



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
02.04.2014 Bulletin 2014/14

(51) Int Cl.:
E04G 21/32 (2006.01) A62B 35/00 (2006.01)

(21) Application number: **13186102.3**

(22) Date of filing: **26.09.2013**

(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

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(30) Priority: **28.09.2012 NL 2009539**

(54) **System for fall protection or fall prevention and method for providing such a system**

(57) A system for preventing a person to fall from a roof of a building onto a lower situated surface, said system comprising a securing system which extends on said roof substantially parallel to and at a distance from an edge of said roof, to which securing system a line can be secured, which line can be secured at its other end to

said person, wherein said securing system comprises a multitude of weights which are arranged on said roof in a linear array parallel to and at a distance from an edge of said roof, wherein each of said weights is provided with a through hole, and wherein said securing system comprises a bar extending through each of said through holes.

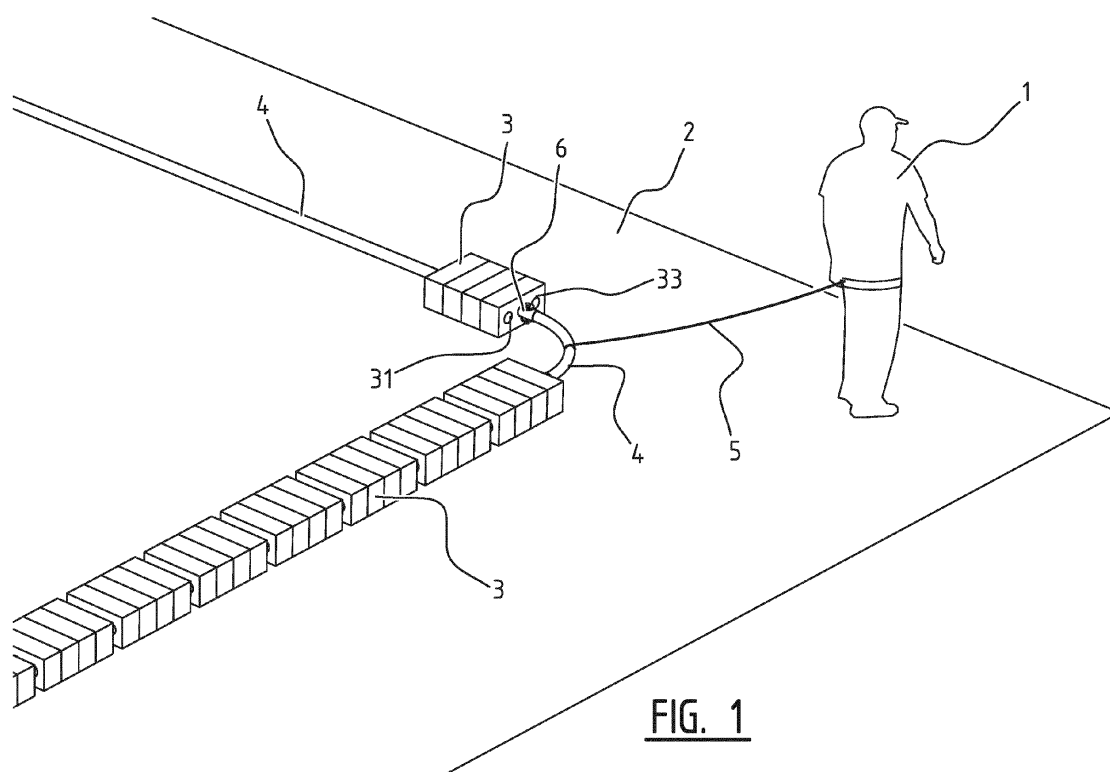


FIG. 1

Description

[0001] The invention relates to a system for preventing a person to fall from a roof of a building onto a lower situated surface, said system comprising a securing system which extends on said roof substantially parallel to and at a distance from an edge of said roof, to which securing system a line can be secured, which line can be secured at its other end to said person.

[0002] A system for preventing a person to fall from a roof of a building in a way that said secured person cannot fall from said roof is known as 'fall prevention'. A system for preventing a person to fall from a roof of a building in a way that said person can only fall a short distance for instance 0.85 meter from said roof is known as 'fall protection'.

[0003] As any other part of a building, the roof of a building needs maintenance from time to time, and systems are provided for preventing that persons carrying out said maintenance fall from said roof onto a lower situated surface. The invention in particular relates to such systems for substantially flat (parts of) roofs.

[0004] 'Fall prevention' systems are well known, for instance as described in European patent application EP 1818480. The line can be secured to a rail of the securing system by a traveller which can travel along the rail, such that the person is able to move along the edge of the roof, without the risk of falling from the roof. In 'fall protection' systems the line can be secured to the securing system by a snap hook and the user can release and re-secure the snap hook at the location where he is moving to. In said fall protection systems said line has an overlength, which means that said line can be longer than the shortest distance between the securing point and the edge of the roof, this overlength is necessary to reach the edge of the roof in the middle between two neighbouring securing points.

[0005] It is a goal of the invention to provide improved systems for fall prevention and fall protection, which are safe to use, which are easy to use, which are simple, which are easy to install, which offer protection during installation, which offer different protection levels, which are expected to do little harm to the roof construction and/or roof characteristics and/or which can be easily reused.

[0006] According to the invention said securing system comprises a multitude of weights which are arranged on said roof in a linear array parallel to and at a distance from an edge of said roof, wherein each of said weights is provided with a through hole, and wherein said securing system comprises a bar extending through each of said through holes.

[0007] GB 2 393 206 A shows a system wherein a bar in the form of a rail extends through securing means, which securing means are mounted above the weights. When the system is installed on a roof the rail is fixed in said securing means by means of screws. According to the present invention however, the bars extend directly

through holes in the weights, whereby the need of securing means is avoided. In this respect, weights provided with securing means extending therefrom, for instance a support bracket with a clamping portion for a bar, are therefore not to be considered weights provided with through holes. In the present case the weights provided with through holes can be created by leaving material of which the weight is made, away and not by adding extra materials to the weight in order to create a securing means. When the system is installed on a roof, the bar only needs to be inserted in and through said through holes, and there is no need for fixing the bar to each of the weights by, for instance, clamping or screw means.

[0008] Preferably said weights are spaced apart at intervals in order to provide access to said bar, such that the person can secure himself to the bar, for instance with said line and a snap hook. Also said spaces provide openings for letting rain water to flow from the centre of the roof towards discharge conduits or gutters at the edges of the roof. Preferably spacers are provided in said spaces, in order to fix said spaces between the weights. Preferably said intervals are less than 2 times (the square root of ((said distance from an edge of the roof plus 1.4 meter line overlength) squared minus (said distance from an edge of the roof) squared)), more preferably 2 times (the square root of ((said distance from an edge of the roof plus 0.85 meter line overlength) squared minus (said distance from an edge of the roof) squared)), even more preferably 2 times (the square root of ((said distance from an edge of the roof plus 0.1 meter line overlength) squared minus (said distance from an edge of the roof) squared)) when said system is to be used in case a line has overlength (fall protection).

[0009] Preferably said intervals are less than 2 times (the square root of ((said distance from an edge of the roof minus 0.5 meter) squared minus (said distance from an edge of the roof minus 0.8 meter) squared)), more preferably 2 times (the square root of ((said distance from an edge of the roof minus 0.5 meter) squared minus (said distance from an edge of the roof minus 0.7 meter) squared)), even more preferably, 2 times (the square root of ((said distance from an edge of the roof minus 0.5 meter) squared minus (said distance from an edge of the roof minus 0.65 meter) squared)), when said system is to be used in case a line has no overlength (fall prevention).

[0010] Alternatively said intervals are preferably less than 9 meter, more preferably less than 6.5 meter, even more preferably less than 4.5 meter when said system is to be used in case a line has overlength (fall protection), or preferably said intervals are less than 3 meter, more preferably less than 2 meter, even more preferably less than 1 meter when said system is to be used in case a line has no overlength (fall prevention).

[0011] In a further preferred embodiment a rail extends above said weights, said rail being connected to said bar, to which rail said line can be secured, for instance by means of a traveller.

[0012] Preferably said weights are comprised of bricks. Preferably said weights are block shaped. Preferably said weights extend in a lateral orientation relative to the bar. Preferably said weights have a mass of between 15 kg and 35 kg per meter, more preferably approximately 25 kg per meter of said securing system.

[0013] In a further embodiment of the invention each of said weights in said securing system has at least two, preferably three of said through holes, said weights extending in a staggered relation in two partially overlapping arrays, and wherein said securing system comprises two of said bars extending in parallel relation through said through holes, such that at least one of said bars extends outside one array of weights such that said bar is accessible at that location from the side of the securing system.

[0014] Preferably said system further comprises at least a ballast unit connected to said securing system, said ballast unit comprising a multitude of said weights, each of said weights having at least two, preferably three of said through holes, said weights extending in a staggered relation in a multitude of partially overlapping arrays, and a multitude of bars extending in parallel relation through said through holes of each of said arrays, such that all of said weights are interconnected by said bars, thereby forming a mat. Preferably said mat has a mass of at least 100 kg, more preferably at least 130 kg, even more preferably approximately 150 kg. Together with the outer end of said securing system to which the mat is connected, the required weight of approximately 300 kg is obtained.

[0015] The invention also relates to a method for providing a system for preventing a person to fall from a roof of a building onto a lower situated surface, said method comprising the following sequence of steps: said weights are laid in an array on said roof such that said through holes are being aligned with each other, wherein at least at intervals spaces are left between said weights; and sliding a bar through said aligned through holes of said weights.

[0016] The invention will be illustrated by means of preferred embodiments as shown in the drawings, wherein:

Figure 1 is a perspective view of a first preferred embodiment of the system of the invention;

Figure 2 is a perspective view of a detail of the system of figure 1;

Figure 3 is a perspective view of a second preferred embodiment of the system of the invention;

Figure 4 is a perspective view of a detail of the system of figure 3;

Figure 5 is a perspective view of a weight as used in the system of the invention;

Figure 6 is a perspective view of weights and bars

and a bar connector piece as used in the system of the invention;

Figure 7 is a perspective view of various other preferred embodiments of the system of the invention;

Figure 8 is a perspective view of the system of figure 1 with an end ballast mat.

[0017] According to figures 1, 2, 5 and 6 a system for preventing a person 1 to fall from a flat roof 2 of a building onto a lower situated surface comprises a securing system which substantially exists of weights in the form of bricks 3, bars 4, and a line 5 to which the person 1 is secured. The end of the line may be secured to a bar 4 by means of a snap hook (not shown). The bars 4 are mutually fixed by connectors 6, 12.

[0018] The bricks 3 are made of concrete and are each provided with three parallel through holes 31, 32, 33. The bars 4 may be made of metal, may be hollow pipes, and have a diameter which is slightly smaller than said through holes 31, 32, 33 such that they can extend therein.

[0019] The securing system is provided on the roof 2 by laying, over the length of one bar, bricks 3 in a straight array such that the through holes 32 are aligned. Generally the bricks 3 are placed against each other, but at regular intervals, for instance every meter, a small space of for instance 10 cm is left between two bricks 3, in order to allow access to the bar 4. A bar 4 is inserted in the aligned through holes, while providing tubes, acting as spacers 13 with a length equal to said spaces, around the bar in every space.

[0020] A connector 12 is inserted in the outer end of the bar 4. This process is repeated for a next bar 4 of the securing system, wherein the first outer end of said next bar 4 is mounted over the connector 12 of the previous bar 4 after it is inserted in the array of bricks 3. In the corner the two neighbouring bars 4 are connected to each other, which may be achieved in any suitable manner (here schematically shown by a bent piece of bar 4).

[0021] As shown in figure 6, the connector 12 between two neighbouring straight bars 4 in principle only needs to fix the bars relative to each other in lateral direction, and may be a small pipe with a stop in its centre. In the corner the bar needs to be fixed securely against the ends of its neighbouring bars 4 by connectors 6, and at approximately 6 meters from the corner another connector 6 is mounted on both bars in order to lock the bricks 3 between said connectors 6, such that the required corner weight (approximately 300 kg) is secured.

[0022] Figures 3 and 4 show substantially the same system, only in this embodiment the securing system is provided with a rail comprised of rail elements 7 which are mounted parallel to and on top of the bars 4 by means of vertical mounting pins 8 and mounting elements 10. A traveller 9, to which the line 5 can be secured, is mounted on the rail such that it can run along the rail.

[0023] Figure 7 show various different embodiments of the securing system, wherein two parallel bars 4 are inserted in the aligned through holes 31, 32, 33 of the array of bricks 3. The bricks may be arranged in a laterally staggered or shifted relation relative to each other, such that one bar 4 extends in front of part of the bricks 3, seen from aside, such that the line 5 can be secured thereto. In these embodiments through holes 31, 32, 33 may be aligned with each other, i.e. through hole 31 of one brick 3 with through hole 33 of the next brick 3.

[0024] Figure 8 shows an embodiment wherein at the end of the securing system a mat 11 of bricks 3 and bars 4 is provided as ballast with sufficient weight, wherein the bricks are arranged in a staggered relation in two dimensions such that the bars 4 interconnect all of said bricks 3. Therefore, also in the mat 11 through hole 31 of one brick 3 is aligned with through hole 33 of the next brick 3.

[0025] The invention has thus been described by means of preferred embodiments. It is to be understood, however, that this disclosure is merely illustrative. Various details of the structure and function were presented, but changes made therein, to the full extent extended by the general meaning of the terms in which the appended claims are expressed, are understood to be within the principle of the present invention. The description and drawings shall be used to interpret the claims. These claims should not be interpreted as meaning that the extent of the protection sought is to be understood as that defined by the strict, literal meaning of the wording used in the claims, the description and drawings being employed only for the purpose of resolving an ambiguity found in the claims. For the purpose of determining the extent of protection sought by the claims, due account shall be taken of any element which is equivalent to an element specified therein.

Claims

1. A system for preventing a person to fall from a roof of a building onto a lower situated surface, said system comprising a securing system which extends on said roof substantially parallel to and at a distance from an edge of said roof, to which securing system a line can be secured, which line can be secured at its other end to said person, wherein said securing system comprises a multitude of weights which are arranged on said roof in a linear array parallel to and at a distance from an edge of said roof, wherein each of said weights is provided with a through hole, and wherein said securing system comprises a bar extending through each of said through holes.
2. The system in accordance with claim 1, wherein said weights are spaced apart at intervals in order to provide access to said bar.
3. The system in accordance with claim 2, wherein said intervals are less than 2 times (the square root of ((said distance from an edge of the roof plus 1.4 meter) squared minus (said distance from an edge of the roof) squared)), more preferably 2 times (the square root of ((said distance from an edge of the roof plus 0.85 meter) squared minus (said distance from an edge of the roof) squared)), even more preferably 2 times (the square root of ((said distance from an edge of the roof plus 0.1 meter) squared minus (said distance from an edge of the roof) squared)), or less than 2 times (the square root of ((said distance from an edge of the roof minus 0.5 meter) squared minus (said distance from an edge of the roof minus 0.8 meter) squared)), more preferably, 2 times (the square root of ((said distance from an edge of the roof minus 0.5 meter) squared minus (said distance from an edge of the roof minus 0.7 meter) squared)), even more preferably 2 times (the square root of ((said distance from an edge of the roof minus 0.5 meter) squared minus (said distance from an edge of the roof minus 0.65 meter) squared)).
4. The system in accordance with claim 2 or 3, wherein said intervals are less than 9 meter, preferably less than 6.5 meter, more preferably less than 4.5 meter, or less than 3 meter, preferably less than 2 meter, more preferably less than 1 meter.
5. The system in accordance with any of the previous claims, wherein a rail extends above said weights, said rail being connected to said bar, to which rail said line can be secured.
6. The system in accordance with any of the previous claims, wherein said weights are comprised of bricks.
7. The system in accordance with any one of the previous claims, wherein said weights are block shaped.
8. The system in accordance with any one of the previous claims, wherein said weights extend in a lateral orientation relative to the bar.
9. The system in accordance with any one of the previous claims, wherein said weights in said securing system have a mass of between 15 kg and 35 kg per meter, preferably approximately 25 kg per meter of said securing system.
10. The system in accordance with any one of the previous claims, wherein each of said weights in said securing system has at least two, preferably three of said through holes, said weights extending in a staggered relation in two partially overlapping arrays, and wherein said securing system comprises

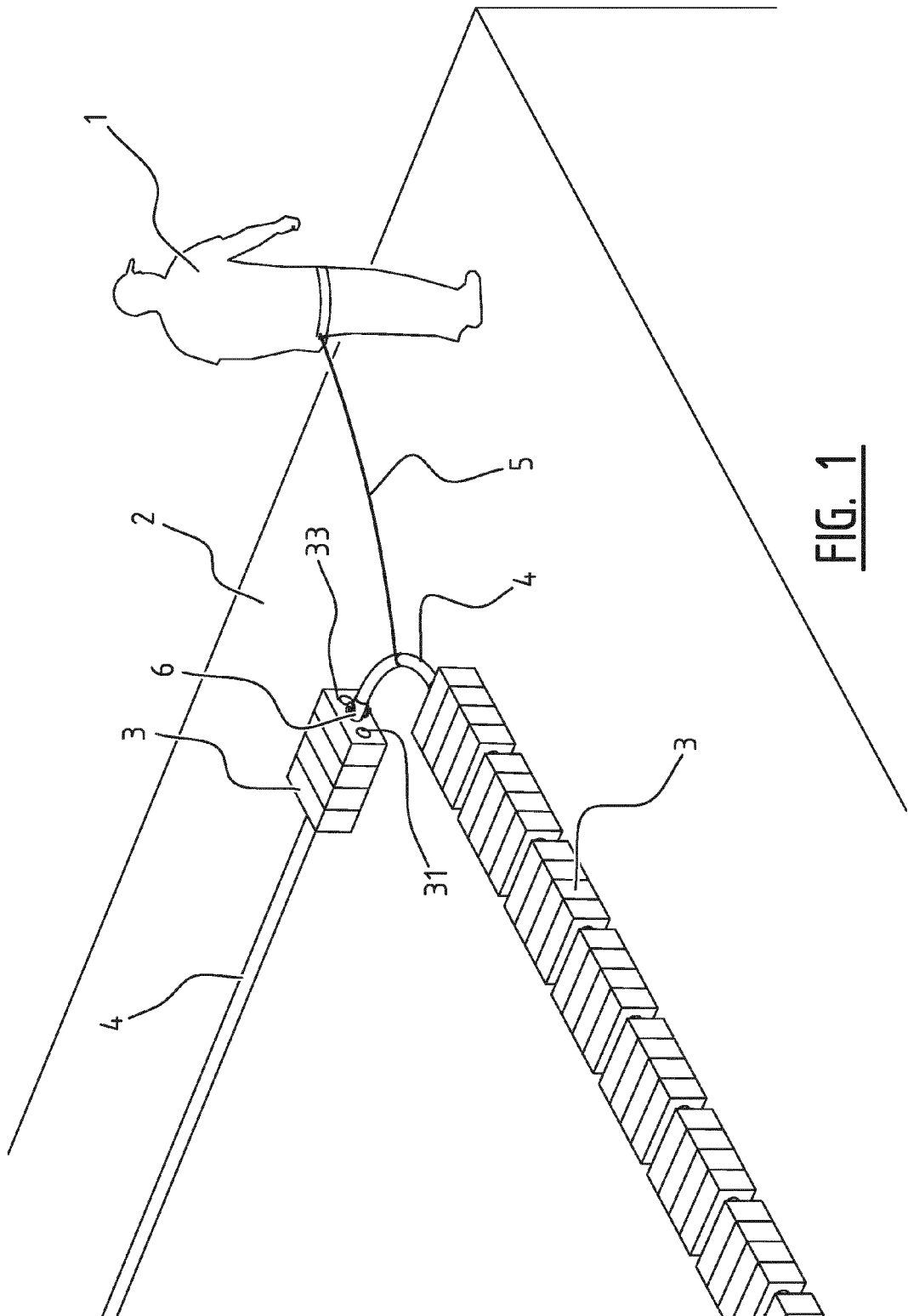
two of said bars extending in parallel relation through said through holes, such that at least one of said bars extends outside one array of weights such that said bar is accessible at that location from the side of the securing system.

11. The system in accordance with any one of the previous claims, wherein said system further comprises at least a ballast unit connected to said securing system, said ballast unit comprising a multitude of said weights, each of said weights having at least two, preferably three of said through holes, said weights extending in a staggered relation in a multitude of partially overlapping arrays, and a multitude of bars extending in parallel relation through said through holes of each of said arrays, such that all of said weights are interconnected by said bars, thereby forming a mat.
12. The system in accordance with claim 11, wherein said mat has a mass of at least 100 kg, preferably at least 130 kg, more preferably approximately 150 kg.
13. A method for providing a system for preventing a person to fall from a roof of a building onto a lower situated surface, said system comprising a securing system which extends on said roof substantially parallel to and at a distance from an edge of said roof, to which securing system a line can be secured, which line can be secured at its other end to said person, wherein said securing system comprises a multitude of weights which are arranged on said roof in a linear array parallel to and at a distance from an edge of said roof, wherein each of said weights is provided with a through hole, and wherein said securing system comprises a bar extending through each of said through holes, said method comprising the following sequence of steps:

said weights are laid in an array on said roof such that said through holes are being aligned with each other, wherein at least at intervals spaces are left between said weights; and inserting a bar through said aligned through holes of said weights.
14. The method in accordance with claim 13, wherein said intervals are less than 2 times (the square root of ((said distance from an edge of the roof plus 1.4 meter) squared minus (said distance from an edge of the roof) squared)), more preferably 2 times (the square root of ((said distance from an edge of the roof plus 0.85 meter) squared minus (said distance from an edge of the roof) squared)), even more preferably 2 times (the square root of ((said distance from an edge of the roof plus 0.1 meter) squared minus (said distance from an edge of the roof)

squared)), or less than 2 times (the square root of ((said distance from an edge of the roof minus 0.5 meter) squared minus (said distance from an edge of the roof minus 0.8 meter) squared)), more preferably, 2 times (the square root of ((said distance from an edge of the roof minus 0.5 meter) squared minus (said distance from an edge of the roof minus 0.7 meter) squared)), even more preferably 2 times (the square root of ((said distance from an edge of the roof minus 0.5 meter) squared minus (said distance from an edge of the roof minus 0.65 meter) squared)).

15. The method in accordance with claim 13 or 14, wherein said intervals are less than 9 meter, preferably less than 6.5 meter, more preferably less than 4.5 meter, or less than 3 meter, preferably less than 2 meter, more preferably less than 1 meter.



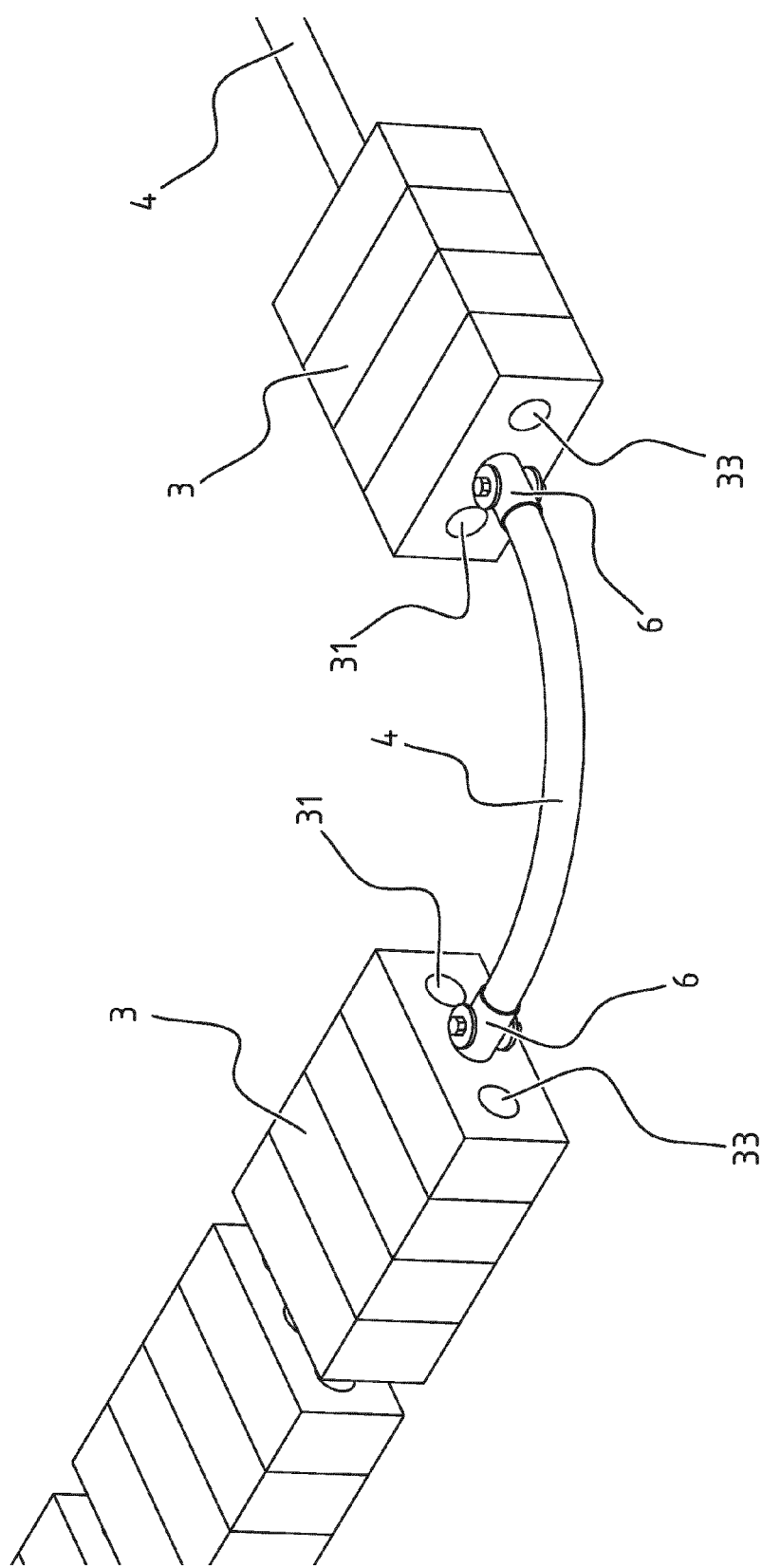
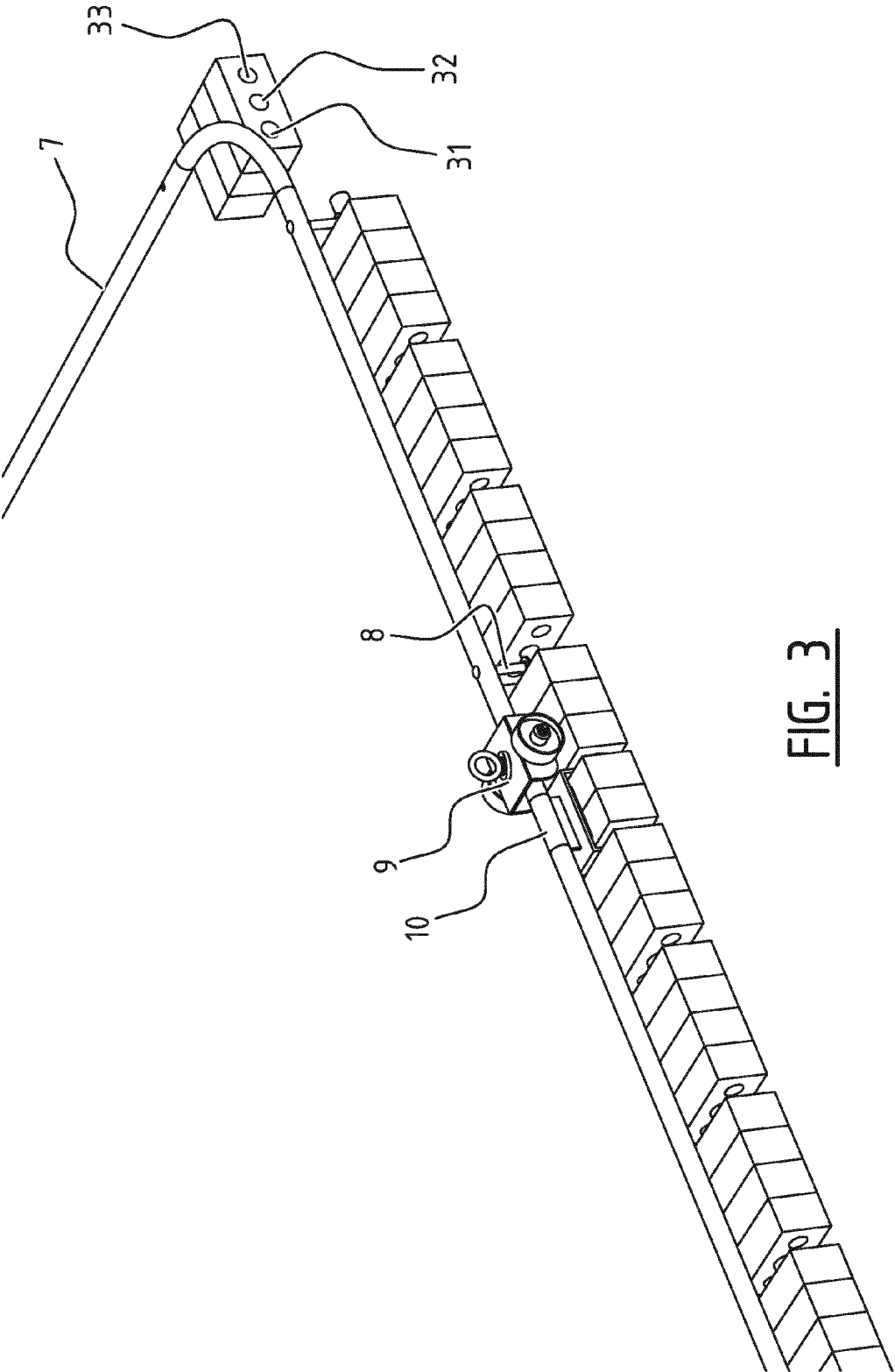


FIG. 2



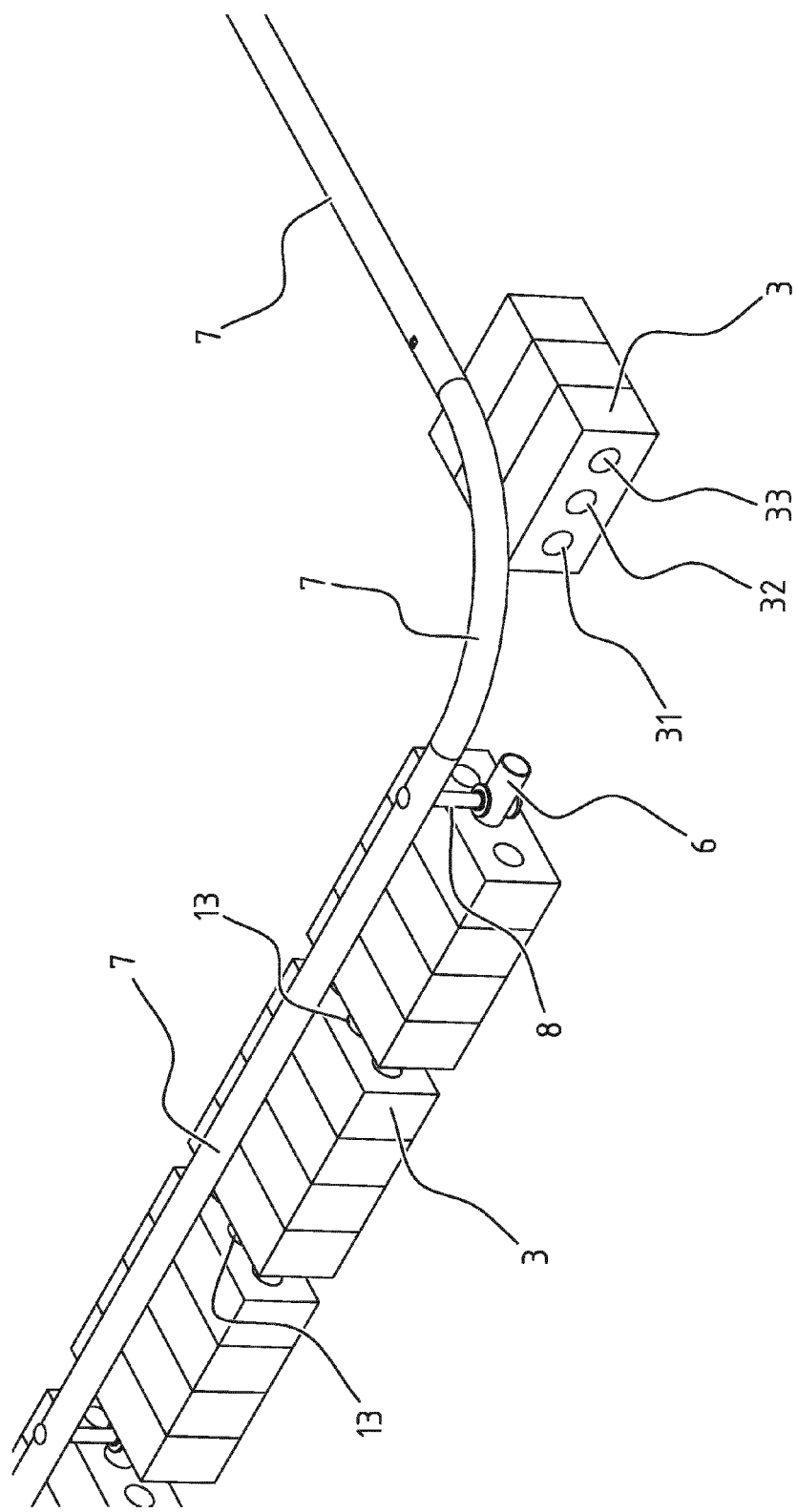


FIG. 4

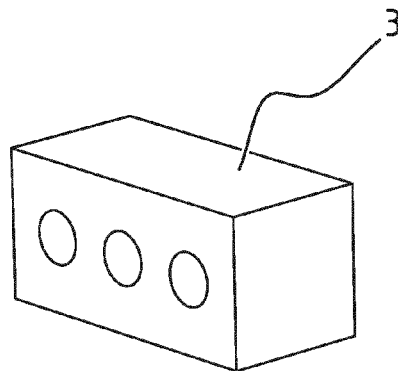


FIG. 5

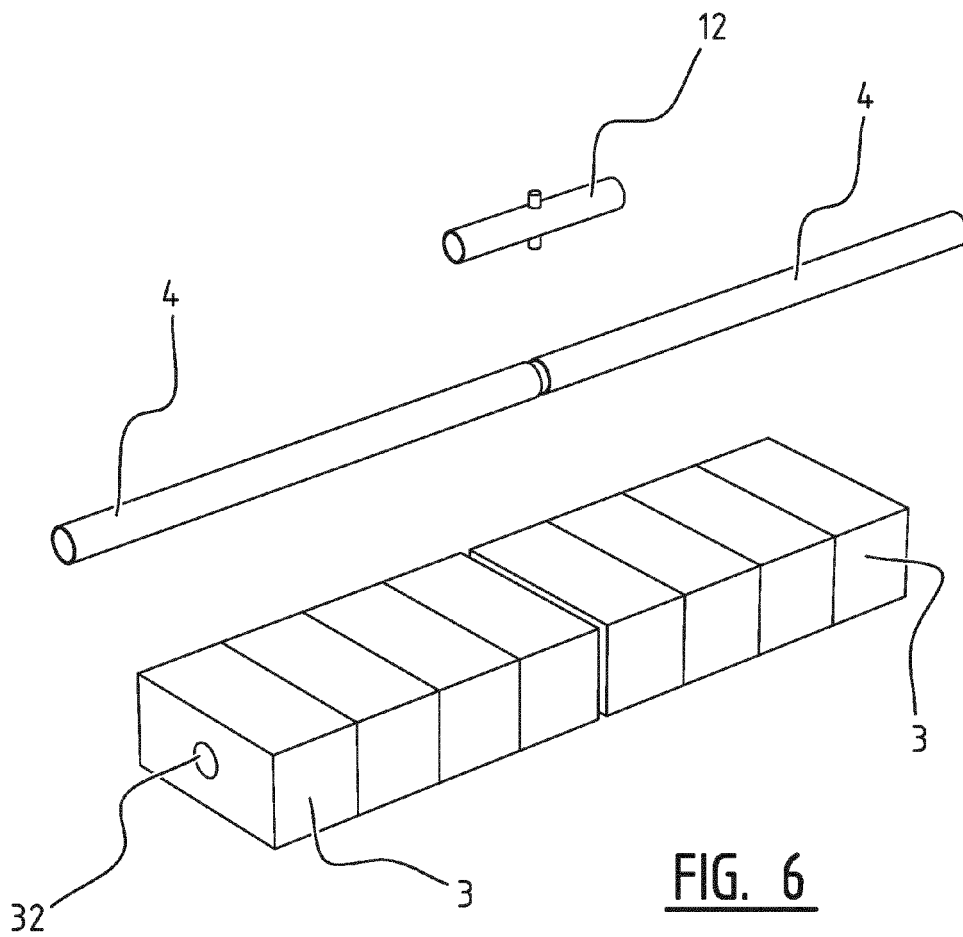


FIG. 6

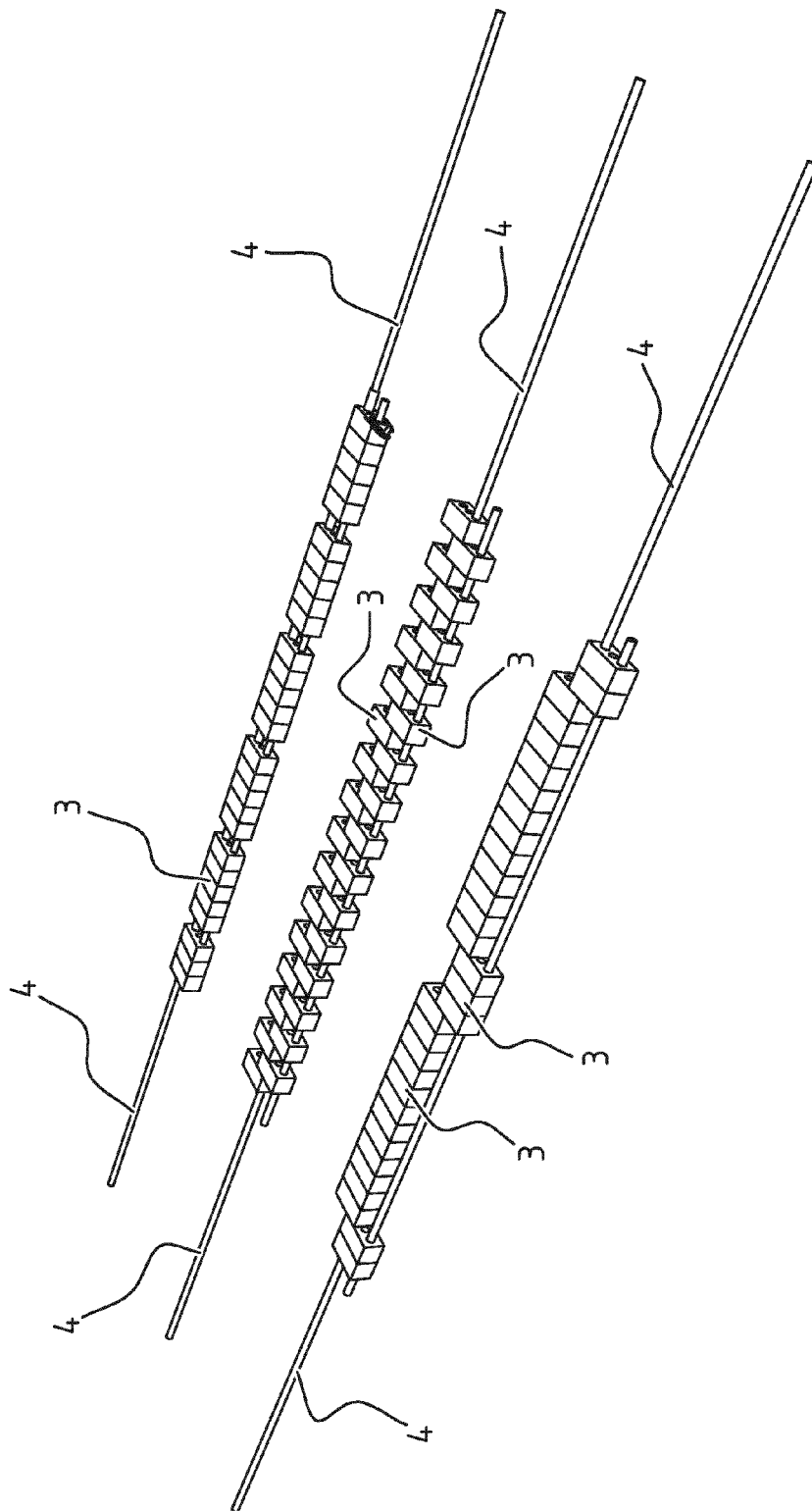


FIG. 7

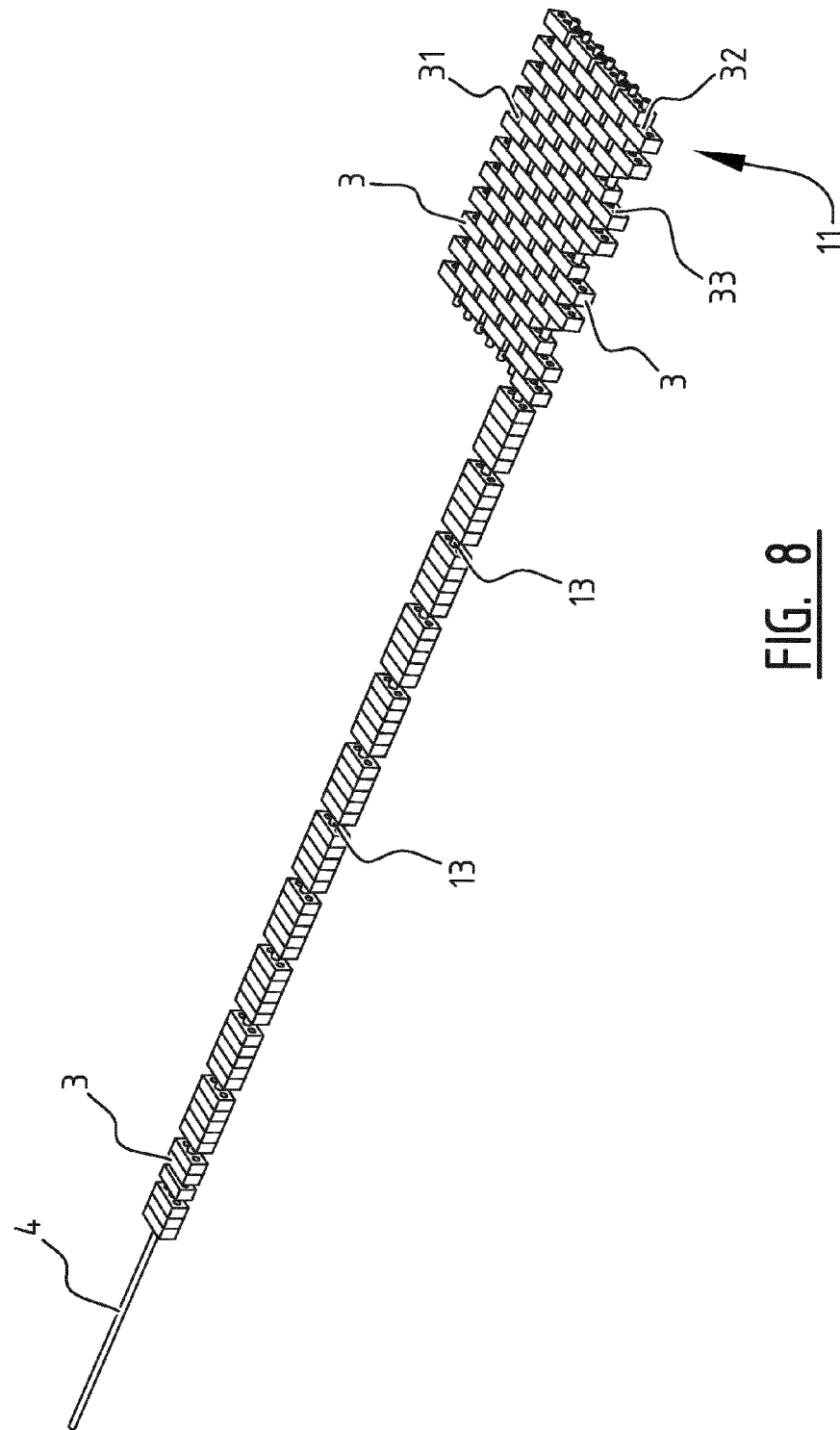


FIG. 8



EUROPEAN SEARCH REPORT

Application Number
EP 13 18 6102

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,D	GB 2 393 206 A (LENNON JAMES BERNARD [IE]) 24 March 2004 (2004-03-24) * figures *	1-15	INV. E04G21/32 A62B35/00
A,D	EP 1 818 480 A2 (HOLLAND DAK ACCESSOIRES BEHEER [NL]; BOKO B V [NL] GEBE GEBIEDSBEGRENZ) 15 August 2007 (2007-08-15) * figures *	1,13	
			TECHNICAL FIELDS SEARCHED (IPC)
			E04G A62B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 27 January 2014	Examiner Andlauer, Dominique
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	

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EPO FORM 1503 03 82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 13 18 6102

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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27-01-2014

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GB 2393206	A	24-03-2004	NONE

EP 1818480	A2	15-08-2007	EP 1818480 A2 15-08-2007
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REFERENCES CITED IN THE DESCRIPTION

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