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(54) **OPERATION CORD AND LIFTING DEVICE USING SAME**

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Description

TECHNICAL FIELD

[0001] The present invention is related to an operation cord suitably used in a horizontal blind, a vertical blind, a shade, a screen window, an up-down sliding window, an awning, a skylight window, a laundry pole and the like, and to an elevation apparatus employing the same.

BACKGROUND ART

[0002] A kind of a horizontal blind is known where an endless-type operation cord is engaged with a pulley that is supported so as to be rotatable at an end of a head box, and the operation cord is operated to rotate the pulley so that operations for moving slats up and down and adjusting their angle are enabled. Further, a technique is known in which an operation cord is wound around a pulley to operate a vertical blind (see Patent Document 1).

[0003] Such an operation cord is formed to be endless through fusing or stitching together both ends of a cord which is formed of a synthetic resin into a string shape. The operation cord of this type is engaged with a concavity formed on a peripheral surface of the pulley without touching the inside of a pulley case in which the pulley is disposed so that the operation cord can rotate the pulley.

[0004] When the endless-type operation cord mentioned above is hanging down from the pulley, part of the endless operation cord sometimes catches a dweller moving in the room or another moving object. Especially, if the operation cord catches a child or an aged person, a dangerous situation easily occurs in which the operation cord tangles around the neck, or the child or the aged person falls down. As a countermeasure against this problem, the following operation cord is proposed. That is, an operation cord which is used in an arrangement where a supporting frame for suspending a light shielding member such as a shade, a blind or a curtain is disposed on a wall surface around a window, to open and close the suspending light shielding member horizontally or vertically, and hanging down from the supporting frame, is provided with a safety member which can be attached and detached and is configured to be deconstructed when a fast and furious force is applied in an extending direction of the operation cord (see Patent Document 2).

PRIOR ART DOCUMENT

PATENT DOCUMENT

[0005]

Patent Document 1: JP-A-05-010081
Patent Document 2: JP-A-2003-184456
Patent Document 3: JP-A-2007-177440

SUMMARY OF THE INVENTION

PROBLEMS TO BE RESOLVED BY THE INVENTIONS

[0006] However, with the operation cord disclosed in Patent Document 2 or 3, while a failsafe function can be achieved to a certain degree, there remains the following problem. That is, in such an operation cord, the safety member tends to be thicker than the operation cord, so that inconvenience is caused in using it. For example, in case of a horizontal blind in which the operation cord is rotated one turn or more around the pulley to perform an operation for moving the slats up and down, the safety member sometimes touches the inside of the pulley case or gets hung up in a concavity formed on the peripheral surface of the pulley. As a result, the operation for moving the slats up and down or for adjusting their angle is hindered. Further, it is highly probable that the pulley and the like are damaged.

[0007] Accordingly, the present invention is made to solve the above-mentioned problem, and the object thereof is to enable smooth rotation of an operation cord and to provide an operation cord equipped with a failsafe function and an elevation apparatus employing the operation cord.

MEANS FOR SOLVING THE PROBLEMS

[0008] To achieve the object, an operation cord according to claim 1 is suggested.

[0009] In the operation cord of the above-mentioned configuration, the coupling portion cannot be a hindrance during rotation, so that the operation cord is rotated smoothly. Further, through adjustment of a coupling force of the coupling portion, the operation cord can be divided at the coupling portion when a fast and furious force is applied in an extending direction of the operation cord, so that the operation cord is equipped with a failsafe function.

[0010] According to a further embodiment, in the above-mentioned invention, each end of the cord is so formed that a diameter thereof gets smaller as a distance to the coupling portion decreases.

[0011] In the operation cord of the above configuration, each end of the cord can be surely connected to the coupling portion, and it is easy to make the outer diameter of the coupling portion in the lateral direction equal to or smaller than the maximum diameter of the cord.

[0012] According to a further embodiment, in the above-mentioned invention, a length of the coupling portion in a longitudinal direction is at least 1.2 times the maximum diameter of the cord and at most 2.5 times the maximum diameter of the cord.

[0013] In the operation cord of the above configuration, the coupling portion is prevented from touching the inside of the pulley case so that the pulley can be rotated smoothly.

[0014] According to a further embodiment, in the

above-mentioned invention, the coupling portion comprises a first joint body provided at one end of the cord, a second joint body provided at another end of the cord, and a joint ring provided between the first joint body and the second joint body, wherein the first joint body and the second joint body each have a fitting protrusion of an axial shape, the joint ring has fitting holes each configured to fit with the fitting protrusion, the fitting protrusion is configured to engage with the fitting hole through being inserted in the fitting hole and subsequently rotated, and the first joint body, the second joint body and the joint ring are each so configured that an outer diameter thereof in a lateral direction is equal to or smaller than the maximum diameter of the cord.

[0015] In the operation cord of the above configuration, the operation cord can be rotated smoothly, and an operation cord equipped with a failsafe function is realized. That is, the coupling portion of the operation cord, which is formed to have an outer diameter in the lateral direction equal to or smaller than the maximum diameter of the cord, seldom touches the inside of the pulley case or the like. Further, the coupling portion is prevented from getting hung up in a concavity or the like formed on a peripheral surface of the pulley. Moreover, the coupling portion is provided with the first joint body, the second joint body and the joint ring disposed between the first joint body and the second joint body, and each of the fitting protrusions provided in the first joint body and the second joint body can engage with the fitting hole provided in the joint ring through being inserted in the fitting hole and subsequently rotated, so that it is possible to make fitting of the fitting protrusion of the coupling portion with the fitting hole break easily, when a great pull force exceeding a normal pull force is applied to the operation cord. Accordingly, when part of the endless operation cord catches a dweller moving in the room or another moving object, it is easy to cut the operation cord at the coupling portion to ensure safety, and to obviate damaging the pulley or the like with which the operation cord is engaged.

[0016] According to a further embodiment, in the above-mentioned invention, a fitting position of the fitting protrusion and the fitting hole is set at a position to which the fitting protrusion is brought through a rotation by 90 degrees after inserted in the fitting hole.

[0017] In the operation cord of the above configuration, it is possible to ensure a sufficient holding force to hold the fitting protrusion in the fitting hole, while minimizing an operation force to make the fitting protrusion fit in the fitting hole.

[0018] According to a further embodiment, in the above-mentioned invention, the first joint body and the second joint body are each formed at one end or another end of the cord by means of outsert molding.

[0019] In the operation cord of the above configuration, joint force of each of the first joint body and the second joint body with the cord can be enhanced.

[0020] According to a further embodiment, in the above-mentioned invention, the cord is made of a ther-

moplastic resin, and a tip of each end of the cord is provided with a flange configured to fit with the first joint body or the second joint body.

[0021] In the operation cord of the above configuration, it is possible to ensure sufficient joint force of each of the first joint body and the second joint body with the cord by way of each flange.

[0022] According to a further embodiment, in the above-mentioned invention, the first joint body, the second joint body and the joint ring are molded from a synthetic resin, the fitting protrusion is provided with swelled portions each having a diameter greater than a diameter of a base end of the fitting protrusion, and the fitting hole is provided with a first locking portion and a second locking portion each configured to engage with the swelled portion.

[0023] In the operation cord of the above configuration, the swelled portions of the fitting protrusion can be fit and held resiliently in the first locking portion and the second locking portion. As a result, it is possible to ensure a sufficient holding force to hold the fitting protrusion in the fitting hole.

[0024] According to a further embodiment, in the above-mentioned invention, the first locking portion and the second locking portion are provided mirror symmetrically within openings of the fitting holes so as to be rotationally shifted from each other by 90 degrees.

[0025] In the operation cord of the above configuration, the first joint body and the second joint body each fitted in the joint ring are held in a state where their fitting protrusions are rotationally shifted from each other by 90 degrees. Therefore, when a pull force is applied to each of the fitting protrusions, the swelled portions of the both fitting protrusions work, by way of the first locking portion and the second locking portion, on the openings of the joint ring so as to push out them in directions shifted from each other by 90 degrees. Therefore, it is easy to ensure a sufficient holding force.

[0026] According to a further embodiment, in the above-mentioned invention, the swelled portion and an inner peripheral surface of the fitting hole are provided with positioning means for determining a rotational position of the fitting protrusion.

[0027] In the operation cord of the above configuration, through determining the rotational position of the fitting protrusion, it is possible to ensure a sufficient holding force to hold the fitting protrusion in the fitting hole.

[0028] According to a further embodiment, an elevation apparatus comprises the operation cord of any one of claims 1 to 9.

[0029] In the elevation apparatus of the above configuration, the operation cord can be rotated smoothly and, at the same time, a failsafe function is equipped.

EFFECT OF THE INVENTION

[0030] According to the present invention, smooth rotation of the operation cord is enabled, and an operation

cord equipped with a failsafe function and an elevation apparatus employing the operation cord are provided.

BRIEF DESCRIPTION OF THE DRAWINGS

[0031]

Fig. 1 is a view illustrating a horizontal blind employing an operation cord according to an embodiment of the present invention;

Fig. 2 is an enlarged view of an operation section on the right side of the horizontal blind shown in Fig. 1; Fig. 3 is a sectional view of a pulley case shown in Fig. 2 taken along line A-A.;

Fig. 4 is a front view illustrating the operation cord according to the embodiment of the present invention;

Fig. 5 is a sectional view illustrating a coupling portion constituting the operation cord according to the embodiment of the present invention;

Fig. 6 is an exploded perspective view illustrating the coupling portion constituting the operation cord according to the embodiment of the present invention; Fig. 7 is an enlarged front view illustrating a first joint body or a second joint body constituting the coupling portion shown in Figs. 5 and 6;

Fig. 8 is an enlarged plan view illustrating the first joint body or the second joint body constituting the coupling portion shown in Figs. 5 and 6;

Fig. 9 is an enlarged side view illustrating the first joint body or the second joint body constituting the coupling portion shown in Figs. 5 and 6;

Fig. 10 is a sectional view taken along line B-B in Fig. 7;

Fig. 11 is an enlarged front view illustrating a joint ring constituting the coupling portion shown in Figs. 5 and 6;

Fig. 12 is an enlarged rear view illustrating the joint ring constituting the coupling portion shown in Figs. 5 and 6;

Fig. 13 is a sectional view taken along line C-C in Fig. 11;

Fig. 14 is a sectional view taken along line D-D in Fig. 11;

Fig. 15 is a sectional view taken along line E-E in Fig. 13;

Fig. 16 is a sectional view illustrating a fitting state of the first or second joint body with the joint ring;

Fig. 17 is an exploded perspective view illustrating a coupling portion of an operation cord according to another embodiment of the present invention; and

Fig. 18 is a sectional view of a major part of the coupling portion shown in Fig. 17.

EMBODIMENTS FOR CARRYING OUT THE INVENTION

[0032] Hereafter, preferred embodiments of an oper-

ation cord according to the present invention and an elevation apparatus employing the operation cord will be described in detail with reference to the drawings. However, the present invention is not limited to any of the following preferred embodiments by any means.

[0033] Fig. 1 illustrates a horizontal blind employing an operation cord 9 according to an embodiment of the present invention, where (A) is a front view and (B) is a plan view. Fig. 2 is an enlarged view of an operation section on the right side of the horizontal blind shown in Fig. 1. Fig. 3 is a sectional view of a pulley case 8 shown in Fig. 2 taken along line A-A.;

[0034] In the horizontal blind shown in Fig. 1, multiple slats 3 are supported by ladder cords 2 which are supported by a head box 1 so as to suspend therefrom, and a bottom rail 4 is disposed at bottom ends of the ladder cords 2.

[0035] Hoisting cords 5 are inserted in the slats 3 at positions near supporting positions of the ladder cords 2. The bottom rail 4 is supported by bottom ends of the hoisting cords 5 so as to suspend therefrom. Top ends of the hoisting cords 5 are wound around a winding shaft 7 which is supported so as to be rotatable by a supporting member disposed in the head box 1.

[0036] As shown in Figs. 2 and 3, a pulley 16 disposed in a pulley case 8 is supported so as to be rotatable at an end of the head box 1. An operation cord 9 is hung on the pulley 16 such that the operation cord 9 is in a concavity 17 formed on an outer periphery of the pulley 16 so as not to touch the inside 8a of the pulley case 8. When the operation cord 9 is operated to rotate the pulley 16 in a forward or reverse direction, the winding shaft 7 is rotated via gears in a gear box 10, a hoisting shaft 12a and the like, so that the hoisting cord 5 is wound by the winding shaft 7 or unwound, causing the slats 3 and the bottom rail 4 to move up or down.

[0037] When the pulley 16 is rotated, a tilt drum 13 is rotated via gears in the gear box 10, a tilt shaft 12b and the like, so that the respective slats 3 are turned via the ladder cords 2.

[0038] Fig. 4 is a front view illustrating the operation cord 9 according to the embodiment of the present invention. Fig. 5 is a sectional view illustrating a coupling portion 20 constituting the operation cord 9 according to the embodiment of the present invention. Fig. 6 is an exploded perspective view illustrating the coupling portion 20 constituting the operation cord 9 according to the embodiment of the present invention.

[0039] As shown in Fig. 4, the operation cord 9 is formed into an endless shape with both ends of a cord 14 being coupled with each other by means of a coupling portion 20. The cord 14 is of a cylindrical shape, and each end thereof has a tapered shape. For the cord 14, a polyester resin can be preferably used, for example. However, the material for the cord 14 is not specifically limited provided that the material is a thermoplastic resin having strength of a predetermined level or higher, and thus, a resin other than a polyester resin, for example, a poly-

mid resin, may be used. Further, a core made of a polyester resin, a polyamide resin or the like may be coated with an envelope cord woven from a polyester resin. With a cord of this configuration, linearity of the operation cord 9 is ensured thanks to the core, and durability in an extending direction is also ensured.

[0040] As shown in Figs. 5 and 6, the coupling portion 20 is composed of a first joint body 40, a second joint body 41 which is of the same constitution as the first joint body 40, and a joint ring 42 which is disposed between the first and second joint bodies 40, 41 and connects them. The coupling portion 20 in which these three members are formed has a cylindrical shape, and is formed such that an outer diameter, that is, an outer diameter M in a lateral direction, is smaller than a maximum diameter P of the cord 14. Note, however, that the outer diameter M of the coupling portion 20 may be equal to the maximum diameter P of the cord 14. Since the coupling portion 20 is configured as described above, when the operation cord 9 is operated to rotate the pulley 16 shown in Fig. 3 in a forward or reverse direction, the coupling portion 20 of the operation cord 9, which is so formed as to have the outer diameter M in the lateral direction equal to or smaller than the maximum diameter P of the cord 14, seldom touches the inside 8a of the pulley case 8. Further, the coupling portion 20 hardly gets hung up in a concavity 17 formed on the peripheral surface of the pulley 16. As a result, smooth rotation of the operation cord 9 is possible. Moreover, the coupling portion 20 is so formed that a longitudinal length thereof is at least 1.2 times the maximum diameter P of the cord 14 and at most 2.5 times the maximum diameter P of the cord 14. When the maximum diameter P of the cord 14 is 5.5 mm, for example, the length of the coupling portion 20 may be 7 mm. Thus, the coupling portion 20 does not touch the inside 8a of the pulley case 8, so that the pulley 16 can be rotated more smoothly.

[0041] Further, a tip of each tapered end of the cord 14, which is made of a thermoplastic resin, is provided with a flange 30 configured to fit with the first joint body 40 or the second joint body 41. In this embodiment, as shown in Fig. 5, the flange 30 is formed into a ring which has a diameter greater than that of the smallest portion on a tip side of the tapered end and smaller than the maximum diameter P. The flange 30 is for ensuring sufficient joint force with the first joint body 40 or the second joint body 41, so that a shape of the flange 30 is not limited particularly, provided that sufficient joint force is ensured, and thus, the flange 30 may have a shape of a gear or the like. Moreover, the outer diameter R1 of the flange 30 is set between 1.05 to 1.3 times a smallest diameter R2 of the cord 14. It is preferable that a value of $R1/R2$ is between 1.1 to 1.2 in view of ease of forming the flange 30 and strength of outsert molding of the first joint body 40 and the second joint body 41.

[0042] Various methods can be employed in attaching the first joint body 40 or the second joint body 41 to the tip of each end of the cord 14. For example, firstly, the

tip of each end of the cord 14 is heated while being compressed, and the ring-shaped flange 30 is formed using a mold prepared beforehand. Subsequently, the first joint body 40 or the second joint body 41 is formed by means of outsert molding so as to cover the flange 30. Through such outsert molding, each end of the cord 14 is fixed to the first joint body 40 or the second joint body 41 with enhanced joint force. Note, however, that the method of integrating the first joint body 40 or the second joint body 41 with the cord 14 is not limited to the method described above. For example, the first joint body 40 or the second joint body 41 is formed first, and thereafter the flange 30 formed at each end of the cord 14 is fitted in the first joint body 40 or the second joint body 41.

[0043] Further, as shown in Fig. 5, the cord 14 is provided with reduced diameter portions 35 between each of the flanges 30 and a portion of the maximum diameter P of the cord 14, where the diameter is gradually reduced as a distance to the flange 30 decreases. Therefore, each end of the cord 14 can be easily coupled with the first joint body 40 or the second joint body 41 constituting the coupling portion 20, and the outer diameter M of the coupling portion 20 in the lateral direction can be easily made equal to or smaller than the maximum diameter P of the cord 14.

[0044] Fig. 7 is an enlarged front view illustrating the first joint body 40 or the second joint body 41 constituting the coupling portion 20 shown in Figs. 5 and 6. Fig. 8 is an enlarged plan view illustrating the first joint body 40 or the second joint body 41 constituting the coupling portion 20 shown in Figs. 5 and 6. Fig. 9 is an enlarged side view illustrating the first joint body 40 or the second joint body 41 constituting the coupling portion 20 shown in Figs. 5 and 6. Fig. 10 is a sectional view taken along line B-B in Fig. 7.

[0045] As shown in Figs. 6 to 10, the first joint body 40 and the second joint body 41 are formed of a same synthetic resin at the both ends of the cord 14. A fitting protrusion 45 of a round shank shape is formed at each of the tips of the first joint body 40 and the second joint body 41.

[0046] On an outer peripheral surface of a tip of the fitting protrusion 45, two swelled portions 46 are formed line symmetrically with regard to a center of the round shank so as to have a greater outer diameter. At a middle in a radial direction of each of the swelled portions 46 is formed a locking concavity 47 which is a concavity having a semicircular cross section. Further, chamfered edges 54 are formed on a front end side and a base end side of the swelled portion 46. A cross section of the swelled portion 46, cut along a central axis, has a trapezoidal shape due to the chamfered edges 54, 54.

[0047] At a base end of the fitting protrusion 45, that is, on the side to the flange 30, as shown in Figs. 6 and 10, rotation restriction portions 48 protruding in radial directions of the round shank are formed line symmetrically with regard to the center. Each of the rotation restriction portions 48 is formed at a position shifted by 45 degrees

from the locking concavity 47 in a circumferential direction with regard to the center of the round shank.

[0048] Fig. 11 is an enlarged front view illustrating the joint ring 42 constituting the coupling portion 20 shown in Figs. 5 and 6. Fig. 12 is an enlarged rear view illustrating the joint ring 42 constituting the coupling portion 20 shown in Figs. 5 and 6. Fig. 13 is a sectional view taken along line C-C in Fig. 11. Fig. 14 is a sectional view taken along line D-D in Fig. 11. Fig. 15 is a sectional view taken along line E-E in Fig. 13. Fig. 16 is a sectional view illustrating a fitting state of the first joint body 40 or the second joint body 41 with the joint ring 42.

[0049] The joint ring 42 is formed entirely into a cylindrical shape. As shown in Figs. 11 and 12, openings 49a, 49b on both sides of the joint ring 42 are each formed generally into a rectangular shape in order to allow the tip of the fitting protrusion 45 including the swelled portion 46 to be inserted therein. Additionally, the openings 49a, 49b are so formed that longitudinal directions of the rectangles are rotated by 90 degrees from each other with regard to a center of a cylinder.

[0050] Within the joint ring 42, a circular hole (fitting hole) 50 is formed having a diameter which allows the tip of the fitting protrusion 45 to rotate. The circular hole 50 has a center which is identical with a center of the outer diameter of the joint ring 42. Further, at each of opening edges, in a shorter-axis direction, of the laterally long opening 49a shown in Fig. 11, a locking portion 51a, 51b is formed which constitutes a first locking portion for preventing the swelled portion 46 from dropping off the circular hole 50. Also, as shown in Fig. 12, at each of opening edges, in a shorter-axis direction, of the longitudinally long opening 49b, a locking portion 51c, 51d is formed which constitutes a second locking portion for preventing the swelled portion 46 from dropping off the circular hole 50. The first locking portion 51a, 51b and the second locking portion 51c, 51d are arranged, within the both openings 49a, 49b of the circular hole 50, mirror symmetrically such that they are rotationally shifted by 90 degrees from each other. Note, however, that the angle is not limited to 90 degrees. Therefore, when a pull force is applied to each of the fitting protrusions 45 in directions to separate them away from each other, though the swelled portions 46 of each fitting protrusion 45 act on the openings 49a, 49b of the joint rings 42 to expand them, the portions to be expanded are at positions shifted by 90 degrees from each other, so that it is easy to ensure the holding force.

[0051] As shown in Figs. 13 and 14, chamfered edges 52 are provided at boundaries of the first locking portion 51a, 51b and the second locking portion 51c, 51d with the circular hole 50, so that when the fitting protrusion 45 is pulled out of the circular hole 50, that is, when a fast and furious force is applied and separation at the coupling portion 20 occurs, the locking portions 51a to 51d are prevented from being damaged thanks to working of the chamfered edges 52.

[0052] Further, a locking protrusion 53a protruding in-

ward in a radial direction is formed on the inside of the first locking portion 51a, and a locking protrusion 53b protruding inward in a radial direction is formed on the inside of the second locking portion 51c. That is, a locking protrusion 53a, 53b configured to engage with the locking concavity 47 is formed on an inner peripheral surface of each of the circular holes 50. To couple the first joint body 40 and the joint ring 42, the fitting protrusion 45 of the first joint body 40 is inserted in the opening 49b of the joint ring 42, and then the first joint body 40 is rotated by 90 degrees with respect to the joint ring 42 in a counter clockwise direction, as seen from the opening 49a. As a result, the locking concavity 47 of the fitting protrusion 45 engages with the locking protrusion 53a in the circular hole 50, one of the rotation restriction portions 48 moves from a side of one second locking portion 51c to a side of another second locking portion 51d so as to abut the second locking portion 51d, and the other of the rotation restriction portions 48 moves from the side of the other second locking portion 51d to the side of the one second locking portion 51c so as to abut the second locking portion 51c, and thus, they are positioned as shown in Fig. 16.

[0053] Also, the second joint body 41 is similarly inserted in the other opening 49a of the joint ring 42 and then relatively rotated by 90 degrees, so that they are positioned. As a result, as shown in Fig. 5, the first joint body 40 and the second joint body 41 are coupled with each other via the joint ring 42.

[0054] In this state, the swelled portions 46 of each of the fitting protrusions 45 of the first joint body 40 and the second joint body 41 engage with each of the locking portions 51a to 51d of the joint ring 42, and are held within the circular holes 50 of the joint ring 42.

[0055] A force for this holding is so set that the fitting protrusion 45 never drops out of the joint ring 42 with a normal pull force applied to the operation cord 9 during a normal operation for moving the slats up and down and adjusting the angle of the slats. Moreover, only when a great force exceeding the normal pull force is applied to the operation cord 9, the openings 49a, 49b of the joint ring 42 are expanded in the radial directions by the swelled portions 46 of the fitting protrusions 45 due to resiliency of the synthetic resin of the joint ring 42, so that the fitting protrusion 45 drops out of the joint ring 42. In this process, either one of the first joint body 40 and the second joint body 41 first drops out of the joint ring 42. Therefore, a state arises where the joint ring 42 is engaged with one of the first joint body 40 and the second joint body 41, and thus, the joint ring 42 never drops off the operation cord 9.

[0056] The operation cord 9 configured as described above can be rotated unlimitedly and smoothly relative to the pulley 16 and is equipped with a failsafe function. After the fitting at the coupling portion 20 is broken, the first joint body 40 or the second joint body 41 can be fitted in the joint ring 42 again, so that the endless operation cord 9 is easily reconstructed. Further, since a configu-

ration is adopted where the fitting protrusion 45 is inserted in the opening 49a, 49b of the joint ring 42 and subsequently rotated by 90 degrees to achieve the fitting of the fitting protrusion 45 with the joint ring 42, it is possible to minimize the operation force needed for fitting the fitting protrusion 45 with the joint ring 42.

[0057] Moreover, since the pulling force in the direction of the axis of the swelled portion 46 is sustained by each of the locking portions 51a to 51d, it is possible to make the holding force to hold the fitting protrusion 45 in the joint ring 42 sufficiently strong. Also, when the locking protrusion 53a, 53b is fitted in the locking concavity 47, the position can be certainly maintained since the positioning is realized by working of the rotation restriction portion 48.

[0058] The elevation apparatus employing the operation cord 9 according to one embodiment of the present invention can be suitably used for a light shielding apparatus such as, in addition to the horizontal blind shown in Fig. 1, a shade, a blind of another type, and a curtain. The elevation apparatus of the present invention, with the operation cord 9 being provided, is not only easy to handle but also free from a potential risk caused by an operation cord.

[0059] A horizontal blind has been described thus far, as a preferable embodiment of the operation cord 9 and the elevation apparatus using the same according to the present invention, however, the present invention is not limited to the embodiment shown above, but can be implemented in variously altered forms.

[0060] Fig. 17 is an exploded perspective view illustrating a coupling portion 60 of an operation cord according to another embodiment of the present invention. Fig. 18 is a sectional view of a major part of the coupling portion 60 shown in Fig. 17. As shown in Figs. 17 and 18, the coupling portion 60 may comprise two members, that is, an integrated portion 61 configured as if the first joint body 40 and the joint ring 42 are integrated together, and the second joint body 41. Both ends of the cord 14 are provided with the second joint body 41 and the integrated portion 61, respectively, via the respective flanges 30.

[0061] Further, a step having a cross-section of a right angle may be provided in place of the chamfered edge 52 in the joint ring 42. Though two members are provided for each of the swelled portion 46, the locking concavity 47, the first locking portion 51a, 51b and the second locking portion 51c, 51d, one member of three or more members may be provided for each of them. In this case, a value other than 90 degrees is preferably employed for the rotation angle.

[0062] Moreover, the cord 14 may be formed of a resin other than a thermoplastic resin or of braided threads. Though each end of the cord 14 is formed into the reduced diameter portion 35 which is gradually reduced in diameter size, it may be formed into a small diameter portion 35 having a fixed diameter from a certain point to the tip. Further, the end may be formed by means of

outsert molding without providing the flange 30.

[0063] Further, the arrangement or the number of the coupling portion 20, 60, for example, may be properly selected in accordance with the design and the failsafe function as needed. The connection of the cord 14 and the first joint body 40 or the integrated portion 61, or the connection of the cord 14 and the second joint body 41 may be established by a method other than outsert molding, for example, by bonding with an adhesive agent.

[0064] Though, in each of the embodiments described above, the outer diameters of the first joint body 40, the second joint body 41, and the joint ring 42 are all made equal to the outer diameter of the coupling portion 20 in the lateral direction, a configuration may be employed where only one or two of the two members or three members are made larger to have a diameter equal to the diameter M of the coupling portion 20, and remaining one or two members are made to have a smaller diameter. Furthermore, though these three or two members are molded from a synthetic resin, they may be made of another material, such as a metallic material.

DESCRIPTION OF NUMERALS

[0065]

1 ... horizontal blind (elevation apparatus); 9 ... operation cord; 14 ... cord; 20 ... coupling portion; 30 ... flange; 40 ... first joint body; 41 ... second joint body; 42 ... joint ring; 45 ... fitting protrusion; 46 ... swelled portion; 47 ... locking concavity (positioning means); 48 ... rotation restriction portion; 50 ... circular hole (fitting hole); 51a, 51b ... first locking portion; 51c, 51d ... second locking portion; 53a, 53b ... locking protrusion (positioning means)

Claims

1. An operation cord (9) comprising a cord (14) whose both ends are configured to be coupled with each other by means of a coupling portion (20, 60) so that the operation cord has an endless shape, **characterized in that** the coupling portion (20, 60) comprises:

(1) a first joint body (40) provided at one end of the cord; a second joint body (41) provided at another end of the cord; and a joint ring (42) provided between the first joint body (40) and the second joint body (41); or (2) an integrated portion provided at one end of the cord and a second joint body (41) provided at another end of the cord, wherein the first joint body (40) and the second joint body (41) each have a fitting protrusion (45) of an axial shape, the joint ring (42) and the integrated portion each

- have a fitting hole (50) configured to fit with the fitting protrusion (45),
the fitting protrusion (45) is configured to engage with the fitting hole (50) through being inserted in the fitting hole (50) and subsequently rotated, and
the first joint body (40), the second joint body (41), the joint ring (42), and the integrated portion are each so formed that an outer diameter thereof in a lateral direction is equal to or smaller than a maximum diameter of the cord.
2. The operation cord (9) of claim 1, wherein the coupling portion (20, 60) is so formed that an outer diameter thereof in a lateral direction is smaller than a maximum diameter of the cord.
 3. The operation cord (9) of claim 1 or 2, wherein each end of the cord (14) is so formed that a diameter thereof gets smaller as a distance to the coupling portion (20, 60) decreases.
 4. The operation cord (9) of any one of claims 1 to 3, wherein a length of the coupling portion (20, 60) in a longitudinal direction is at least 1.2 times the maximum diameter of the cord and at most 2.5 times the maximum diameter of the cord.
 5. The operation cord (9) of any one of claims 1 to 4, wherein a fitting position of the fitting protrusion (45) and the fitting hole (50) is set at a position to which the fitting protrusion (45) is brought through a rotation by 90 degrees after inserted in the fitting hole (50).
 6. The operation cord (9) of any one of claims 1 to 5, wherein the first joint body (40) and the second joint body (41) are each formed at the one end or the other end of the cord by means of outsert molding.
 7. The operation cord (9) of any one of claims 1 to 6, wherein the cord (14) is made of a thermoplastic resin, and
a tip of each end of the cord is provided with a flange configured to fit with the first joint body (40) or the second joint body (41).
 8. The operation cord (9) of any one of claims 1 to 7, wherein the first joint body (40), the second joint body (41) and the joint ring (42) are molded from a synthetic resin,
the fitting protrusion (45) is provided with swelled portions (46) each having a diameter greater than a diameter of a base end of the fitting protrusion (45), and
the fitting hole (50) is provided with a first locking portion (51a, 51b) and a second locking portion (51c, 51d) each configured to engage with the swelled portion (46).
 9. The operation cord (9) of claim 8, wherein the first locking portion (51a, 51b) and the second locking portion (51c, 51d) are provided mirror symmetrically within openings of the fitting holes (50) so as to be rotationally shifted from each other by 90 degrees.
 10. The operation cord (9) of claim 8 or 9, wherein the swelled portion (46) and an inner peripheral surface of the fitting hole (50) are provided with positioning means (53a, 53b) for determining a rotational position of the fitting protrusion (45).
 11. An operation cord (9) according to any of claims 1 to 10 wherein the joint ring (42) is so formed to be a cylindrical shape having a fitting hole (50), the fitting hole (50) is provided with a circular hole having a diameter which allows a tip of a fitting protrusion (45) to rotate,
the fitting hole (50) is provided with a locking portion configured to engage with the fitting protrusion (45), the joint ring (42) is so formed that an outer diameter thereof in a lateral direction is equal to or smaller than a maximum diameter of the cord, and
the coupling portion (20, 60) couples the both ends of the cord by fitting of the fitting protrusion (45) and the fitting hole (50).
 12. An operation cord (9) according to any of claims 1 to 10 wherein the joint body (40, 41) is provided with a fitting protrusion (45) having a round shank shape on a tip of the joint body,
the fitting protrusion (45) is provided with a swelled portion (46) having a diameter greater than a diameter of a base end of the fitting protrusion (45), and
the joint body (40, 41) is so formed that an outer diameter thereof in a lateral direction is equal to or smaller than a maximum diameter of the cord.
 13. An elevation apparatus comprising the operation cord of any one of claims 1-12.

Patentansprüche

1. Betätigungsschnur (9) aufweisend eine Schnur (14), deren beide Enden konfiguriert sind, mit Hilfe eines Kopplungsteils (20, 60) miteinander gekoppelt zu werden, so dass die Betätigungsschnur eine Endlosform hat,
dadurch gekennzeichnet, dass der Kopplungsteil (20, 60) aufweist:

(1) einen an einem Ende der Schnur bereitgestellten ersten Verbindungskörper (40); einen an einem anderen Ende der Schnur bereitgestellten zweiten Verbindungskörper (41); und einen zwischen dem ersten Verbindungskörper (40) und dem zweiten Verbindungskörper (41)

bereitgestellten Verbindungsring (42); oder
(2) einen an einem Ende der Schnur bereitgestellten integrierten Teil und einen an dem anderen Ende der Schnur bereitgestellten zweiten Verbindungskörper (41), wobei

der erste Verbindungskörper (40) und der zweite Verbindungskörper (41) jeweils einen axialförmigen Einpassungsvorsprung (45) aufweisen, der Verbindungsring (42) und der integrierte Teil jeweils ein Einpassungsloch (50) aufweisen, das konfiguriert ist, passend mit dem Einpassungsvorsprung (45) zu sein, der Einpassungsvorsprung (45) konfiguriert ist, in Eingriff mit dem Einpassungsloch (50) gebracht zu werden, dadurch, dass er in das Einpassungsloch (50) eingeführt wird und anschließend gedreht wird, und der erste Verbindungskörper (40), der zweite Verbindungskörper (41), der Verbindungsring (42) und der integrierte Teil jeweils so gebildet sind, dass ihr Außendurchmesser in einer lateralen Richtung gleich oder kleiner als ein maximaler Durchmesser der Schnur ist.

2. Betätigungsschnur (9) nach Anspruch 1, wobei der Kopplungsteil (20, 60) so gebildet ist, dass sein Außendurchmesser in einer lateralen Richtung kleiner als ein maximaler Durchmesser der Schnur ist.
3. Betätigungsschnur (9) nach Anspruch 1 oder 2, wobei jedes Ende der Schnur (14) so gebildet ist, dass ein Durchmesser mit abnehmendem Abstand zu dem Kopplungsteil (20, 60) kleiner wird.
4. Betätigungsschnur (9) nach einem der Ansprüche 1 bis 3, wobei eine Länge des Kopplungsteils (20, 60) in einer Längsrichtung mindestens das 1,2fache des maximalen Durchmessers der Schnur und höchstens das 2,5fache des maximalen Durchmessers der Schnur ist.
5. Betätigungsschnur (9) nach einem der Ansprüche 1 bis 4, wobei eine Einpassungsposition des Einpassungsvorsprungs (45) und des Einpassungslochs (50) auf eine Position festgesetzt ist, in welche der Einpassungsvorsprung (45), nachdem er in das Einpassungsloch (50) eingeführt worden ist, durch eine Drehung von 90 Grad gebracht wird.
6. Betätigungsschnur (9) nach einem der Ansprüche 1 bis 5, wobei der erste Verbindungskörper (40) und der zweite Verbindungskörper (41) jeweils an dem einen Ende oder dem anderen Ende der Schnur mit Hilfe eines "Outsert"-Formverfahrens gebildet sind.
7. Betätigungsschnur (9) nach einem der Ansprüche 1 bis 6, wobei die Schnur (14) aus einem thermoplastischen Harz hergestellt ist und eine Spitze jedes Schnurendes mit einem Flansch versehen ist, der passend zu dem ersten Verbindungskörper (40) oder dem zweiten Verbindungskörper (41) konfiguriert ist.

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8. Betätigungsschnur (9) nach einem der Ansprüche 1 bis 7, wobei der erste Verbindungskörper (40), der zweite Verbindungskörper (41) und der Verbindungsring (42) aus einem synthetischen Harz hergestellt sind, der Einpassungsvorsprung (45) mit ausgebauchten Abschnitten (46) versehen ist, die jeweils einen Durchmesser haben, der größer ist als ein Durchmesser eines Basisendes des Einpassungsvorsprungs (45), und das Einpassungsloch (50) mit einem ersten Verriegelungsabschnitt (51a, 51b) und einem zweiten Verriegelungsabschnitt (51c, 51d) versehen ist, die jeweils zum Eingriff mit dem ausgebauchten Abschnitt (46) konfiguriert sind.
9. Betätigungsschnur (9) nach Anspruch 8, wobei der erste Verriegelungsabschnitt (51a, 51b) und der zweite Verriegelungsabschnitt (51c, 51d) spiegelsymmetrisch in den Öffnungen der Einpassungslöcher (50) bereitgestellt sind, so dass sie um eine 90-Grad-Drehung zueinander versetzt sind.
10. Betätigungsschnur (9) nach Anspruch 8 oder 9, wobei der ausgebauchte Abschnitt (46) und eine Innenrandfläche des Einpassungslochs (50) mit Positionierungseinrichtungen (53a, 53b) versehen sind, um eine Drehposition des Einpassungsvorsprungs (45) festzulegen.
11. Betätigungsschnur (9) nach einem der Ansprüche 1 bis 10, wobei der Verbindungsring (42) in Form eines Zylinders mit einem Einpassungsloch (50) gebildet ist, das Einpassungsloch (50) mit einem kreisförmigen Loch bereitgestellt ist, das einen solchen Durchmesser hat, dass sich eine Spitze des Einpassungsvorsprungs (45) drehen kann, das Einpassungsloch (50) mit einem Verriegelungsabschnitt versehen ist, der konfiguriert ist, den Einpassungsvorsprung (45) einrasten zu lassen; der Verbindungsring (42) so gebildet ist, dass sein Außendurchmesser in einer lateralen Richtung gleich oder kleiner als ein maximaler Durchmesser der Schnur ist, und der Kopplungsteil (20, 60) die beiden Enden der Schnur durch Einpassen des Einpassungsvorsprungs (45) in das Einpassungsloch (50) koppelt.
12. Betätigungsschnur (9) nach einem der Ansprüche 1 bis 10, wobei der Verbindungskörper (40, 41) mit einem Einpas-

sungsvorsprung (45) versehen ist, der eine runde Schaffform an einer Spitze des Verbindungskörpers hat,
 der Einpassungsvorsprung (45) mit einem ausgebauchten Abschnitt (46) versehen ist, der einen Durchmesser hat, der größer als ein Durchmesser eines Basisendes des Einpassungsvorsprungs (45) ist, und
 der Verbindungskörper (40, 41) so gebildet ist, dass sein Außendurchmesser in einer lateralen Richtung gleich oder kleiner als ein maximaler Durchmesser der Schnur ist.

13. Hebevorrichtung aufweisend die Betätigungsschnur nach einem der Ansprüche 1 bis 12.

Revendications

1. Câble d'actionnement (9) comprenant un câble (14), dont les deux extrémités sont configurées pour être couplées l'une avec l'autre au moyen d'une partie de couplage (20, 60) de sorte que le câble d'actionnement possède une forme sans fin,
caractérisé en ce que
 la partie de couplage (20, 60) comprend :

(1) un premier corps de joint (40) prévu sur une extrémité du câble ; un second corps de joint (41) prévu sur l'autre extrémité du câble ; et un anneau de joint (42) prévu entre le premier corps de joint (40) et le second corps de joint (41) ; ou
 (2) une partie intégrée prévue sur une extrémité du câble et un second corps de joint (41) prévu sur l'autre extrémité du câble, dans lequel

le premier corps de joint (40) et le second corps de joint (41) présentent chacun une saillie de montage (45) d'une forme axiale, l'anneau de joint (42) et la partie intégrée présentent chacun un trou de montage (50) configuré pour s'adapter à la saillie de montage (45), la saillie de montage (45) est configurée pour s'engager avec le trou de montage (50) en étant insérée dans le trou de montage (50) et tournée ultérieurement et

le premier corps de joint (40), le second corps de joint (41), l'anneau de joint (42) et la partie intégrée sont chacun formés de sorte qu'un diamètre extérieur de ceux-ci dans une direction latérale soit égal ou inférieur à un diamètre maximum du câble.

2. Câble d'actionnement (9) selon la revendication 1, dans lequel la partie de couplage (20, 60) est formée de sorte qu'un diamètre extérieur de celle-ci dans une direction latérale soit inférieur à un diamètre maximum du câble.

3. Câble d'actionnement (9) selon la revendication 1 ou 2, dans lequel chaque extrémité du câble (14) est formée de sorte qu'un diamètre de celui-ci devienne plus petit lorsqu'une distance de la partie de couplage (20, 60) diminue.

4. Câble d'actionnement (9) selon l'une quelconque des revendications 1 à 3, dans lequel une longueur de la partie de couplage (20, 60) dans une direction longitudinale est au moins 1,2 fois le diamètre maximum du câble et au plus 2,5 fois le diamètre maximum du câble.

5. Câble d'actionnement (9) selon l'une quelconque des revendications 1 à 4, dans lequel une position de montage de la saillie de montage (45) et du trou de montage (50) est placée sur une position, dans laquelle la saillie de montage (45) est amenée par une rotation de 90 degrés après l'insertion dans le trou de montage (50).

6. Câble d'actionnement (9) selon l'une quelconque des revendications 1 à 5, dans lequel le premier corps de joint (40) et le second corps de joint (41) sont chacun formés sur l'une extrémité ou l'autre extrémité du câble par moulage outsert.

7. Câble d'actionnement (9) selon l'une quelconque des revendications 1 à 6, dans lequel le câble (14) est constitué d'une résine thermoplastique et un bout de chaque extrémité du câble est doté d'une bride configurée pour s'adapter au premier corps de joint (40) ou au second corps de joint (41).

8. Câble d'actionnement (9) selon l'une quelconque des revendications 1 à 7, dans lequel le premier corps de joint (40), le second corps de joint (41) et l'anneau de joint (42) sont moulés en une résine synthétique, la saillie de montage (45) est dotée de parties gonflées (46) présentant chacune un diamètre supérieur à un diamètre d'une extrémité de base de la saillie de montage (45) et le trou de montage (50) est doté d'une première partie de verrouillage (51a, 51b) et d'une seconde partie de verrouillage (51c, 51d) configurées chacune pour s'engager avec la partie gonflée (46).

9. Câble d'actionnement (9) selon la revendication 8, dans lequel la première partie de verrouillage (51a, 51b) et la seconde partie de verrouillage (51c, 51d) sont prévues de manière symétrique dans des ouvertures des trous de montage (50) de sorte à être décalées en rotation l'une de l'autre de 90 degrés.

10. Câble d'actionnement (9) selon la revendication 8 ou 9, dans lequel la partie gonflée (46) et une surface périphérique intérieure du trou de montage (50) sont

dotées d'un moyen de positionnement (53a, 53b) pour déterminer une position de rotation de la saillie de montage (45).

11. Câble d'actionnement (9) selon l'une quelconque des revendications 1 à 10, dans lequel l'anneau de joint (42) est formé de sorte à présenter une forme cylindrique avec un trou de montage (50), le trou de montage (50) est doté d'un trou circulaire présentant un diamètre qui permet à un bout d'une saillie de montage (45) de tourner, le trou de montage (50) est doté d'une partie de verrouillage configurée pour s'engager avec la saillie de montage (45), l'anneau de joint (42) est formé de sorte qu'un diamètre extérieur de celui-ci dans une direction latérale soit égal ou inférieur à un diamètre maximum du câble et la partie de couplage (20, 60) couple les deux extrémités du câble par adaptation de la saillie de montage (45) et du trou de montage (50). 5 10 15 20
12. Câble d'actionnement (9) selon l'une quelconque des revendications 1 à 10, dans lequel le corps de joint (40, 41) est doté d'une saillie de montage (45) présentant une forme de tige ronde sur un bout du corps de joint, la saillie de montage (45) est dotée d'une partie gonflée (46) présentant un diamètre supérieur à un diamètre d'une extrémité de base de la saillie de montage (45), et le corps de joint (40, 41) est formé de sorte qu'un diamètre extérieur de celui-ci dans une direction latérale soit égal ou inférieur à un diamètre maximum du câble. 25 30 35
13. Appareil de levage comprenant le câble d'actionnement selon l'une quelconque des revendications 1 à 12. 40

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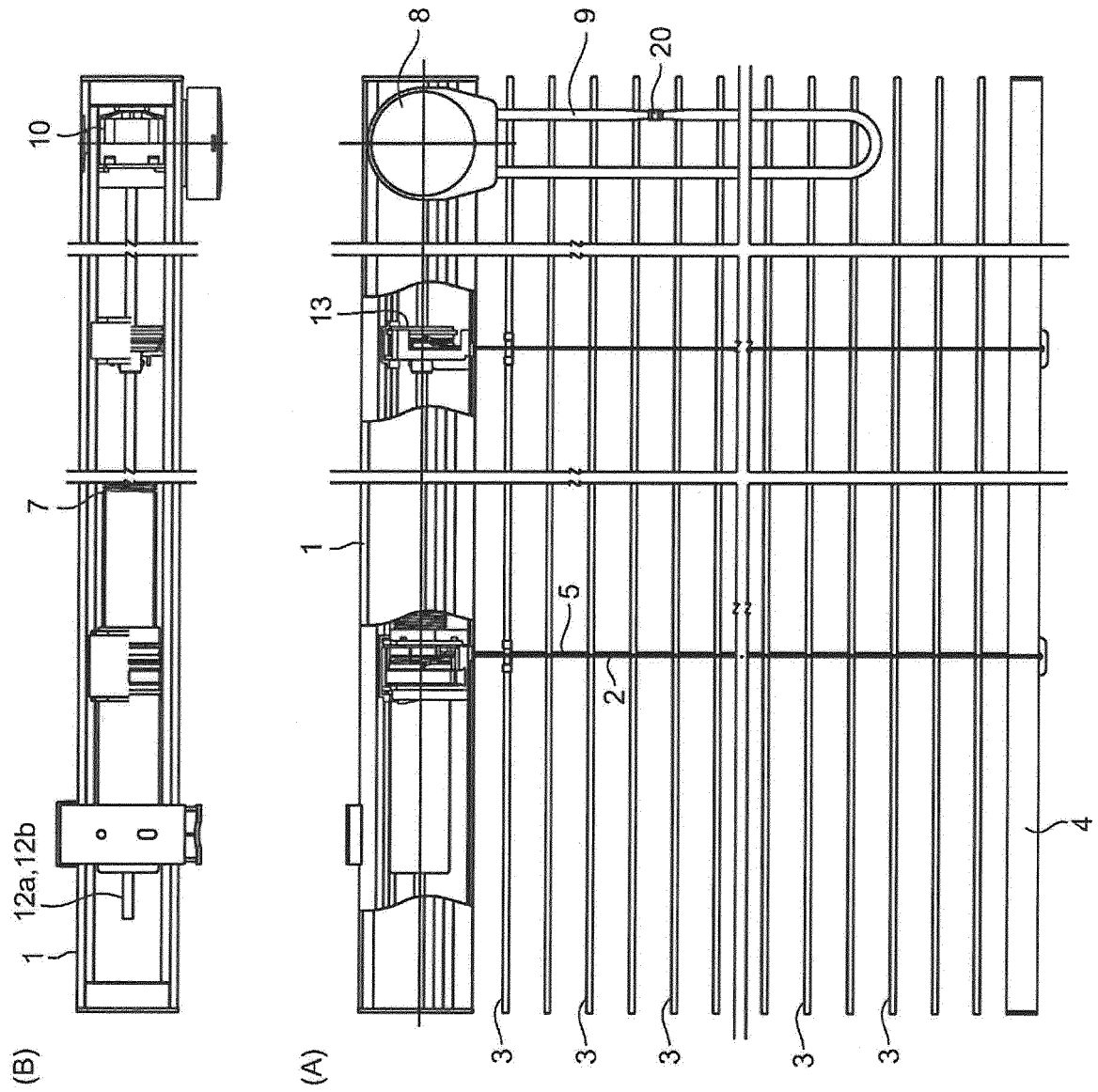


Fig. 1

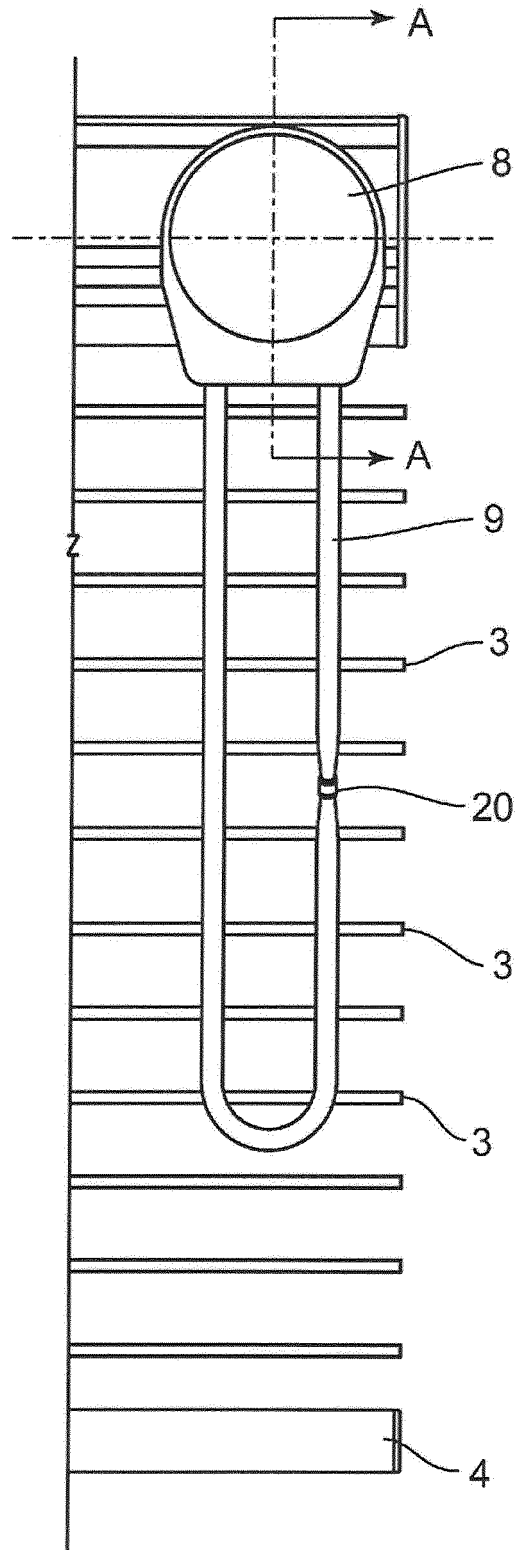


Fig. 2

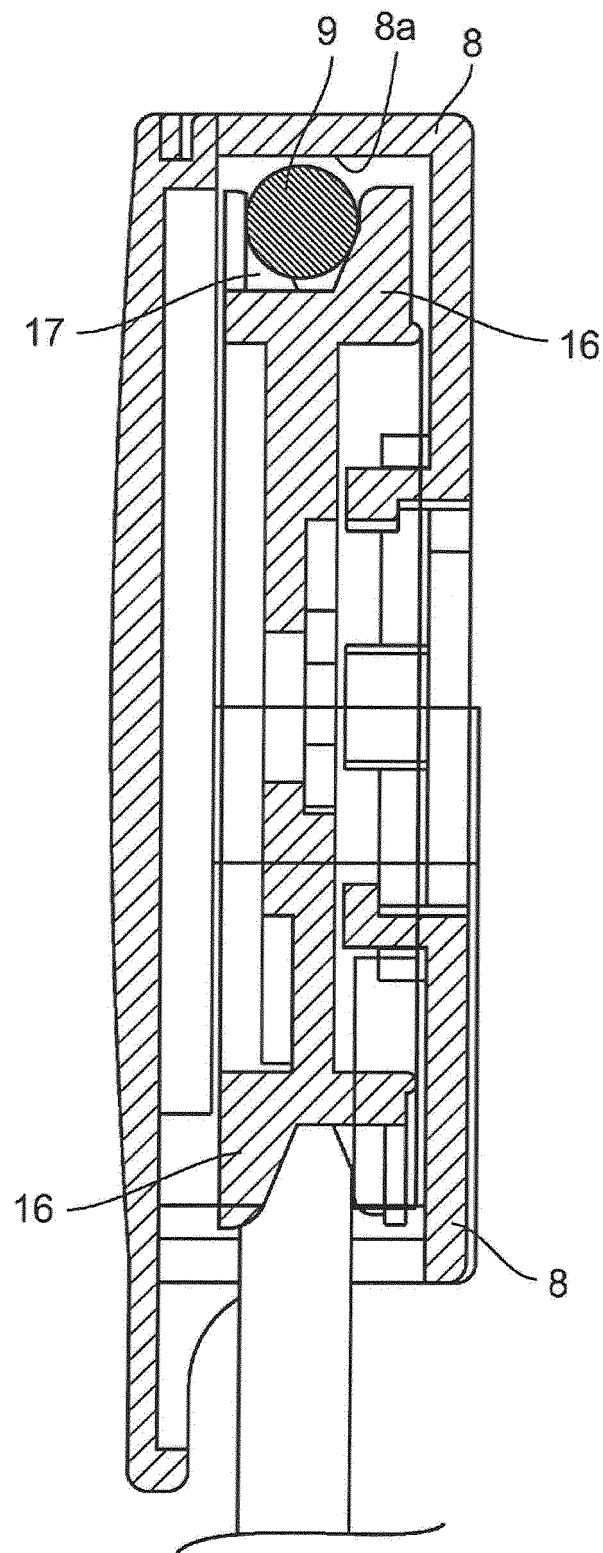


Fig. 3

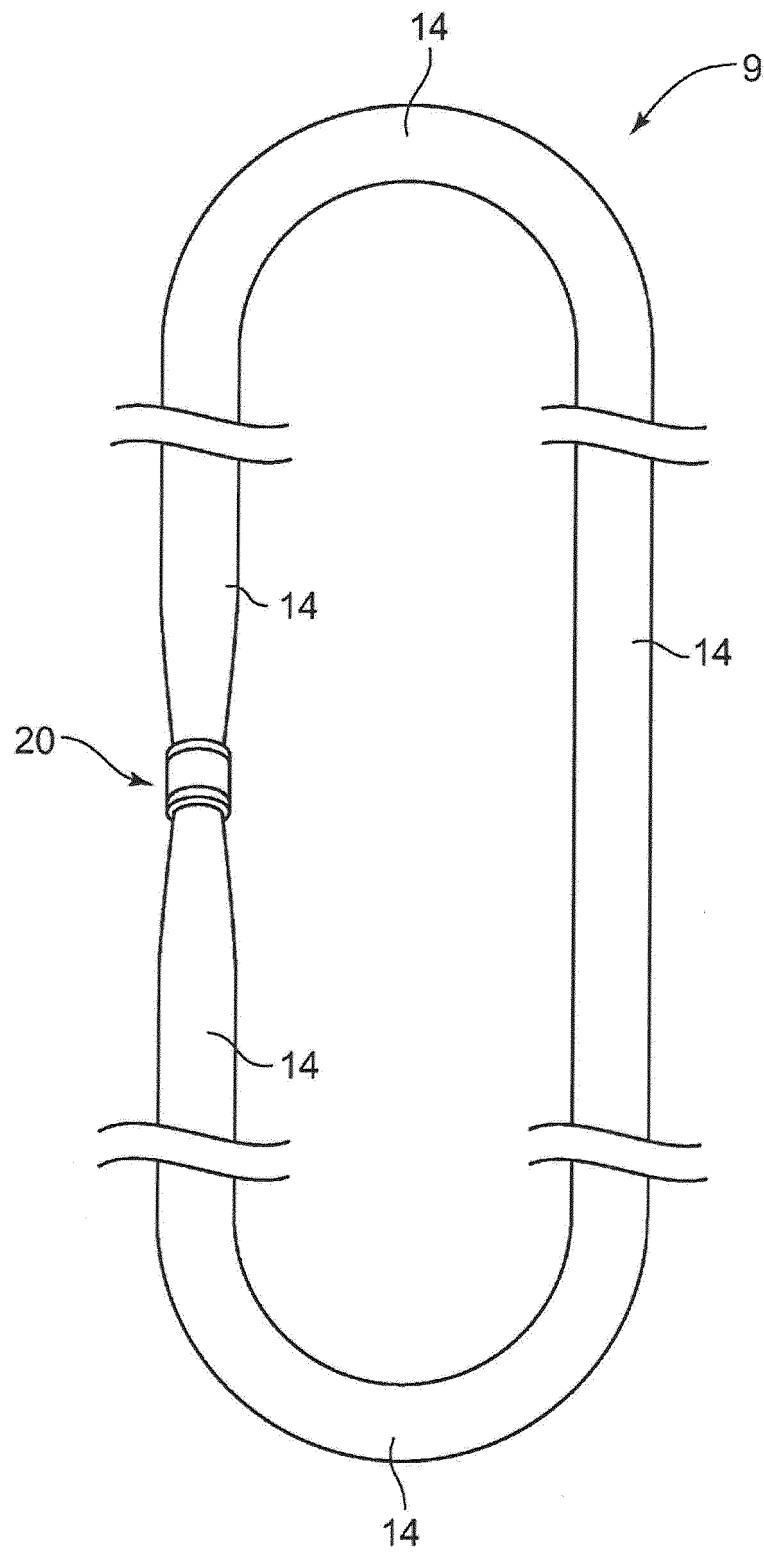


Fig. 4

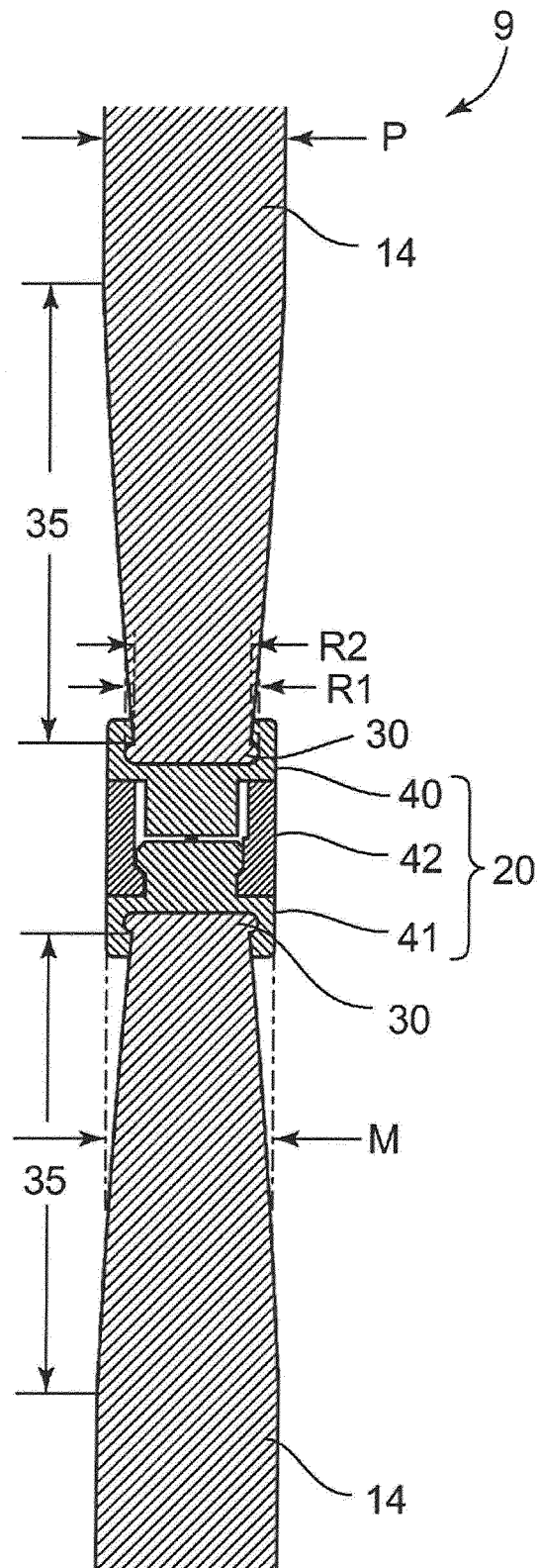


Fig. 5

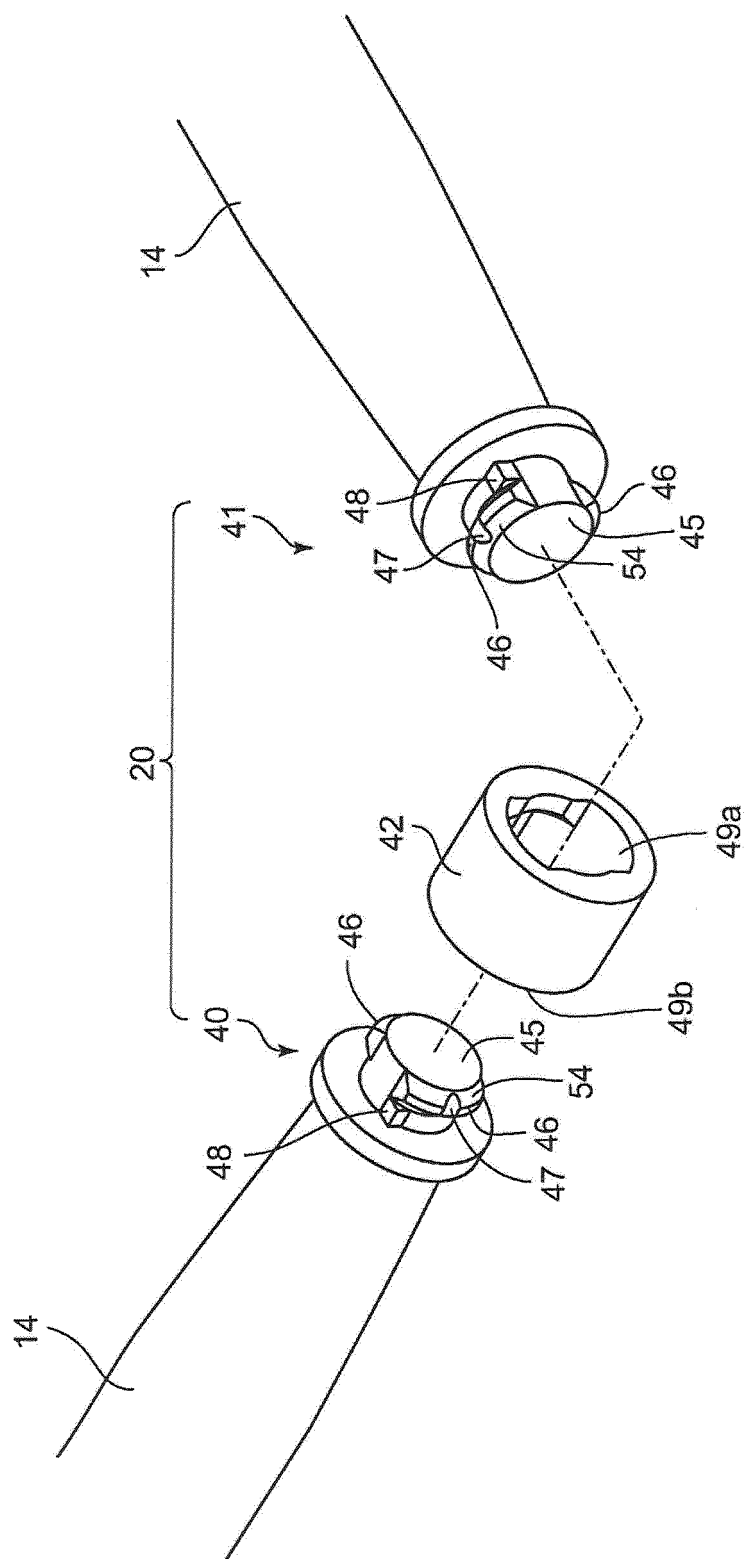


Fig. 6

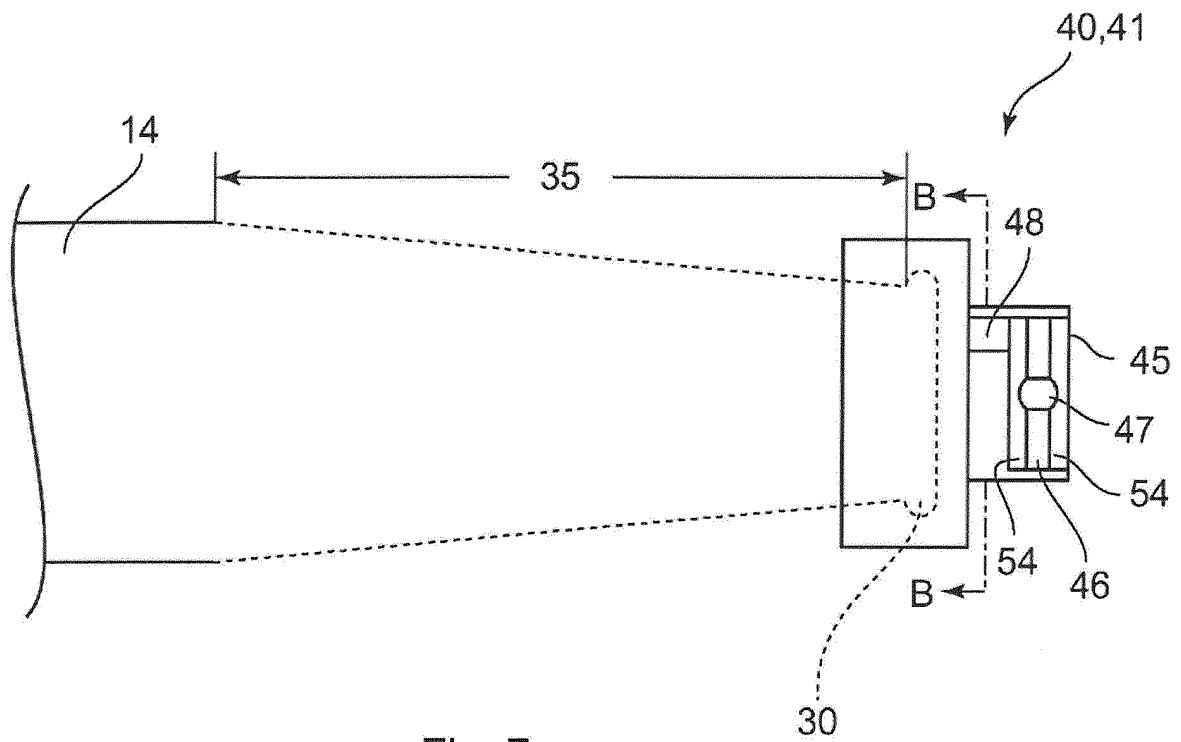


Fig. 7

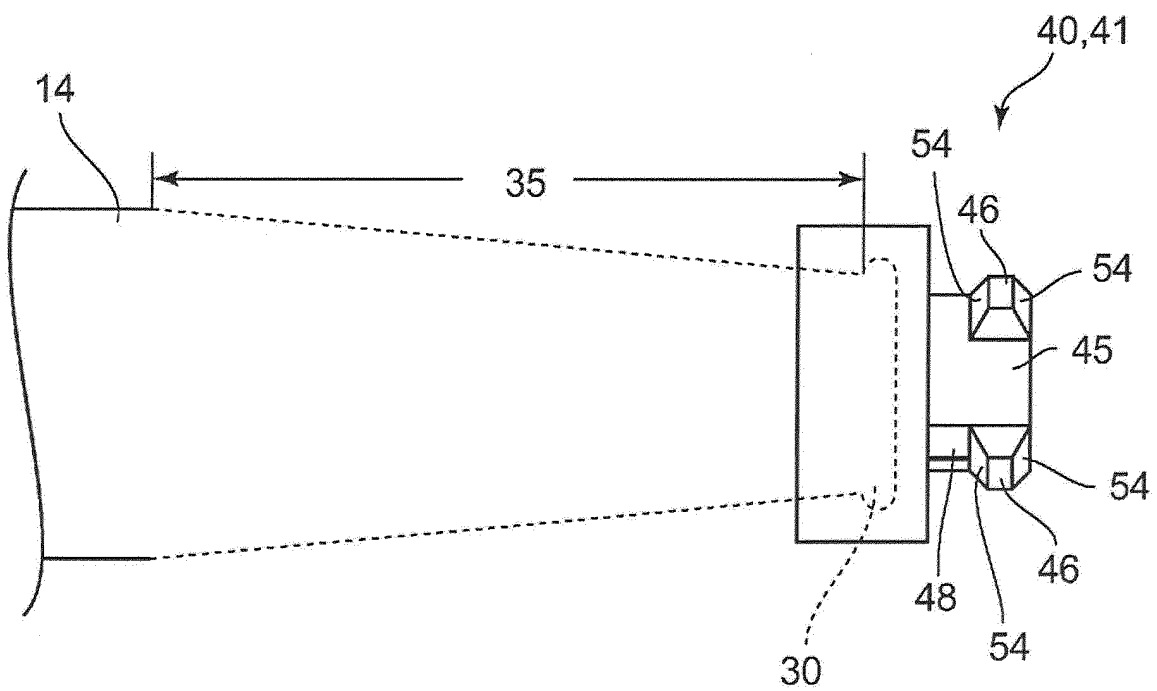


Fig. 8

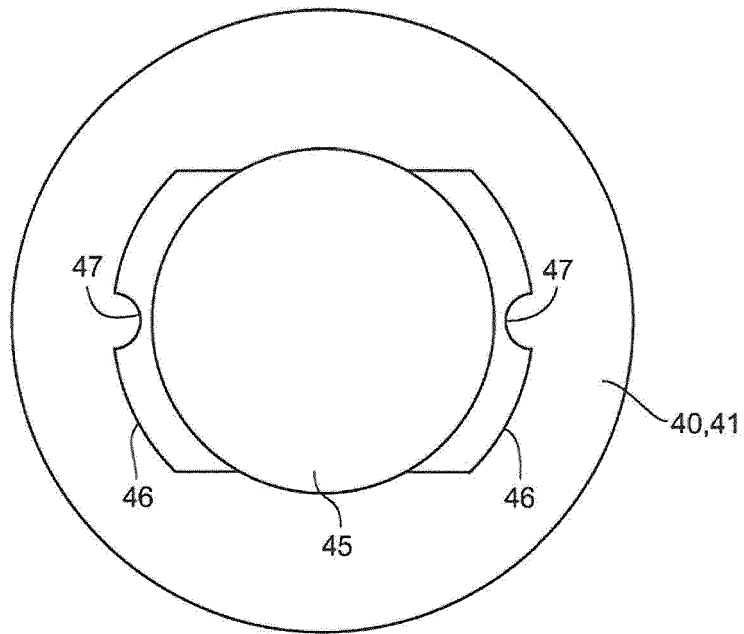


Fig. 9

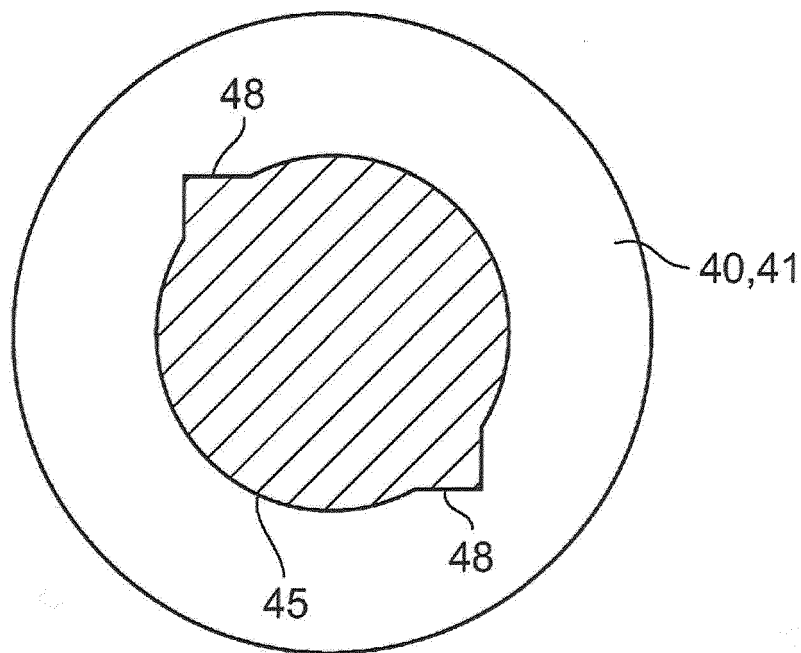


Fig. 10

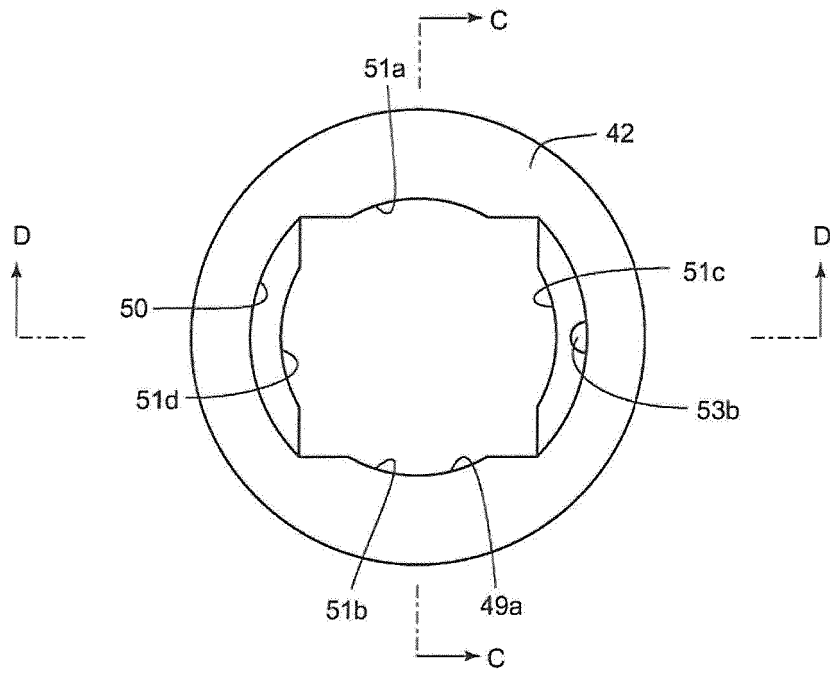


Fig. 11

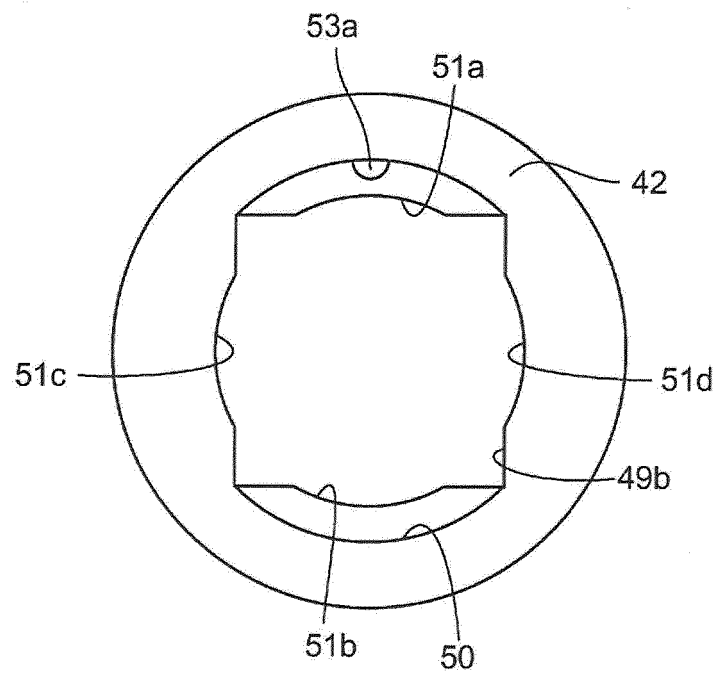


Fig. 12

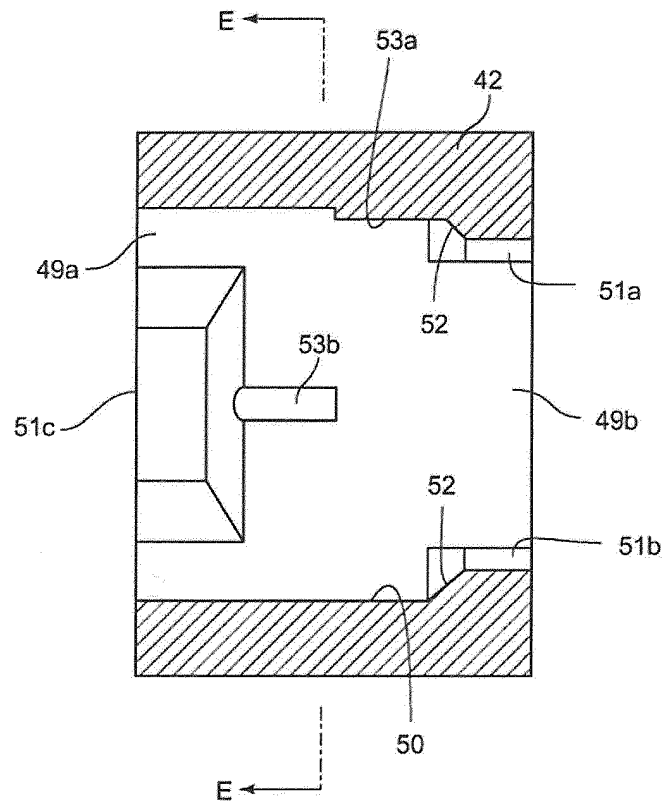


Fig. 13

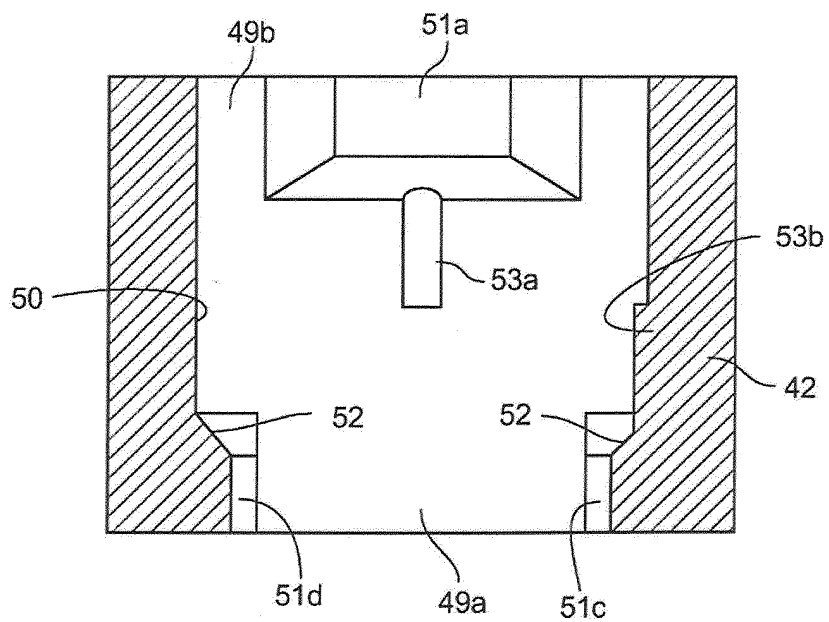


Fig. 14

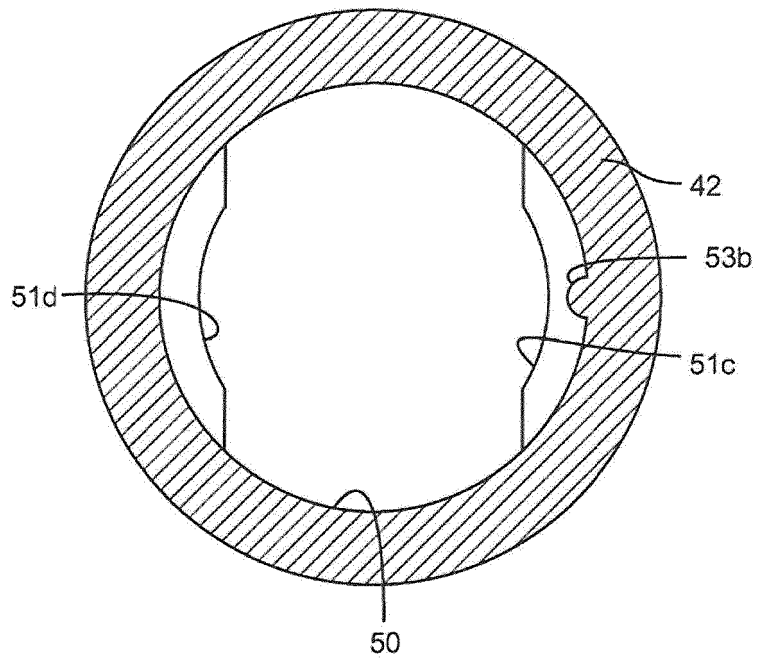


Fig. 15

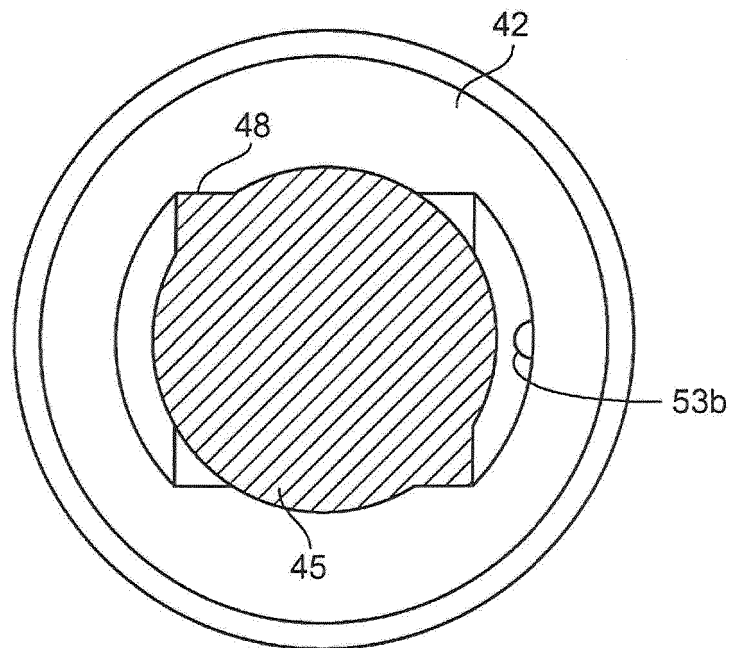


Fig. 16

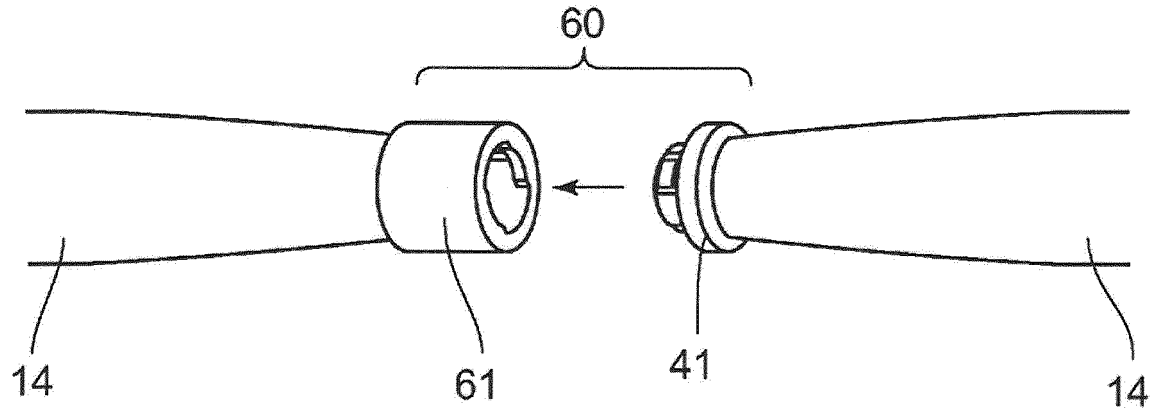


Fig. 17

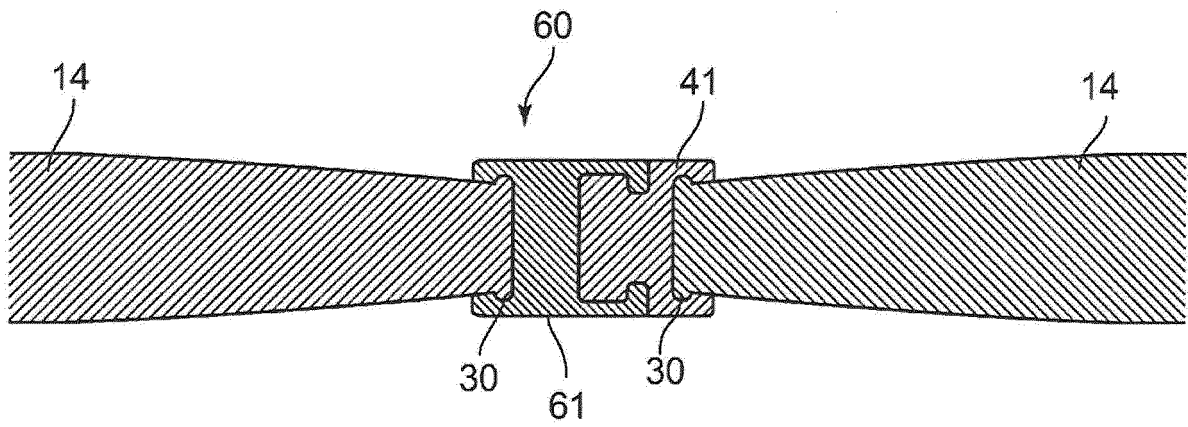


Fig. 18

REFERENCES CITED IN THE DESCRIPTION

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