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(71) Applicant: **Checcucci, Antonio**
50028 Tavernelle val di Pesa (FI) (IT)

(72) Inventor: **Checcucci, Antonio**
50028 Tavernelle val di Pesa (FI) (IT)

(74) Representative: **Celestino, Marco**
ABM Agenzia Brevetti & Marchi,
Viale Giovanni Pisano, 31
56123 Pisa (IT)

(54) **Support structure for rolling shutters, fast rolling shutter doors or similar closure elements**

(57) A support structure (1) for a rolling shutter, or for a fast rolling shutter door, or similar elements (50) for closure of an opening (250), comprises a tubular body (10) having a side surface (15) and a longitudinal axis (101). The outer surface (15) comprises a first end portion (11), a central portion (13), and a second end portion (12) opposite to the first end portion (11). The structure (1) also comprises a motor means (60) for causing the rotation of a drive shaft about a rotation axis, and a transmission means (70) for transmitting the rotation movement of the drive shaft to the tubular body (10) at the first end (11), in order to cause it to rotate about the longitudinal axis (101). More precisely, the rolling shutter (50) is wound about the central portion (13) of the tubular body (10) when the latter rotates at a first rotation speed (201) and is unwound, instead, from the tubular body (10) when the tubular body (10) same rotates at a second rotation speed (202), opposite to the first. The structure (1) comprises also a support means (40) for supporting the tubular body (10) at the second end (12) to make it possible a free rotation of the tubular body (10) about the longitudinal rotation axis (101).

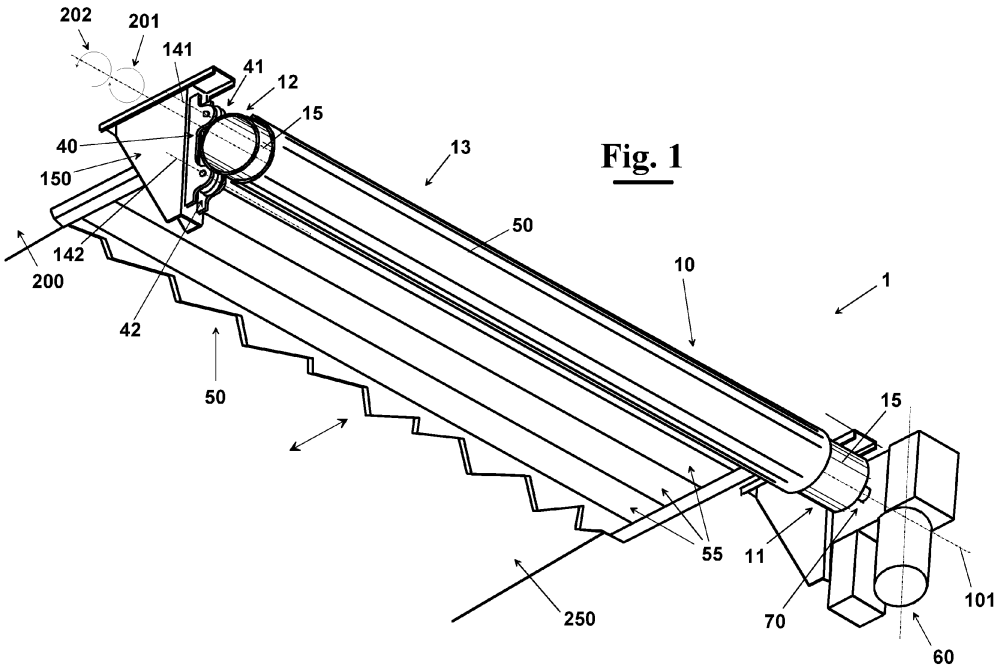

Fig. 1

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Description

Scope of the invention

[0001] The present invention relates to the field of doors or windows and, in particular, it relates to a support structure for rolling shutters, fast rolling shutter doors and similar elements for closure of an opening of driven type.

Description of the prior art

[0002] As well known, a driven shutter of traditional type comprises a tubular body from which ends two shafts protrude integrally, which engage pivotally on the one side with a bearing mounted to a fixed support, and on the other side with a motor for rolling shutters, for example a gear motor. To the side surface of the tubular body, which has a predetermined diameter, for large parts of its length, an edge of the shutter is fastened, in order cause it to wind or to unwind on the tubular body with the rotation of the same. Transmission parts are provided for the movement of an electric motor at one of the two shafts. This way, the operation of the motor in one direction, or in the opposite direction, causes the rotation of the tubular body about its own longitudinal axis, and therefore winding, or unwinding of the shutter.

[0003] To obtain each shaft protruding from the tubular body, the inner surfaces of the tubular body are normally fastened, by means of good quality welding, usually of class two, or more discs in turn are welded to the shaft, from which shaft portions protrude from the end of the tubular body. In particular, another portion of the shaft remains welded stably in the tubular body, and the protruding portion can operate stably cantilever-like, like a rotation pin. This way, once mounted, the tubular body has the shaft opposite to the gear motor that is free of rotating with respect to the fixed bearing that is mounted, for example by means of screws, to a holding wall, such as the external wall of a building.

[0004] However, the mounting by means of welding the shafts and of the discs to it integral in the tubular body needs various hours work by means of special equipment, in particular to provide the weldings of a correct class and carry out necessary quality tests, such as x-ray tests, etc.

[0005] Furthermore, before starting the operations of welding to fasten the shaft in the tubular support it is necessary to execute a succession of operations of lathing for bringing each shaft in a position co-axial to the other shaft and to that of the tubular support, in order to avoid disassembling and ensuring a correct operation of the support structure of the shutter.

[0006] With the final tubular body, is then necessary to mount the bearing support and to introduce the shaft in the bearing, step long and difficult, to obtain a correct alignment.

[0007] It is then desirable to provide the tubular body in a way cheaper, at least at the end where is not present the motor.

[0008] Furthermore, both for the many working steps of the installation, also for the wear, the shaft with time can damage up to breaking causing a fall of the rolling shutter and, then bringing to reduction of the safety of people.

[0009] In US3900063 a cylindrical roller is described for winding/unwinding flexible curtains. The roller and the curtain are supported as the lowest for all their length, in order to avoid folding the roller and the production of possible folds on the curtain caused by a not uniform winding of the curtain on the roller.

[0010] More precisely, at a first end of the roller, a frame is provided comprising an upper member, for fixing the roller to a support, and a lower member, which holds the roller. The upper member and the lower member are connected to each other by means of a connecting element, in order to form a frame having the shape of a "C". The shaft that causes the rotation of the roller protrudes from the first end of the roller same up to a bearing. This is arranged in a housing slidingly mounted along vertical guides. The curtain is, instead, arranged next to two tensioning rollers located in respective fixed positions, arranged at opposite sides with respect to a longitudinal axis of the roller and that extend for all the length of the curtain. At a second opposite end of the roller a frame is equipped with shape similar to that above described and, in particular, having a guide that allows the vertical sliding of the roller for following the growth, or the reduction, of the diameter of the curtain at winding and unwinding it, respectively. More precisely, at the second end, the roller is operatively connected to a drive shaft by a transmission belt.

[0011] Owing to the structure above described, when winding the curtain, the roller rises freely along the guide for following the growth of the diameter of the curtain. Instead, whem unwinding the curtain, the roller drops along the guide for following the reduction of diameter of the curtain. Both when unwinding the tenda and winding about the tube, the tensioning rollers remain adjacent to the curtain for ensuring a homogeneous winding for all its length and avoiding, then, the production of folds. Therefore, the support structure described in US3900063 is specifically designed for handling large curtains and, in order to solve the particular technical problem of the production of folds, wrinkles, or creases on the surface of the curtains during the operations of winding, or unwinding the same from a support roller.

[0012] Furthermore, the technical solution above described is structurally complex and then expensive in addition to causing long time for its installation.

[0013] Similar solutions are described also in DE1241956 and in US2002/059985.

Summary of the invention

[0014] It is then a feature of the present invention to provide a support structure for a rolling shutter, a fast

rolling shutter door, or similar rolling closure members for closure of an opneing, which improves remarkably the production step with respect to the solutions presently adopted.

[0015] It is another feature of the present invention to provide a support structure for a rolling shutter, a fast rolling shutter door, or similar elements for closure of an opening, which reduces remarkably the costs and the time for installation with respect to the solutions of the prior art.

[0016] It is a further feature of the present invention to provide a support structure for a rolling shutter, a fast rolling shutter door, or similar elements for closure of an opening, which can ensure high conditions of safety for people that use the shutter, or that in any case use the opnening to which the shutter is applied.

[0017] These and other objects are achieved by a support structure for rolling elements of a rolling shutter, or a fast rolling shutter door, for closure of an opening, according to the invention, said support structure comprising:

- a tubular body having a side surface comprising a first end portion, a central portion and a second end portion opposite to the first end portion, said side surface of said tubular body having a diameter for winding said rolling elements on said central portion, said tubular body having, furthermore, a longitudinal axis;
- a motor means that is arranged to cause the rotation of a drive shaft about an axis of rotation;
- a transmission means that is arranged to transmit the rotation movement of the drive shaft to said tubular body at said first end, in order to cause it to rotate about said longitudinal axis in a first rotation direction, or at a second rotation speed opposite to the first rotation direction, said rolling elements mounted to wind about said tubular body when said tubular body rotates at said first rotation speed and to unwind from said tubular body when said tubular body rotates at said second rotation direction;
- a means for supporting said tubular body at said second end, said support means mounted to allow a free rotation of said tubular body about said longitudinal axis;

whose main feature is that said means for supporting said tubular body at said second end comprises at least one low friction contact element, which is in contact with said side surface of said tubular body at a position external to the central portion on which the rolling elements are wound.

[0018] This way, at the second end portion, the tubular body rotates about the support means, by means of the, or each, low friction contact element which rolls/slides on the side surface of the tubular body. This way, the tubular body has not to be worked at the second end, and then it does not need a half-shaft from it protruding.

[0019] In particular, the support means for supporting the tubular body at the second end comprises at least one first and at least one second low friction contact element, for example arranged in symmetrical positions in a plane passing through the longitudinal axis of the tubular body.

[0020] In particular, the support means that is arranged to support the tubular body at the second end can comprises:

- a base body integral to a holding surface, said base body defining a low friction cradle open above and of diameter substantially alike, or larger than the diameter of the tubular body;
- said first and second low friction contact elements mounted to said cradle to contact said cradle in a rolling engagement about longitudinal axis.

[0021] Advantageously, said first and second low friction contact elements are small roller bearings, where the first roller bearing is pivotally connected to the base body and the second roller bearing is pivotally connected to said base body arranged in a position substantially symmetric to that of said first roller bearing in a plane substantially vertical and passing through the longitudinal axis of the tubular body.

[0022] Advantageously, a line r passing through the centre of said first roller bearing and through the centre of said tubular body and arranged in a plane δ orthogonal to said tubular body, and a line t which is also arranged in the plane δ and passing through the centre of said second roller bearing and through the centre of said tubular body, form an angle α set between 80° and 130° from each other.

[0023] Preferably, the line r and the line t form an angle α set between 90° and 120°. For example, the angle α can be equal to 90°, or 94°, or 100°, or 114°, or 120°, according to the diameter of the tubular body.

[0024] Alternatively, the means to low friction consist of slides lubricated made in said cradle open superiorly.

[0025] Advantageously, the support means is associated with lateral containing means located opposite to the support surface with respect to the tubular body. More in detail, the lateral containing means is adapted to avoid that the tubular body can fall from the support means by accident, or during maintenance of the support structure.

[0026] Advantageously, the lateral containing means is integrated in the support means and form with it a single part.

[0027] In particular, the support means can comprise:

- a base body integral to a holding surface;
- a first unit for roller bearings, each roller bearing of said first unit being pivotally connected to said base body;
- a second unit for roller bearings, each roller bearing of said second unit being pivotally connected to said base body, said roller bearings of said first unit ar-

ranged in substantially symmetrical positions to that of the roller bearings of said second unit in a plane γ substantially vertical and passing through the longitudinal axis of the tubular body.

[0028] In an exemplary embodiment of the invention, the base body comprises a first plate and a second plate, said first and said second plates having respective facing surfaces, said first and said second roller bearings arranged between said facing facing surfaces of said first and of said second plate.

[0029] Advantageously, each plate has a shape selected from the group consisting of:

- a curvilinear shape;
- a linear shape;
- a combination thereof.

[0030] In particular, each plate of said base body can comprise at least one first embracing portion for first roller bearing and at least one second embracing portion for second roller bearing, said first and said second embracing portions protruding from a base portion.

[0031] Advantageously, at least one among the first and the second roller bearing can be a radial roller bearing, or a spherical roller bearing.

[0032] In particular, the, or each, bearing can be selected from the group consisting of:

- a one crown bearing;
- a two crown bearing;
- a three crown bearing;
  or a combination thereof.

[0033] Advantageously, the, or each, bearing is selected from the group consisting of:

- ball bearings;
- cylindrical roller bearings;
- conic roller bearings.

[0034] Such exemplary embodiment allows compensating possible movements of the tubular body from the correct operation position. The bearings allow, in fact, ensuring a correct operation also in situations in which it is not certain the alignment of a stiff shaft held by two, or more roller bearings both for construction and for dilation, or other deformation. This way, the stress is reduced of deformation due to an inaccurate construction, or operation.

[0035] For example, the bearing can be coated with a layer of material at high rolling coefficient, such as rubber, or plastic material.

[0036] In particular, the layer of material at high rolling coefficient can be mounted directly on the outer surface of the bearing.

[0037] For example, the layer at high rolling coefficient can be laid in a molten status on the outer surface of the bearing and.

[0038] In an exemplary embodiment between the bearing and the layer of material at high rolling coefficient a bush can be provided.

[0039] In an exemplary embodiment of the invention at least one among the first and the second low friction contact elements can comprise a brass bearing, or a bush, or another element of cylindrical shape.

Brief description of the drawings

[0040] The invention will be now shown with the following description of some exemplary embodiments, exemplifying but not limitative, with reference to the attached drawings in which:

- Fig. 1 shows a perspective view of a support structure for rolling shutters similar rolling elements for closure of an opening, according to the invention;
- Fig. 2 shows an elevational side view of the support structure for rolling shutters, fast rolling shutter doors and similar elements for closure of an opening of Fig. 1;
- Figs. 3 and 4, 7 and 8 show a perspective view of some possible exemplary embodiments of the support structure for rolling shutters, fast rolling shutter doors and similar elements for closure of an opening shown in Fig. 1;
- Figs. 5, 6 and 8 show diagrammatically an elevational side view of further exemplary embodiments of the invention for support structure for rolling shutters, fast rolling shutter doors and similar elements for closure of an opening of Fig. 1;
- Fig. 9 diagrammatically shows some possible working configurations of the low friction contact elements responsive to the diameter of the tubular body;
- Figs. 10 and 11 show two possible exemplary embodiments of the low friction contact elements;
- Fig. 12 shows a perspective view of a further exemplary embodiment of the support structure of Fig. 1;
- Fig. 13 shows a perspective view of still a further exemplary embodiment of the support structure of Fig. 1.

Detailed description of some exemplary embodiments

[0041] With reference to Fig. 1, a support structure 1 for rolling elements of a rolling shutter 50, or a fast rolling shutter door, or similar elements for closure of an opening 250, comprises a tubular body 10 having a side surface 15. The tubular body comprises a first end portion 11, a second end portion 12 opposite to the first end portion 11 and a central portion 13 about which the rolling elements 55 are wound, for example slats rolling shutter 50, or the portions that make up the rolling door, for example made of PVC.

[0042] The support structure 1 also comprises a motor means 60 that is arranged to cause the rotation of a drive

shaft, not visible in the figures, about a respective axis of rotation.

[0043] Motor means 60 is connected to the tubular body 10 through a transmission means 70. The latter transmits the rotation movement of the drive shaft to the tubular body 10, in order to cause it to rotate at a first rotation speed 201 for winding the shutter 50 about the tubular body 10 same to make it possible an access to the light 250, or at a rotation speed 202, to unwind shutter 50 from the tubular body 10 in order to shut the opening 250.

[0044] The tubular body 10 is held at the second end portion 12 by support means 40. The latter is connected to a support surface 200 and is adapted to support the tubular body 10 allowing to it, at a same time, a free rotation about longitudinal axis 101.

[0045] According to the invention, the support means 40 comprises at least one low friction contact element 41, or 42, which are mounted to contact the outer surface 15. For example, a first and a second low friction contact element 41 and 42 can be provided that, in use, are arranged in contact with the side surface 15 of the tubular body 10 at the second end 12 at a position external to the rolling shutter 50 (Figs. 1 and 3).

[0046] In particular, the first and the second low friction contact elements 41 and 42 can be a first and a second roller bearing.

[0047] In the exemplary embodiment shown in detail in Fig. 2, the support means 40 comprises a base body 45 defining a rolling cradle open above, that is arranged to receive the side surface 15 of the tubular body 10. The roller bearings 41 and 42 are arranged in the cradle and are pivotally connected to it, in order to cause the tubular body 10 roll in the cradle its own axis 101. The roller bearings 41 and 42 rotate about respective rotation axes 141 and 142 substantially parallel to the rotation axis 101 of the tubular body 10. More in detail, the second roller bearing 42 is in a position substantially symmetric to that of the first roller bearing 41 in a plane γ substantially vertical and passing through the longitudinal axis 101 of the tubular body 10 and orthogonal to the base body 45.

[0048] The base body 45 can be fastened, for example by means of screws, nails, or the like, to a bracket 150 connected to support surface 200 (Fig. 2).

[0049] Alternatively, the base body 45 has a stiff portion 145 in which it is connected to the support surface 200 that defines the opening 250 (Figs. 3 and 4).

[0050] As shown in detail still in Fig. 2, a line r, arranged in a plane δ orthogonal to the tubular body 10 and passing through the centre C1 of the first roller bearing 41 and for the centre C of the tubular body 10, and a line t, which is also arranged in the plane δ and passes through the centre C2 of the second roller bearing 42 and for the centre C of the tubular body, form an angle α with each other. Such angle can be set between 80° and 130°, advantageously, set between 90° and 120°. In particular, the angle α can be chosen responsive to the diameter d of the tubular body 10 (Fig. 9). For example, in case a tubular support 10' is used having a diameter d1 set between about 270 and 275 mm, an angle $\alpha 1$ can be chosen that is about 90°. In the case, instead, of a tubular support 10" having a diameter d2 set between about 295 and 300 mm, an angle $\alpha 2$ can be chosen that is about 98°. In case of a tubular support 10"' having a diameter d3 set between about 320 and 325 mm, an angle $\alpha 3$ can be chosen that is about 108°.

[0051] In an exemplary embodiment diagrammatically shown in Figs. 7 and 8, the support means 40 comprises a first unit for roller bearings 41, for example two roller bearings 41'a and 41'b, pivotally connected to the base body 45, for example substantially U-shaped, or "V-shaped", and a second unit for roller bearings 42', for example two roller bearings 42'a and 42'b, pivotally connected to the base body 45. More in detail, each roller bearing of the first unit 41'a, 41'b, is in a position substantially symmetric to that of a corresponding roller bearing of the second unit 42'a, 42'b, respectively, in a plane γ substantially vertical and passing through the longitudinal axis 101 of the tubular body 10 (Fig. 7).

[0052] As shown in Fig. 4, the base body 45 can comprise a first plate 46 and a second plate 47 having respective facing surfaces 46a and 47a. More precisely, the first and the second roller bearing 41 and 42, or the first and the second unit is a ball bearing 41' and 42' (Fig. 7), arranged between surfaces 46a and 47a of the first and of the second plates 46 and 47.

[0053] As shown in Fig. 7, each plate 46 and 47 may have a shape selected from the group consisting of: a curvilinear shape, a linear shape or a combination of linear and curved portions.

[0054] The plates 46 and 47 of the base body can comprise respective portions of engagement 48 and 49 for first roller bearing 41 and for second roller bearing 42 that protrude from a base portion 44.

[0055] In an exemplary embodiment, as shown in Fig. 5, the support means 40 is associated with a lateral containing means 70 located opposite to the support surface with respect to the tubular body 10. More precisely, the lateral containing means 70 is adapted to avoid that the tubular body 10 can fall from the support means 40 by accident, or during maintenance.

[0056] As diagrammatically shown in Fig. 6, the lateral containing means 70 has at least one roller bearing 43 that assiste the rotation of the tubular body 10 during winding and unwinding steps of the shutter.

[0057] In an advantageous exemplary embodiment, the, or each, roller bearing 41, 42, 41'a, 41'b, 42'a, 42'b is a radial roller bearing, or a spherical roller bearing, in particular with balls, or with rollers. For example, it is possible to use radial roller bearings, or spherical, to a crown, or to double crown, or even bearings with triple crown.

[0058] Such exemplary embodiment allows compensating possible movements of the tubular body 10 from a correct operation position. In this case, the bearings, either radial or spherical roller bearings, allow to ensure a correct operation also in situations in which the align-

ment is not certain of a stiff shaft held by two, or more rollier bearings both for construction and for dilation, or other deformations. This way, the stress is reduced of deformation due to an inaccurate construction, or operation.

[0059] In Fig. 10 a possible exemplary embodiment is shown in detail for roller bearing 41. In this case, the roller bearing 41 comprises a bearing, for example a ball bearing 61, coated outside with a layer 62 of plastic material, or rubber, for example polyzene, in particular having a high rolling coefficient. The layer 62 can be applied, for example, in the molten state on the outer surface of the bearing 61 using known techniques.

[0060] In the exemplary embodiment of Fig. 11, between bearing 61 and a layer of material at high rolling coefficient 62, an interposition element 63 is provided, for example a bush. In a possible exemplary embodiment, the bearing 61, or 62 can be mounted to a shaft 65 connected to base portion 45 by an antirotation device. In this way, only the bearing 61, or 62, in use, rotates about shaft 65, whereas the latter remains integral to base portion 45.

[0061] In a further exemplary embodiment, as diagrammatically shown in Fig. 12, the low friction contact element is a slide 40", in particular a lubricated slide, cradle-like, i.e. substantially "U-shaped" that is arranged to support, in use, the tubular body 10 at the second end 12 at a position external to the rolling shutter 50. More in detail, the slide is mounted to allow the tubular body 10 to rotate freely. In this case, the base body 45 has a support portion 141 protruding from it, in particular equipped with a arc-shaped portion 143 in which the slide 40" is connected. More in detail, the slide 40" can be constrained, for example by a fixed joint, in the arc-shaped portion 143 of the support portion 141.

[0062] In another exemplary embodiment, as shown in Fig. 13 two slides 41" and 42" are provided, in particular two lubricated slides. The two slides 41" and 42" can be made of a low friction material, for example of composite material polytetrafluorethylene (PTFE) and bronze. In this case, the base body 45 has two support portions 141 and 142, protruding from it to which slides 41" and 42" are mounted. More in detail, support portions 141 and 142 may have respective end portions 143 and 144, for example with curvilinear shape, in particular arc-shaped, and opposite to the end connected to the base body 45, at which the slides 41" and 42" are arranged. In an exemplary embodiment, the slides 41" and 42" are engaged in a removable way at the end portions 143 and 144, for example by a matching form. More precisely, the end portions 143 and 144 have curvilinear shape, for example arc-shaped, and comprise respective longitudinal grooves 145 and 146 with which the slides 41" and 42" engage by fixed portions 147 and 148 protruding from slides 41 and 42.

[0063] The foregoing description of a specific embodiment 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 an embodiment without further research and without parting from the invention, and it is therefore to be understood that such adaptations and modifications will have to be considered as equivalent to the specific embodiment. The means and the materials to realise the different functions described herein could have a different nature without, for this reason, departing from the field of the invention. It is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation.

Claims

1. Support structure (1) for rolling elements of a rolling shutter, or a fast rolling shutter door (50), for closure of an opening (250), comprising:

   - a tubular body (10) having a side surface (15) comprising a first end portion (11), a central portion (13) and a second end portion (12) opposite to said first end portion (11), said side surface (15) of said tubular body (10) having a diameter for winding said rolling elements (55) on said central portion (13), said tubular body (10) having, furthermore, a longitudinal axis (101);
   - a drive shaft and a motor means (60) that is arranged to cause the rotation of the drive shaft about an axis of rotation;
   - a transmission means (70) that is arranged to transmit the rotation movement of said drive shaft to said tubular body (10) at said first end (11), in order to cause it to rotate about said longitudinal axis (101) at a first rotation speed (201), or at a second rotation speed (202) opposite to said first rotation speed (201), said rolling elements (50) mounted to wind about said tubular body (10) when said tubular body (10) rotates at said first rotation speed (201) and to unwind from said tubular body (10) when said tubular body (10) rotates at said second rotation speed (202);
   - a support means (40) of said tubular body (10) at said second end (12), said support means (40) mounted to allow a free rotation of said tubular body (10) about said longitudinal rotation axis (101); **characterised in that** said support means (40) of said tubular body (10) at said second end (12) comprises at least one low friction contact element (41, 42) mounted to contact said side surface (15) of said tubular body (10) at a position external to said central portion about which said rolling elements are wound (55).

2. Support structure, according to claim 1, wherein said support means (40) of said tubular body (10) at said

second end (12) comprises at least one first and at least one second low friction contact element (41, 42).

3. Support structure, according to claim 1, wherein said support means (40) that is arranged to support said tubular body (10) at said second end (12) comprises a base body (45) integral to a support surface (200), said base body (45) defining an open low friction cradle, said first and second low friction contact elements (41, 42) mounted to said cradle to contact (10) said cradle in a rolling engagement about said longitudinal axis (101).

4. Support structure, according to claim 3, wherein said first and second low friction contact elements are small roller bearings, wherein said first roller bearing (41) is pivotally connected to said base body (45) and said second roller bearing (42) is pivotally connected to said base body (45) and is in a position substantially symmetric to that of said first roller bearing (41) in a plane γ substantially vertical and passing through said longitudinal axis (101) of said tubular body (10).

5. Support structure, according to claim 2, wherein a line r passing through the centre C1 of said first low friction contact element (41) and for the centre C of said tubular body (10) and arranged in a plane δ orthogonal to said tubular body (10), and a line t which is also arranged in said plane δ and passing through the centre of said second low friction contact element and through the centre of said tubular body (10), form an angle α set between about 90° and about 120° from each other.

6. Support structure, according to claim 1, wherein said support means (40) is associated with a lateral containing means (70) located opposite to said support surface (200) with respect to said tubular body (10), said lateral containing means (70) configured to avoid that said tubular body (10) can fall from said support means (40) by accident, or during maintenance.

7. Support structure, according to claim 5, wherein said lateral containing means (70) are integrated in said support means (40) and form with it a single part.

8. Support structure, according to claim 1, wherein said support means (40) comprises:

- a base body (45) integral to a holding surface;
- a first unit for low friction contact elements (41'), each low friction contact element (41') of said first unit being pivotally connected to said base body (45);
- a second unit for low friction contact elements (42'), each low friction contact element (42') of said second unit being pivotally connected to said base body (45), said low friction contact elements (41'a, 41'b) of said first unit arranged in substantially symmetrical positions to that of the low friction contact elements (42'a, 42'b) of said second unit in a plane γ substantially vertical and passing through said longitudinal axis (101) of said tubular body (10).

9. Support structure, according to claim 3, wherein said base body (45) comprises a first plate (46) and a second plate (47), said first and said second plates (46, 47) having respective facing surfaces (46a, 47a) said first and said second low friction contact elements (41, 42) arranged between said facing surfaces (46a, 47a) of said first and of said second plate (46, 47).

10. Support structure, according to claim 9, wherein each said plate (46, 47) has a shape selected from the group consisting of:

- a curvilinear shape;
- a linear shape;
- a combination thereof;

11. Support structure, according to claim 9, wherein, each said plate (46, 47) of said base body (45) comprises at least one first embracing portion (48) for said first low friction contact element (41) and at least one second embracing portion (49) for said second low friction contact element (42), said first and said second embracing portion (48, 49) protruding from a base portion (44).

12. Support structure, according to claim 1, wherein at least one among said first and said second low friction contact elements (41, 42) is selected from the group consisting of:

- a radial roller bearing.
- a spherical roller bearing,

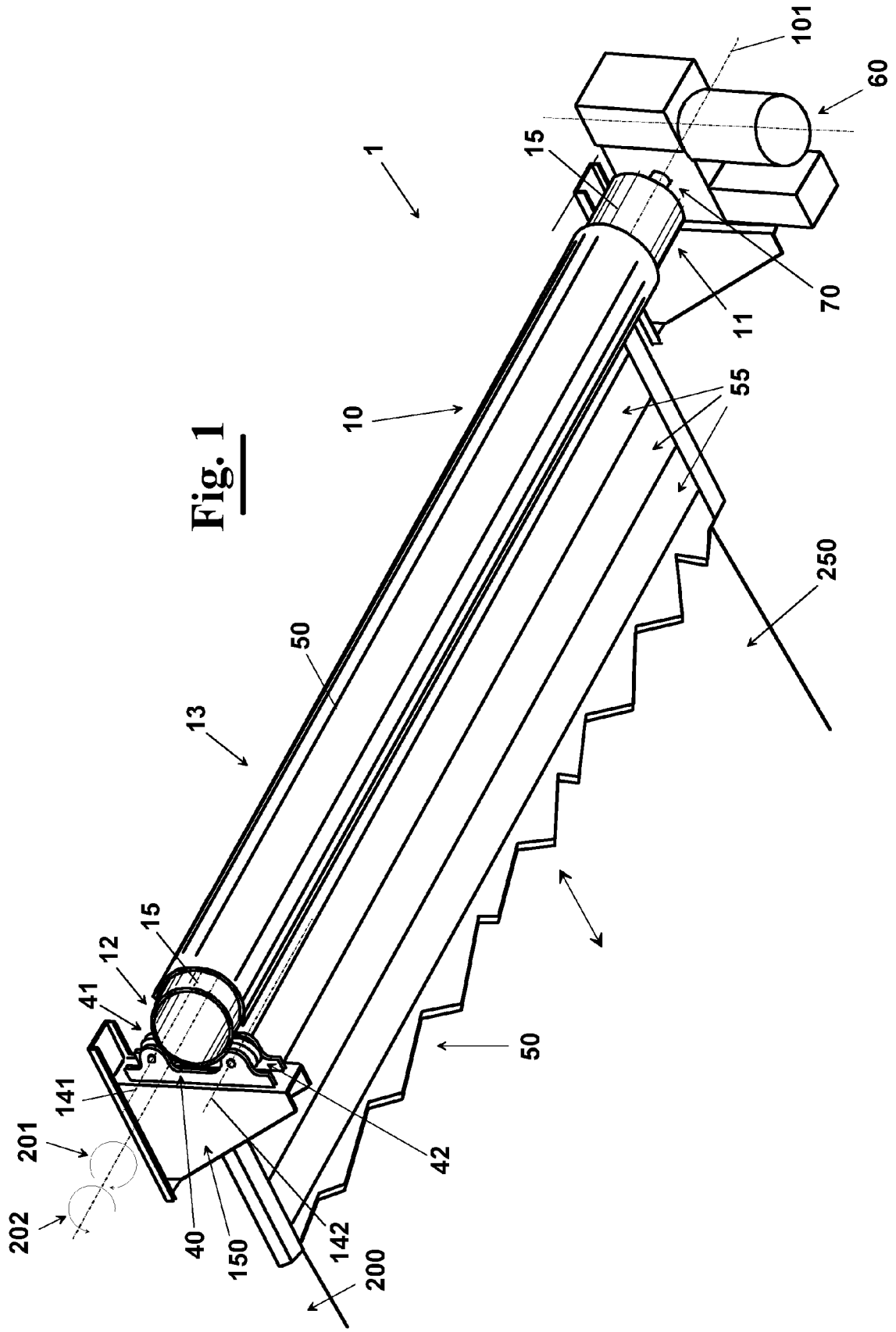
13. Support structure, according to claim 11, wherein said radial roller bearing, or said spherical roller bearing is selected from the group consisting of:

- a one crown bearing;
- a two crown bearing;
- a three crown bearing;
- or a combination thereof.

14. Support structure, according to claim 11, wherein said radial roller bearing, or said spherical roller bearing, is coated outside of a layer of material at high rolling coefficient, in particular said material at high rolling coefficient selected from the group consisting

of: plastic material, or rubber.

15. Support structure, according to claim 1, wherein said, or each, low friction contact element is a lubricated slide, or autolubricated (40", 41", 42").


101
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12
41
141
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202
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142
200
42
50

Fig. 1

Fig. 2

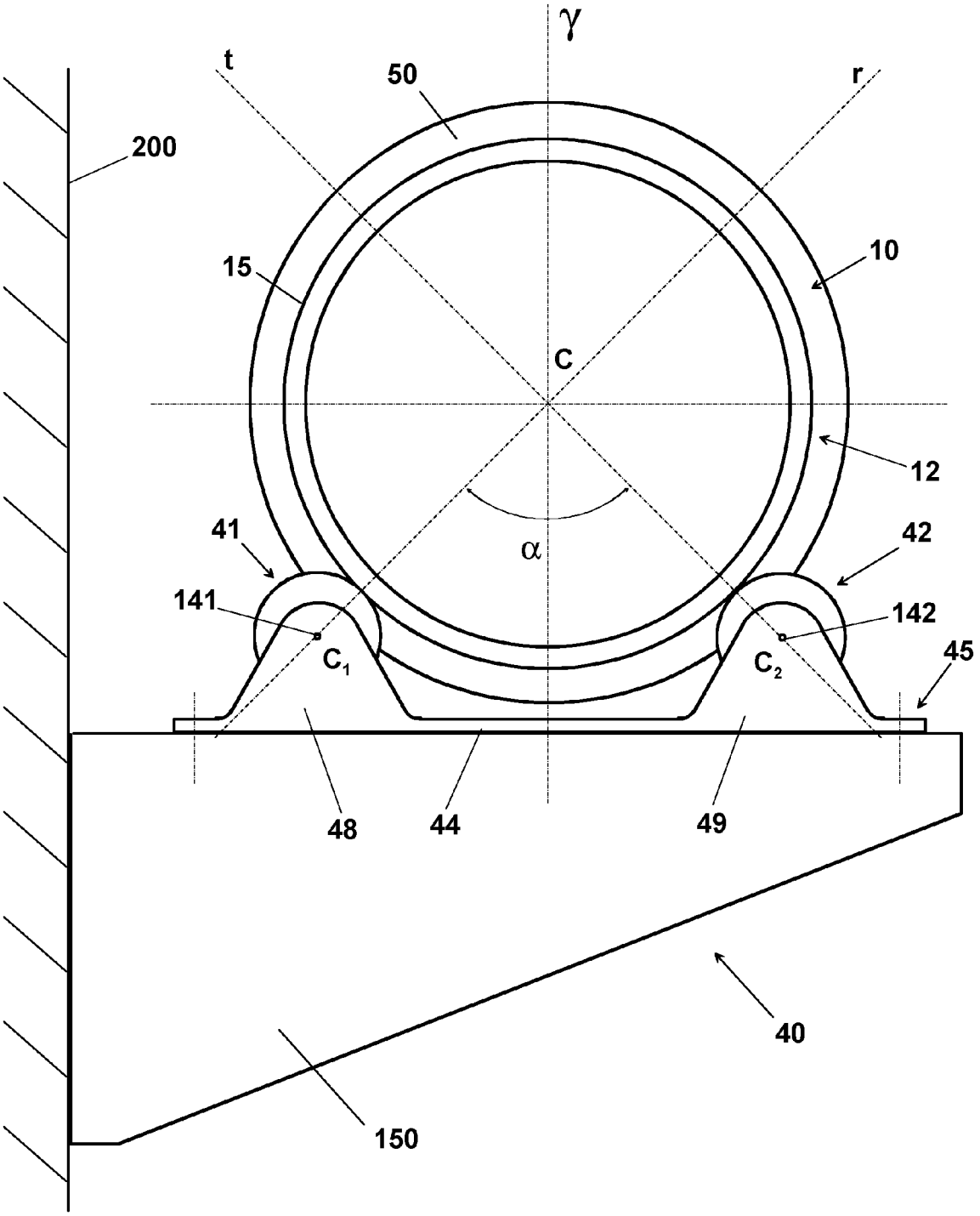
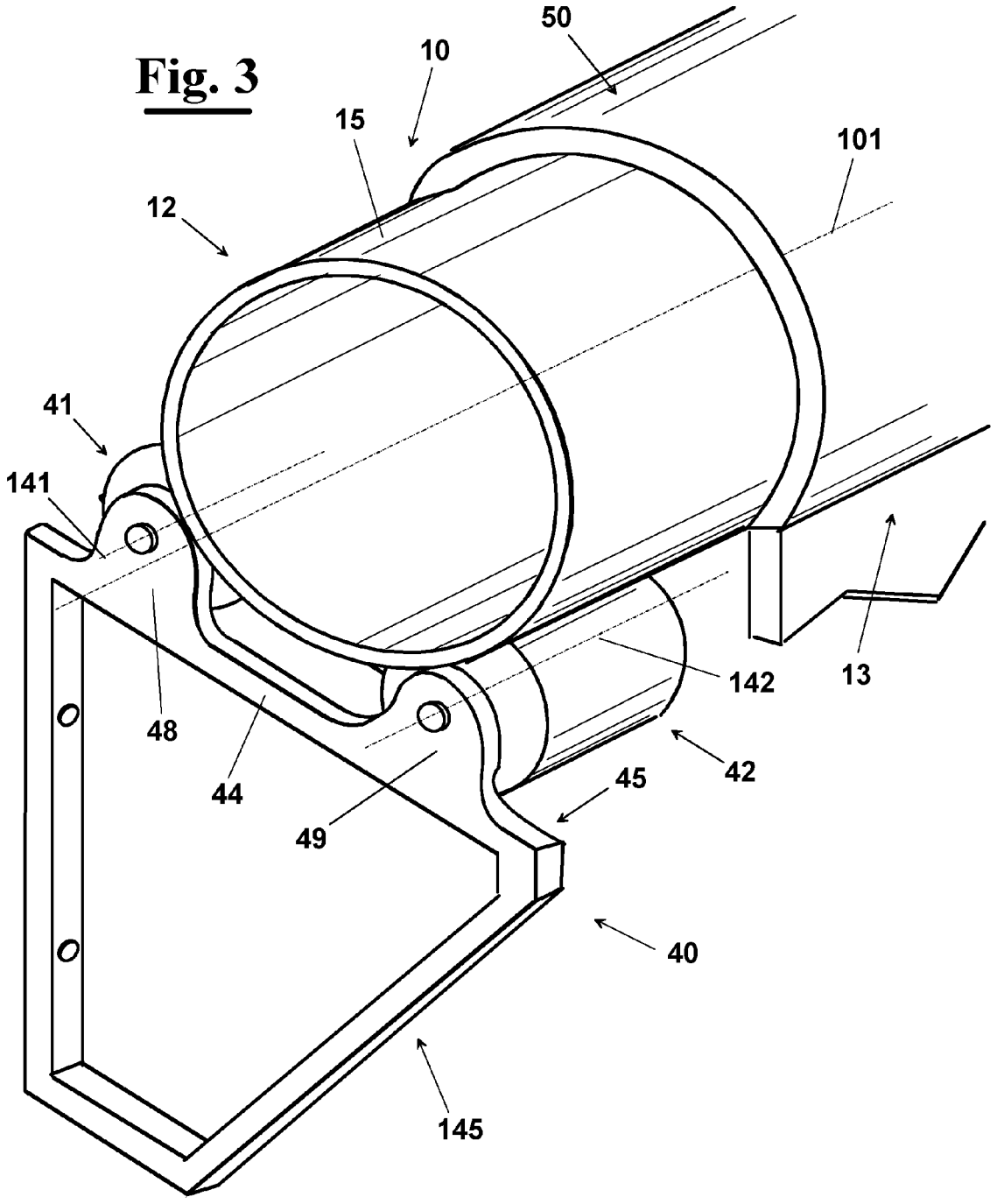


Fig. 3



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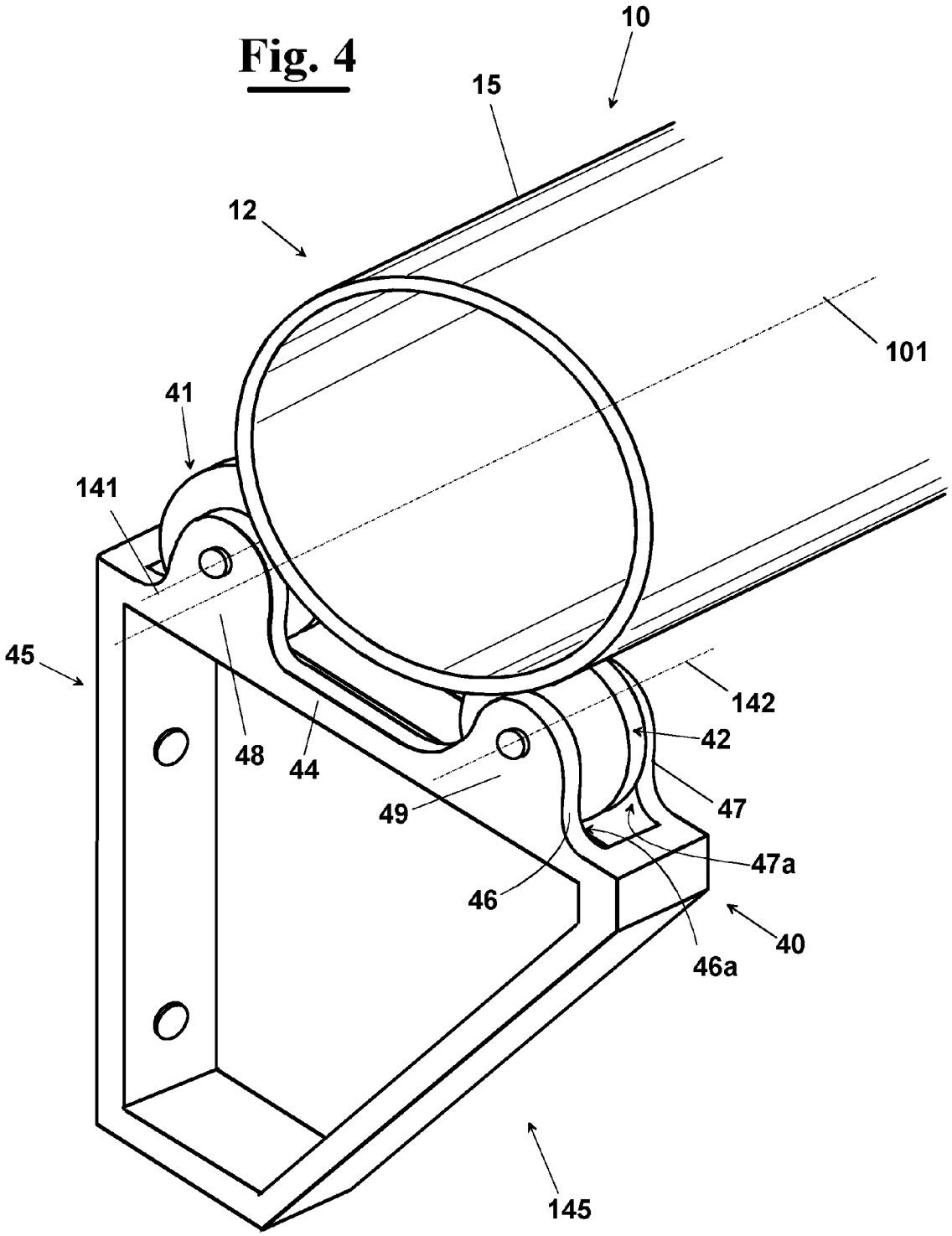
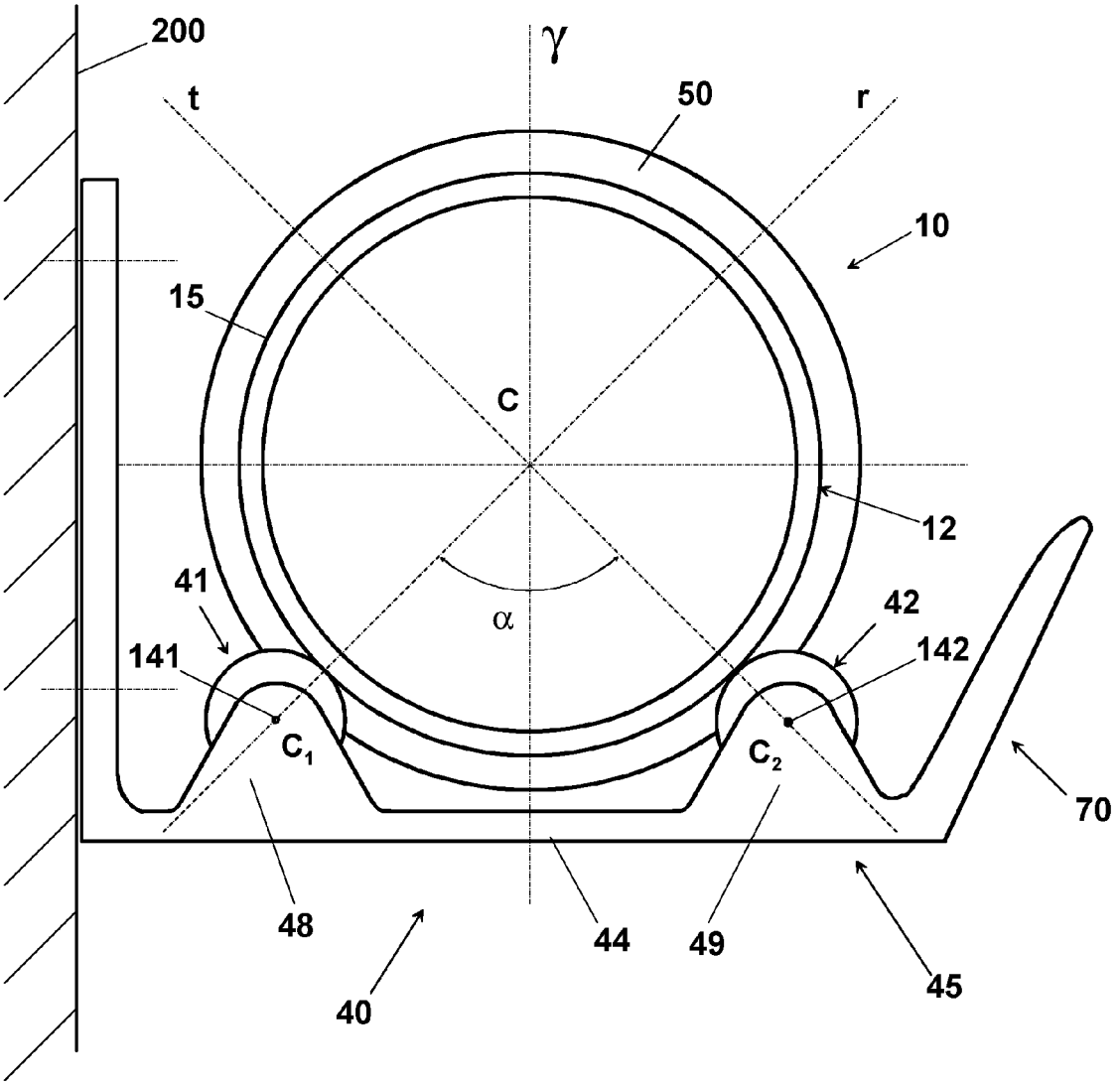


Fig. 5



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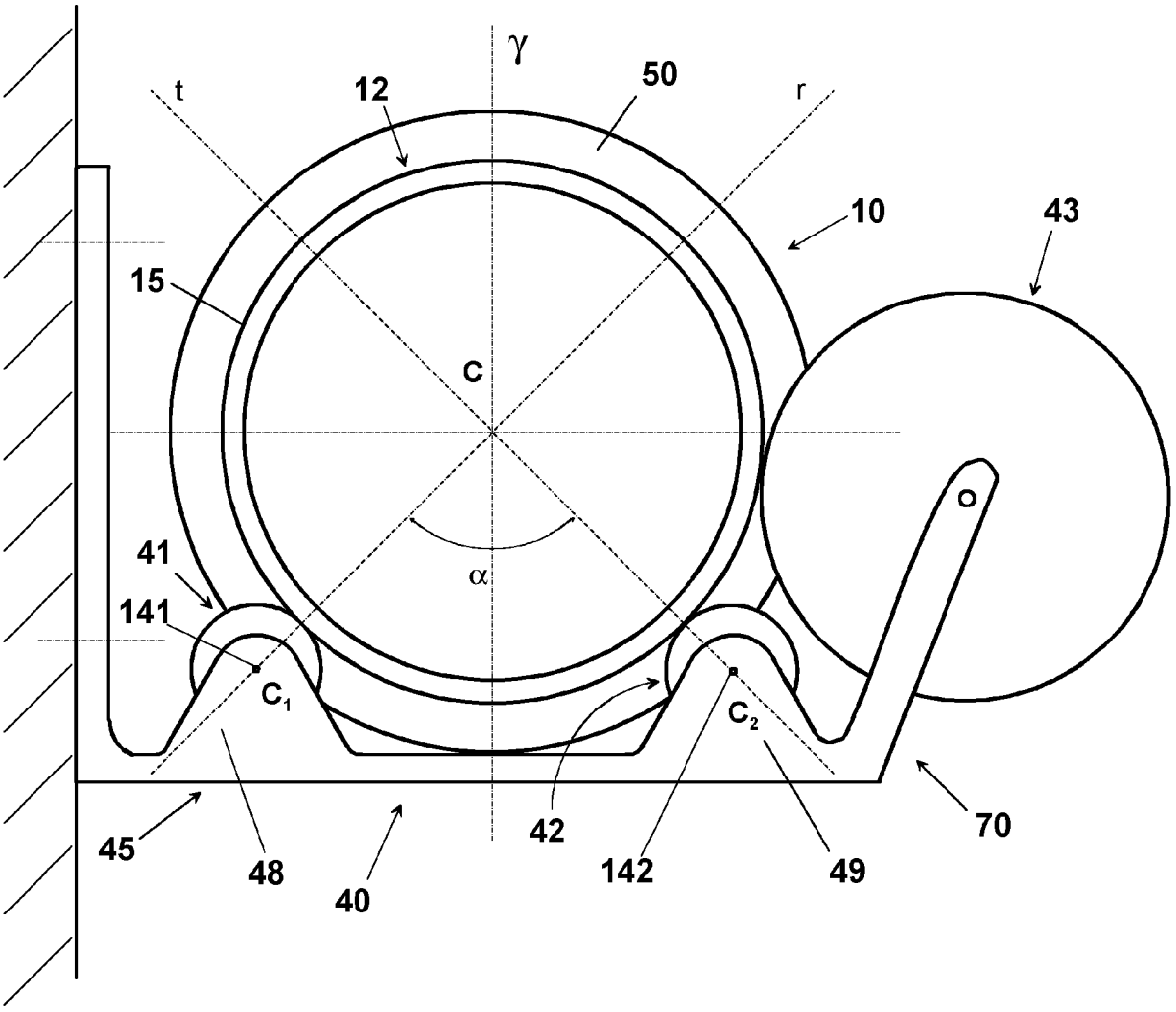

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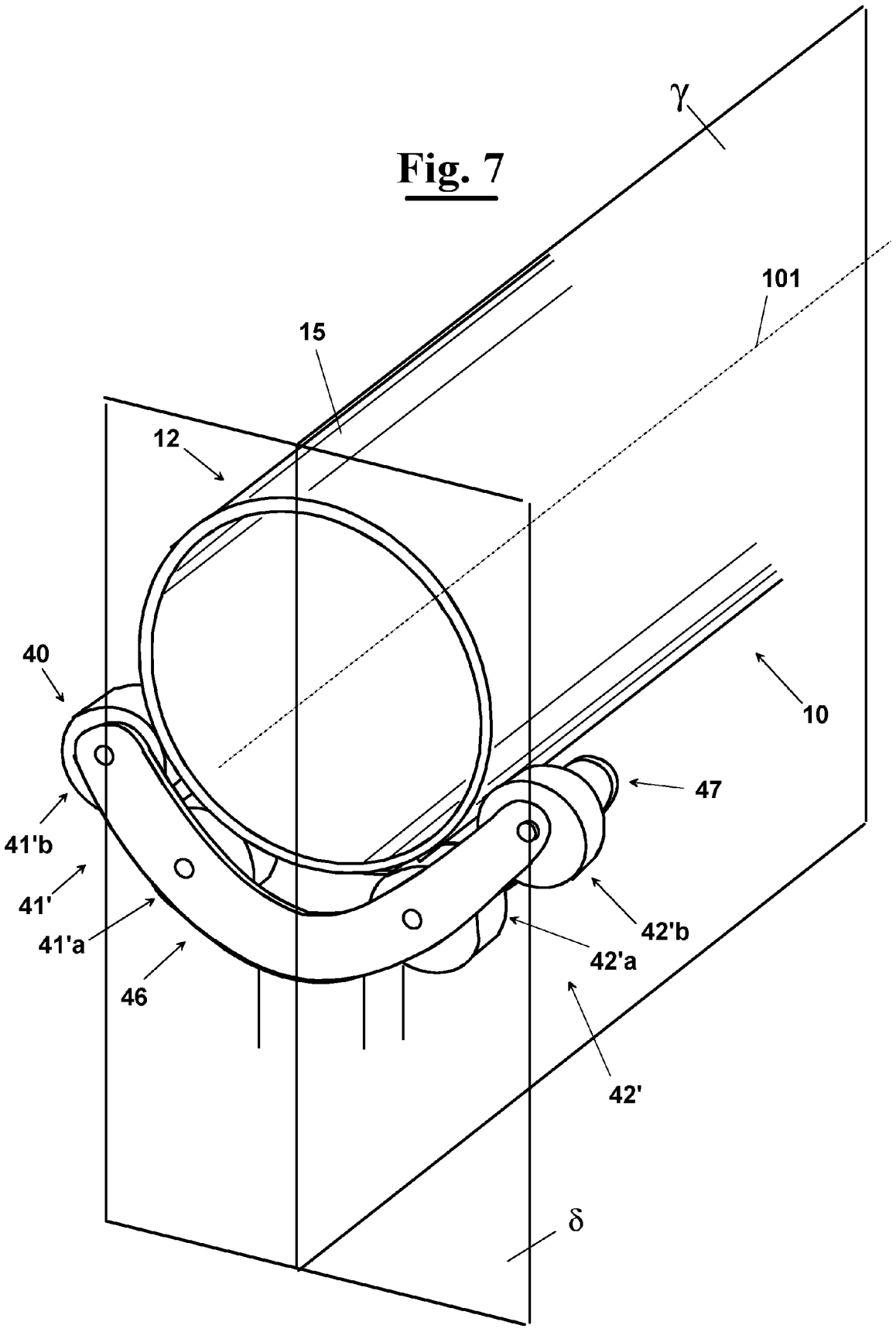

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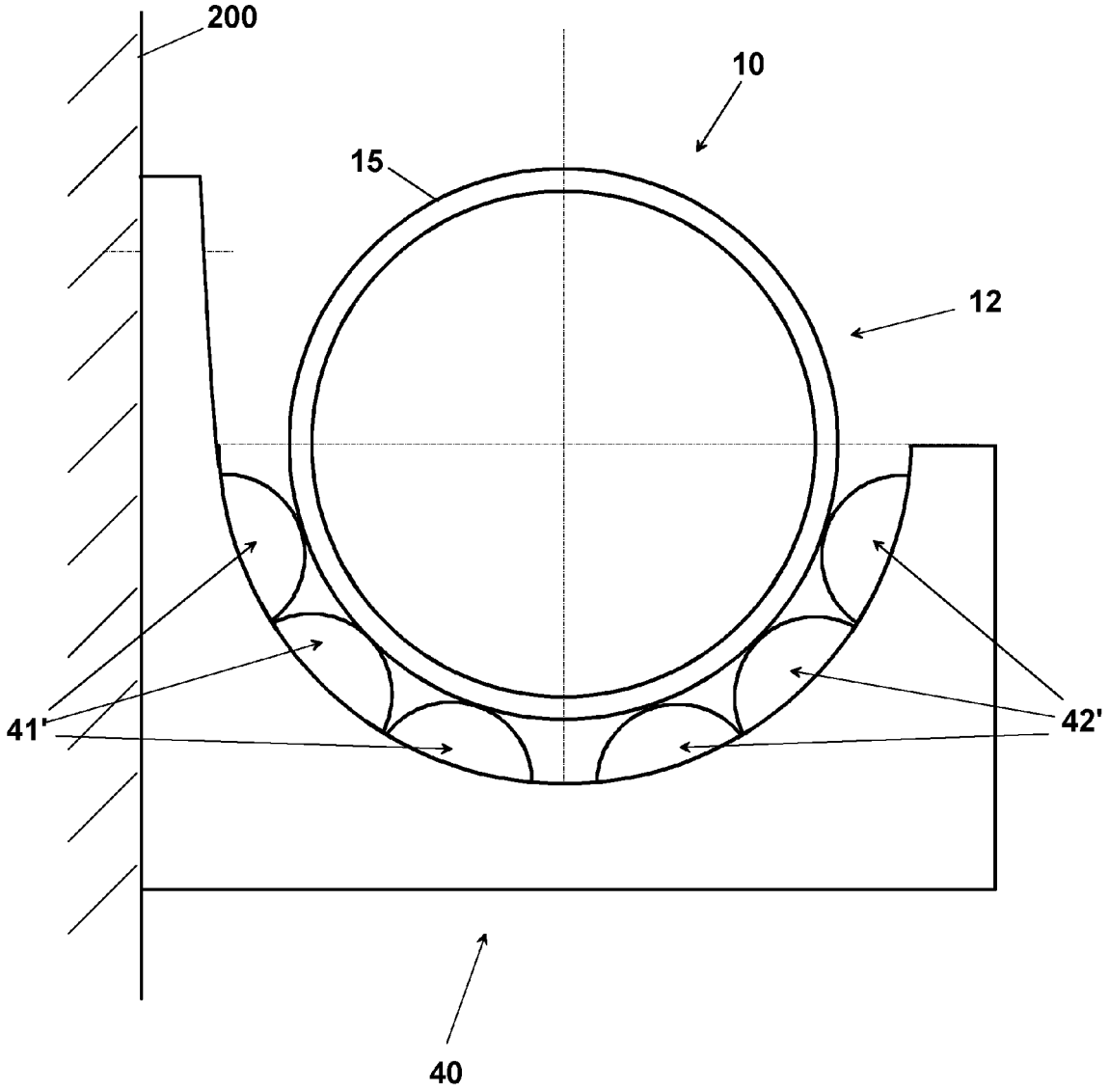


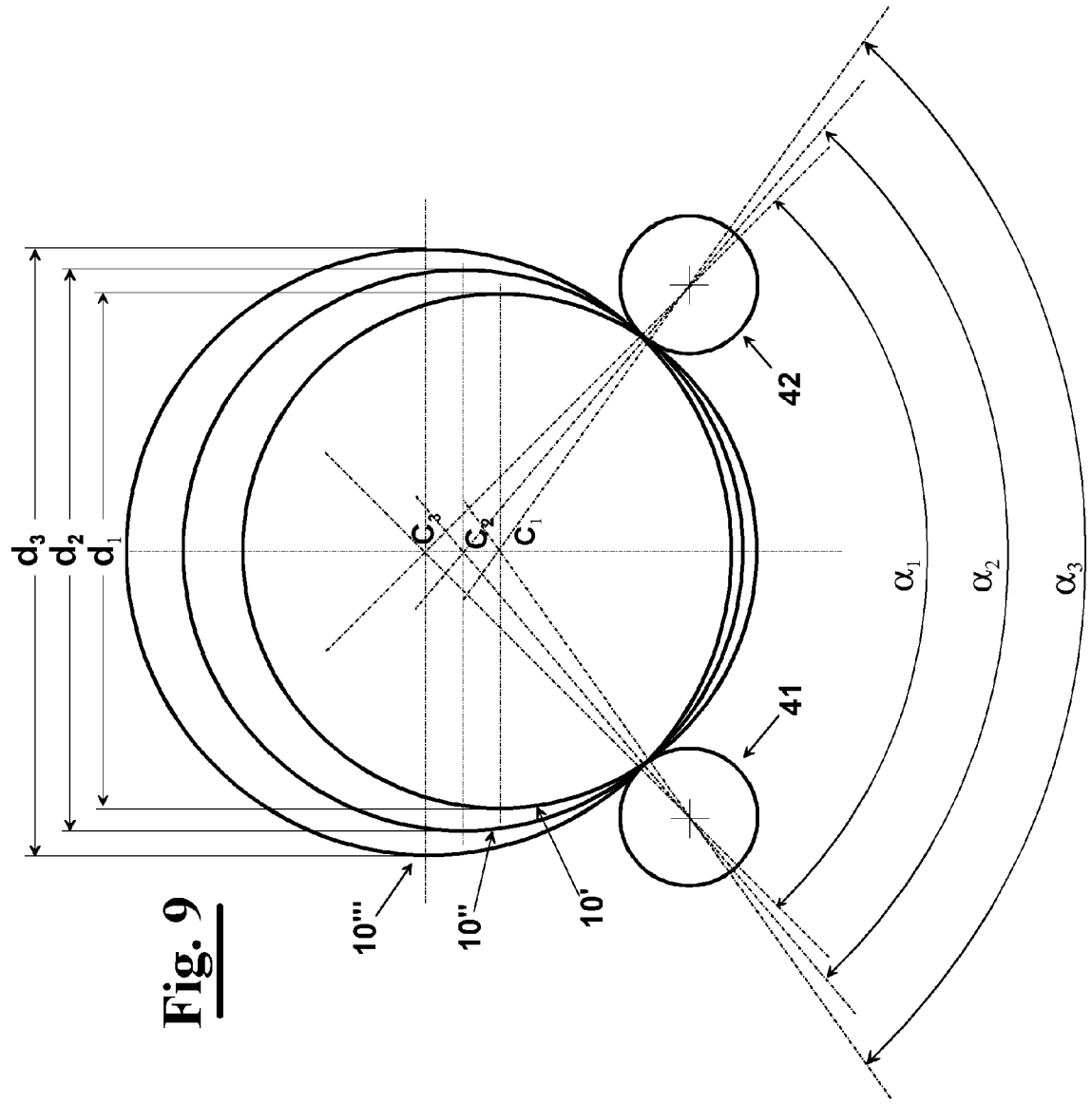
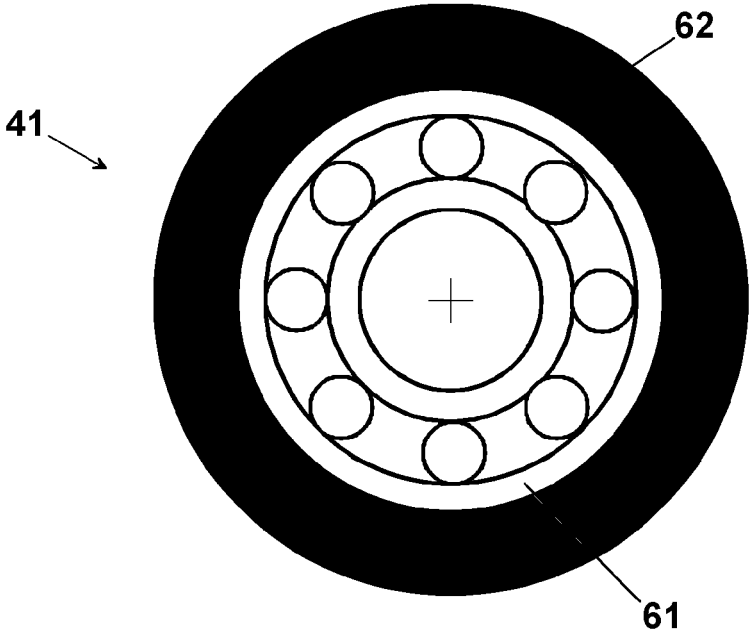


Fig. 9

Fig. 10



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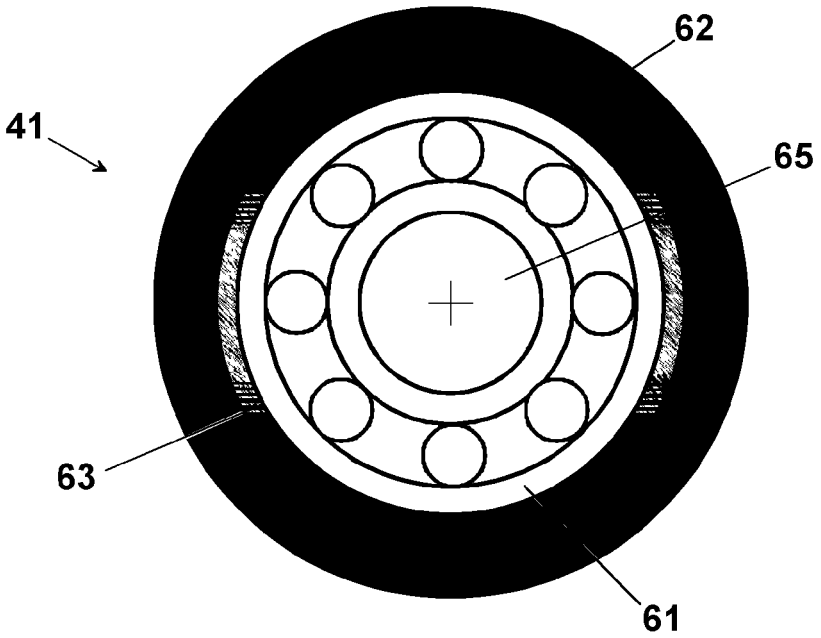

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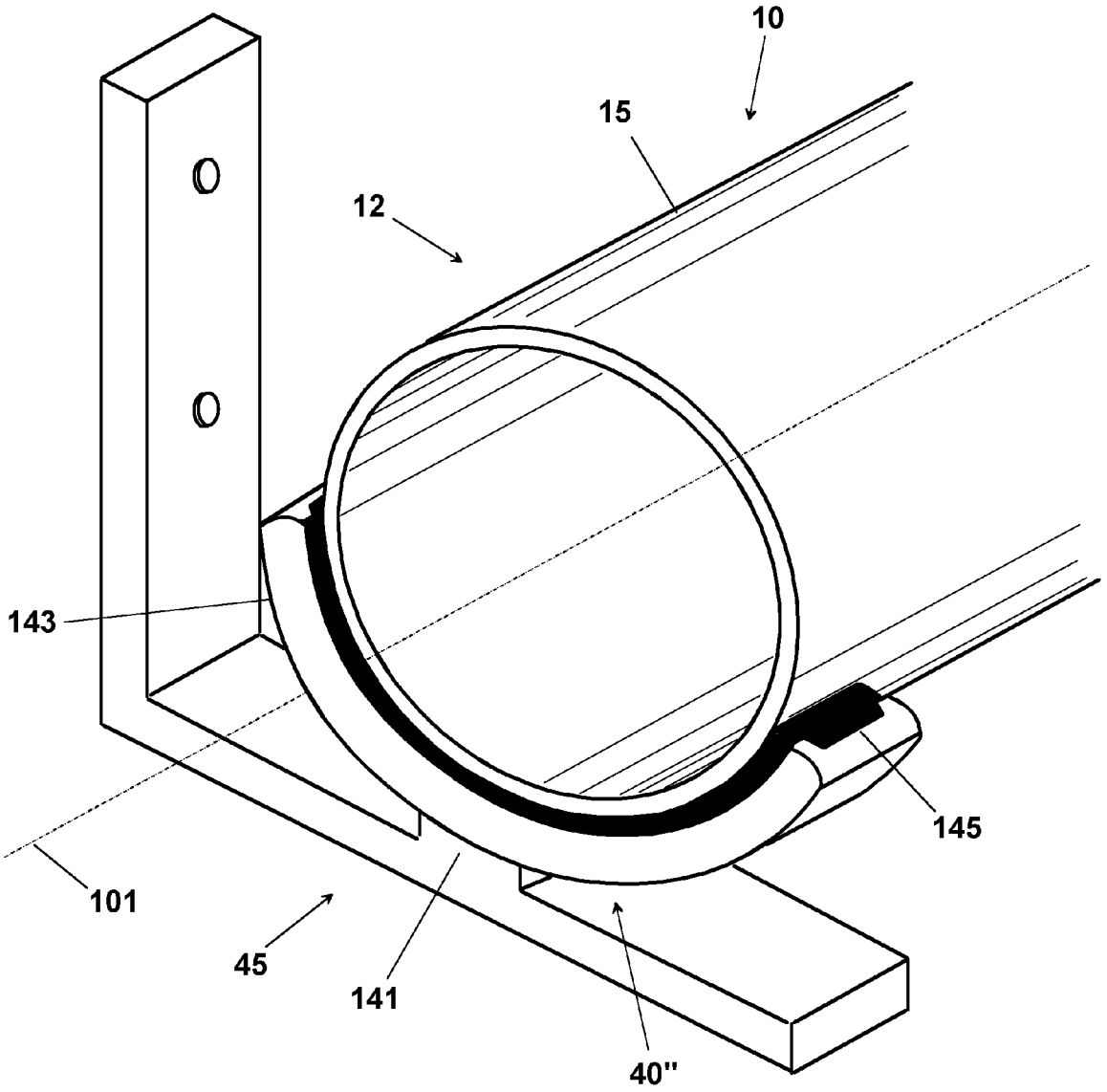

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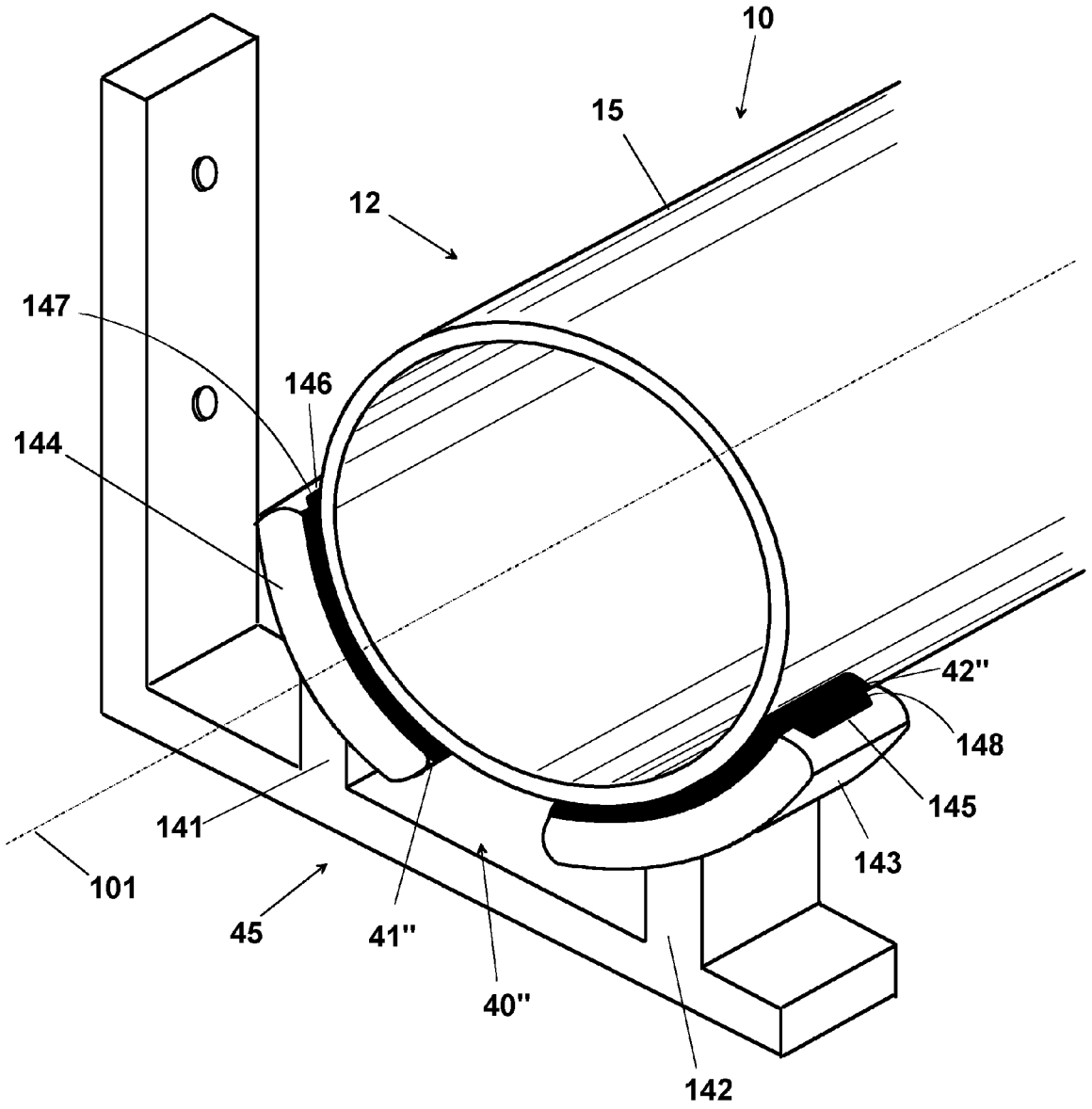

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Application Number
EP 11 17 6529

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A	US 3 900 063 A (ROLLER MAX F) 19 August 1975 (1975-08-19) * figures 1,2,3 * * column 4, line 4 - column 5, line 25 * -----	1-15	INV. E06B9/174
A	DE 12 41 956 B (KLAUS W KNITTEL) 8 June 1967 (1967-06-08) * column 3, line 1 - line 11; figures 1,2 * * column 3, line 65 - column 4, line 2 * * line 11 - column 4, line 15 * -----	1,15	
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	3 February 2012	Tänzler, Ansgar

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