to the rolling surface for motion of vehicle, whereby up to half of plurality of load-bearing elements are rigidly fixed in longitudinal direction in fastening units located on intermediate supports, and the remaining part of plurality of load-bearing elements is connected to intermediate supports without restriction of their longitudinal movement.

[0012] The solution of the given problem is also ensured provided that up to one-third of plurality of load-bearing elements are rigidly fixed in longitudinal direction in fastening units located on intermediate supports.

[0013] The technical aim is also achieved provided that up to a tenth of plurality of load-bearing elements are rigidly fixed in longitudinal direction in fastening units located on the intermediate supports.

[0014] The technical objective is achieved also due to the fact that load-bearing member possesses body and load-bearing elements positioned therein.

[0015] The above result is also achieved because the space within body of load-bearing member is filled up with hardening mixture.

[0016] The solution of the given task is also possible provided that load-bearing member is implemented in a bodyless embodiment.

[0017] Achievement of this result is also ensured by the fact that fastening unit represents an anchor.

[0018] The solution of the set task is also possible on the condition that anchor is configured to joint prestressed load-bearing elements.

[0019] This result is also achieved by the fact that joints of load-bearing elements are located on intermediate supports in fastening units.

[0020] Achievement of the above result is also ensured by the fact that intermediate support containing fastening unit is equipped with elements reinforcing its stability.

Brief description of drawings

[0021] The essence of this invention is clarified through the drawings in Fig.1-Fig.6, which illustrate the following:

Fig. 1 - schematic view of string transport system by Yunitski - general view (embodiment);

Fig.2 - schematic view of cross section of body of rail cord for mounted vehicle (embodiment);

Fig.3 - schematic view of cross section of body of rail cord for suspended vehicle (embodiment);

Fig.4 - schematic view of longitudinal section of rail body on intermediate supports (embodiment);

Fig. 5 - schematic view of anchors in fastening unit of load-bearing elements on intermediate support (embodiment);

Fig.6 - schematic view of fastening units of load-bearing elements on various supports of string transport system by Yunitski - general view (embodiment).

Embodiments of invention

[0022] The essence of the claimed invention is further presented in a closer detail.

[0023] The claimed string transport system by Yunitski (see Fig.1) comprises end 2 supports and intermediate 3 supports mounted on foundation 1.

[0024] Depending on the properties of the foundation 1, installation site and set of functions, end 2 supports and intermediate 3 supports may have various designs, for example - in the form of towers, columns with caps (not shown on figures), steel and reinforced concrete columnar and frame buildings and structures equipped, for example, with passenger stations and/or cargo terminals (not shown on figures), other functional structures.

[0025] In spans L between supports, at least one rail cord 4 is tensioned, comprising plurality of prestressed load-bearing elements 5 tensioned between supports, and combined at least in one load-bearing member 6 (see Figs.2 and 3).

[0026] End 2 supports are anchor supports with ends of prestressed load-bearing elements 5 of rail cords 4 fastened thereon by means of anchoring.

[0027] Intermediate 3 supports represent anchor supports, with ends of prestressed load-bearing elements 5 of rail cords 4 fastened thereon by means of anchoring. At the same time, the claimed string transport system may include intermediate 3 supports which are not anchor ones.

[0028] In some cases, in places with limited capacity to erect full end 2 supports, for example, in urban conditions, as well as on weak soils, it is advisable to partially redistribute the tension force of load-bearing elements 5 to intermediate 3 anchor supports.

[0029] In such cases, some of plurality of load-bearing elements are rigidly fixed (e.g. by anchoring) in fastening units on intermediate 3 anchor supports. At the same time, the remaining load-bearing elements 5 of rail cord 4 remain unfixed on intermediate 3 support and are connected to these supports without restrictions on their longitudinal movement. Such intermediate 3 supports partially act as intermediate anchor supports and participate in redistribution of force loads on end 2 (anchor) supports. Hereby, stability of end 2 supports in relation to longitudinal tension forces is increased.

[0030] As load-bearing member 6, schematic view of cross section in body embodiment of which is presented on Figs.2 and 3, load-bearing elements 5 may be used, made of, as a rule, in the form of twisted and/or untwisted

ropes, cables, bands, strips, cords, strands, reinforcement bars, high-strength steel wire, tubes or other extended load-bearing elements from any high-strength materials, assembled in one bunch and/or several bunches.

[0031] Load-bearing member 6 is connected via body 8 with rolling surface A for motion of vehicle 7.

[0032] Wheeled vehicle 7 (passenger and/or cargo, and/or cargo-passenger), as part of string transport system by Yunitski, can be either mounted on wheels on rolling surface A of load-bearing member 6 of rail cord 4, a view of cross-sectional embodiment of which is schematically shown on Fig. 2, or suspended from below on rolling surface A of load-bearing member 6 of rail cord 4, a view of cross-sectional embodiment of which is schematically shown on Fig. 3. At the same time, the motion of vehicle 7 can be realized by any of the known types of drive.

[0033] It is obvious to a person skilled in the art, that the presented inventive concept, depending on design option and required technical parameters, allows application of multiple combinations of embodiment of both load-bearing member 6 and rail cord 4 as a whole. Rail cord 4 may be monorail, or may be, for example, an element of a multi-rail track structure, or one of chords (or chord fragment) of trussed construct of track structure of string transport system, or cable/cord assembly (not shown on figures).

[0034] In some cases of practical implementation of the proposed transport system, load-bearing member 6 may comprise body 8, in which load-bearing elements 5 are placed. An embodiment of load-bearing member 6 of rail cord 4 in a body variant of practical implementation is shown schematically on Figs.2 - 5.

[0035] The space inside body 8 of load-bearing member 6 can be filled with hardening mixture 9.

[0036] According to any of the unlimited variants of use of hardening mixture 9, as such, depending on the design option, polymer binder composite compositions, cement mixtures (see Figs.2, 3 and 4) and/or similar hardening materials are used.

[0037] As a result, load-bearing member 6 of rail cord 4 is grouted (concreted), thereby transferring and redistributing external loads and forces to all prestressed load-bearing elements 5 of string transport system, which significantly increases flexural rigidity and reliability of body 8 of load-bearing member 6 of rail cord 4 (see Figs.2, 3 and 4).

[0038] At the same time, load-bearing member 6 of rail cord 4 does not work as a flexible element, but as a rigid continuous beam.

[0039] An alternative embodiment is a bodyless variant of load-bearing member 6 of rail cord 4, whereby vehicle 7 interacts and travels on the rolling surface A located directly on the surface of load-bearing member 6, made, for example, in the form of a rope.

[0040] Common to all practical embodiments of the proposed transport system is that up to half of plurality

of load-bearing elements 5 are rigidly fixed in longitudinal direction in fastening units 10 located on intermediate 3 supports, while the remaining part of plurality of load-bearing elements 5 is connected to intermediate 3 supports without limiting their longitudinal movement.

[0041] Fastening units 10 of load-bearing elements 5 of load-bearing member 6 (and rail cord 4 as a whole) on end 2 and intermediate 3 anchor supports represent any known devices similar to those used in suspension and cable-stayed bridges, ropes and prestressed reinforced concrete structures for fastening (anchoring) of tensioned load-bearing members (reinforcement, ropes, high-strength wires, etc.).

[0042] On Figs.4 and 6, an embodiment of fastening unit 10 of load-bearing elements 5 of load-bearing member 6 on intermediate 3 anchor supports is shown. In this embodiment, fastening unit 10 comprises anchor 11 positioned on load-bearing bulkhead 12 (see Fig.5) rigidly fixed on intermediate 3 anchor support.

[0043] Due to the fact that any intermediate 3 anchor support has a certain margin of stability, in order to save material resources, it is advisable to redistribute between end 2 and intermediate 3 anchor supports of transport system, through the anchors 11 positioned on transverse bulkhead 12 of intermediate 3 anchor support, the effect of axial forces which create prestressing of load-bearing elements 5 of rail cord 4.

[0044] Partial anchoring of load-bearing elements 5 on intermediate 3 anchor supports (on load-bearing bulkheads 12, rigidly fixed on these supports) allows to evenly distribute combined tension force of load-bearing member 6, transferred to intermediate 3 anchor supports, and thereby ensure their load relief, and increase stability of end 2 supports and reliability of rail-string transport overpass, with decreased material capacity, costs of supports and load-bearing member 6, alongside with load-bearing elements 5 and rail cord 4 as a whole.

[0045] As proven by practical experience of elaborating and operating of the claimed string transport system, a significant reduction in material capacity and stresses in intermediate 3 anchor supports is achieved when up to half of plurality of load-bearing elements 5 are rigidly fixed in longitudinal direction in fastening units 10, located on intermediate 3 anchor supports, provided that the remaining part of plurality of load-bearing elements 5 is connected to intermediate 3 supports without restrictions of their longitudinal movement (see Fig.4).

[0046] From the viewpoint of labor intensity and profitability, optimal is the embodying of up to a third of plurality of load-bearing elements 5 fixed rigidly in longitudinal direction in fastening units 10 positioned on intermediate 3 supports.

[0047] It is advisable from the viewpoint of saving materials, to ensure durability of rail cord 4 and safety of the transport system, to embody up to a tenth of a plurality of load-bearing elements 5 rigidly fixed in longitudinal direction in fastening units 10 located on intermediate 3 anchor supports.

[0048] Thus, the mentioned embodiment of track structure, and in particular of rail cord 4, ensures the preservation of reliability and safety, even in extreme situation, when the integrity of one or more load-bearing elements 5 is damaged. Increase of number of load-bearing elements 5 rigidly fixed in longitudinal direction in fastening units 10, located on intermediate 3 anchor supports, more than half of all load-bearing elements 5 of load-bearing member 6, makes it possible to carry out more substantial load relief of supports, but at the same time there is a significant increase in material consumption and cost of intermediate 3 anchor supports, as well as - unjustifiable reduction in technological effectiveness of construction of the transport system as a whole.

[0049] Preferably, anchor 11 on intermediate 3 anchor support is configured to join prestressed load-bearing elements 5. In this case, durability of both load-bearing elements 5 of load-bearing member 6 and rail cord 4 as a whole is improved.

[0050] Advantageously, the joints of load-bearing elements 5 are arranged on intermediate 3 anchor supports in fastening units 10. This will allow to reduce cost and simplify assembly process of transport system in field conditions.

[0051] Advantageously, intermediate 3 anchor support comprising fastening unit 10 is provided with elements reinforcing its stability, for example, stays 13, and/or braces 14 (see Figs.1 and 6). In this case, material capacity and cost of supports are significantly reduced, and reliability and bearing capacity of Yunitski string transport system are significantly increased.

Industrial applicability

[0052] Construction of the presented string transport system by Yunitski includes installation on foundation 1 of end 2 and intermediate 3 supports, in spans L between which at least one rail cord 4 is fastened and at least one wheeled vehicle 7 is guided along it. In this case, the load-bearing elements 5 of load-bearing member 6 of rail cord 4 are tensioned and anchored, in accordance with design option, both on end 2 and intermediate 3 anchor supports.

[0053] Hence, in span between end 2 anchor supports, equaling to, for example, 10,000 meters, it can be established, at the same distance from each other, depending on the design option, from two to ten intermediate 3 anchor supports. Thus, the intermediate 3 anchor supports, during construction and installation of rail cord 4, will experience 2 to 10 times less forces from load-bearing elements 5, since load-bearing elements 5, for example, reinforcement ropes, have a limited length not exceeding 1,000 - 5,000 m.

[0054] String transport system by Yunitski works in the following way.

[0055] Rail cord 4 is arranged between supports in spans L. Its prestressing is carried out by tensioning in longitudinal direction of load-bearing elements 5 of load-

bearing member 6 and their anchoring on corresponding supports. Hereby, on each intermediate 3 anchor support, there occurs balancing of tension forces, formed on both sides of the support, of load-bearing elements 5 anchored on this support. As a result, there is no overturning moment on intermediate 3 support. In addition, each intermediate 3 support has a certain margin of stability. Thus, with end 2 supports distancing, the stability of intermediate 3 support 3 and its resistance to overturning moment from load-bearing elements 5 anchored thereon is increased. This makes it possible to redistribute the effect of longitudinal forces, which create prestressing of load-bearing elements 5 of load-bearing member 6 of rail cord 4, between end 2 and intermediate 3 supports of transport system, especially during construction and installation, when each intermediate 3 support becomes end, since it closes with a part of load-bearing elements 5 and tension from them.

[0056] To increase reliability and bearing capacity of string transport system, intermediate 3 anchor support with anchor 11 is made reinforced and/or it is supplied with stays 13 and/or braces 14, which allows to increase its stability without significant increase in material capacity.

[0057] This makes it possible to significantly reduce material capacity and, accordingly, the cost of the transport system, without deteriorating its speed characteristics, due to load relief of supports, as well as reducing and redistributing combined tension force of load-bearing member 6 between all supports along rail cord 4. As a result, it is possible to increase spans L between adjacent supports.

[0058] String transport system by Yunitski of the described structure allows to create a transport system, having high load capacity and improved operational characteristics and ensure load relief, reduction of material capacity and stresses in end 2 supports, increase of rigidity and reliability of rail cord 4 with stabilization throughout its longitudinal evenness and straightness of rolling surfaces A and achievement of "velvet-smooth track" effect with increase of spans L between supports.

[0059] Thanks to possessing the abovementioned distinctive features, the claimed technical solution differs from the prototype, that is, meets the criterion of the inventive step.

[0060] Upon reviewing the patent and scientific-technical literature, no subjects were found containing features which distinguish the claimed solution from the prototype and allow to achieve the proposed effect, therefore, it is obvious that the claimed invention meets the criterion of the patentable novelty.

Information sources

[0061]

1. Patent RU No 2080268, IPC B61B 5/02, 13/00; E01B 25/00, publ.1997.

2. Patent EA 006111, IPC B61B 3/00, 5/00; E01B 25/00, publ.25.08.2005.
 3. Patent EA 005017, IPC B61B 5/00, E01B 25/24, publ.28.10.2004.

units.

10. String transport system according to claim 1, **characterized by that** intermediate anchor support, containing fastening unit, is equipped with elements reinforcing its stability.

Claims

1. String transport system, which comprises end and intermediate anchor supports mounted on foundation, and at least one rail cord stretched in the spans between them, which includes a plurality of prestressed load-bearing elements tensioned between the supports, combined, at least, in one load-bearing member coupled to the rolling surface for motion of vehicle, **characterized by that** up to half of plurality of load-bearing elements are rigidly fixed in longitudinal direction in fastening units located on intermediate anchor supports, and the remaining part of plurality of load-bearing elements is connected to intermediate anchor supports without restriction of their longitudinal movement. 10
2. String transport system according to claim 1, **characterized by that** up to one-third of plurality of load-bearing elements are rigidly fixed in longitudinal direction in fastening units located on intermediate anchor supports. 15
3. String transport system according to claim 1, **characterized by that** up to a tenth of plurality of load-bearing elements are rigidly fixed in longitudinal direction in fastening units located on intermediate anchor supports. 20
4. String transport system according to claim 1, **characterized by that** load-bearing member possesses body and load-bearing elements positioned therein. 25
5. String transport system according to claim 4, **characterized by that** the space within body of load-bearing member is filled up with hardening mixture. 30
6. String transport system according to claim 1, **characterized by that** load-bearing member is realized in bodyless embodiment. 35
7. String transport system according to claim 1, **characterized by that** fastening unit represents an anchor. 40
8. String transport system according to claims 1 and 7, **characterized by that** anchor is configured to joint prestressed load-bearing elements. 45
9. String transport system according to claim 8, **characterized by that** joints of load-bearing elements are located on intermediate anchor supports in fastening 50

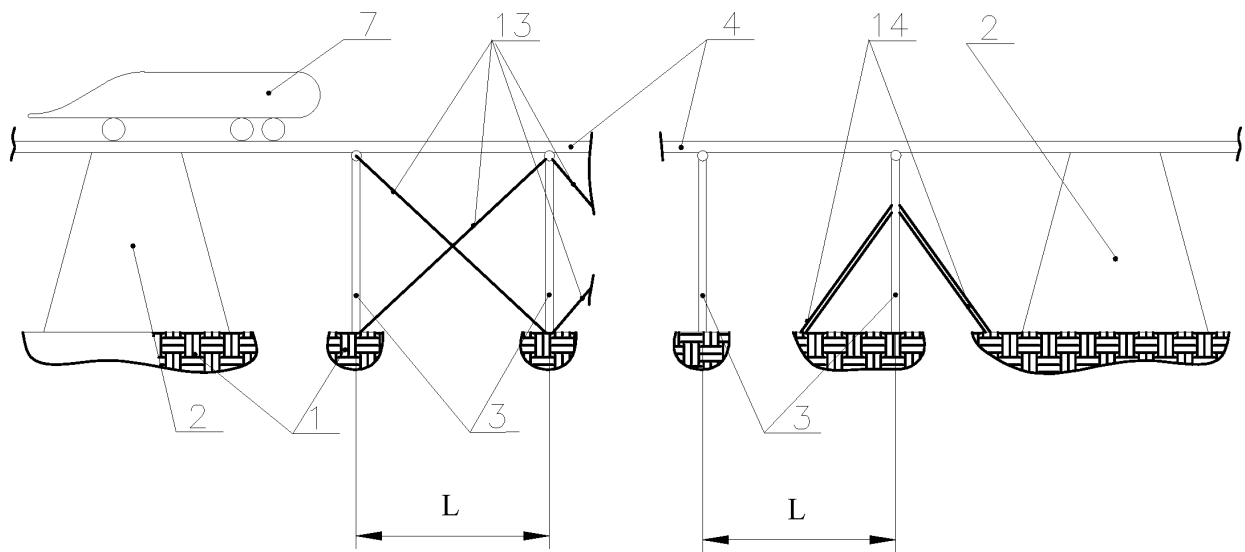


Fig.1

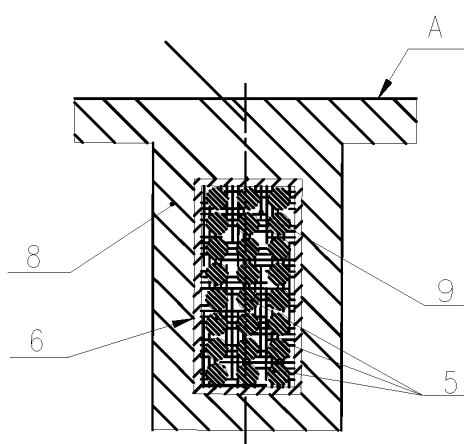


Fig.2

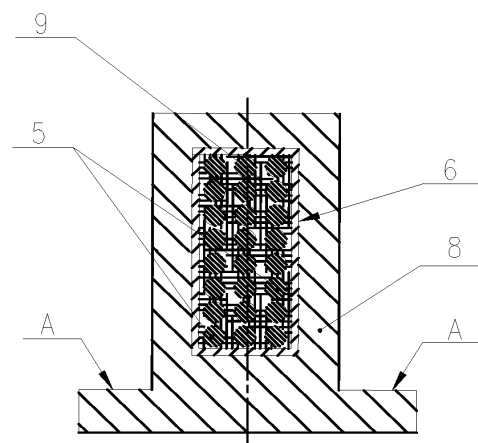


Fig.3

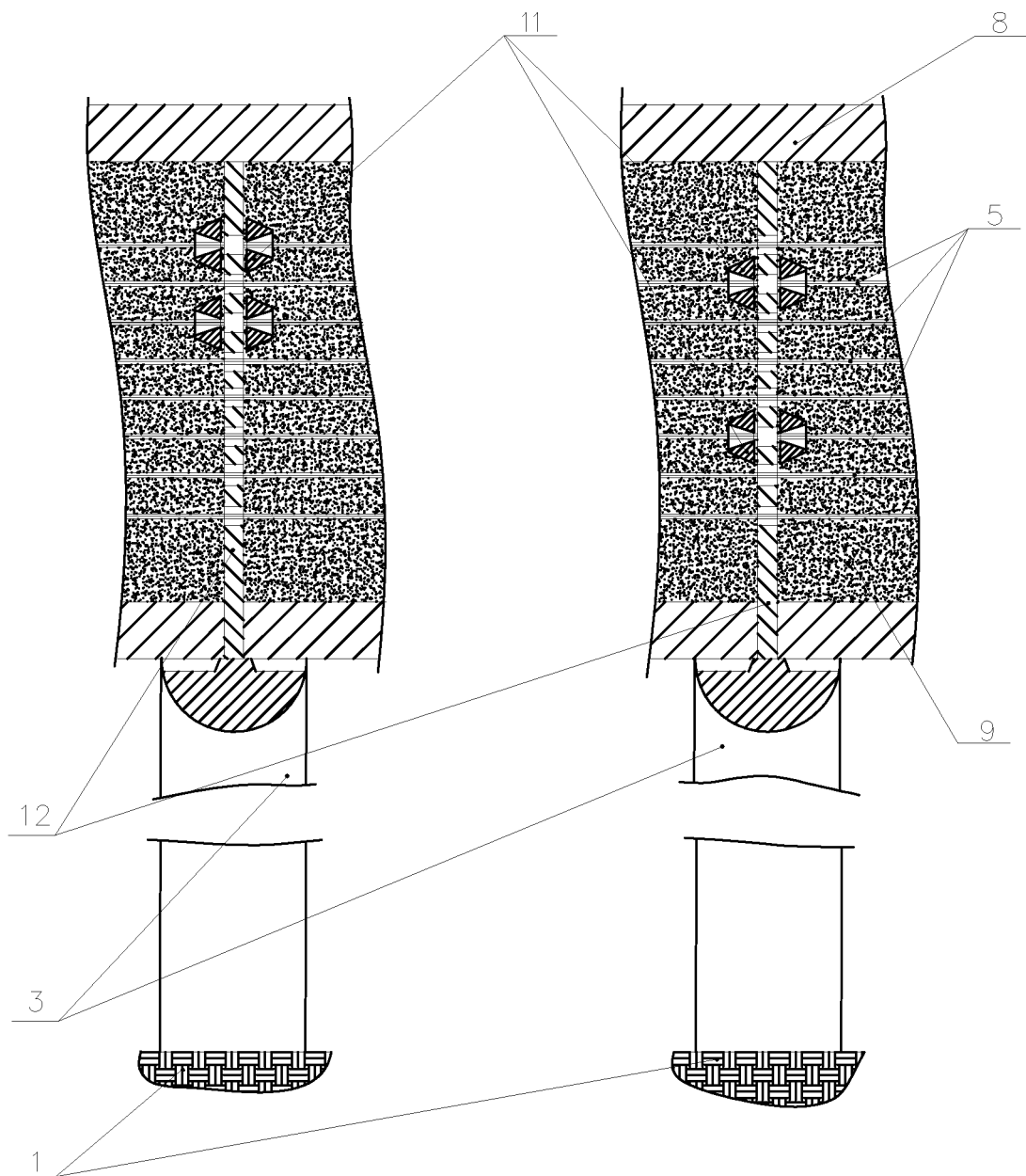


Fig.4

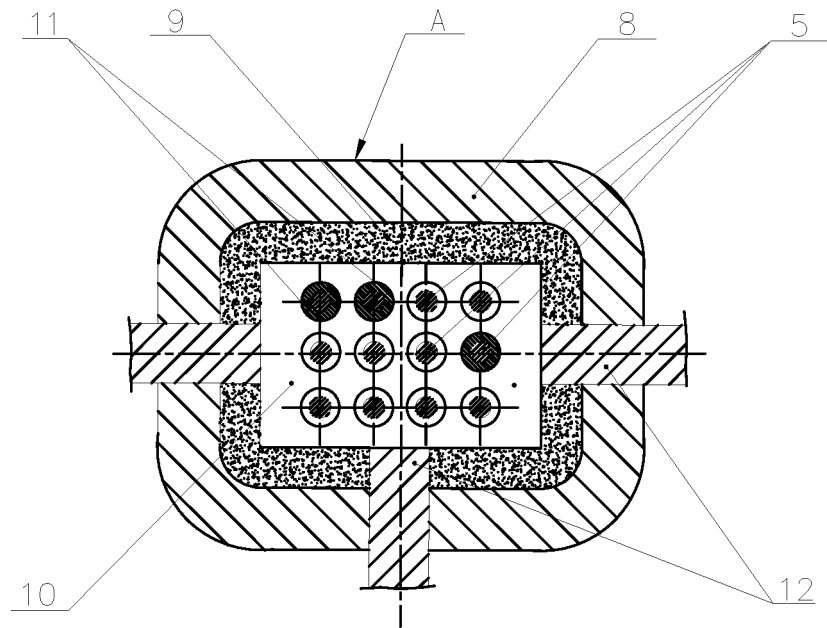


Fig. 5

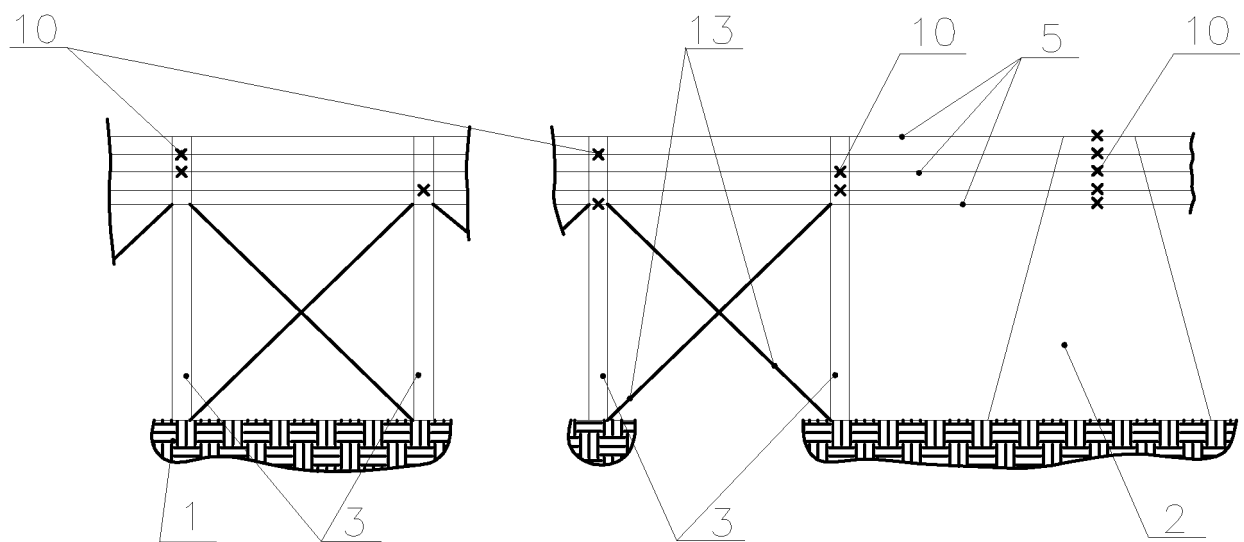


Fig. 6

INTERNATIONAL SEARCH REPORT

International application No.

PCT/BY 2019/000018

A. CLASSIFICATION OF SUBJECT MATTER <i>B61B 3/02 (2006.01)</i> <i>B61B 13/04 (2006.01)</i> <i>B61B 5/00 (2006.01)</i> <i>E01B 25/08 (2006.01)</i> According to International Patent Classification (IPC) or to both national classification and IPC <i>E01B 25/22 (2006.01)</i>															
B. FIELDS SEARCHED															
Minimum documentation searched (classification system followed by classification symbols) B61B 3/00, 3/02, 5/00, 5/02, 13/00, 13/04, 13/06, 15/00, E01B 25/00, 25/08, 25/10, 25/22, 25/24, 26/00															
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched															
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) PatSearch (RUPTO Internal), USPTO, PAJ, Espacenet, Information Retrieval System of FIPS															
C. DOCUMENTS CONSIDERED TO BE RELEVANT															
<table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>EA 5017 B1 (JUNITSKY ANATOLY EDUARDOVICH) 28.10.2004, abstract, the claims, fig. 1-11</td> <td>1-10</td> </tr> <tr> <td>A</td> <td>RU 2325293 C2 (JUNITSKY ANATOLY EDUARDOVICH) 27.05.2008, abstract, the claims, fig. 1-3</td> <td>1-10</td> </tr> <tr> <td>A</td> <td>RU 2223357 C1 (JUNITSKY ANATOLY EDUARDOVICH et al.) 10.02.2004, abstract, the claims, fig. 1a-5b</td> <td>1-10</td> </tr> <tr> <td>A</td> <td>US 4211171 A (RUDOLF BALTENSBERGER et al.) 08.07.1980, abstract, the claims, fig. 1-8</td> <td>1-10</td> </tr> </tbody> </table>	Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	A	EA 5017 B1 (JUNITSKY ANATOLY EDUARDOVICH) 28.10.2004, abstract, the claims, fig. 1-11	1-10	A	RU 2325293 C2 (JUNITSKY ANATOLY EDUARDOVICH) 27.05.2008, abstract, the claims, fig. 1-3	1-10	A	RU 2223357 C1 (JUNITSKY ANATOLY EDUARDOVICH et al.) 10.02.2004, abstract, the claims, fig. 1a-5b	1-10	A	US 4211171 A (RUDOLF BALTENSBERGER et al.) 08.07.1980, abstract, the claims, fig. 1-8	1-10
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.													
A	EA 5017 B1 (JUNITSKY ANATOLY EDUARDOVICH) 28.10.2004, abstract, the claims, fig. 1-11	1-10													
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A	RU 2223357 C1 (JUNITSKY ANATOLY EDUARDOVICH et al.) 10.02.2004, abstract, the claims, fig. 1a-5b	1-10													
A	US 4211171 A (RUDOLF BALTENSBERGER et al.) 08.07.1980, abstract, the claims, fig. 1-8	1-10													
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Date of the actual completion of the international search 15 April 2020 (15.04.2020)															
Date of mailing of the international search report 14 May 2020 (14.05.2020)															
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REFERENCES CITED IN THE DESCRIPTION

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