

(19)



(11)

**EP 3 392 447 A1**

(12)

**EUROPEAN PATENT APPLICATION**

(43) Date of publication:  
**24.10.2018 Bulletin 2018/43**

(51) Int Cl.:  
**E06B 9/58 (2006.01)**      **E06B 9/13 (2006.01)**  
**E06B 9/40 (2006.01)**      **E04F 10/06 (2006.01)**

(21) Application number: **18167437.5**

(22) Date of filing: **16.04.2018**

(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**

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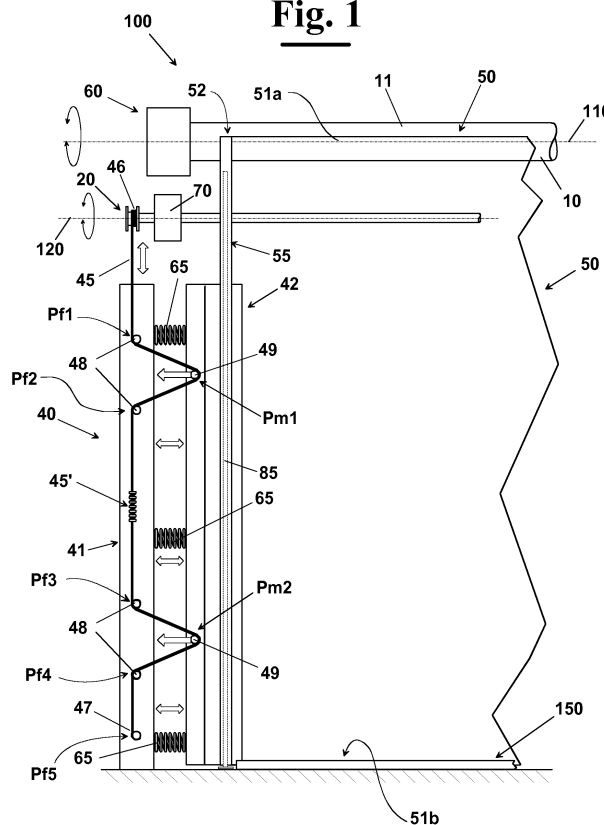
(30) Priority: **20.04.2017 IT 201700043658**

(54) **STRETCHING DEVICE FOR A ROLLER CURTAIN**

(57) A system ( 100 ) for tensioning roller curtains ( 50 ) comprising a flexible curtain ( 50 ) and a winding/unwinding roller ( 10 ) having a support surface ( 11 ) and rotatably mounted about a longitudinal rotation axis ( 110 ) to cause alternatively the unwinding, or the winding of the flexible curtain ( 50 ). The system ( 100 ) pro-

vides, furthermore, a stretching device ( 40 ) configured to move from a rest configuration, to a stretched configuration in which it is adapted to exert a determined stretching force on the flexible curtain ( 50 ) when this is arranged in said unwound configuration.

**Fig. 1**



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## Description

### Field of the invention

**[0001]** The present invention relates to the field of curtains, such as curtains and sun curtains for outside, in particular of the type that is wound about a winding roller.

**[0002]** In particular, the invention relates to a tensioning system for roller curtains.

### Description of the prior art

**[0003]** As known, a great variety of curtains exists, in particular of roller curtains, i.e. of curtains that are able to move from a rest configuration, in which they are wound about a winding roller, to an operative configuration, in which they are, instead, unwound from the winding roller, in such a way to close an aperture, for example a window, a door, but also a space between two uprights of a support structure such as a gazebo, a pergola, or a canopy. Generally, the roller curtains of prior art, at the free end, i.e. at the end that is not fixed to the winding roller, are "made heavy" by a bar, or end bar. This, besides of assisting the unwinding of the curtain from the winding roller, is also used for engaging the curtain to two lateral guides arranged at opposite sides of the curtain. More precisely, the opposite end portions of the end bar are slidingly engaged into respective lateral guides.

**[0004]** In particular, the roller curtains are usually used in outside environments as barriers against the atmospheric agents, in particular the wind and the sun, and, therefore, have the drawback that, when they are arranged in the operative configuration, i.e. when they are unwound from the winding roller, are exposed to the atmospheric agents, in particular the wind, but also the rain, the snow, etc.

**[0005]** Many solutions have been adopted in order to solve the above mentioned drawback, and, therefore, in order to prevent that the curtain can be moved from the correct operative position, owing to a sudden wind blow, or to a particularly strong rain, and causing an unwanted "knocking" of the curtain that can cause damages to the curtain same, besides of compromising its main function, i.e. to form a barrier between a determined environment and the atmospheric agents.

**[0006]** A solution adopted provides to equip the lateral guides, at which the opposite end portions of the end bar slide, with bristles, i.e. with elements having a high friction, in order to contrast, a sudden blow of wind. However, this solution is not satisfactory, because, a modest wind is sufficient in order to win the friction produced by the above mentioned bristles and causes the curtain to exit the lateral guides.

**[0007]** Other solutions adopted provide to block the end bar by means of pawls, bolts, or similar locking devices.

**[0008]** However, this solution, besides not being particularly effective and able to satisfactory solve the prob-

lem, has also an aesthetic impact on the product.

**[0009]** Analogous drawbacks are noted also in the case in which the curtain provides, at the lateral portions, reinforcement elements, usually round bars, in order to attempt to stiffen the structure.

**[0010]** In US881507 a system is described for guiding the sliding of the window-screen made of fabric during winding of the same about a winding roller, or the unwinding. The system comprises a bar, about which the screen made of fabric is wound, that is positioned in a first guide channel, which is housed within an outermost second guide channel. The upper portion of the bar is maintained in position by a bracket to which it is fixed by means of rivets. The upper edge of the screen made of fabric is engaged to the bar, at a second turned bracket with respect to the first, and is slidingly mounted in the first guide channel in order to allow to unwind the screen made of fabric from the winding roller on which it is wound, or to wind it on the same.

### Summary of the invention

**[0011]** It is therefore an object of the present invention to provide a system for tensioning roller curtains that is able to solve the above mentioned drawbacks of the prior art solutions.

**[0012]** It is in particular an object of the present invention to provide a system for tensioning roller curtains that can be easily inspected, in such a way to simplify the assembly and installation steps and to carry out ordinary and extraordinary maintenance interventions.

**[0013]** These and other objects are achieved by the system, according to the invention, for tensioning curtains, in particular roller curtains, comprising:

- a flexible curtain;
- a winding/unwinding roller having a support surface and rotatably mounted about a longitudinal rotation axis, said winding/unwinding roller being configured to rotate about the above disclosed longitudinal rotation axis in a first direction of rotation to cause the unwinding of said flexible curtain from said support surface up to obtain an unwound configuration, or in a second direction of rotation, opposite to the first, in order to cause the winding of the flexible curtain about said support surface up to obtain a wound configuration, said flexible curtain having a first extremity portion fixed to said support surface, and a second extremity portion opposite to the first;
- an actuation device adapted to cause said winding/unwinding roller to rotate in said first, or in said second, direction of rotation about said longitudinal rotation axis;

whose main characteristic is to provide:

- a stretching device adapted to move from a rest configuration, to a stretched configuration, said stretch-

ing device being configured to exert, in said stretched configuration, a determined stretching force, substantially horizontal, on said flexible curtain, when the flexible curtain is arranged in said unwound configuration;

and that the stretching device comprises:

- at least a hollow containment body defining a housing and having an inlet mouth to reach said housing, said hollow containment body being positioned laterally to said flexible curtain;
- at least a fixed body housed in said housing;
- at least a movable body configured to slide transversally to said flexible curtain and housed within said housing, said movable body being arranged to engage, in use, a lateral portion of said flexible curtain arranged in said housing through said inlet mouth;
- at least a tensioning cable having a first end fixed to a support rotatably mounted about a rotation axis, said tensioning cable being, furthermore, engaged to said movable body and to said fixed body in at least a respective engagement point, said support being configured to rotate in a first direction of rotation to subject said tensioning cable to a tractive force such to cause said movable body to move from a position distant from said fixed body to a position close to said fixed body, to exert said determined stretching force substantially horizontal on the flexible curtain, which, therefore, is arranged in a laterally stretched configuration.

**[0014]** Further features of the invention are defined in the dependent claims.

**[0015]** Preferably, the, or each, cable has a second end fixed to a respective fixed body of said stretching device. Alternatively, the possibility is also provided that the second end can be fixed to the movable body.

**[0016]** More precisely, the, or each, engagement point is interposed between the first end and the second end, and, furthermore, an additional actuation device is provided adapted to cause the support to rotate about the rotation axis in a first direction of rotation to cause the, or each, tensioning cable to be wound about the support, in such a way that the cable is subjected to a determined tractive force adapted to cause the movable body to it engaged, to move from the distant position to the close position with respect to said respective fixed body.

**[0017]** In particular, furthermore, a plurality of guide members can be provided adapted to define a predetermined path for the, or each, tensioning cable. More in particular, the, or each, path defined by the guide members passes through the, or each, engagement point. More in detail, the, or each, tensioning cable and the above mentioned plurality of guide members are configured to exert at the, or each, engagement point, the above mentioned substantially horizontal force on the movable body and, therefore, a lateral stretching force that is sub-

stantially uniform on the flexible curtain.

**[0018]** Advantageously, a first support is provided configured to rotate about a first rotation axis to wind/unwind the first tensioning cable, and a second support configured to rotate about a second rotation axis to wind/unwind said second tensioning cable.

**[0019]** Preferably, the first and the second support are positioned at opposite sides with respect to the flexible curtain and are operatively connected to each other in such a way that they can be simultaneously actuated.

**[0020]** In particular, the first and the second support can be rotatably mounted about a same transmission shaft, at opposite sides.

**[0021]** Preferably, the second extremity portion of the flexible curtain is fixed to an end bar. More precisely, the end bar is adapted to make the flexible curtain heavy at the second extremity portion, in such a way to maintain it stretched and, therefore, to assist, in particular, the step of winding of the same on the support surface of the winding/unwinding roller.

**[0022]** In particular, the end bar can have at least an end portion adapted, in use, to engage, free to slide, in a respective inlet mouth of a respective hollow containment body. In this way, the flexible curtain is guided during the winding and unwinding steps on/from the support surface.

**[0023]** In a possible embodiment of the invention, the, or each, lateral portion of the flexible curtain is engaged, in use, to a support bar. For example, the support bar can be adapted to engage into a slot of which the lateral portion of the flexible curtain is provided.

**[0024]** Advantageously, the rotation axis of the, or each, support is parallel to the rotation axis of the above mentioned winding/unwinding roller.

**[0025]** Preferably, at least a return elastic member is, furthermore, provided configured to elastically oppose the displacement of said, or each, movable body from the distant position to the close position with respect to the respective fixed body. In particular, the, or each, return elastic member is adapted to bring the, or each, movable body back from the close position to the distant position with respect to the respective fixed body, when the stretching device is brought from the stretched configuration back to the rest configuration.

**[0026]** In a preferred embodiment, the, or each, fixed body, and/or the, or each, movable body and/or the, or each, hollow containment body is an extruded profile which extends laterally to the flexible curtain.

**[0027]** In particular, the, or each, fixed body, and/or the, or each, movable body and/or the, or each, hollow containment body, and/or the, or each, support bar, can extend substantially for the whole length of the flexible curtain arranged in the unwound configuration.

**[0028]** Advantageously, the above mentioned tensioning cable has an end fixed to an additional winding/unwinding roller and another end fixed to the fixed body, or to the movable body, of the stretching device. More precisely, when the tensioning cable is wound about the ad-

ditional winding/unwinding roller, it is subjected to a determined tractive force, which causes the movable body to move towards the fixed body. Therefore, the flexible curtain is subjected to the above mentioned stretching force.

**[0029]** In a possible embodiment, both the first and the second tensioning cable are rotatably mounted about the same additional winding/unwinding roller, at opposite sides.

**[0030]** Advantageously, an actuation device is provided configured to selectively cause the winding/unwinding roller to rotate about the longitudinal rotation axis in the first direction of rotation, or in the second direction of rotation.

**[0031]** In particular, an additional actuation device can be, furthermore, provided configured to selectively cause, as above described, the additional winding/unwinding roller to rotate about its longitudinal rotation axis in a first direction of rotation, in order to cause the winding of the tensioning cable about the additional winding/unwinding roller, and therefore in order to subject the flexible curtain to the above mentioned stretching force, or otherwise in the opposite direction of rotation, in order to bring the tensioning cable in the rest configuration.

#### Brief description of the drawings

**[0032]** The invention will now be shown with the following description of its exemplary embodiments, exemplifying but not limitative, with reference to the attached drawings in which:

- Fig. 1 diagrammatically shows an elevational front view of a first embodiment of the tensioning system, according to the invention, for roller curtains;
- Figs. 2 and 3 show in detail two sectioned views according to a horizontal plane and two possible embodiments of the tensioning system, according to the invention, for roller curtains;
- Fig. 4 shows a partial perspective view of the tensioning system for roller curtains of figure 1;
- Fig. 5 diagrammatically shows an alternative embodiment of the tensioning system for roller curtains of figure 1;
- Figs. 6 and 7 diagrammatically show sectioned views according to a horizontal plane of the tensioning system for roller curtains of figure 5, respectively in a rest configuration, and in a stretched configuration;
- Fig. 8 diagrammatically shows a partial perspective view of an alternative embodiment of the tensioning system, according to the invention, for roller curtains;
- Fig. 9 diagrammatically shows a transversal sectioned view of the tensioning system of figure 8;
- Figs. 10 and 11 show plan views of an alternative embodiment of the invention for the hollow containment body, respectively in an assembled configuration, and in an open configuration.

#### Detailed description of some exemplary embodiments of the invention

**[0033]** As diagrammatically shown in figure 1, a system 100, according to the invention, for tensioning roller curtains 50, of the type made of a flexible material, in particular a plastic material, such as PVC, or a fabric, in case covered by a film of plastic material, in particular in order to make them waterproof, provides a winding/unwinding roller 10 rotatably mounted about a longitudinal rotation axis 110. In particular, the flexible curtain 50 has a first extremity portion 51a fixed to the support surface 11 of the winding/unwinding roller 10 and a second extremity portion 51b opposite to the first. More in detail, the winding/unwinding roller 10 is configured to rotate about the above mentioned longitudinal rotation axis 110, in a first direction of rotation in order to cause the flexible curtain 50 to be unwound from the support surface 11 up to obtain an unwound configuration (see figure 1), or in a second direction of rotation, opposite to the first direction of rotation, in order to cause the flexible curtain 50 to be wound about the support surface 11, up to obtain a wound configuration. An actuation device 60 is, furthermore, provided adapted to cause the winding/unwinding roller 10 to rotate in the first, or in the second direction of rotation, about the rotation axis 110. More precisely, the actuation device 60 can be an electric motor, or a capstan manually operated, provided with a handle, or an analogous device.

**[0034]** The system 100 is, then, provided of a stretching device 40 configured to move from a rest configuration, in which it does not exert any force on the flexible curtain 50, to a stretched configuration, in which it is adapted to exert a determined stretching force, in particular a horizontal force, on the flexible curtain 50, when this is arranged in the unwound configuration of figure 1, or 5. According to the invention, the above mentioned stretching device 40 provides a hollow containment body 30 positioned laterally to the above mentioned flexible curtain 50 and defining a housing 35. In particular, the hollow containment body 30 can be provided of an inlet mouth 31, through which it is possible to reach the inside of the housing 35. Into the housing 35 at least a fixed body 41 is provided, in particular fixed to the hollow containment body 30 and, therefore, to a fixed support, such as a wall, or a vertical upright of a support structure, to which the containment body 30 is fixed. More in particular, within the housing 35 a movable body 42 can be also provided engaged, in use, to a respective lateral portion 55 of the flexible curtain 50. In particular, the movable body 42 is slidingly mounted, in such a way to slide along a sliding direction 140 (see figure 4). In particular, the sliding direction 140 is orthogonal to the winding/unwinding direction of the flexible curtain 50, in such a way to exert the above mentioned horizontal force on the curtain 50.

**[0035]** In an embodiment of the invention shown in detail in the figures 2 and 3, the lateral portion 55 of the

flexible curtain 50 can provide a slot 52. More precisely, the slot 52 can be used to engage a support bar 85 to the lateral portion 55 of the flexible curtain 50. The support bar, in particular, extends laterally to the flexible curtain 50, in the case that is shown in figure along a substantially vertical direction, and it is mounted within the hollow containment body 30. More in particular, in an embodiment of the invention, the support bar 85 is slidingly mounted within a seat 142, of which the movable body 42 is provided. In this case, therefore, the movable body 42, advantageously, provides an opening 62, in which, in use, the lateral portion 55 of the flexible curtain 50 is positioned. In other words, the support bar 85 is engaged to the movable body 42, by means of the flexible curtain 50 that is engaged, also this, to the movable body 42 same, at the lateral portion 55. Therefore, when the movable body 42 is actuated by the stretching device 40 to slide towards the fixed body 41, or in the opposite direction, also the support bar 85 moves in the same direction and, therefore, the flexible curtain 50, engaged to it, is arranged in the stretched configuration, or in the rest configuration, respectively.

**[0036]** In a preferred embodiment of the invention, the stretching device 40 provides at least a tensioning cable 45 engaged to the movable body 42 in at least an engagement point Pm, for example in 2 engagement points Pm1 and Pm2. More precisely, the tensioning cable 45 is configured to cause a motion, in particular a transversal translation, to the flexible curtain 50, of the movable body 42 in order to move it from a position distant from the fixed body 41, in which no horizontal stretching force is exerted on the flexible curtain 50, which is, therefore, arranged in a rest configuration, to a position close to the fixed body 41, in which the tensioning cable 45 is adapted to exert a determined substantially horizontal force on the movable body 42 that causes the flexible curtain 50 to be laterally stretched, and, therefore, arranged in a laterally stretched configuration. Unlike the prior art solutions, the present invention, allows to guarantee that the flexible curtain 50, when this is arranged in the unwound configuration, is maintained stretched and, therefore, in a correct operative position and it is avoided, in particular, that a sudden blow of wind can cause damages, or that the exiting from the lateral guides, if these are present.

**[0037]** According to an embodiment of the invention, at least one between the above mentioned fixed body 41 and the above mentioned movable body 42 is an elongated element extending laterally to the flexible curtain 50, substantially for the whole of its length. Advantageously, the hollow containment body 30 can be an extruded profile, in particular made of metallic material, or made of plastic material, which extends laterally to the curtain, substantially for the whole length. Advantageously, at least one between the above mentioned fixed body 41 and the above mentioned movable body 42 can be an extruded profile, in particular made of metallic material, or made of plastic material. Furthermore, the pos-

sibility is provided that the fixed body 41 is a section bar having substantially a C-shaped cross section fixed by means of screws, bolts, or similar elements, to the hollow containment body 30 (figure 2). Alternatively, the fixed body 41 and the hollow containment body 30 can be a single piece, for example produced by extrusion of metallic material, or plastic material (figure 3).

**[0038]** The second extremity portion 51b of the flexible curtain 50 is advantageously fixed to an end bar 150. In particular, the end bar 150 has essentially the function to make the flexible curtain 50 heavy at the second extremity portion 51b, in such a way to assist the unwinding of the curtain 50 from the support surface 11 of the winding/unwinding roller 10.

**[0039]** In the preferred embodiment shown, for example, in figure 1, the tensioning cable 45 has a first end 46 fixed to a support 20 rotatably mounted about a rotation axis 120, and is engaged to the other point Pf, for example a second end 47, to the fixed body 41, and to the movable body 42 at another engagement point Pm. In particular, many engagement points, for example 2 engagement points Pm1 and Pm2, can be provided, at which the tensioning cable 45 is adapted to exert a force, which has a substantially horizontal component, on the movable body 42. This force is, then, transmitted from the movable body 42 to the support bar 85 that is engaged to it, and, therefore, to the flexible curtain 50, which is, instead, engaged to the support bar 85 at slot 52. The engagement points Pm1 and Pm2 are both interposed, in this case, between the first and the second end 46 and 47 of cable 45. In the case shown by way of example in figure 1, the tensioning cable 45 is engaged to the fixed body 41 at five points Pf1-Pf5. Furthermore, an additional actuation device 70 is provided that can be, for example, an electric motor, or otherwise a capstan manually operated, or a similar device, adapted to cause the support 20 to rotate about the rotation axis 120, in a first direction of rotation, or in the opposite direction of rotation. More in detail, the rotation of support 20 about the rotation axis 120 in the first direction of rotation, causes the winding of the tensioning cable 45 about support 20. In this way, the tensioning cable 45 is subjected to a determined tractive force that is transmitted to the movable body 42 at the engagement point, or points, Pm1, Pm2. This causes, therefore, the displacement of movable body 42 from the distant position to the close position with respect to the fixed body 41 and therefore the positioning of curtain 50 in the above mentioned stretched configuration.

**[0040]** As diagrammatically shown, for example in figure 1, a plurality of guide members 48, 49, for example idler pins, or similar elements as for example idler pulleys, is provided adapted to define a predetermined path for the tensioning cable 45 between the ends 46 and 47. The tensioning cable 45 can be advantageously made of an elastic material, or it can be integral to at least an elastic body 45', for example at least a linear spring.

**[0041]** More precisely, the above mentioned path passes through the, or each, engagement point Pm1,

Pm2, at which the cable 45 engages the movable body 42, in order to exert the above mentioned substantially horizontal force, which causes the flexible curtain 50 to be laterally stretched, as well as through the, or each engagement point Pf1, Pf2, at which the cable 45, instead, engages the fixed body 41. In the example shown in figure 4, both the guide members 48a fixed to the fixed body 41, and the guide members 49a fixed to the movable body 42 are provided. In the exemplary embodiment shown in figure 4, the guide members 48a are fixed to the fixed body 41 at protruding portions substantially shaped as two wings 44a and 44b, of which it is provided. Analogously, the guide members 48, 49 are fixed to the movable body 42 at protruding portions 43a and 43b, also these, for example, shaped as lateral wings. However, other solutions are possible.

**[0042]** In the preferred embodiment of the invention shown in the figures from 5 to 7, the stretching device 40 provides a first and a second hollow containment body 30a and 30b arranged at opposite sides with respect to the flexible curtain 50. More precisely, each hollow containment body 30a, or 30b, is adapted to define a housing 35a, or 35b, within each of which a fixed body 41a, 41b and a movable body 42a, 42b, are provided. More precisely, the stretching device 40 provides a first movable body 42a adapted to engage, in use, a first lateral portion 55a of flexible curtain 50, and a second movable body 42b adapted to engage, in use, a second lateral portion 55b at the opposite side with respect to the first movable body 42a. In this case, advantageously, a first and a second tensioning cable 45a and 45b are provided. Each tensioning cable 45a and 45b is configured to be wound/unwound about/from a first support 20a and a second support 20b, respectively. Each support 20a, 20b is rotatably mounted about a rotation axis 120a, 120b in such a way that, analogously to what above described with reference to the case of a single tensioning cable 45, it can apply a determined horizontal stretching force, respectively, on a first and a second movable body 42a and 42b, respectively, at engagement points P1a, P2a, and P1b, P2b in order to cause a motion between a position close, and a position distant, respectively, with respect to a first and to a second fixed body 41a, 41b.

**[0043]** In particular, the first and the second support 20a, 20b can be rotatably mounted about a same transmission shaft 130, at opposite sides, in such a way to be simultaneously actuated to rotate about a same rotation axis 120. In this way, it is guaranteed that the two tensioning cables 45a and 45b are simultaneously subjected substantially to the same tractive force, and therefore, that they can exert, at the engagement points Pmia, Pmib, with  $i=1\dots n$ , of the opposite lateral portions 55a and 55b of curtain 50, substantially the same stretching force. Therefore, this guarantees to maintain the curtain 50 in a correct stretched configuration, in which the curtain same is perfectly stretched. Therefore, it is avoided that, during the use of the curtain, i.e. when it is arranged in the unwound configuration, folds can be formed, and

it is, therefore, guaranteed that the curtain 50 correctly "reacts" to sudden blows of wind, in such a way to prevent damages, or that the curtain is moved from the correct operative position.

**[0044]** Advantageously, the above mentioned end bar 150, at the opposite end portions 151 and 152, is adapted to engage, free to slide, respective inlet mouths 31a and 31b of the hollow containment bodies 30a and 30b. Practically, therefore, the hollow containment bodies 30a and 30b act as lateral guides during winding and unwinding of flexible curtain 50. More in detail, at the opposite end portions 151 and 152, the end bar 150 can provide engagement portions, for example of removable type, 156 and 157. These can be made of a different material with respect to the one of the bar 150, for example a plastic material, e.g. PVC, nylon or similar materials. As diagrammatically shown in figure 8, the flexible curtain 50 can be engaged to the end bar 150 at a longitudinal slit 155, which extends, advantageously, for the whole of its length, i.e. between the end portions 151 and 152, and if the end portions 156 and 157 are present for the whole length of these too.

**[0045]** Advantageously, the system 100 according to the invention, provides, furthermore, at least a return elastic member 65, for example one, or more, spiral spring, adapted to oppose the displacement of the, or each, movable body 42 from the position distant from the respective fixed body 41 to the close position. In other words, in order to move the movable body 42 from the distant position to the position close to the fixed body 41, it is necessary to win the elastic force exerted by the, or each, return element 65. Once the stretching device 40 is, instead, brought back in the rest configuration, in which it does not exert the above mentioned horizontal stretching force on the flexible curtain 50, the return elastic element 65 brings the movable body 42, or each movable body 42a, 42b back in the above mentioned position distant from the fixed body 41, or from the respective fixed body 41a, 41b, that means that the return occurs from the condition shown in figure 7 to the condition shown in figure 6, in which the flexible curtain 50 is not horizontally stretched.

**[0046]** As shown in detail in the figures 8 and 9, the, or each, movable body 42 can be positioned above a respective base body 90 free to slide with respect to it. More in detail, the, or each, base body 90 is a fixed body, and is provided of a slot hole 95 arranged along the sliding direction 140, within which, in use, the support bar 85 is slidingly engaged. In a possible embodiment, the base body 90 has a substantially "C-shaped" cross section, and the support bar 85 provides an enlarged portion 92, for example by a nut, a flat washer, or the like, having a diameter greater than the slot hole 95 and is arranged, in use, at the opposite side of the movable body 42 with respect to the base body 90 (figure 9). In this way, the support bar 85, besides of being able to slide along the sliding direction 140, is at least in part free to slide along a direction 185 substantially orthogonal to the sliding di-

rection 140. In particular, the stroke of the support bar 85 along direction 185 is defined between the upper wall 91 of the base body 90 and a base surface 71. At this regard, it is suitable to explain that the hollow containment body 30 as well as the other components above disclosed, in particular the base body 90, can be mounted on a base plate 75 provided of the above mentioned base surface 71.

**[0047]** Another alternative embodiment of the invention is, finally, shown in the figures 10 and 11. In this case, the hollow containment body 30 provides a first and a second part 131 and 132, respectively provided of mutual engagement members 133 and 134, which allow the positioning between an assembled configuration in which a mutual firm engagement is carried out (figure 10), and an open configuration, in which the two parts 131 and 132 are disengaged (figure 11). In particular, the mutual engagement members 133 and 134 can provide at least an engagement portion 134, for example a teeth, provided at the second part 132, and adapted to snap-engage a free portion 133 of the first part 131. This solution allows to obtain a hollow containment body 30 that can be easily inspected. In this way, not only both the ordinary and extraordinary maintenance interventions are simplified, but also the steps of assembly and installation of the whole system 100. What above described for the case in which the, or each, movable body 42, or 42a, and 42b, is provided constrained to the lateral portion 55, or 55a, and 55b, of the flexible curtain 50 through the slot 52, or 52a and 52b, and the support bar 85, engaged to it, is to be considered valid also in the case in which the movable body 42, or 42a, and 42b, is constrained to the above mentioned lateral portion by using a different solution, for example by the so called "zip" system.

**[0048]** In an embodiment of the invention not shown in the figures, the, or each, movable body 42 is slidingly mounted on a guide arranged along the above mentioned sliding direction 140.

**[0049]** Even though in the figures from 1 to 10, a structure is shown having substantially vertical development, the tensioning system 100, according to the present invention, can be also used to stretch a flexible curtain 50, which, in operative conditions, is arranged on a substantially horizontal plane, i.e. also in the case of a flexible curtain 50 that is used in support structures such as canopy colonnades, gazebos, and the like.

**[0050]** The foregoing description exemplary embodiments of the invention will so fully reveal the invention according to the conceptual point of view, so that others, by applying current knowledge, will be able to modify and/or adapt for various applications such embodiment without further research and without parting from the invention, and, accordingly, it is therefore to be understood that such adaptations and modifications will have to be considered as equivalent to the specific embodiments. The means and the materials to realize the different functions described herein could have a different nature with-

out, for this reason, departing from the field of the invention. It is to be understood that the phraseology or terminology that is employed herein is for the purpose of description and not of limitation.

## Claims

1. System (100) for tensioning roller curtains (50) comprising:

- a flexible curtain (50);
- a winding/unwinding roller (10) having a support surface (11) and rotatably mounted about a longitudinal rotation axis (110), said winding/unwinding roller (10) being configured to rotate about the above mentioned longitudinal rotation axis (110) in a first direction of rotation to cause said flexible curtain (50) to be unwound from said support surface (11) up to obtain an unwound configuration, or in a second direction of rotation, opposite to the first, in order to cause the flexible curtain (50) to be wound about said support surface (11) up to obtain a wound configuration, said flexible curtain (50) having a first extremity portion (51a) fixed to said support surface (11) and a second extremity portion (51b) opposite to the first extremity portion (51a);
- an actuation device (60) arranged to cause said winding/unwinding roller (10) to rotate in said first, or in said second, direction of rotation about said longitudinal rotation axis (110);

said system (100) being **characterised in that** a stretching device (40) is provided arranged to move from a rest configuration, to a stretched configuration, said stretching device (40) being configured to exert, in said stretched configuration, a determined stretching force, substantially horizontal, on said flexible curtain (50), when said flexible curtain (50) is arranged in said unwound configuration, and **in that** said stretching device (40) provides:

- at least a hollow containment body (30) defining a housing (35) and having an inlet mouth (31) to reach said housing (35), said hollow containment body (30) being positioned laterally to said flexible curtain (50) ;
- at least a fixed body (41) housed, in use, in said housing (35) ;
- at least a movable body (42) configured to slide transversally to said flexible curtain (50) and housed within said housing (35), said movable body (42) being arranged to engage, in use, a lateral portion (52) of said flexible curtain (50) positioned through said inlet mouth (31);
- at least a tensioning cable (45,45a,45b) having a first end (46, 46a, 46b) fixed to a support (20,

20a, 20b) rotatably mounted about ad a rotation axis (120, 120a, 120b), said tensioning cable (45, 45a, 45b) being engaged to said fixed body (41) and to said movable body (42) in at least a respective engagement point (Pf, Pm), said support (20, 20a, 20b) being configured to rotate about said rotation axis (120,120a,120b) in a first direction of rotation to subject said tensioning cable (45, 45a, 45b) to a tractive force such that it causes said movable body (42) to move from a position distant from said fixed body (41), to a position close to said fixed body (41), in order to exert said determined substantially horizontal stretching force on said flexible curtain (50, which is, therefore, arranged in a laterally stretched configuration.

2. System (100) for tensioning roller curtains (50), according to any previous claim, wherein said stretching device (40) provides:

- a first hollow containment body (30a) defining a first housing (35a) and having an inlet mouth (31a) to reach said first housing (35a), said first hollow containment body (30a) being positioned at a first side with respect to said flexible curtain (50);
- a first fixed body (41a) housed in said first housing (35a);
- a first movable body (42a) configured to slide transversally to said flexible curtain (50) and housed within said first housing (35a), said first movable body (42a) being arranged to engage, in use, a first lateral portion (52a) of said flexible curtain (50) that is positioned through said inlet mouth (31a);
- a second hollow containment body (30b) defining a second housing (35b) and having an inlet mouth (31b) to reach said second housing (35b), said second hollow containment body (30b) being positioned at a second side, opposite to the first side, with respect to said flexible curtain (50);
- a second fixed body (41b) housed in said second housing (35b);
- a second movable body (42b) configured to slide transversally to said flexible curtain (50) and housed within said second housing (35b), said second movable body (42b) being arranged to engage, in use, a second lateral portion (52b) of said flexible curtain (50) positioned through said inlet mouth (31b);

and wherein are, furthermore, provided:

- a first and a second tensioning cable (45a,45b) respectively engaged to said first and to said second fixed body (41a, 41b) in at least an en-

gagement point (Pfa, Pfb), and to said first and to said second movable body (42a, 42b) in at least a respective engagement point (Pma, Pmb), each said first and second tensioning cable (45a, 45b) having a first end (46a, 46b) fixed to a respective support (20a, 20b) rotatably mounted about a rotation axis (120a, 120b), said respective support (20a, 20b) being configured to rotate about said rotation axis (120a, 120b) in a first direction of rotation to cause, respectively, said first and said second movable body (42a, 42b) to move from a distant position, respectively, from said first and said second fixed body (41a, 41b), to a close position in such a way to subject said flexible curtain (50) to a lateral stretch at the respective side.

3. System (100) for tensioning roller curtains (50), according to any previous claim, wherein said, or each, tensioning cable (45, 45a, 45b) has a second end (47, 47a, 47b) fixed to said respective fixed body (41, 41a, 41b) of said stretching device (40), said, or each, engagement point (Pfa, Pfb, Pma, Pmb) being interposed between said first end (46, 46a, 46b) and said second end (47, 47a, 47b).

4. System (100) for tensioning roller curtains (50), according to any previous claim, wherein an additional actuation device (70) is, furthermore, provided configured to operate said rotation of said support (20, 20a, 20b) about said rotation axis (120, 120a, 120b) in a first direction of rotation to cause said, or each, tensioning cable (45, 45a, 45b) to be wound about said support (20, 20a, 20b).

5. System (100) for tensioning roller curtains (50), according to claim 1, or 3, wherein at said, or each, engagement point (Pf, Pm) a respective guide member (48, 48a, 48b, 49a, 49b) is provided in such a way to define a predetermined path for said, or each, tensioning cable (45, 45a, 45b) passing through said engagement points (Pf, Pm), said, or each, tensioning cable (45, 45a, 45b) and said plurality of guide members (48, 48a, 48b, 49a, 49b) being configured to exert at said, or each, engagement point (Pma, Pmb), said substantially horizontal force on said movable body (42).

6. System (100) for tensioning roller curtains (50), according to claim 3 wherein a first support (20a) configured to rotate about a first rotation axis (120a) to wind/unwind said first tensioning cable (45a), and a second support (20b) configured to rotate about a second rotation axis (120b) to wind/unwind said second tensioning cable (45b) are provided, said first and second support (20a,20b) arranged at opposite sides with respect to said flexible curtain (50) and being operatively connected in such a way to be si-

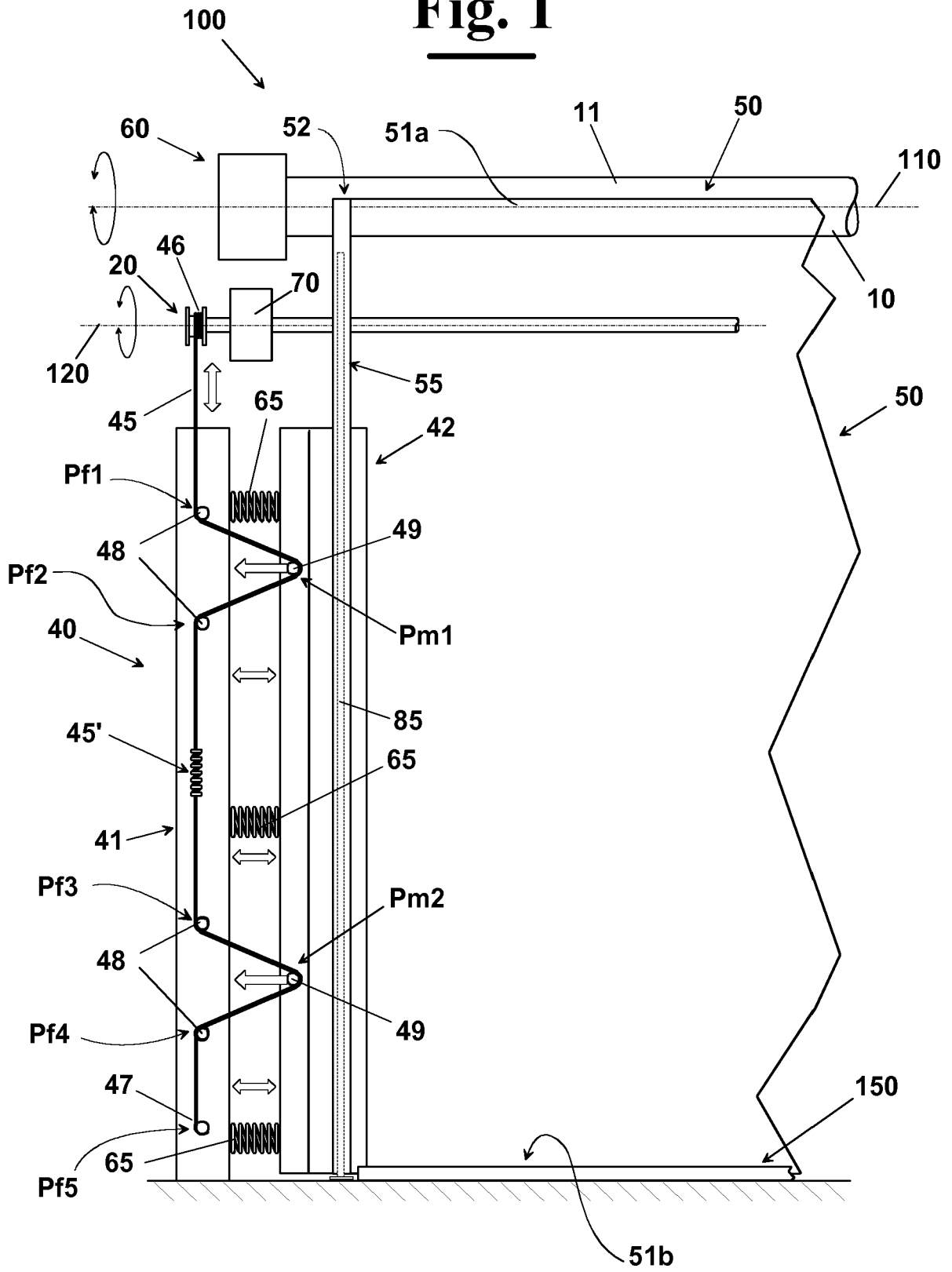
multaneously operated.

7. System (100) for tensioning roller curtains (50), according to claim 6, wherein said first and said second support (20a, 20b) are rotatably mounted about a same transmission shaft (130), at opposite sides.
8. System (100) for tensioning roller curtains (50), according to any previous claim, wherein, at least a return elastic member (65) is provided configured to elastically oppose the displacement of said, or each, movable body (42, 42a, 42b) from said distant position to said close position to the respective fixed body (41, 41a, 41b), said, or each return elastic member (65) being arranged to bring said, or each, movable body (42, 42a, 42b) back from said close position to said close position with respect to the respective fixed body (41, 41a, 41b), when said stretching device (40) is brought back from said stretched configuration to said rest configuration.
9. System (100) for tensioning roller curtains (50), according to any previous claim, wherein said hollow containment body (30) comprises a first and a second part (131, 132), respectively provided of mutual engagement members (133, 134) of removable type, whereby said first and said second part (131, 132) of said hollow containment body (30) are able to move between an assembled configuration, in which they are firmly engaged, and an open configuration, in which they are disengaged.
10. System (100) for tensioning roller curtains (50), according to any previous claim, wherein said, or each, fixed body (41, 41a, 41b), said, or each, movable body (42, 42a, 42b), and said, or each, hollow containment body (30, 30a, 30b) is an extruded profile which extends laterally to said flexible curtain (50) arranged in said unwound configuration, substantially for the whole of its length.
11. System (100) for tensioning roller curtains (50), according to any previous claim, wherein said, or each, movable body (42) is slidingly mounted along a sliding direction (140) orthogonal to an unwinding/winding direction of said flexible curtain (50), in such a way to exert on it said substantially horizontal force.
12. System (100) for tensioning roller curtains (50), according to claim 11, wherein said, or each, movable body (42) is positioned above a respective base body (90) free to slide with respect to it, said, or each, base body (90) being provided with a slot hole (95) arranged along said sliding direction (140) within of which, in use, it is arranged to slidingly engage said support bar (85).
13. System (100) for tensioning roller curtains (50), ac-

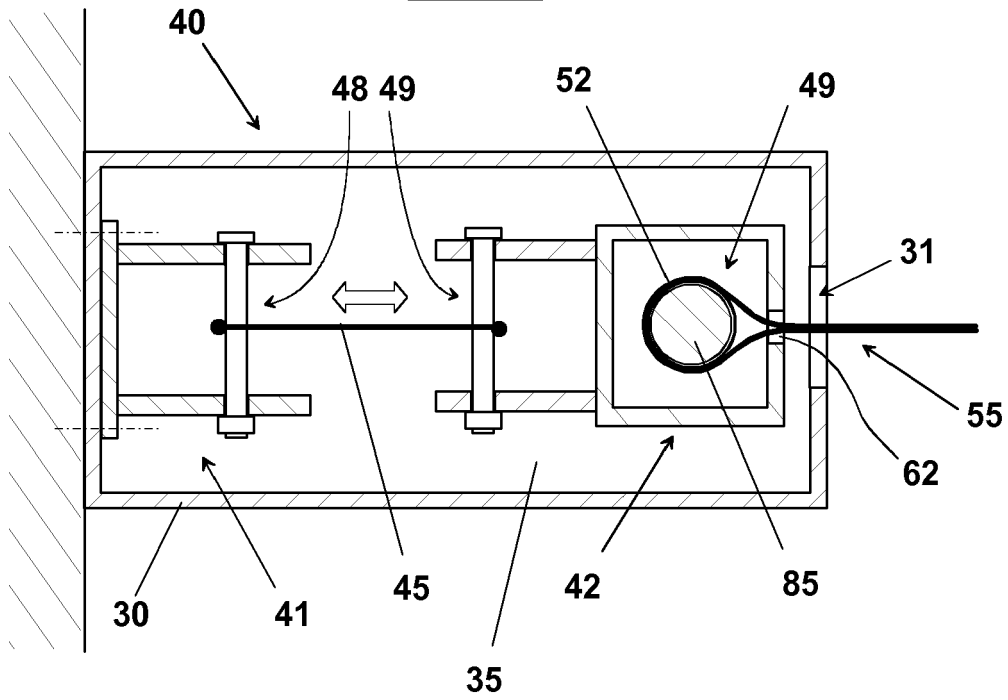
ording to any previous claim, wherein said, or each, movable body (42, 42a, 42b) is slidingly mounted on a guide positioned along said sliding direction (140) .

- 5 14. System (100) for tensioning roller curtains (50), according to any previous claim, wherein, said second extremity portion (51b) of said flexible curtain (50) is fixed to an end bar (150), said end bar (150) having at least an end portion (151, 152), arranged, in use, to engage free to slide in a respective inlet mouth (31a, 31b) of a respective hollow containment body (30a, 30b).
- 10 15. System (100) for tensioning roller curtains (50), according to claim 14, wherein, at said opposite end portions (151, 152), said end bar (150) provides engagement portions of removable type (156, 157) arranged to be engaged, respectively, in said first and in said second inlet mouth (31a, 31b) of said first and of said second hollow containment body (30a, 30b), said end bar (150) and said end portions (156, 157) providing a longitudinal slit (155) at which said flexible curtain (50) is arranged to engage.
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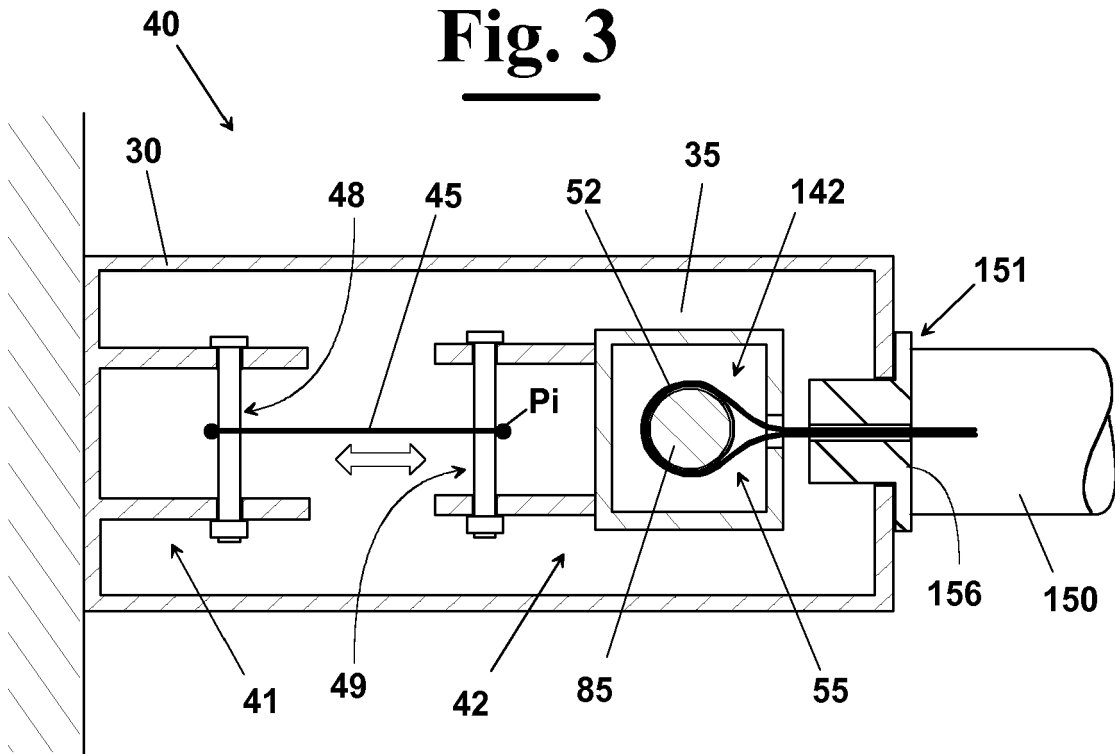
**Fig. 1**



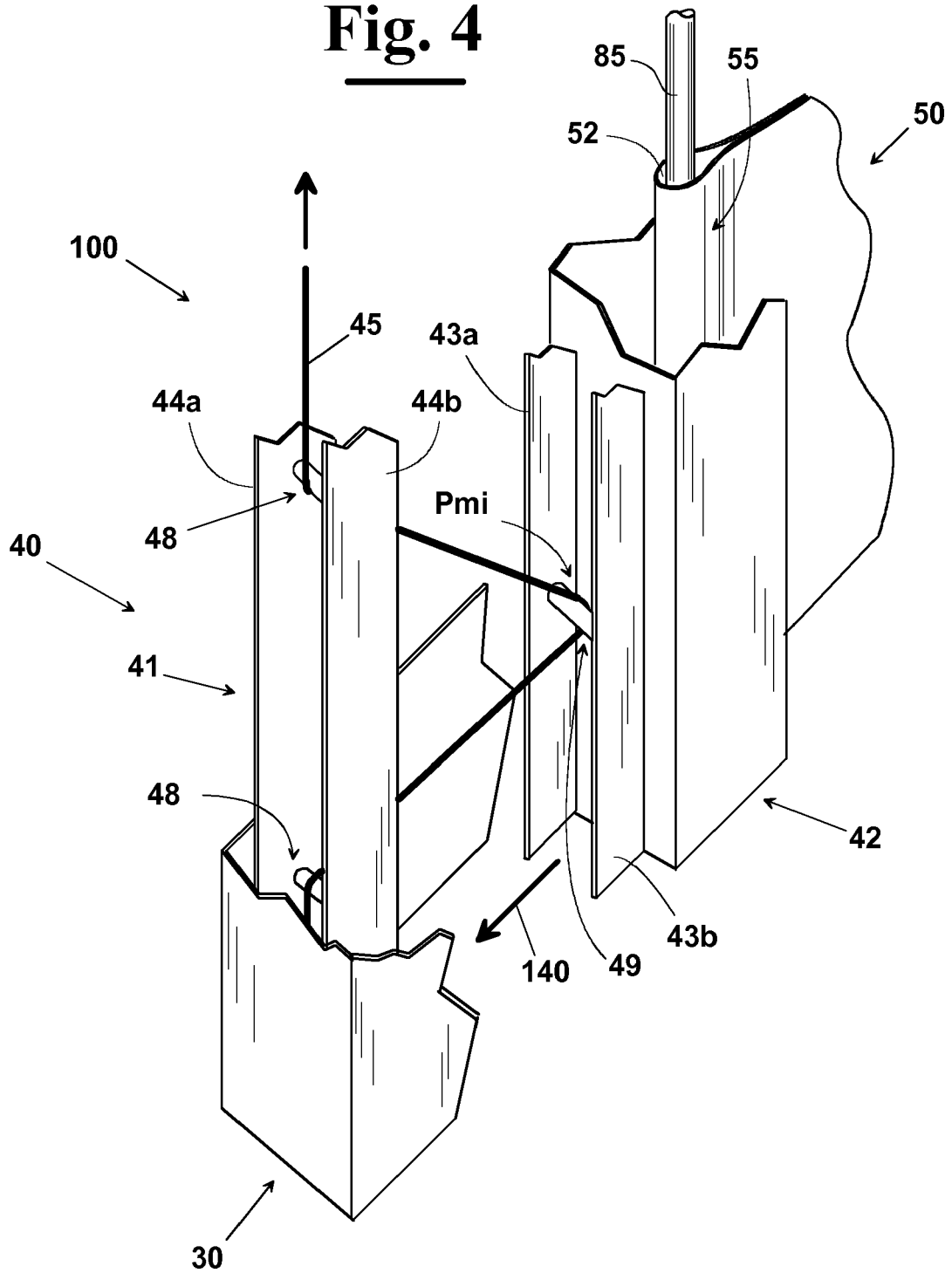
**Fig. 2**



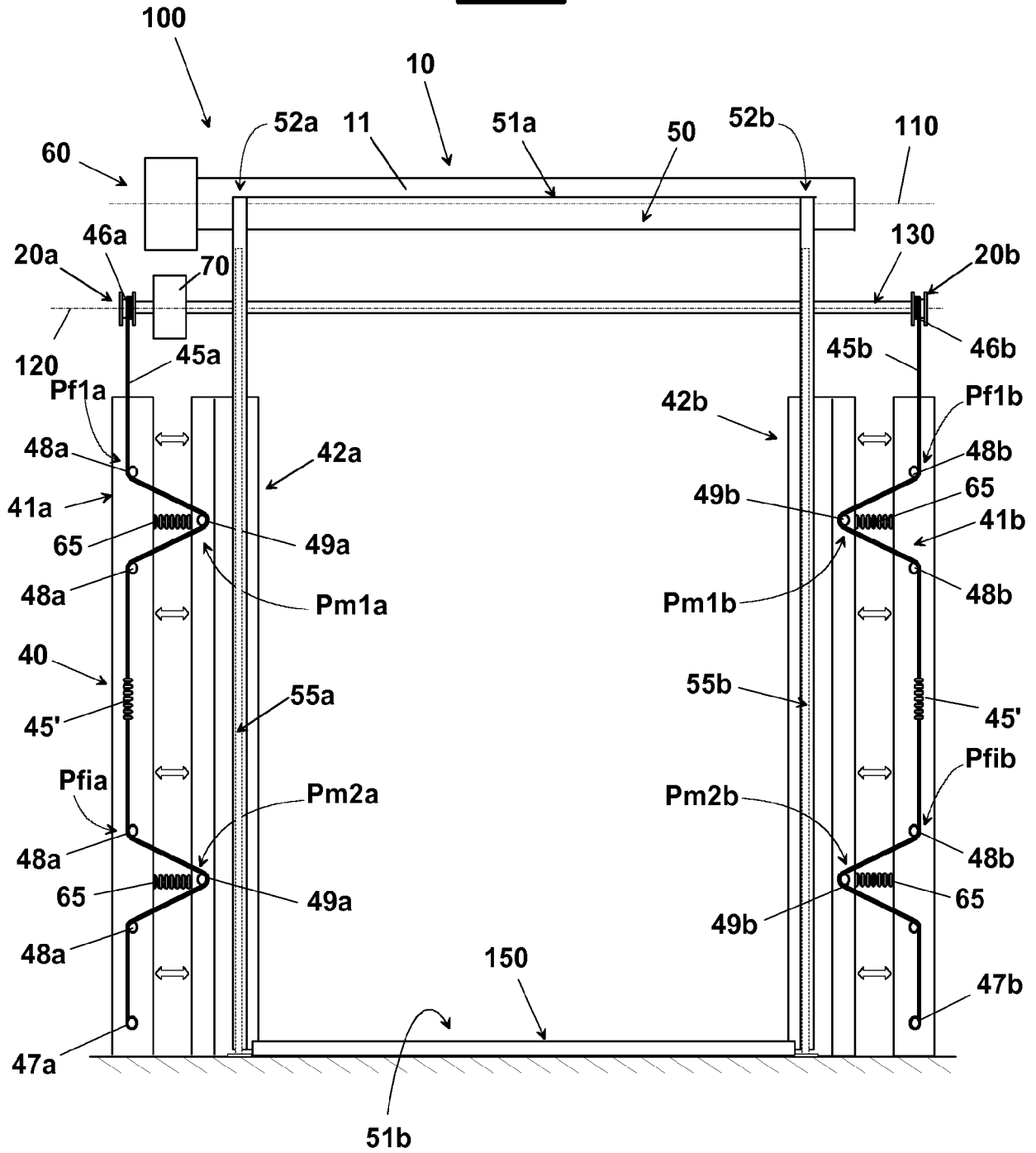
**Fig. 3**



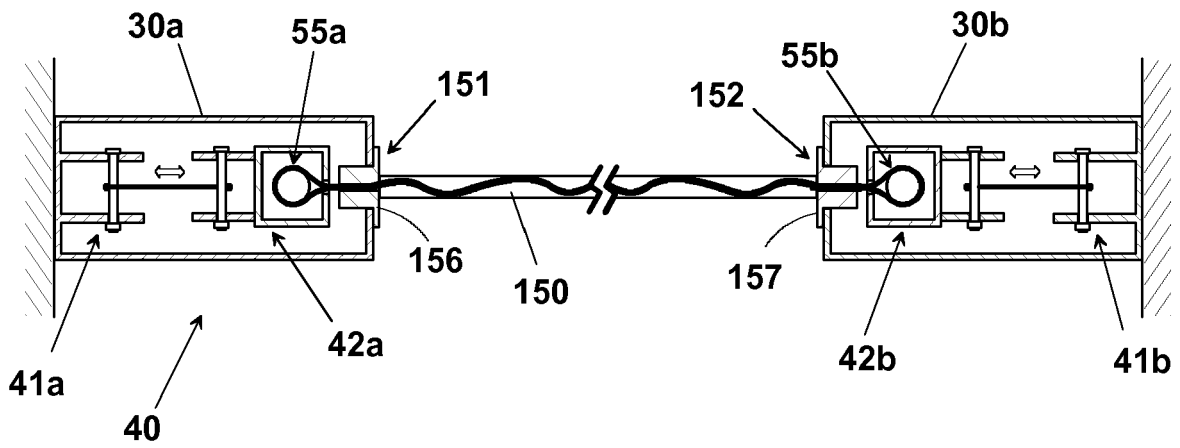
**Fig. 4**



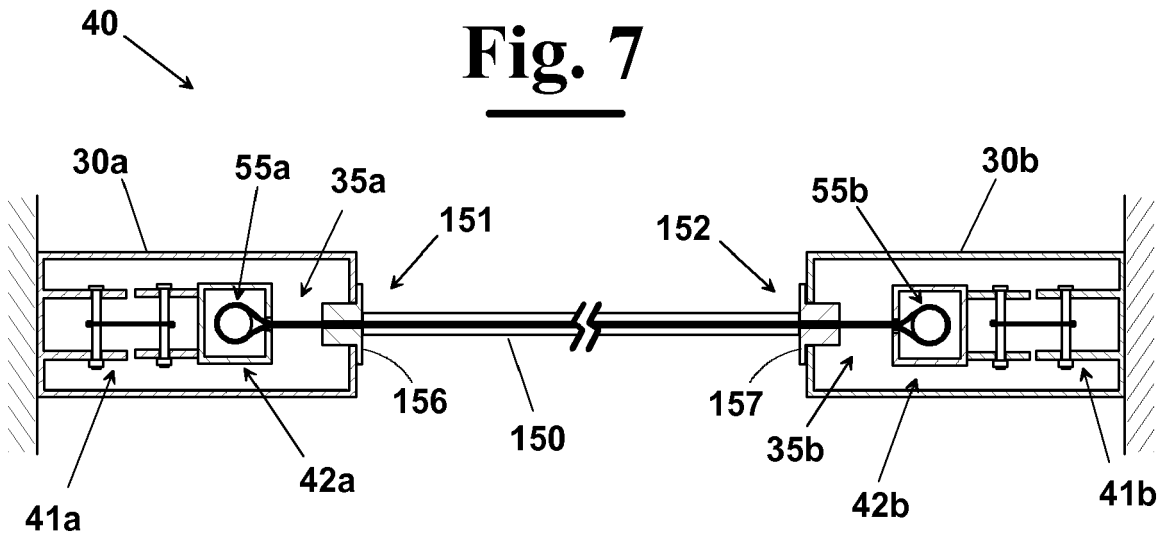
**Fig. 5**



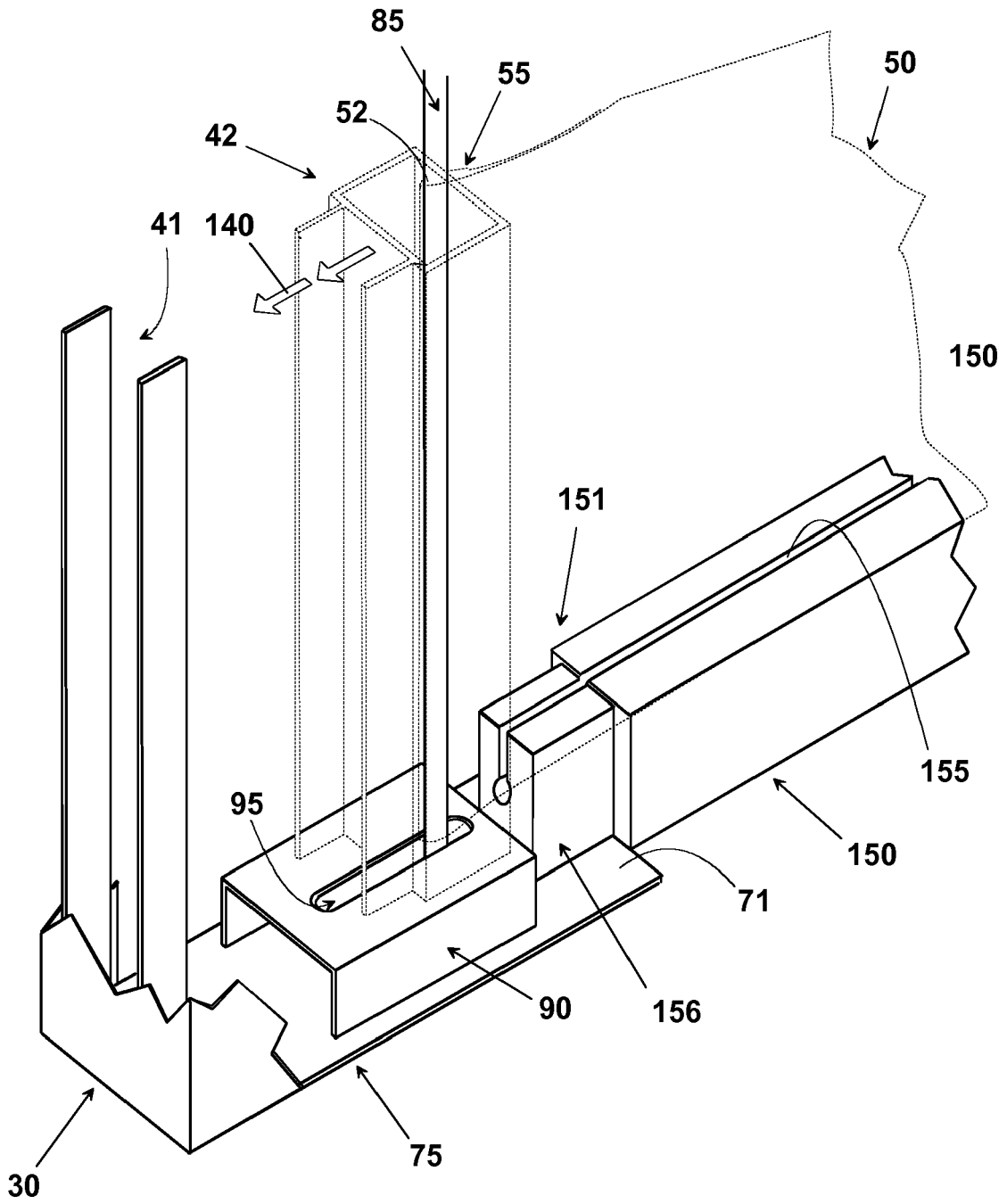
**Fig. 6**



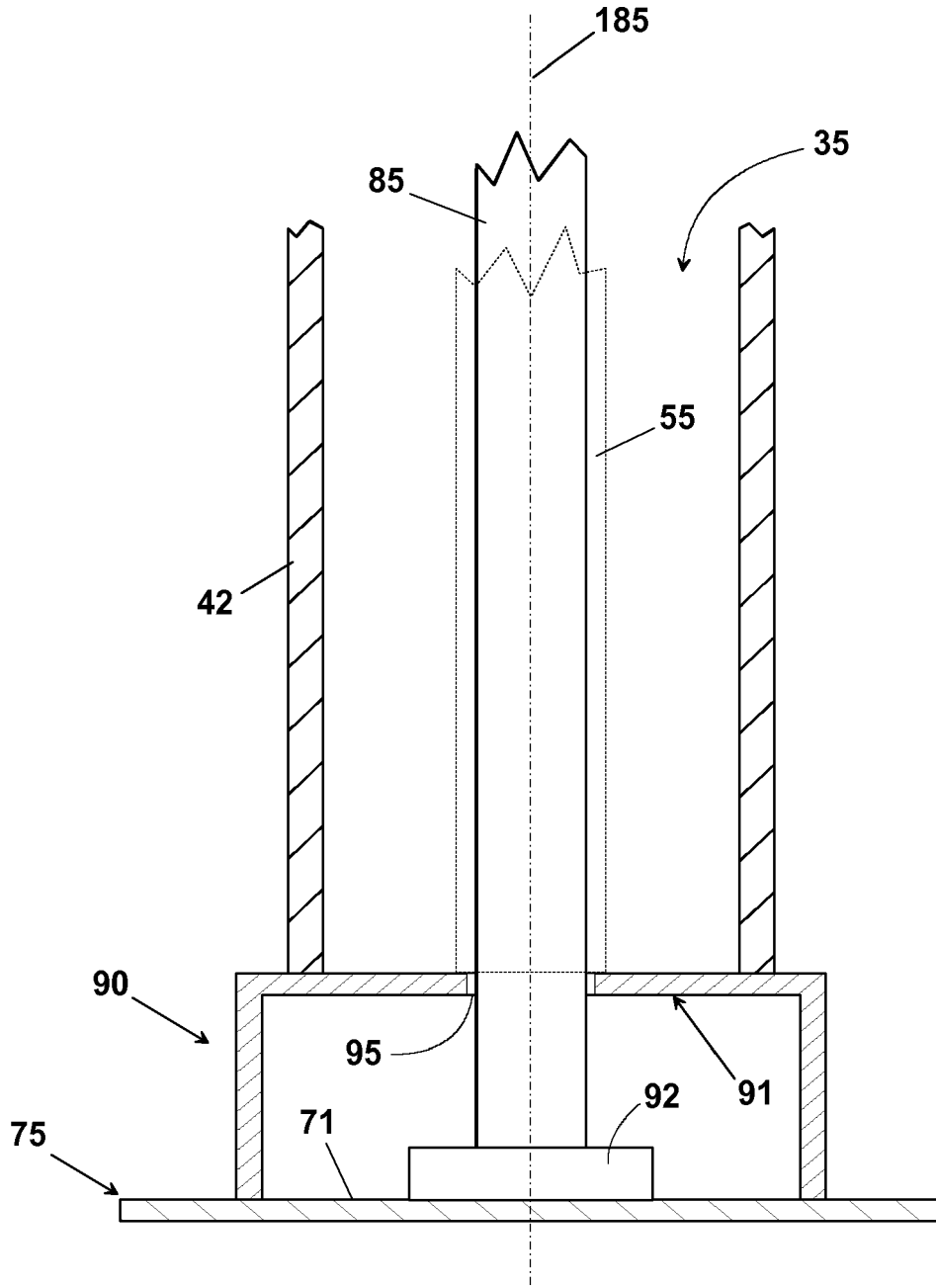
**Fig. 7**



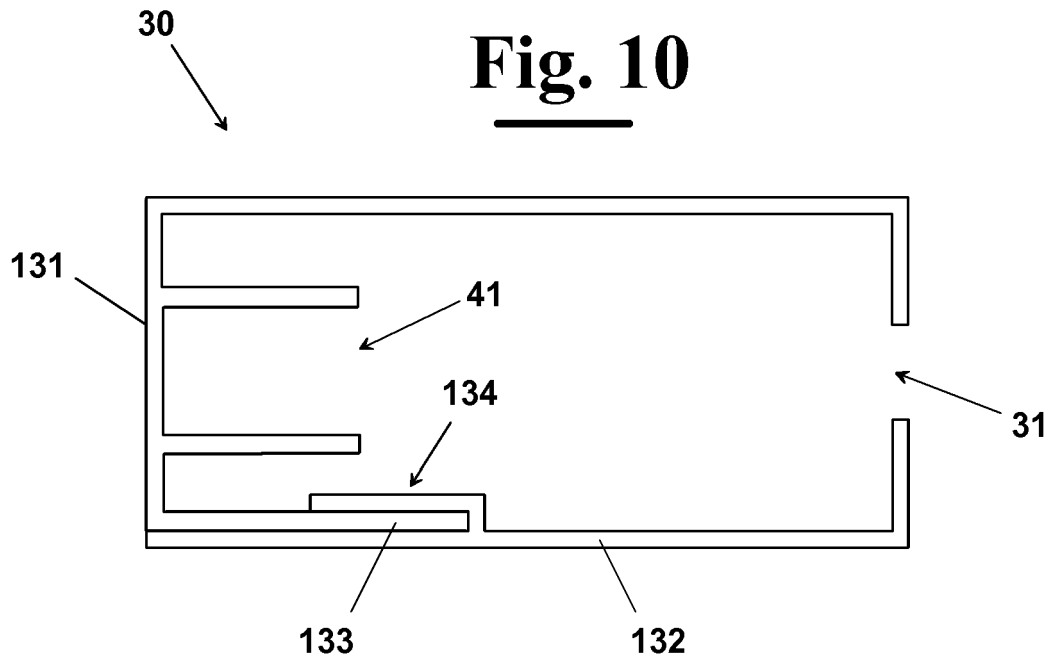
**Fig. 8**



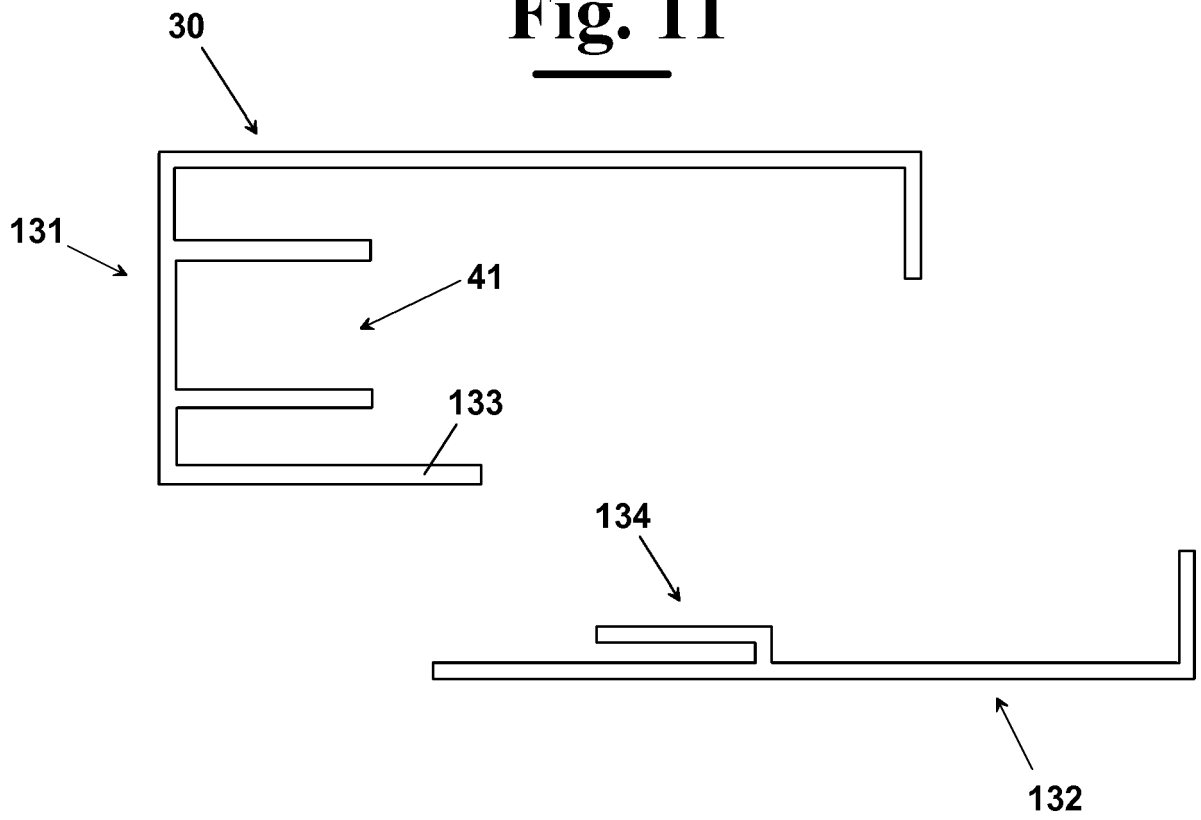
**Fig. 9**



**Fig. 10**



**Fig. 11**





EUROPEAN SEARCH REPORT

Application Number  
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A	FR 2 753 743 A1 (T G D [FR]) 27 March 1998 (1998-03-27) * figures 2,3 * * page 8, line 1 - line 5 * -----	1	
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			E06B E04F
The present search report has been drawn up for all claims			
Place of search <b>Munich</b>		Date of completion of the search <b>7 September 2018</b>	Examiner <b>Tänzler, Ansgar</b>
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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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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