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(54) **ROLLER ASSEMBLY FOR AN AWNING**

(57) The invention relates to a roller assembly 100 for an awning 20 comprising a roller 40, which defines a rotation axis X, and support elements for the roller 40 provided at ends 41 of the roller 40. The support elements comprise:

- a support 60 suitable for being fastened to a fixed structure 50;
- a grip element 42 integral with the roller; and
- a bearing 43 suitable for supporting axial and radial loads.

Moreover at least one end 41 of the roller comprises a tension element 44 suitable for applying a force in the axial direction between the grip element 42 and the support 60, so as to induce a tensile strain in the roller 40.

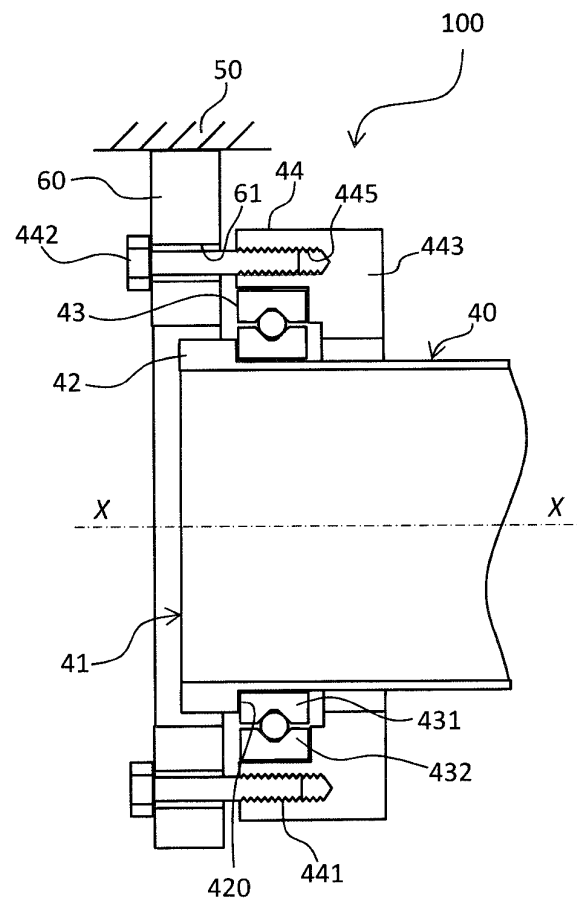


Fig. 7

Description

[0001] The present invention relates to a roller assembly for an awning comprising a roller and the associated support elements, in particular a roller assembly for an awning comprising a roller and the support elements intended to support the roller/awning group, securing it to a fixed external structure.

[0002] There exist various types of external awnings, which are usually intended to protect an environment from solar radiation. For this reason these awnings are referred to below as "sun awnings", although they may be used also for other purposes, for example in order to protect an environment from rain or more simply to prevent the environment from being visible to outside persons.

[0003] In a manner known per se, some sun awnings may be kept in a retracted state and then unfolded only when necessary. This solution is particularly valid because it offers various advantages compared to the use of fixed awnings. For example this solution allows the awnings to be protected from adverse weather conditions for the whole of the time during which they are not required. Moreover, this solution is such that it is possible to protect the environment from solar radiation when this is bothersome (typically in the summer and/or during the hottest hours of the day), while it allows the environment to be exposed to solar radiation when this may be pleasant (for example in the winter and/or during the coolest hours of the day).

[0004] In some types of particularly popular sun awnings, when the awning is retracted, it is rolled up onto a rotating roller, whereas, when the awning must be extended, it is unrolled from the roller. Usually the cloth of a sun awning of this type is fastened along one side to the roller, while on the other side it is fastened to an end-piece consisting of a bar or other rigid element.

[0005] There are different structures which may support and move the roller on one hand, the end-piece on the other hand and the awning which is mounted on them. Below particular reference will be made to so-called arm awnings, but the person skilled in the art will readily understand that the invention may be used in awnings of other types such as drop awnings or laterally guided awnings. The arm awnings of the known type will be described below with reference to the attached Figures 1 and 2.

[0006] In an arm awning, denoted overall by 20, a pair of hinged arms 22 allow the end-piece 24 to be moved towards and away from the roller 40 in the ideal plane of the awning. Usually the roller 40 is mounted on a fixed structure 50, for example a wall, by means of suitable supports 60. The arms 22 support in a cantilever manner the end-piece 24 and the cloth 26 of the awning. When the awning 20 is in the completely extended position, it is completely unrolled from the roller 40, the arms 22 are completely extended and the end-piece 24 is situated in its position furthest from the roller 40. In this way the cloth

26 of the awning is tensioned between the roller 40 and the end-piece 24, thus forming the broadest possible barrier against the solar radiation. When, instead, the awning 20 is situated in its completely retracted position, it is completely rolled up onto the roller 40, the arms 22 are folded up and the end-piece 24 is situated in its position closest to the roller 40. In this way the cloth 26 of the awning is wound up close to the fixed structure 50 and does not form any barrier for the solar radiation. In accordance with some known solutions, when the awning 20 is in the retracted position, it is housed at least partially inside a box 70 or underneath a small roofing for protection against the atmospheric agents.

[0007] The movement of the arm awning 20 is usually obtained by means of two different active elements which cooperate with each other. A first active element consists of pretensioned springs 23 which push the arms 22 out from the retracted position into the extended position. A second active element consists of a device designed to cause rotation of the roller 40 about its axis X, so as to wind up or unwind the cloth 26 of the awning. This device which causes rotation of the roller 40 will be referred to below as motor 25, although it may also be a device operated manually by the user (as in the embodiments of Figures 1 and 2). The use of a motor 25, typically an electric motor, is nevertheless able to achieve a series of advantages such as a certain degree of automation of the awning 20, allowing it for example to be retracted automatically in the event of particular atmospheric conditions (wind or particularly strong showers) and/or be extended automatically in particular light conditions.

[0008] Starting from the completely retracted position and wishing to extend the awning 20, the user must operate the motor 25 so that the roller 40 starts to rotate in the direction in which the awning is unwound. This causes the release of the cloth 26 of the awning and the extension of the arms 22 owing to the action of the springs 23. The extension of the arms 22 gradually moves the end-piece 24 away from the roller 40, thus extending the cloth 26 of the awning. Conversely, starting from an at least partially extended position and wishing to retract the awning 20, the user must operate the motor 25 so that the roller 40 starts to rotate in the direction in which the awning is wound up. This causes tensioning of the cloth 26 of the awning and folding-up of the arms 22 against the action of the springs 23. Folding-up of the arms 22 gradually moves the end-piece 24 towards the roller 40, thus retracting the cloth 26 of the awning.

[0009] The rollers 40 for sun awnings of the known type, while widely considered to be valid, are not without drawbacks.

[0010] A major drawback arises in connection with the bending resistance of the roller 40. As regards this type of problems, it must be considered first and foremost that the awnings 20 may have a linear extension along the axis X of up to 6 metres. As the person skilled in the art may easily understand, with such a length the loads applied onto the roller 40 generate bending moments which

may also be very considerable. A first load applied to the roller 40 is obviously that of the weight force. With reference to the weight, it should be considered that the awning 20 may have an axial length of 6 metres and lateral extension of 3-4 metres. The weight per square metre of a typical fabric for this use may be in the region of 300 g/m². Basically, therefore, when the cloth 26 is completely rolled up, its load distributed along the roller 40 is about 5.5 - 7 kg. It is also necessary to add the weight of the roller itself to this load. Obviously the linear mass of the roller depends on its diameter. A weight of 1.5 kg/m may therefore be considered for a roller with a diameter of 60 mm and a weight of 2.9 kg/m for a roller with a diameter of 85 mm. The weight of the only roller with a length of 6 metres therefore ranges between 9 kg and 17.4 kg. To conclude, therefore, the total weight of the roller 40 on which the cloth 26 is completely rolled up varies between 14.5 and 24.4 kg.

[0011] As can be noted, the weight-related load does not reach considerable values, but another load which is similarly distributed and therefore has effects entirely similar to those of the weight-related force must be added. This second load is that introduced by the arms 22. The springs 23 in fact apply constantly a thrusting force on the end-piece 24 via the arms 22, which thrusting force tends to move the end-piece 24 away from the roller 40. In particular, this load, since it is of a resilient nature, is all the greater the more the arms 22 are folded and is therefore maximum in the configuration where the awning 20 is completely retracted. The resilient action of the springs 23 therefore applies a load distributed along the entire roller 40. The amount of this resilient force is much greater in terms of absolute value than that described above in connection with the weight-related force. It should be considered in fact that this load may reach a value of 10 kg/m. For a roller which is 6 metres long, therefore, the resilient load may reach a value as high as 60 kg.

[0012] Obviously, as the person skilled in the art may easily understand, the resilient load and the weight-related load give rise to a resultant load equal to the vectorial sum of the two loads. The structure of the roller 40 supported by its supports 60 is schematically shown in Figure 3 in its undeformed state, in the form of a beam resting on two supports as commonly illustrated in building science. If the overall bending load were to be applied to an ideal beam, it would give rise in each section of the beam to the strain schematically shown in Figure 4. This strain, referred to as being of "butterfly" type, has a zone in which the beam cross-section is compressed (in Figure 4, the top zone, where the arrows converge towards each other) and a zone where the cross-section of the beam is tensioned (in Figure 4, the bottom zone, where the arrows diverge from each other). The locus of the points where the strain is equal to zero is called the neutral axis of the beam.

[0013] However the roller 40 does not behave at all like an ideal beam. It in fact has a tubular structure formed

from a flat metal sheet which is deformed so as to cause it acquire the desired circular profile. At the end of this deformation the two edges of the metal sheet are joined together continuously along the axis X. Usually the joint is formed by means of seaming or welding. The roller 40 as a whole therefore has an internally hollow structure with a very thin wall thickness compared to the diameter of the roller itself. As the person skilled in the art may easily understand, the thin wall of the roller which is compressed is able to withstand a load markedly less than that of the wall which is tensioned. This means that each section of the roller is subject to a strain which is very different from the ideal state shown in Fig. 4. In general, for a section of the roller 40, the compressive strain has a limited maximum value, while the tensile strain assumes much higher values. The overall deformation of the roller 40 subject to a bending load is shown schematically in Figure 5, where the maximum camber f , equal to the maximum deviation of the neutral axis with respect to its undeformed state, is also shown.

[0014] In the rollers 40 according to the prior art, the maximum camber f may commonly assume values close to 50 mm for rollers with a length of 6 metres. It is therefore clear to the person skilled in the art that such a deformation of the roller 40 gives rise to various drawbacks.

[0015] Firstly, such a deformation of the roller 40 has the effect that, when the cloth 26 is wound up, visible folds are formed and these soon become unacceptable from an aesthetic point of view. Moreover, if the roller 40 is housed inside a box 70, it rests with its central zone against the inner wall of the said box. In fact, the forces acting on the box 70 and the consequent deformations are insignificant, for which reason it may be assumed that the box 70 maintains a substantially straight form. This contact results in friction of the cloth 26 against the inner wall of the box, with consequent widespread premature wear of the cloth 26.

[0016] In order to overcome these drawbacks the use of an intermediate roller-holder support has on occasions been adopted. In order to limit the camber f , this support must necessarily apply a thrusting force on the rolled-up cloth 26, this itself thus resulting in premature and very localized wear.

[0017] The object of the present invention is therefore to overcome at least partially the drawbacks mentioned above with reference to the prior art.

[0018] In particular, a task of the present invention is that of providing a roller assembly for an awning configured to ensure, as a whole, greater bending resistance of the roller compared to the rollers of the prior art.

[0019] More particularly, a task of the present invention is to provide a roller assembly for an awning which is such that the roller, when subjected to bending, has a maximum camber f decidedly smaller than that of the rollers of the prior art.

[0020] The object and tasks indicated above are achieved by a roller assembly for an awning according to Claim 1.

[0021] The features and further advantages of the invention will emerge from the description, provided hereinbelow, of a number of embodiments, provided by way of a non-limiting example, with reference to the accompanying drawings.

- Figure 1 shows a perspective view of an arm-type awning;
- Figure 2 shows the awning of Figure 1 where, for greater clarity, the cloth has been removed;
- Figure 3 schematically shows a beam not subject to any load and in the undeformed state;
- Figure 4 schematically shows an ideal cross-section through a beam subject to a bending force;
- Figure 5 schematically shows the strain and deformation state of a beam which represents a roller for an awning according to the prior art;
- Figure 6 schematically shows the strain of a beam which represents a roller for an awning according to the present invention;
- Figure 7 schematically shows an axially cross-section of a detail of the roller and the associated support elements of the roller assembly according to a possible embodiment of the invention;
- Figure 8 schematically shows an axially cross-section of a detail of the roller and the associated support elements of the roller assembly according to another possible embodiment of the invention;
- Figure 9 schematically shows an axially cross-section of details of the roller and the associated support elements of a roller assembly according to a further possible embodiment of the invention;
- Figure 10 schematically shows an axially cross-section of a detail of the roller and the associated support elements of a roller assembly according to an embodiment of the invention similar to that of Figure 7;
- Figure 11 shows an overall perspective exploded view of a roller assembly according to an embodiment of the invention similar to that of Figure 10;
- Figure 12 shows a view similar to that of Figure 11, in which the roller assembly comprises a series of various accessory elements,
- Figure 13 shows an overall perspective view of an awning comprising the roller assembly according to Figure 12; and
- Figure 14 shows an exploded perspective view of a detail of the roller and the associated support elements of a roller assembly according to an embodiment of the invention similar to that of Figure 8.

[0022] With reference to the attached drawings, 20 denotes in its entirety an awning. The invention relates to a roller assembly 100 for the awning 20, which comprises a roller 40 and associated support elements. The roller 40 defines an axis of rotation X and comprises ends 41. Each end 41 of the roller 40 is provided with the support elements which comprise:

- a support 60 suitable for being fastened to a fixed structure 50;
- a grip element 42 integral with the roller; and
- a bearing 43 suitable for supporting axial and radial loads.

[0023] Moreover at least one end 41 of the roller comprises a tension element 44 suitable for applying a force in the axial direction between the grip element 42 and the support 60, so as to induce a tensile strain in the roller 40.

[0024] As the person skilled in the art may easily understand, in order to induce a tensile state in the roller 40, it is sufficient for only one of the two ends 41 to comprise the tension element 44, while the other end 41 may simply define an axial abutment. However, it is preferable, for example for easier assembly, that both the ends 41 of the roller 40 should comprise the tension element 44. Therefore, below, embodiments are described where each of the ends 41 of the roller 40 comprises an associated tension element 44.

[0025] Preferably, the end 41 of the roller 40 comprises a threaded coupling 441 which allows the axial force to be applied easily in a gradual and increasing manner. It is also advantageous if the threaded coupling 441 may be locked in the configuration where the desired tensile strain in the roller 40 is reached.

[0026] Preferably, the bearing 43 comprises a first slewing ring 431 which rotates together with the roller 40 and a second slewing ring 432 which is fixed with respect to the support 60. The accompanying figures show by way of example ball bearings, but it is clear that other types of revolving bearings, such as roller bearings, may be used. Moreover, considering the low rotational speeds typically associated with this application, it is also possible to use friction bearings comprising materials with a very low coefficient of friction and/or self-lubricating materials.

[0027] A number of possible embodiments of the invention will be described below by way of example.

[0028] A first embodiment is schematically shown in Figure 7. In this schematic illustration it can be seen how the grip element 42 comprises a shoulder 420 integral with the roller 40. The shoulder abuts axially on the first slewing ring 431 of the bearing 43. The tension element 44 comprises instead screws 442 and a crown ring 443. Each of the screws 442 passes through a hole 61 in the support 60. Each hole 61 has an axial direction, is a through-hole and is smooth. The diameter of the hole 61 is smaller than the diameter of the screw head and greater than the diameter of the screw shank. In this way the hole 61 forms only an axial constraint for the screw 442, but the latter may freely rotate inside it. The crown ring 443, which abuts axially on the second slewing ring 431 of the bearing 43, also comprises threaded holes 445 which establish the threaded coupling 441 with the screws 442.

[0029] As the person skilled in the art may easily un-

derstand, once the roller assembly 100 has been assembled so that both the ends 41 of the roller 40 are configured in accordance with the diagram shown in Figure 7, the rotation of the screws 442 applies an axial force which tends to move the crown ring 443 towards the support 60. This force, by means of the bearing 43, reaches the shoulder 420 of the grip element 42 and induces a tensile state of the roller 40. As can be noted in Figure 7, the tensile force exerted by means of rotation of the screws 442 is transmitted directly from the support 60 onto the fixed structure 50. This fixed structure 50 may be for example a wall or a frame or a similar structure which is able, not only to support the weight of the awning 20 as a whole, but also to oppose the tensile force generated on the roller 40.

[0030] The diagram shown in Figure 7 forms the basis of the embodiment illustrated in Figures 10 to 13, in which numerous other details of the roller assembly 100 according to the invention are shown. As the person skilled in the art may easily understand, Figures 11 to 13 are not in scale. In particular, in said figures the proportions between the diameter of the roller and its length are not maintained. The roller 40 is in fact shown with a diameter big enough to allow the details to be seen and with a length small enough to allow both the ends 41 to be shown.

[0031] As can be noted in Figures 10, 11 and 12, preferably the grip element 42 does not form an integral part of the roller 40 (as suggested in Figure 7), but is a separate sleeve which is rigidly connected to the roller 40. For example, the grip element 42 may be fitted onto the roller 40 and fixed there by means of a series of radial fixing elements 422, such as screws, grub screws, rivets, rivets, spot welds or the like. During this step preferably care is taken to ensure that the inside of the roller 40 is not obstructed, since in some applications it is intended to receive the motor 25 for moving the awning 20.

[0032] In the embodiment shown in Figures 10, 11 and 12, the axial abutment between the crown ring 443 and the second slewing ring 432 of the bearing 43 is not obtained by means of an internal shoulder of the crown ring 443 (as suggested in Figure 7). In order to facilitate the assembly step this axial abutment is obtained by means of a retaining ring 444, in particular a Seeger ring.

[0033] In accordance with these embodiments, the screws 442 rotate about axes of rotation different from the axis of rotation X of the roller 40. For this reason the rotation of the roller 40 during the working life of the awning 20 does not cause slackening of the screws 442. The threaded coupling 441 may therefore be easily fixed in the configuration where the roller 40 is subject to the desired tensile strain. In order to achieve fixing, it is sufficient to use one of the normal measures adopted for this purpose such as the provision of a locking washer, a section of nylon thread or the use of a special thread-fixing adhesive.

[0034] A second embodiment is schematically shown in Figure 8. In this schematic embodiment it can be seen

how the grip element 42 comprises a threaded portion 424 integral with the roller 40. The tension element 44 comprises instead a ring nut 446 which is screwed onto the threaded portion 424. The ring nut 446 abuts axially on the first slewing ring 431 of the bearing 43. The second slewing ring 431 of the bearing 43 instead abuts directly on the support 60. The threaded coupling 441 is therefore established between the threaded portion 424 of the grip element 42 and the ring nut 446.

[0035] As the person skilled in the art may easily understand, once the roller assembly 100 has been assembled so that both the ends 41 of the roller 40 are configured in accordance with the diagram of Figure 8, the rotation of the ring nuts 446 applies an axial force which induces a tensile state of the roller 40. As can be noted in Figure 8, the tensile force exerted by means of rotation of the ring nut 446 is transmitted directly from the support 60 onto the fixed structure 50. This fixed structure 50 may be for example a wall or a frame or a similar structure which is able, not only to support the weight of the awning 20 overall, but also to oppose the tensile force generated on the roller 40.

[0036] The diagram shown in Figure 8 forms the basis of the embodiment illustrated in Figure 14, in which numerous other details of the roller assembly 100 according to the invention are shown. In this case also preferably the grip element 42 does not form an integral part of the roller 40 (as suggested in Figure 8), but is a separate sleeve which is rigidly connected to the roller 40. For example, the grip element 42 may be fitted onto the roller 40 and fixed there by means of a series of radial fixing elements 422, such as screws, grub screws, rivets, rivets, spot welds or the like. During this step preferably care is taken to ensure that the inside of the roller 40 is not obstructed since in some applications it is intended to receive the motor 25 for moving the awning 20.

[0037] The embodiment shown in Figure 14 also shows a finned washer 448 intended to fix the ring nut 446 in its definitive position. Fixing is performed by bending one or more of the fins of the finned washer 448, so that they engage inside the special recesses formed on the outer surface of the ring nut 446. This measure is necessary since the axis of rotation of the roller 40 and the axis of rotation of the ring nut 446 coincide and during the working life of the awning 20 the rotation of the roller 40 could result in slackening of the threaded coupling 441.

[0038] A third embodiment is shown in schematic form in Figure 9. In this schematic embodiment, the grip element 42 and the tension element 44 adopt the solution of Figure 7, but could also adopt equally well that of Figure 8. The difference between the embodiment shown in Figure 9 and the preceding embodiments relates to the way in which the reaction force arising with the creation of the tensile state in the roller 40 is opposed. As the person skilled in the art may easily understand, the tensile force exerted on the roller 40 produces, as a reaction, a force which tends to move the supports 60 towards each other.

In the embodiments shown in Figures 7 and 8, this reaction is transmitted from the supports 60 to the fixed structure 50. Conversely, in the embodiment of Figure 9, the reaction force is opposed by the box 70. This box 70 is in fact, in a manner known per se, a fairly sturdy structure since, as already mentioned with reference to the prior art, it must support the central part of the awning once it has been wound up onto the roller 40 and the latter is subject to bending. The box 70 is therefore able to support the compression necessary for opposing the tensile force on the roller 40. In this embodiment, therefore, it is sufficient for the fixed structure 50 to be able to support the sole weight of the awning 20 and may, for example, comprise a pair of posts separate from each other.

[0039] It should therefore be noted how, in the embodiment of Figure 9, the supports 60 support the roller 40 with respect to the box 70, by means of which fastening of the assembly with respect to the fixed structure 50 is then obtained.

[0040] As already mentioned above, Figures 10 to 13 show a quantity of accessory elements which are not essential for the realization of the invention, but which may make it more suitable for satisfying various specific requirements. The main accessory elements are briefly described here below.

[0041] Figures 10 and 12, 13 show firstly a box 70. Unlike the boxes of the prior art, the box 70 which is shown here is a very light structure, which must be able to support only itself. From this point of view the box according to the invention shown in Figures 10 and 12, 13 differs markedly from the box known per se of Figure 9. The box according to Figures 10 and 12, 13 consists of a cylindrical tube which comprises a slit 72 along a generatrix. The cloth 26 of the awning 20 projects out from the slit (see Figure 13). Preferably the slit 72 comprises two brushes extending along the entire length of the cloth 26. The presence of these brushes allows two main advantages to be obtained. A first advantage is that the cloth 26 is cleaned whenever it is extended and retracted. A second advantage consists in preventing foreign bodies from entering inside the box 70 or colonies of insects from making nests there. As can be seen in particular in Figure 10, the box 70 abuts on the crown rings 443 and is therefore free to rotate about the axis X so as to follow autonomously any movements of the cloth 26.

[0042] Figures 10-13 show square bars 220 situated underneath the supports 60. These square bars are intended to support the arms 22. As can be seen in Figure 2, a square bar 220 is already present in the awnings 20 according to the prior art, but in accordance with this solution it runs along the whole length of the awning 20. This solution involves the provision and the positioning of a structural element which is made use of only minimally. In accordance with the invention, instead, only the necessary portions of the square bar 220, i.e. those on which the arms 22 must be fastened, are provided. Owing to the segmentation, each square bar 220 is also provided with an adjuster 222 which allows it to be correctly

aligned during mounting of the awning 20.

[0043] Figures 11-13 also show an auxiliary reinforcing element 62. This element connects the two wings of the support 60 and ensures that they cooperate so as to oppose the force transmitted from the roller 40 once it is tensioned. This solution allows the wings of the support 60 to be lightened substantially compared to the dimensions which it should have in order to oppose on its own the force transmitted from the roller 40.

[0044] Figure 12 and 13 show, finally, an intermediate support 64. While being similar to the end supports 60, it does not perform any function in relation to the roller 40. One or more intermediate supports 64 may be arranged along the awning 20 with the main aim of providing additional square bar portions 220 should one or more additional arms 22 be required. Moreover, owing to its form, the intermediate support 64 provides a support for the box 70.

[0045] As the person skilled in the art may easily understand from the description provided above, the roller assembly 100 according to the present invention achieves the object of overcoming at least partly the drawbacks mentioned with reference to the prior art. The induction of a tensile state in the roller 40 allows in fact the maximum camber f to be reduced to negligible values f . The studies carried out by the Applicant have shown that, in the roller according to the invention, the maximum camber f is limited to less than 10 mm for a roller of 8 metres length. It should be noted that, during commercial use, the rollers according to the prior art have never reached such a length. As the person skilled in the art may easily understand, no zone of the roller 40 according to the invention is subject to a compressive load, i.e. a condition where the thin sheet-metal wall is acted on by the major deformations. On the contrary, the tensile force is opposed very effectively by the thin wall of the roller 40. Moreover, the constant tensile state tends to keep the roller straight, even in distributed load conditions.

[0046] In particular, therefore, the present invention achieves the task of providing a roller assembly for an awning configured so as to ensure that the roller has overall a greater bending resistance compared to the rollers of the prior art.

[0047] Moreover, the present invention achieves the task of providing a roller assembly for an awning which is such that the roller, when subjected to bending, has a maximum camber f decidedly smaller than that of the rollers of the prior art.

[0048] The person skilled in the art, in order to satisfy specific requirements, may make modifications to the embodiments of the roller assembly 100 for an awning 20 described above and/or replace the parts described with equivalent parts, without thereby departing from the scope of the accompanying claims.

Claims

1. Roller assembly (100) for an awning (20) comprising a roller (40), having ends (41) and defining a rotation axis X, and support elements (60, 42, 43) provided at each end (41) of the roller (40), said support elements (60, 42, 43) comprising:
 - a support (60) suitable for being fastened to a fixed structure (50);
 - a grip element (42) integral with the roller; and
 - a bearing (43) suitable for supporting axial and radial loads;

the roller assembly (100) further comprising a tension element (44) of the roller (40) provided at at least one of said ends (41) of the roller (40) and suitable for applying a force in the axial direction between the grip element (42) and the support (60), so as to induce a tensile strain in the roller (40).
2. Roller assembly (100) according to claim 1, wherein said at least one end (41) of the roller (40) comprising the tension element (44) also comprises a threaded coupling (441) which allows the axial force to be applied in a gradual and increasing manner.
3. Roller assembly (100) according to claim 2, wherein:
 - the grip element (42) comprises a shoulder (420) which axially abuts on a first slewing ring (431) of the bearing (43) rotating together with the roller (40);
 - the tension element (44) comprises:
 - screws (442) passing through respective holes (61) in the support (60);
 - a crown ring (443) which comprises threaded holes (445) and which axially abuts on a second slewing ring (431) of the bearing (43) fixed with respect to the support (60);

wherein the threaded coupling (441) is established between the screws (442) and the threaded holes (445).
4. Roller assembly (100) according to claim 3, wherein the grip element (42) is rigidly connected to the roller (40) with a series of radial fixing elements (422).
5. Roller assembly (100) according to claim 3 or 4, wherein the axial abutment between the crown ring (443) and the second slewing ring (432) of the bearing (43) is obtained by means of a retaining ring (444).
6. Roller assembly (100) according to claim 2, wherein:
 - the grip element (42) comprises a threaded

portion (424) integral with the roller (40);

- the tension element (44) comprises a ring nut (446) which axially abuts on a first slewing ring (431) of the bearing (43) rotating together with the roller (40);
- a second slewing ring (431) of the bearing (43) fixed with respect to the support (60) abuts on the support (60); and

wherein the threaded coupling (441) is established between the threaded portion (424) of the grip element (42) and the ring nut (446).

7. Roller assembly (100) according to claim 6 further comprising a finned washer (448) intended to fix the ring nut (446) in its definitive position.

8. Roller assembly (100) according to any one of the preceding claims, wherein the reaction to the tensile force exerted on the roller (40) is transmitted onto the fixed structure (50).

9. Roller assembly (100) according to any one of the preceding claims, further comprising a box (70) for housing at least partially the awning (20).

10. Roller assembly (100) according to any one of claims 1 to 7, further comprising a box (70) for housing at least partially the awning (20) and wherein the reaction to the tensile force exerted on the roller (40) is opposed by the box (70).

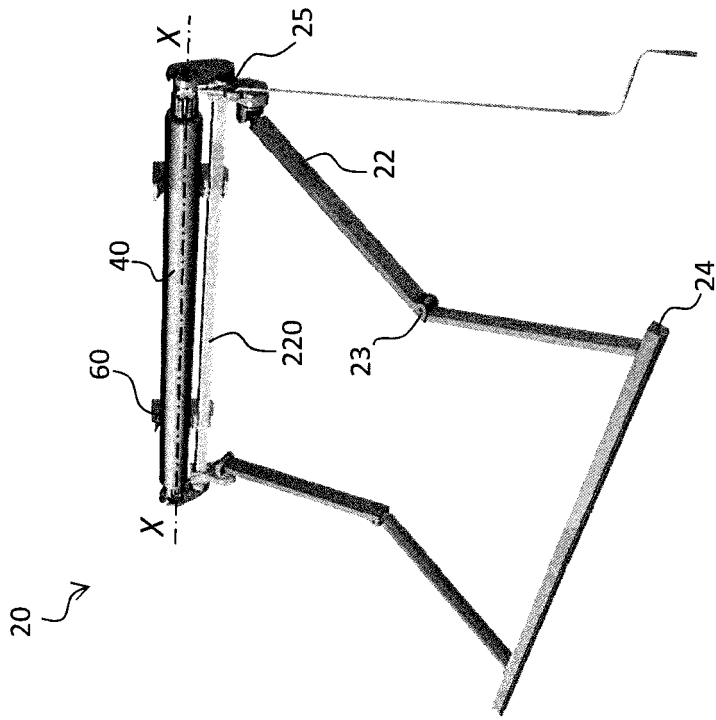


Fig. 1

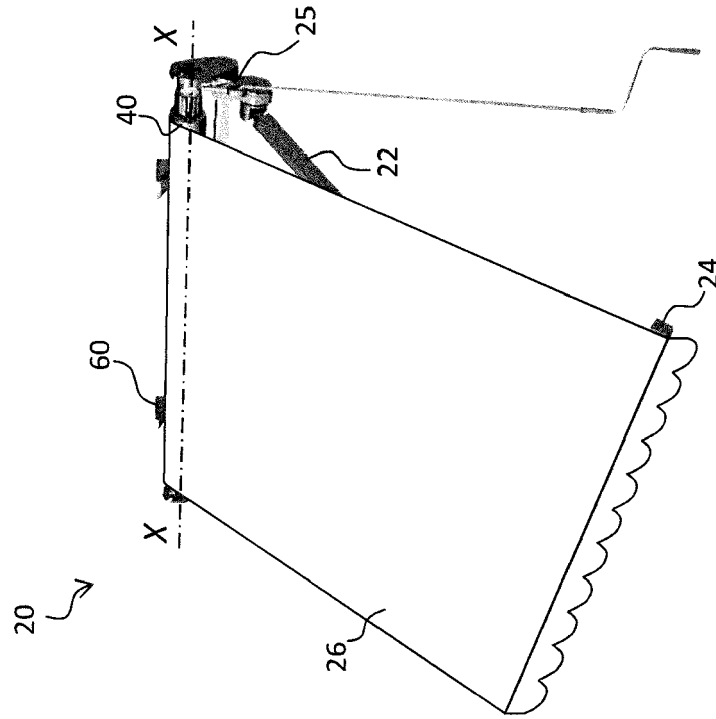


Fig. 2

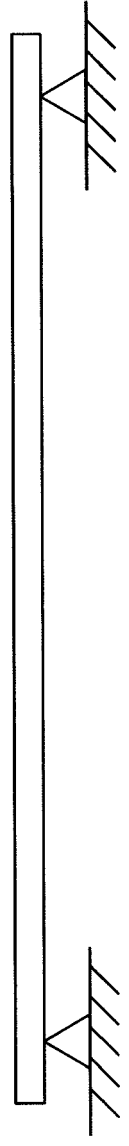


Fig. 3

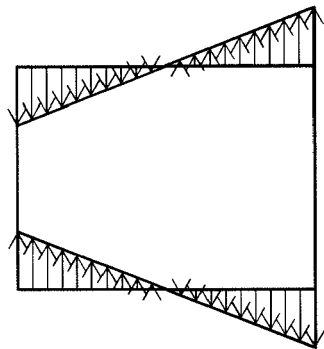


Fig. 4

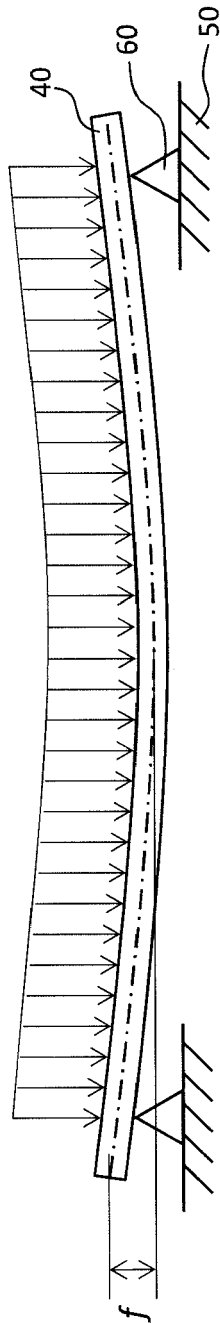


Fig. 5

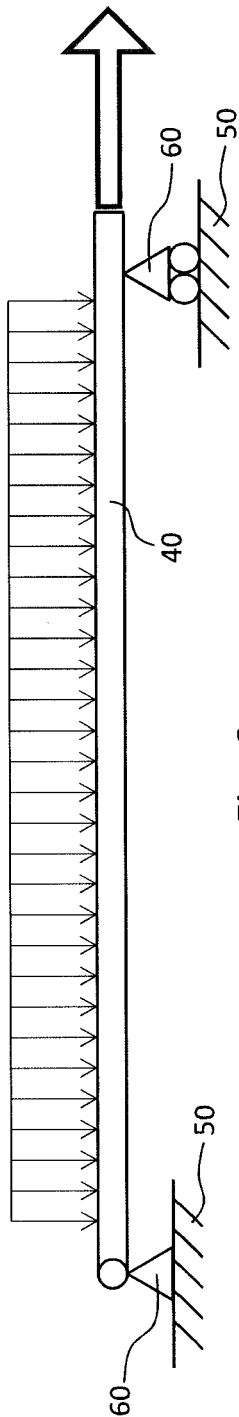


Fig. 6

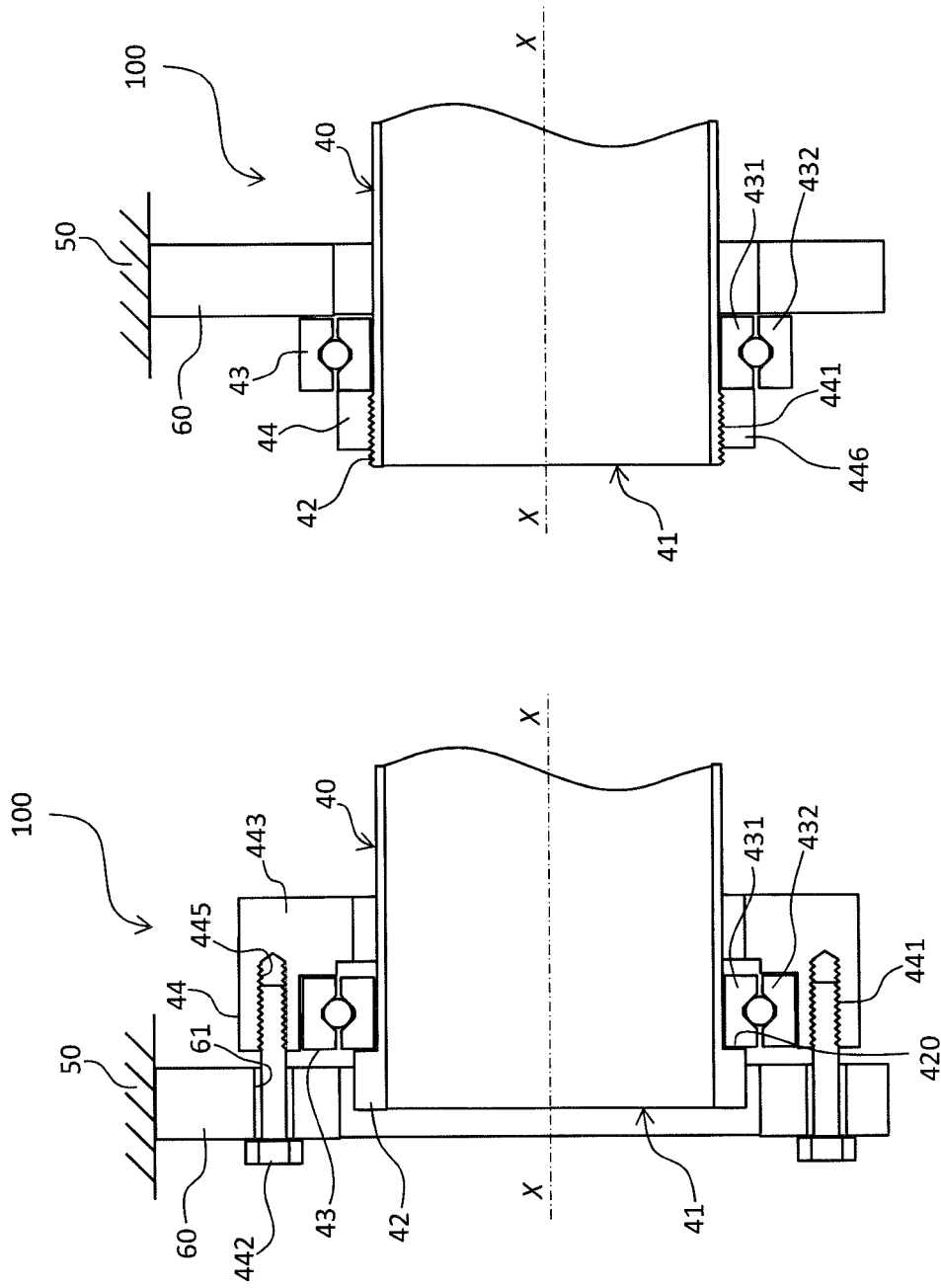


Fig. 8

Fig. 7

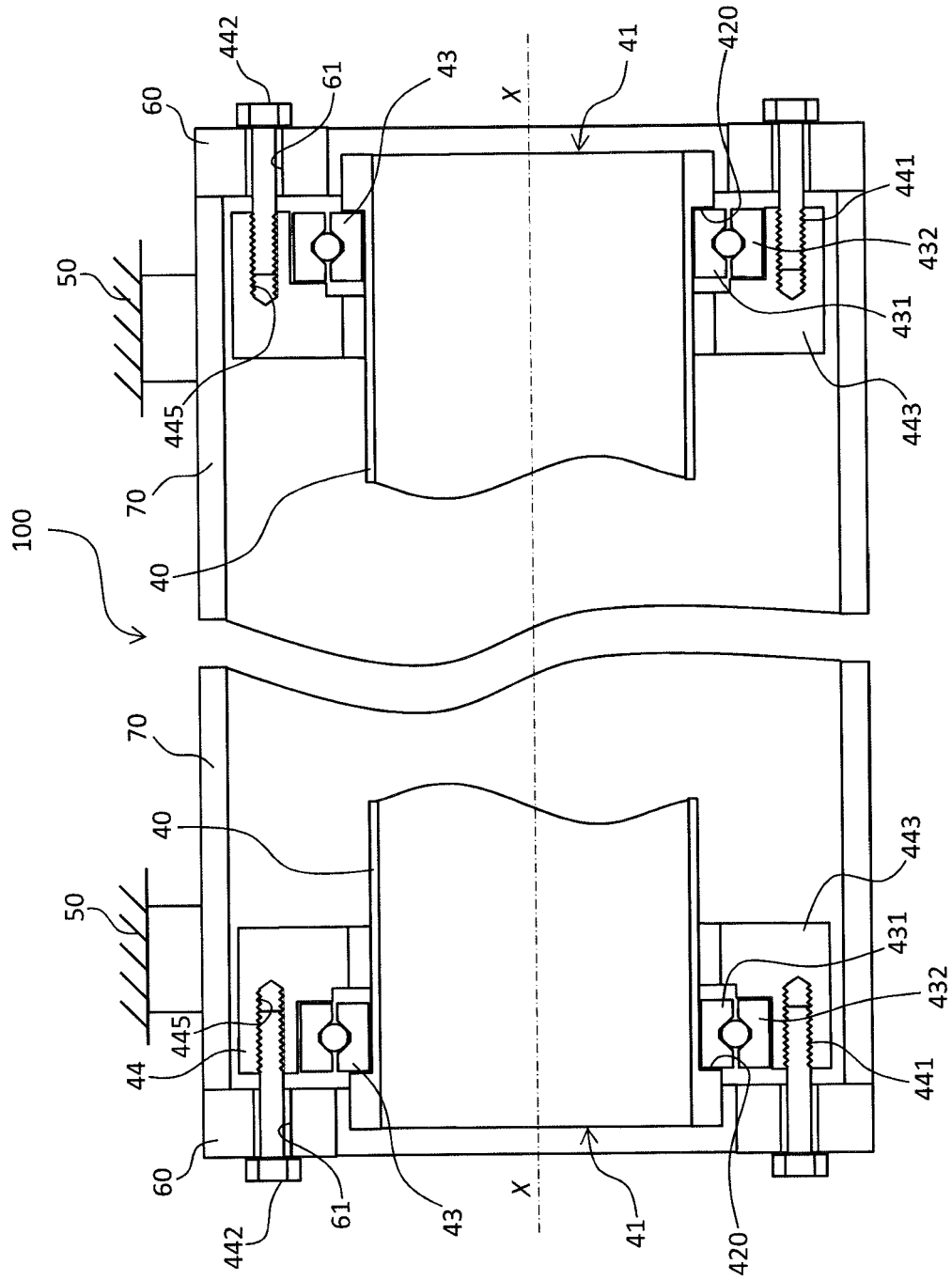


Fig. 9

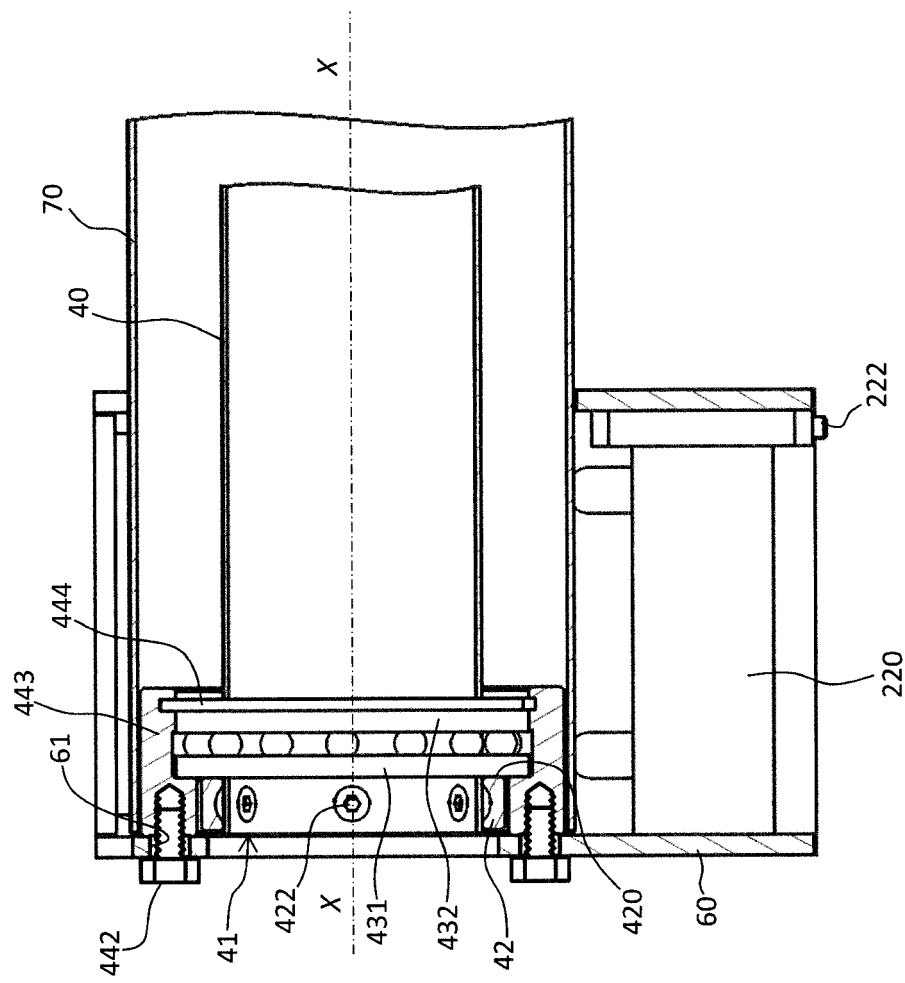


Fig. 10

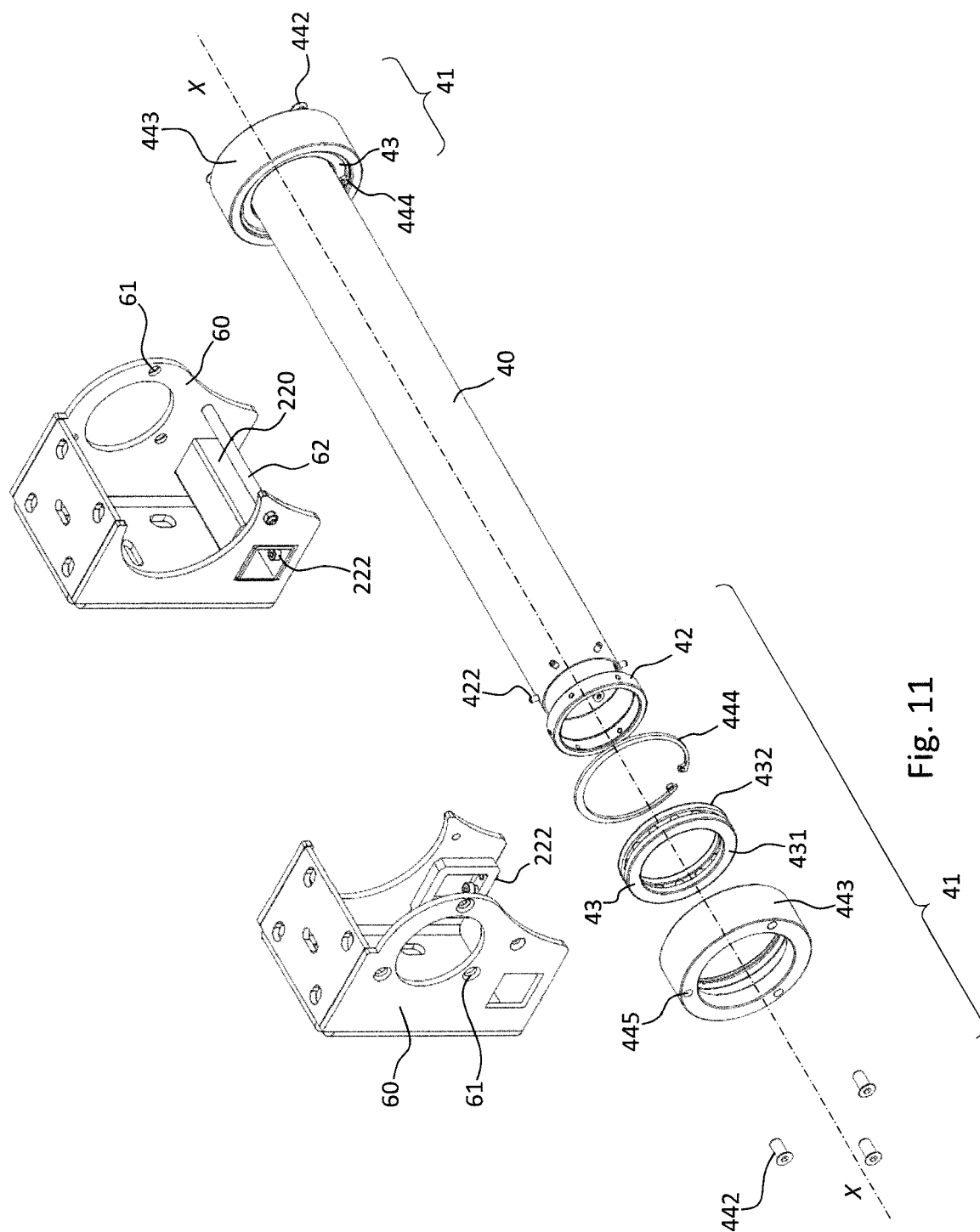
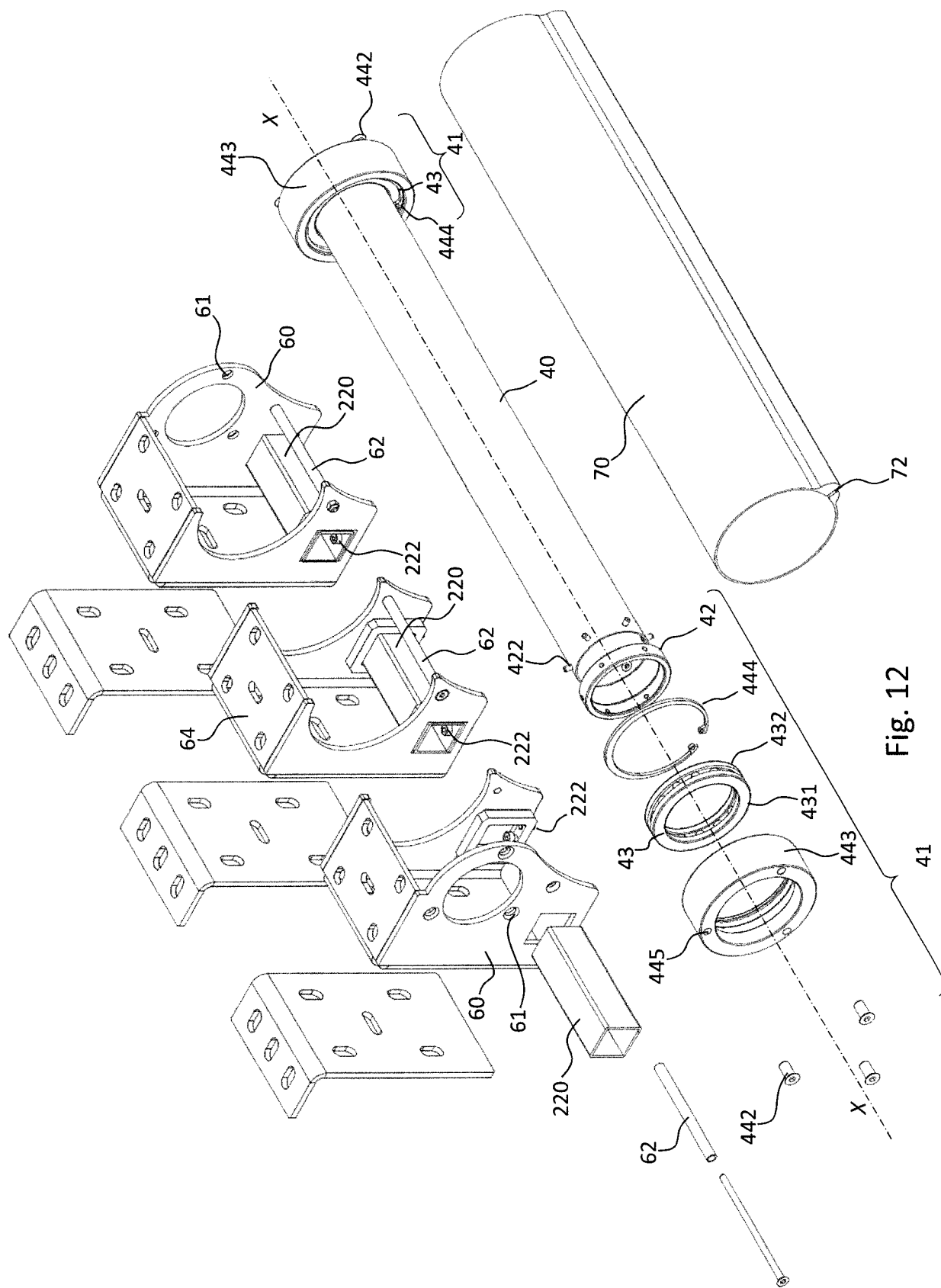


Fig. 11



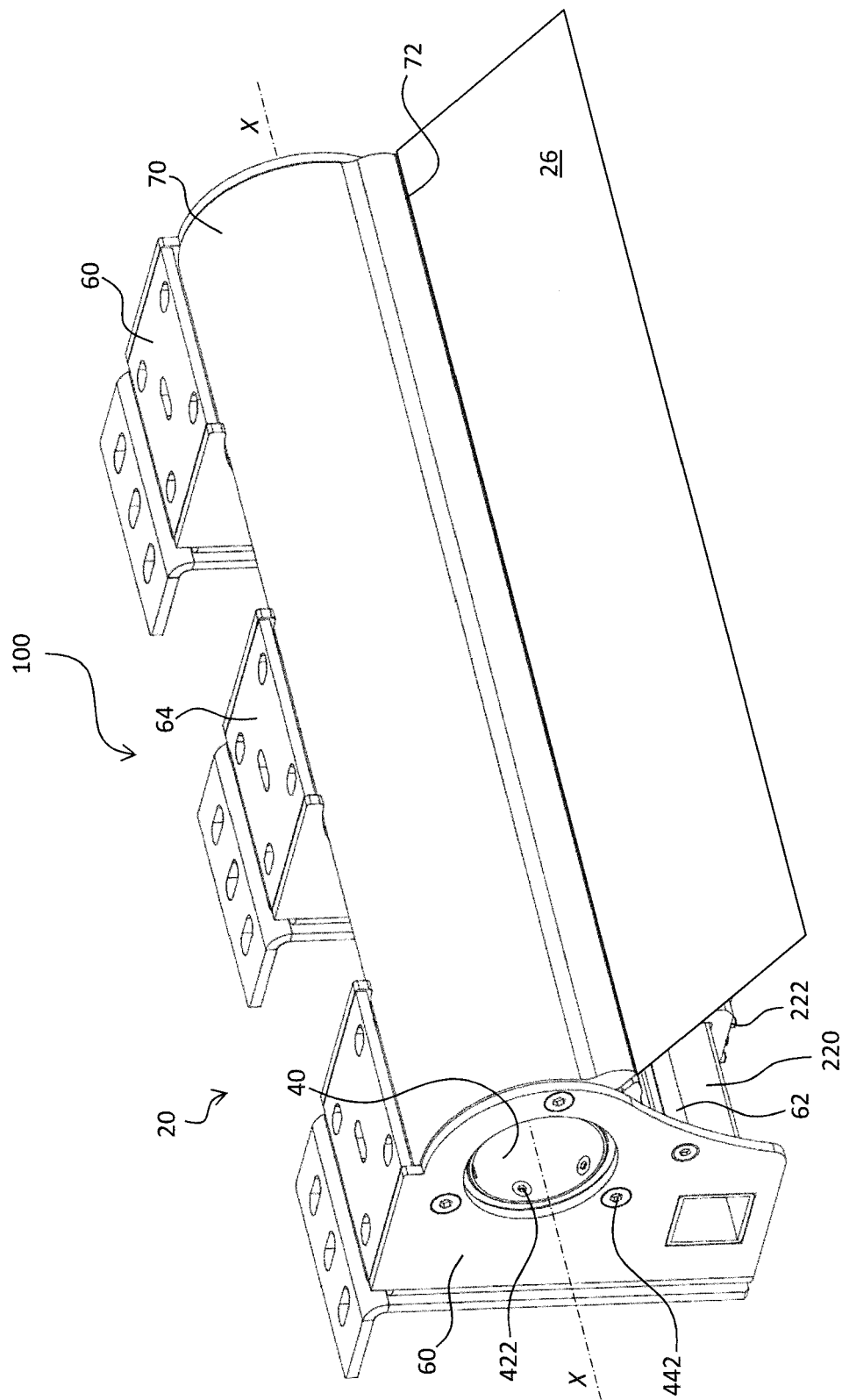


Fig. 13

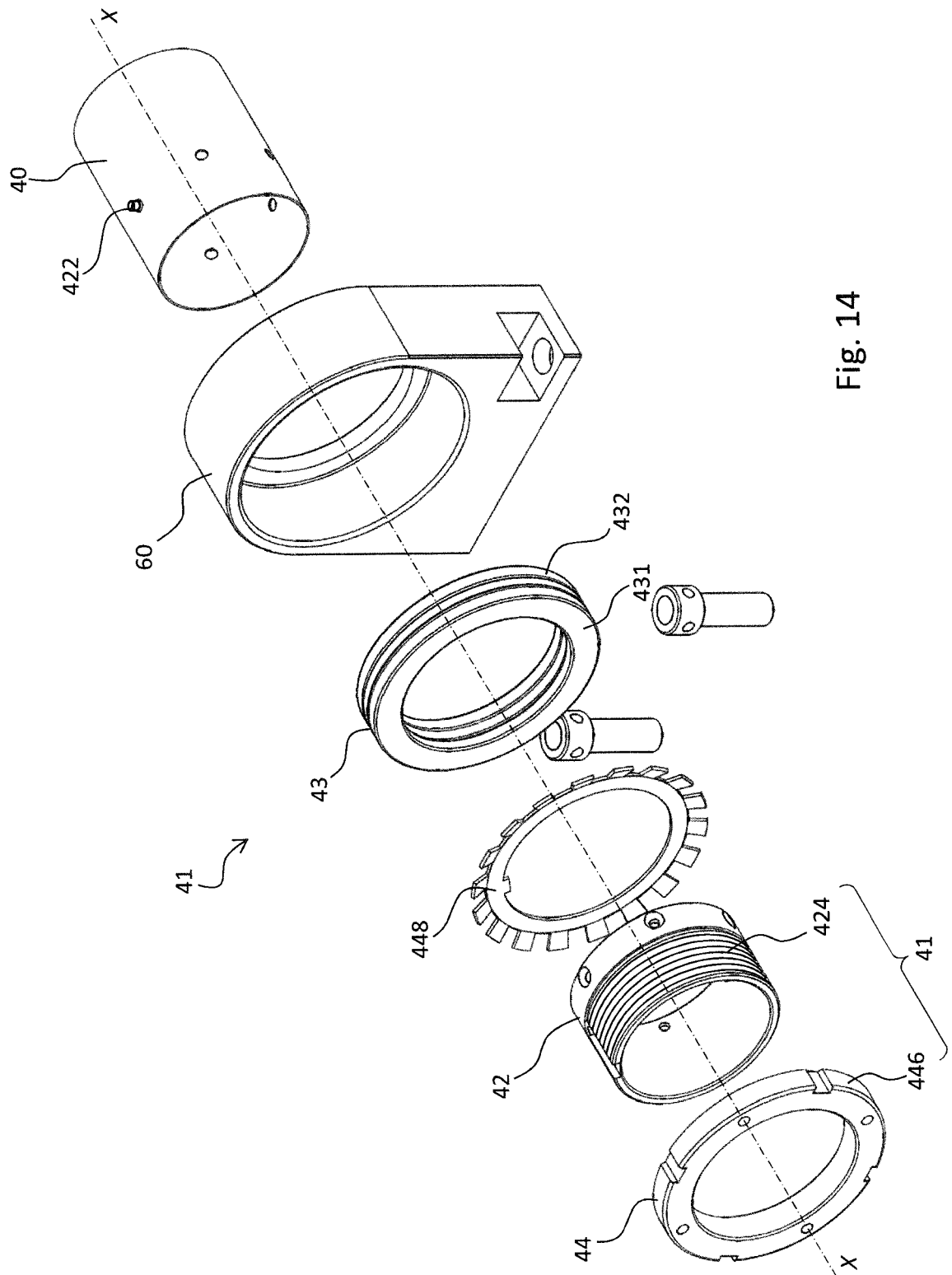


Fig. 14



EUROPEAN SEARCH REPORT

Application Number
EP 17 16 9100

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 1 416 102 A2 (DOMETIC CORP [US]) 6 May 2004 (2004-05-06) * the whole document *	1-10	INV. E04F10/06 E06B9/50 E06B9/44
A	US 3 151 664 A (CARL TRADELIUS) 6 October 1964 (1964-10-06) * figure 5 *	1-10	
X	US 2014/352893 A1 (MALOTT DALE [US]) 4 December 2014 (2014-12-04) * abstract; figures 3,6,4 *	1,8-10	
A	* paragraph [0044] *	2-7	
X	EP 0 730 080 A1 (BUBENDORFF SA [FR]) 4 September 1996 (1996-09-04) * figures 1,2 *	1	
A	EP 2 009 192 A2 (WEINOR GMBH & CO KG [DE]) 31 December 2008 (2008-12-31) * the whole document *	2-10	TECHNICAL FIELDS SEARCHED (IPC) E04F E06B E04H
		1-10	
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 23 June 2017	Examiner Cornu, Olivier
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P04C01)

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

EP 17 16 9100

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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23-06-2017

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1416102 A2	06-05-2004	AT 410329 T EP 1416102 A2 US 2004084933 A1 US 2004201248 A1	15-10-2008 06-05-2004 06-05-2004 14-10-2004
US 3151664 A	06-10-1964	GB 1011085 A US 3151664 A	24-11-1965 06-10-1964
US 2014352893 A1	04-12-2014	AU 2014273925 A1 CA 2913265 A1 EP 3003754 A1 US 2014352893 A1 WO 2014194233 A1	10-12-2015 04-12-2014 13-04-2016 04-12-2014 04-12-2014
EP 0730080 A1	04-09-1996	AT 180311 T DE 69602476 D1 DE 69602476 T2 EP 0730080 A1 ES 2132862 T3 FR 2731038 A1	15-06-1999 24-06-1999 09-12-1999 04-09-1996 16-08-1999 30-08-1996
EP 2009192 A2	31-12-2008	DE 102007030478 A1 EP 2009192 A2	08-01-2009 31-12-2008