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(54) WINDING ROLLER FOR A SHADING DEVICE OR AN AWNING

(57) The invention relates to a roller 40 for the sunblind 20. The roller is designed to be fastened to a canvas 26 of the blind and defines an axis of rotation *X*. A cross-section of the roller perpendicular to the axis *X*:
- defines an external profile *P* suitable for allowing winding-up of the canvas; and
- comprises a longitudinal seat 42 formed inside the external profile *P*.

The longitudinal seat:
- communicates with the exterior via a longitudinal slit 44 defined by two edges 440;
- comprises two separate main portions 420, inside each of which a cylinder of diameter *d* may be inscribed; and
- comprises an auxiliary portion 422 between the two main portions.

Furthermore the two separate main portions are separated by a cusp 424 and the distance *w* between the cusp and each edge of the longitudinal slit is smaller than the diameter *d*.

The invention also relates to a sunblind 20 comprising such a roller 40.

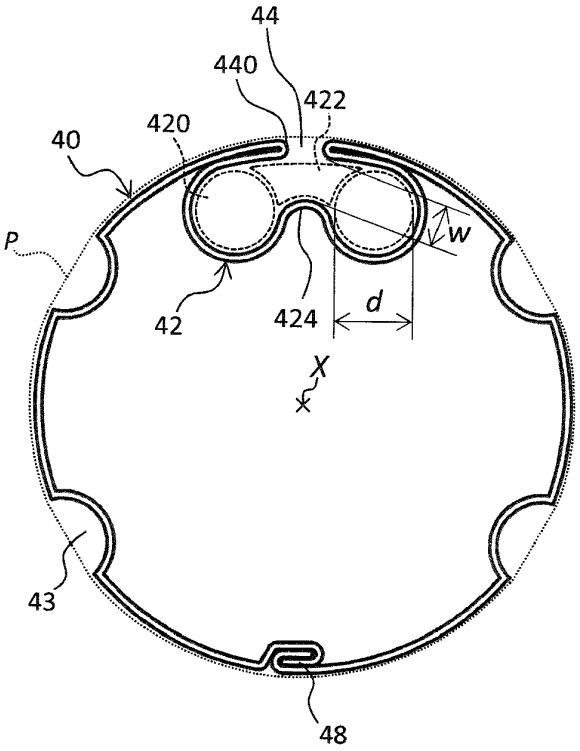

Fig. 8

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Description

[0001] The present invention relates to a roller for a blind, in particular a roller for a sunblind which may be rolled up and unrolled depending on the specific needs of the user. The invention also relates to a sunblind comprising such a roller.

[0002] There exist various types of external awnings or blinds which are usually intended to protect a place from solar radiation. For this reason these blinds are referred to below as "sunblinds", although they may be used also for other purposes, for example in order to protect a place from rain or more simply conceal it from the view of outside persons.

[0003] In a manner known per se, some sunblinds may be kept in a retracted state and then extended only when needed. This solution is particularly popular because it offers various advantages compared to the use of fixed blinds. For example this solution allows the blinds to be protected from adverse weather conditions for the whole of the time during which they are not used. Moreover, this solution is such that it is possible to protect the place from solar radiation when this is bothersome (typically in the summer and/or during the hottest hours of the day), while it allows the place 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 sunblinds, when the blind is retracted, it is rolled up onto a rotating roller, while when the blind must be extended, it is unrolled from the roller. Usually the canvas of a sunblind 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 the one hand, the end-piece on the other hand and the blind which is mounted on them. Below particular reference will be made to so-called arm blinds, but the person skilled in the art will readily understand that the invention may be used in blinds of other types such as drop blinds or laterally guided blinds. The arm blinds of the known type will be described below with reference to the attached figures 1-6, 11-12, and 14.

[0006] In an arm blind, 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 blind. Usually the roller 40 is mounted on a fixed structure, for example a wall, while the projecting arms 22 support the end-piece 24 and the canvas 26 of the blind. When the blind 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 canvas 26 of the blind is tensioned between the roller 40 and the end-piece 24, forming the broadest possible barrier against the solar radiation. When, instead, the blind 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 canvas 26 of the blind is stowed away close to the fixed structure and does not form any barrier for the solar radiation. In accordance with some known solutions, when the blind 20 is in the retracted position, it is housed at least partially inside a box or underneath a small roofing for protection against the weather.

[0007] The movement of the arm blind 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 canvas 26 of the blind. 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 blind 20, allowing it for example to be retracted automatically in the event of particular weather conditions (wind or particularly heavy showers) and/or be extended automatically in particular light conditions.

[0008] Starting from the completely retracted position and wishing to extend the blind 20, the user must operate the motor 25 so that the roller 40 starts to rotate in the direction in which the blind is unwound. This causes the release of the canvas 26 of the blind 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 canvas 26 of the blind. On the other hand, starting from an at least partially extended position and wishing to retract the blind 20, the user must operate the motor 25 so that the roller 40 starts to rotate in the direction in which the blind is wound up. This causes tensioning of the canvas 26 of the blind 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 canvas 26 of the blind.

[0009] The rollers 40 for sunblinds of the known type, while very popular, are not without drawbacks.

[0010] A first drawback is associated with the way in which the canvas 26 and the roller 40 are fastened together. This fastening system is described below with particular reference to Figure 11. According to this solution, the roller 40 comprises a longitudinal seat 42 inside which a rod-like element 27 fixed to an edge of the canvas 26 is inserted. The rod-like element 27 usually consists of a loop formed by the canvas 26 rolled up around a core 46 consisting for example of a cord. The seat 42 comprises a longitudinal slit 44 which has a width w smaller than the diameter *d* of the rod-like element 27. This thus results in a system for fastening together the canvas

26 and the roller 40 which is both extremely stable and avoids the generation of local forces on the canvas 26. These local forces, such as those which arise from the use of pointed fastening devices such as nails or the like, tend to damage the canvas 26 in the long run.

[0011] However the edge of the canvas 26 must be folded over and stitched in order to acquire sufficient rigidity. The folded-over hem 28 which is obtained cannot be accommodated inside the longitudinal seat 42. As can be seen in Figure 11, this seat 42 is in fact able to receive only the rod-like element 27, but the folded-over hem 28 must be necessarily arranged outside the seat 42, on the surface of the roller 40 where the canvas 26 is subsequently rolled up. The presence of the folded-over hem 28 of the canvas 26 thus forms a bulk which causes irregular winding-up of the canvas 26, its fabric being affected to the point that, when the blind 20 is extended, it has wrinkles which increase and become very pronounced in the vicinity of the roller 40. This creates a problem in terms of the appearance which in many cases becomes unacceptable or in any case reduces considerably the value and attractiveness of the blind 20 as a whole.

[0012] A solution to this problem was proposed in the patent application EP1564363, the roller 40 of which is schematically shown in Figure 12. In accordance with this solution, the longitudinal seat 42 comprises a main portion 420 designed to receive the rod-like element 27, and an auxiliary portion 422 designed to receive the folded-over hem 28. In this way the folded-over hem 28 remains within the external profile of the cross-section and does not create an obstacle. With this solution, however, the canvas may be rolled up only in one direction; with specific reference to Figure 12, the canvas 26 may be rolled up only by causing the roller 40 to rotate in the clockwise direction. On the other hand, by causing the roller 40 to rotate in an anti-clockwise direction, the folded-over hem 28 would be pulled outwards through the longitudinal slit 44. In this case, therefore, the same problem already described above in connection with the roller 40 shown in Figure 11 would arise.

[0013] The roller 40 according to Figure 12 may create significant problems at the time of assembly, because often it is not possible either to define beforehand the correct orientation of the blind 20 or reverse its orientation on-site during assembly.

[0014] A second problem arises in connection with the flexural strength of the roller 40. As regards this type of problem it must be considered first and foremost that the blinds 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 flexural moments which may also be very considerable in nature.

[0015] 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 blind 20 may have an axial length of 6 metres and lateral extension of 3-4 metres. The weight per square metre of typical fabric for this use may be in the region of 300 g/m^2. Basically, therefore, when the canvas 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 weight 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 roller alone having 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 canvas 26 is completely rolled up varies between 14.5 and 24.4 kg.

[0016] As can be noted, the weight-related load does not reach high values, but another load which is similarly distributed and therefore has effects entirely similar to those of the weight force must be added to it. This second load is that introduced by the arms 22. The springs 23 in fact constantly apply 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 an elastic nature, is all the greater the more the arms 22 are folded and is therefore maximum in the configuration where the blind 20 is completely retracted. The elastic action of the springs 23 therefore applies a load distributed along the whole of the roller 40. The amount of this elastic force is much greater in absolute terms than that considered above in connection with the weight 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 elastic load may reach a value as high as 60 kg.

[0017] Obviously, as the person skilled in the art may easily understand, the elastic load and the weight-related load give rise to a resultant load equal to the vectorial sum of the two loads.

[0018] Usually, the roller 40 is made from a flat metal sheet which, after formation of the seat 42, is deformed so as to 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, indicated by 48 in the embodiments of the attached figures. The cross-section of the roller 40 according to the prior art therefore comprises two zones which are reinforced in relation to the wall alone of the roller 40; the first reinforced zone is that of the seat 42, while the other reinforced zone is that of the seamed joint 48. As the person skilled in the art may easily understand, the presence of these two reinforced zones helps greatly increase the flexural strength of the roller 40 compared to the strength which a completely smooth roller would have.

[0019] In some cases, the roller 40, especially when it has a relatively small diameter, is further reinforced by grooves 43. See Figures 5 and 6 in this connection. These grooves, in addition to having a limited effectiveness with regard to strengthening the roller against flex-

ure, also give rise to irregular winding-up of the canvas 26, for which reason they are avoided as far as possible.

[0020] As the person skilled in the art may easily understand, the total load will assume gradually different directions with respect to the roller 40, owing to the rotation of the latter about the axis *X*. Two different load conditions will be analyzed below with reference to Figure 14. The first condition is that where the load is contained in the plane *XZ* (this load will therefore assume a vertical direction in Figure 14) and where also the deformation of the roller 40 will occur in the same plane *XZ*. As the person skilled in the art may easily understand, it may be considered that the behaviour of the roller 40 with respect to this flexural action is defined by the moment of inertia of the cross-section with respect to the axis *Y*. As can be seen in Figure 14, the two reinforced zones of the cross-section of the roller 40 (i.e. the seat 42 and the seamed joint 48) are positioned far from the axis *Y* and this has the effect that the corresponding moment of inertia is relatively high.

[0021] The second condition is that where the load is contained in the plane *XY* (this load therefore assumes a horizontal direction in Figure 14) and where therefore also the deformation of the roller 40 will occur in the same plane *XY*. As the person skilled in the art may easily understand, it may be considered that the behaviour of the roller 40 with respect to this flexural action is defined by the moment of inertia of the cross-section with respect to the axis *Z*. As can be seen in Figure 14, the two reinforced zones of the cross-section of the roller 40 (i.e. the seat 42 and the seamed joint 48) are positioned precisely on the axis *Z* and this has the effect that the corresponding moment of inertia is relatively low.

[0022] Basically, therefore, the roller 40 may oppose fairly effectively a load applied in the plane *XZ*. On the other hand, a load applied in the plane *XY* may easily cause relatively pronounced flexure of the roller 40. If this flexural action has the effect that the yield point of this material is exceeded - even only locally - a permanent deformation of the roller 40 occurs. This permanent deformation necessarily gives rise to complications in the overall functioning of the blind 20. For example, the permanent deformation of the roller 40 may easily produce overloads and irregularities in the operation of the ball bearings on which the said roller 40 is mounted. Moreover, the permanent deformation of the roller 40 may easily result in the volume of the blind 20, when completely rolled-up, no longer being able to be accommodated inside any housing provided around the roller 40. Finally, the permanent deformation of the roller 40 may result in the formation of folds in the canvas 26 while the latter is being rolled up.

[0023] The object of the present invention is therefore to overcome at least partially the drawbacks mentioned above with reference to the prior art.

[0024] In particular, a task of the present invention is to provide a roller for a blind able to solve at least partially the problem of the bulk created by the folded-over hem 28 of the canvas 26. Furthermore, a task of the present invention is to provide a roller for a blind which is able to allows easy reversal of the orientation of the blind at the time of assembly.

[0025] Moreover, a task of the present invention is that of providing a roller for a blind which has overall a greater flexural strength compared to the rollers of the prior art.

[0026] The object and tasks indicated above are achieved by a roller for a blind according to Claim 1. The characteristic features and further advantages of the invention will emerge from the description, provided hereinbelow, of a number of examples of embodiment, provided by way of a non-limiting example, with reference to the accompanying drawings.

- Figure 1 shows a perspective view of an arm sunblind;
- Figure 2 shows the blind according to Figure 1 where, for the sake of clarity, the canvas has been removed;
- Figure 3 shows a perspective view of a portion of a roller according to the prior art;
- Figure 4 shows a cross-sectional view of the roller according to Figure 3;
- Figure 5 shows a perspective view of a portion of another roller according to the prior art;
- Figure 6 shows a cross-sectional view of the roller according to Figure 5;
- Figure 7 shows a perspective view of a portion of a roller according to the invention;
- Figure 8 shows a cross-sectional view of the roller according to Figure 7;
- Figure 9 shows a perspective view of a portion of another roller according to the invention;
- Figure 10 shows a cross-sectional view of the roller according to Figure 9;
- Figure 11 shows in schematic form, a roller according to the prior art having, fastened thereto, the canvas of a sunblind with clockwise winding;
- Figure 12 shows in schematic form, another roller according to the prior art having, fastened thereto, the canvas of a sunblind with clockwise winding;
- Figure 13.a shows in schematic form, a roller according to the invention having, fastened thereto, the canvas of a sunblind with clockwise winding;
- Figure 13.b shows in schematic form, the roller according to Figure 13.a having, fastened thereto, the canvas of a sunblind with anti-clockwise winding;
- Figure 14 shows a cross-sectional view of a roller according to the prior art similar to that of Figure 4; and
- Figure 15 shows a cross-sectional view of a roller according to the invention similar to that of Figure 10.

[0027] With reference to the attached drawings, 20 denotes in its entirety a sunblind. The invention relates to a roller 40 for the sunblind 20. The roller 40 is designed to be fastened to a canvas 26 of the sunblind 20 and defines an axis of rotation *X*. A cross-section of the roller

40 perpendicular to the axis *X*:

- defines an external profile P suitable for allowing winding-up of the canvas 26; and
- comprises a longitudinal seat 42 formed inside the external profile *P*.

[0028] The longitudinal seat 42 communicates with the exterior via a longitudinal slit 44 defined by two edges 440. The longitudinal seat 42 comprises two separate main portions 420 inside each of which a cylinder with diameter *d* may be inscribed. The longitudinal seat 42 comprises an auxiliary portion 422 between the two main portions 420. The two separate main portions 420 are separated by a cusp 424 and the distance w between the cusp 424 and each edge 440 of the longitudinal slit 44 is smaller than the diameter *d*.

[0029] From that stated above it is therefore clear that each of the two main portions 420 of the longitudinal seat 42 is designed to receive a rod-like element 27 fixed to an edge of the canvas 26, the rod-like element 27 having a diameter *d*. Furthermore the cusp 424, defining the distance w smaller than the diameter *d* of the rod-like element 27, is designed to retain the rod-like element 27 so that it cannot move from one main portion to the other. Finally, the auxiliary portion 422 is designed to receive a folded-over hem 28 of the canvas 26 so that the folded-over hem 28 remains inside the external profile *P* of the cross-section.

[0030] In the present document, both as regards the description of the prior art and as regards the description of the invention, a number of agreed terms are assumed: "Axial" or "longitudinal" is understood as referring to the direction of any straight line parallel to the axis *X* about which the roller 40 rotates. "Radial" or "transverse" refers to the direction of any half-line having its origin on the axis *X* and being perpendicular thereto. "Circumferential" refers to the direction of any circumference centred on the axis *X* and situated in a plane perpendicular thereto.

[0031] In particular, in accordance with certain possible embodiments of the invention, the auxiliary portion 422 of the seat 42 is arranged in the vicinity of the longitudinal slit 44.

[0032] As the person skilled in the art may easily understand from the description of the invention given above and the schematic illustration thereof shown in Figures 13.a and 13.b, the roller 40 according to the invention solves completely the problem associated with the obstacle represented by the folded-over hem 28 of the canvas 26. As already mentioned above, in some rollers 40 according to the prior art (see in particular Figure 11), the seat 42 is able to receive only the rod-like element 27, while the folded-over hem 28 must be necessarily arranged outside of the seat and therefore outside of the external profile *P* defined by the roller 40. In this way, in accordance with the prior art, the folded-over hem 28 of the canvas 26 forms a bulk resulting in irregular winding-up of the canvas 26.

[0033] In other rollers 40 according to the prior art, see for example Figure 12, the volume of the folded-over hem 28 is housed inside the seat 42 and therefore inside the external profile *P* defined by the roller 40, but only for a given direction of winding (in the specific case only clockwise winding). On the other hand, as already mentioned above, if the canvas is wound-up in the opposite direction, the folded-over hem 28 is located outside of the seat 42 and therefore outside of the external profile *P* defined by the roller 40, thus creating a bulk which causes irregular winding-up of the canvas 26. Therefore, in accordance with such a solution, the canvas 26 may be rolled up regularly onto the roller 40 in one direction only.

[0034] On the other hand, in accordance with the invention, the seat 42 comprises two separate main portions 420, each of which is designed to receive the rod-like element 27. The two separate main portions 420 are separated by a cusp 424 designed to retain the rod-like element 27 so that it cannot move from one main portion to the other nor from a main portion 420 to the auxiliary portion 422. Moreover, in accordance with certain possible embodiments of the invention, the overall form of the seat 42 is symmetrical with respect to a diametral axis *Z* passing through the centre of the longitudinal slit 44. This solution is illustrated in particular in Figures 8, 10, 13.a, 13.b and 15.

[0035] This particular configuration of the invention is particularly advantageous in various respects. A first advantage associated with the seat 42 which comprises two separate main portions 420 is the greater freedom during assembly. This advantage is particularly evident in the embodiments where the overall form of the seat 42 is symmetrical with respect to the axis *Z*. As the person may easily understand, the known roller according to Figure 12 is not symmetrical and therefore may be used only in applications where the blind is wound rotating the roller 40 in a clockwise direction (clockwise winding). This limitation is excessive because often the assembly constraints emerge only on-site, during assembly, and it is therefore difficult to prepare beforehand a sunblind 20 in such a way that it may be efficiently mounted.

[0036] As the person may readily understand, instead, the embodiments of the invention according to Figures 8, 10, 13.a, 13.b and 15 are symmetrical and therefore may be used both in applications where the blind is wound rotating the roller 40 in a clockwise direction (clockwise winding) and in applications where the blind is wound rotating the roller 40 in an anti-clockwise direction (anti-clockwise winding).

[0037] A second advantage associated with the seat 42 which comprises two separate main portions 42 is the greater resistance to flexure which it gives the roller, in particular flexure due to loads contained in the plane *XY*, whereas the rollers of the prior art have a relatively small resistance to such stresses. The cross-section of the roller 40 according to the invention comprises in fact a strengthened zone (the seat 42) which has a greater extent in the circumferential direction than the seat 42 of

the prior art. As a result the moment of inertia of the cross-section relative to the axis *Z* is considerably greater in the cross-section according to the invention than in the prior art.

[0038] In order to increase further the moment of inertia and therefore the flexural strength, in accordance with some embodiments it is also possible to provide the seamed joint 48 with a greater circumferential extent. This characteristic is illustrated in the cross-section of Fig. 15. In the case where the roller 40 is intended to have a greater length (for example 4-6 metres), its greater flexural strength ensures the elimination of the problems arising from permanent deformation. These problems have been described above in connection with the prior art.

[0039] In the case where the roller 40 is intended to have a smaller length (for example 2-3 metres), its greater flexural strength allows the use of metal sheets with a thickness smaller than those used in the prior art. This results in the use of smaller amount of material for manufacture of the roller 40, despite the fact that the starting metal sheet must have a greater planar area in order to be able to form the double seat 42 and/or the larger seamed joint 48.

[0040] The invention also relates to a sunblind 20 comprising a roller 40 in accordance with the description provided above. Preferably the sunblind 20 comprises a canvas 26 and a rod-like element 27 fixed to an edge of the canvas 26. The canvas 26 further comprises a folded-over hem 28. The sunblind 20 according to the invention is characterized in that the rod-like element 27 is housed inside one of the main portions 420 of the seat 42 and the folded-over hem 28 is housed in the auxiliary portion 422 of the seat 42.

[0041] In accordance with some possible embodiments of the invention, the rod-like element 27 consists of a loop formed by the canvas 26 wound around a core 46.

[0042] As the person skilled in the art may easily understand from the description provided above, the roller 40 and the sunblind 20 according to the present invention achieve the object of overcoming at least partly the drawbacks mentioned with reference to the prior art.

[0043] In particular, the present invention achieves the object of providing a roller for a blind able to solve the problem of the obstacle created by the folded-over hem 28 of the canvas 26. Furthermore, the present invention achieves the object of providing a roller 40 for a blind which is able to allow easy reversal of the orientation of the blind 20 at the time of assembly. Moreover, the present invention achieves the object of providing a roller for a blind which has overall a greater flexural strength compared to the rollers of the prior art.

[0044] The person skilled in the art, in order to satisfy specific requirements, may make modifications to the embodiments of the roller 40 for a blind and the sunblind 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 (40) for a sunblind (20), designed to be fastened to a canvas (26) of the sunblind (20), wherein the roller (40) defines an axis of rotation *X* and wherein a cross-section through the roller (40) perpendicular to the axis *X*:

- defines an external profile *P* suitable for allowing winding-up of the canvas (26);
- comprises a longitudinal seat (42) formed inside the external profile *P*;

wherein:

- the longitudinal seat (42) communicates with the exterior via a longitudinal slit (44) defined by two edges (440);
- the longitudinal seat (42) comprises two separate main portions (420), inside each of which a cylinder of diameter *d* may be inscribed;
- the longitudinal seat (42) comprises an auxiliary portion (422) between the two main portions (420);
- the two separate main portions (420) are separated by a cusp (424); and
- the distance *w* between the cusp (424) and each edge (440) of the longitudinal slit (44) is smaller than the diameter *d*.

2. Roller (40) according to Claim 1, wherein the auxiliary portion (422) of the seat (42) is arranged close to the longitudinal slit (44).

3. Roller (40) according to Claim 1 or 2, wherein the overall form of the seat (42) is symmetrical with respect to a diametral axis *Z* passing through the centre of the longitudinal slit (44).

4. Sunblind (20) comprising a roller (40) according to any one of the preceding claims.

5. Sunblind (20) according to Claim 4, comprising a canvas (26) and a rod-like element (27) firmly fixed to an edge of the canvas (26), wherein the canvas also comprises a folded-over hem (28), **characterized in that** the rod-like element (27) has a diameter *d* and is housed inside one of the main portions (420) of the seat (42) and the folded-over hem (28) is housed inside the auxiliary portion (422) of the seat (42).

6. Sunblind (20) according to Claim 4 or 5, wherein the rod-like element (27) consists of a loop formed by the canvas (26) wound up around a core (46).

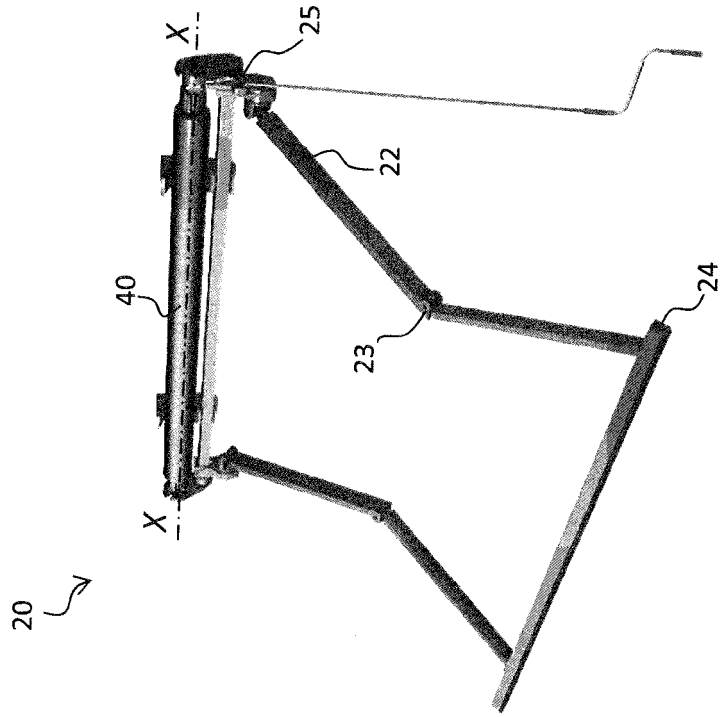

Fig. 2

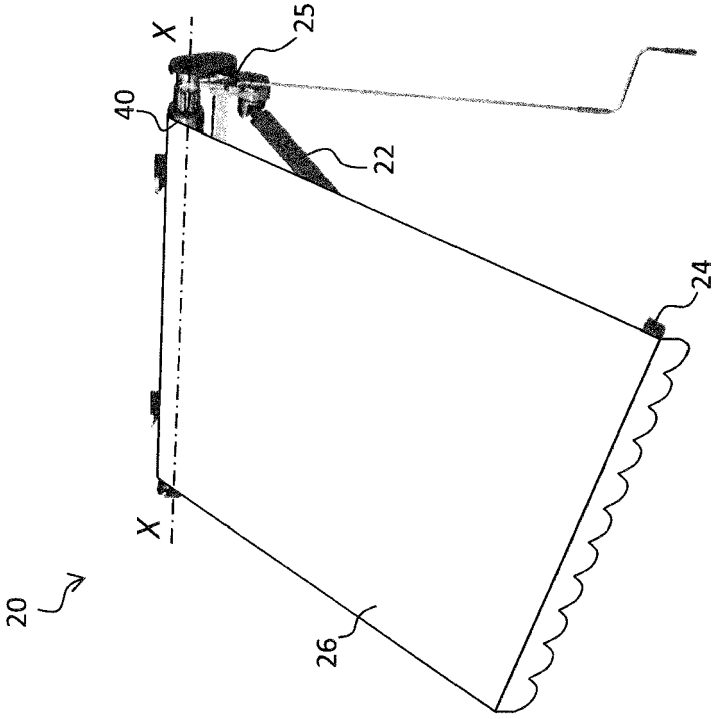

Fig. 1

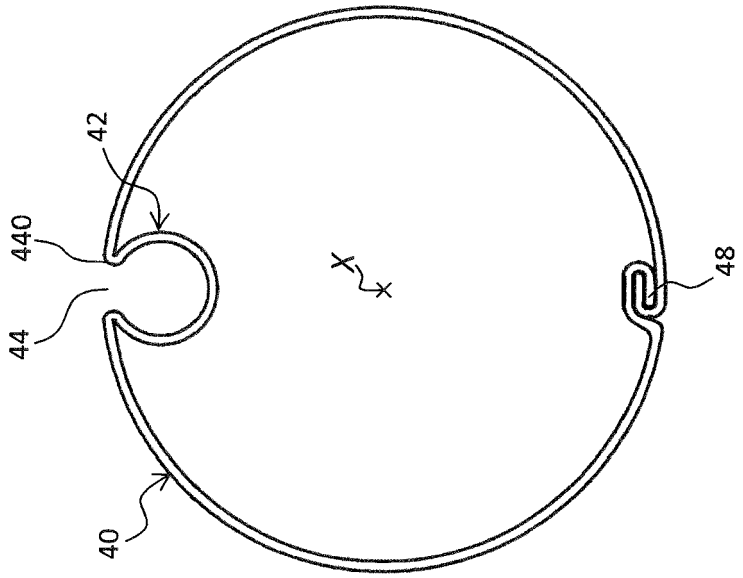

Fig. 4

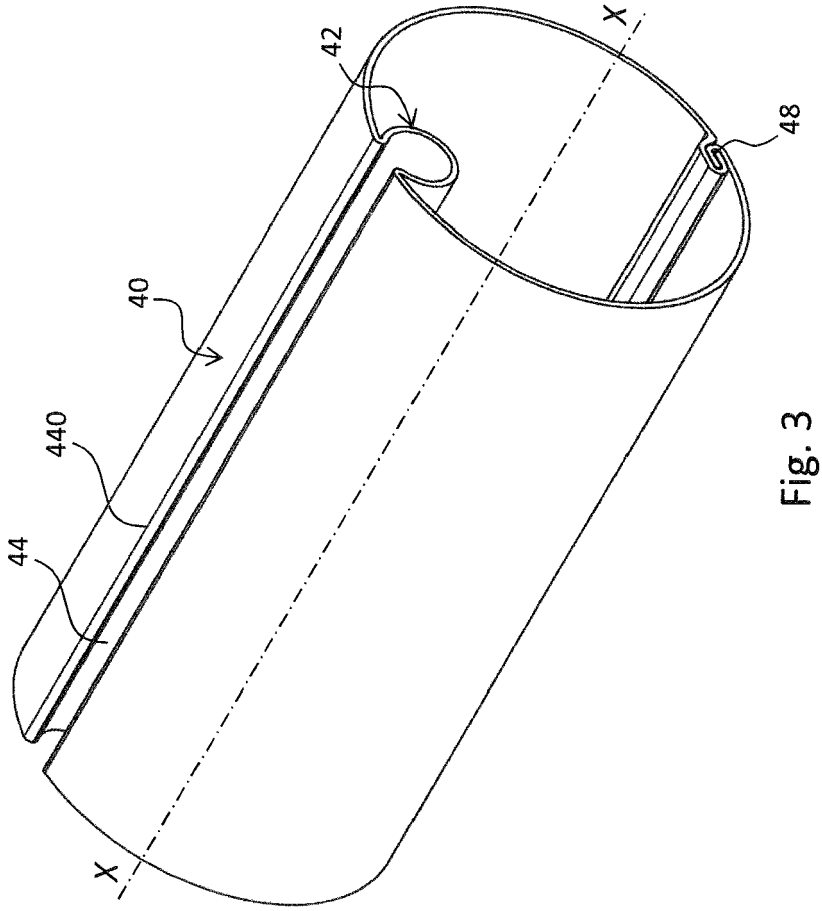

Fig. 3

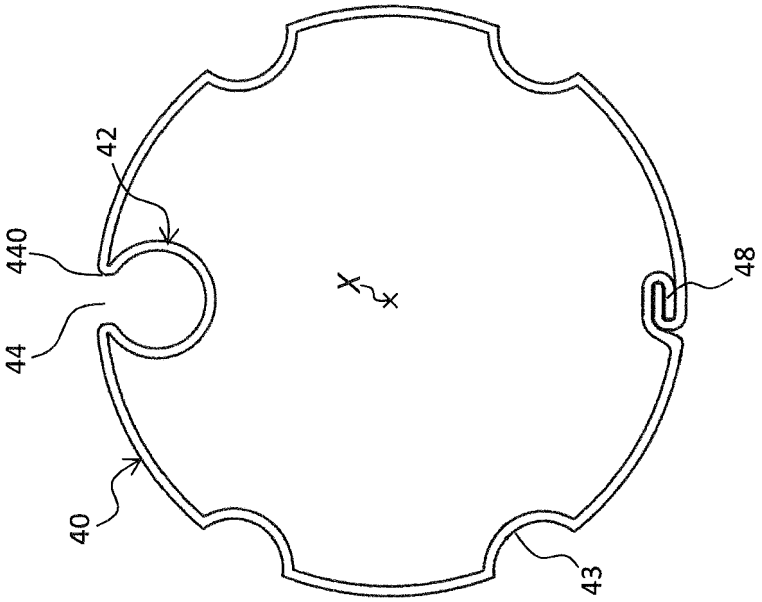

Fig. 6

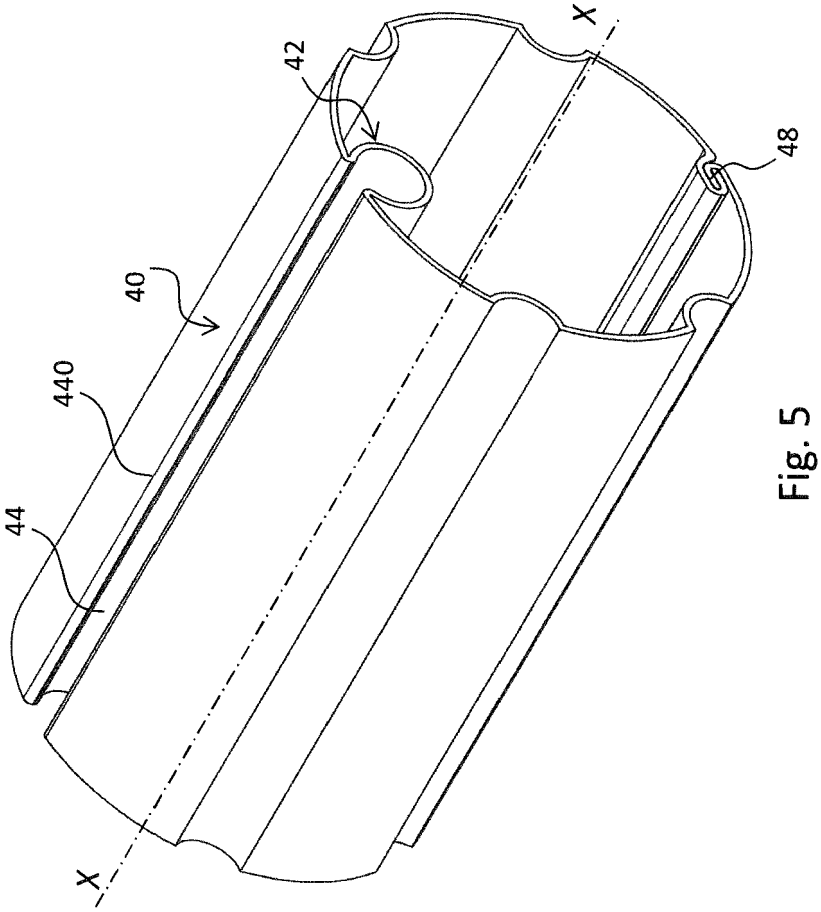

Fig. 5

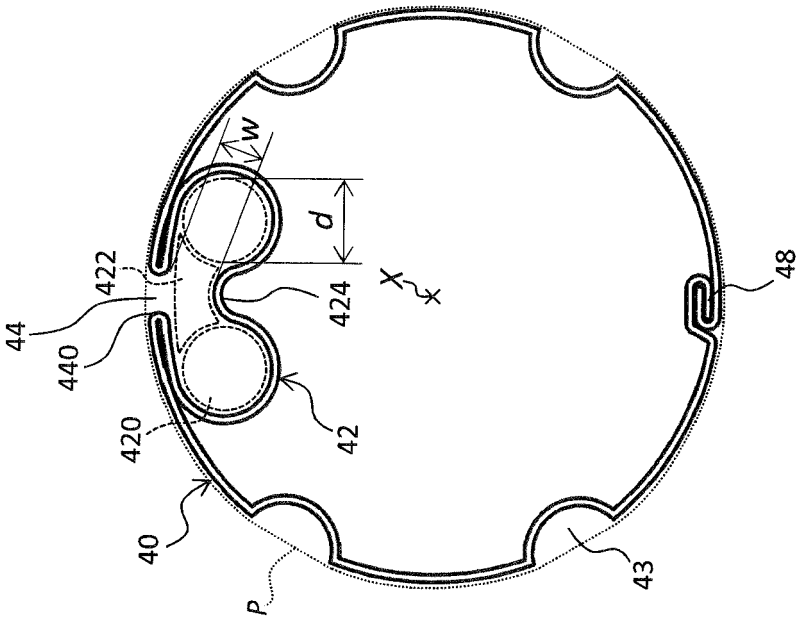
w
d
422
424
X
X
44
440
420
42
40
P
43
48

Fig. 8

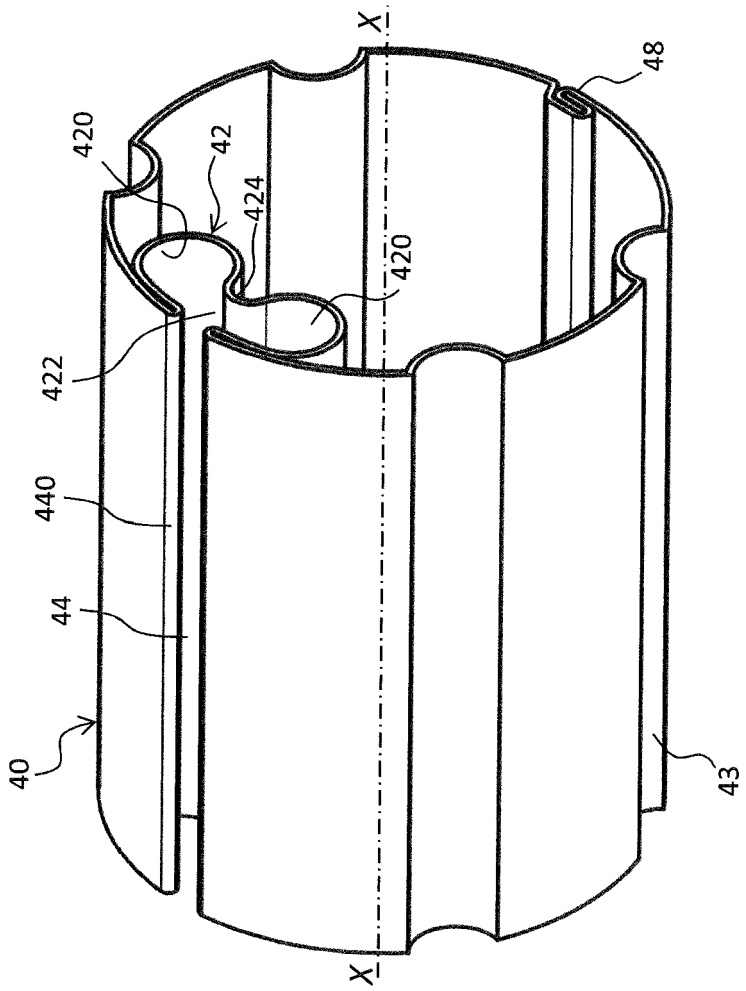
X
48
420
42
424
420
422
440
44
40
43
X

Fig. 7

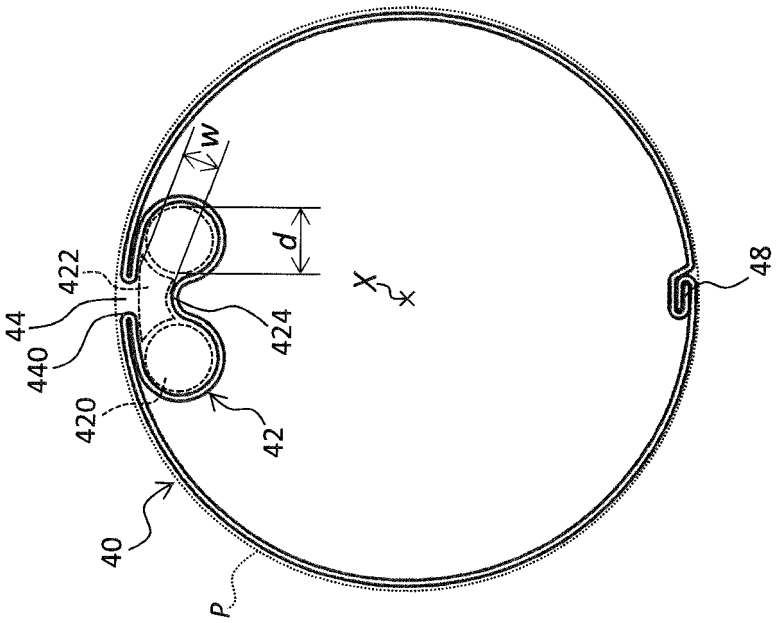
w
d
422
44
440
420
424
42
40
P
X
X
48

Fig. 10

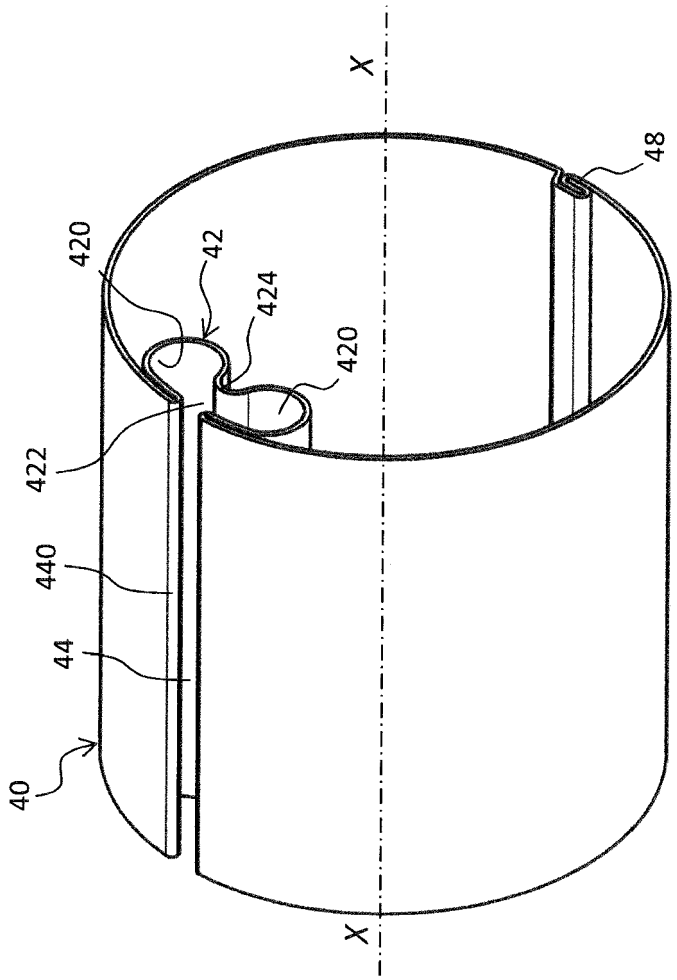
X
48
420
42
424
420
422
440
44
40
X

Fig. 9

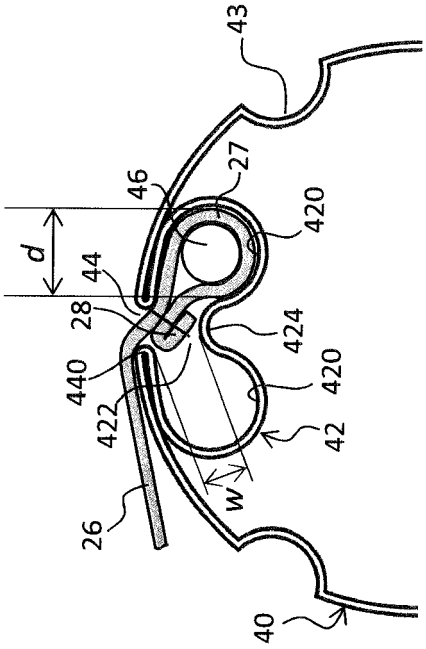

Fig. 13.a

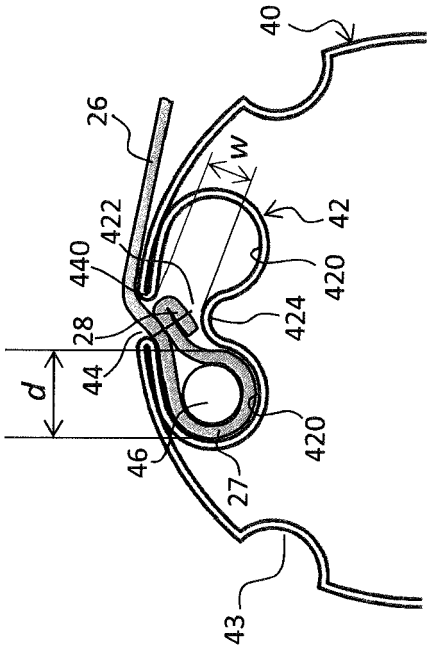

Fig. 13.b

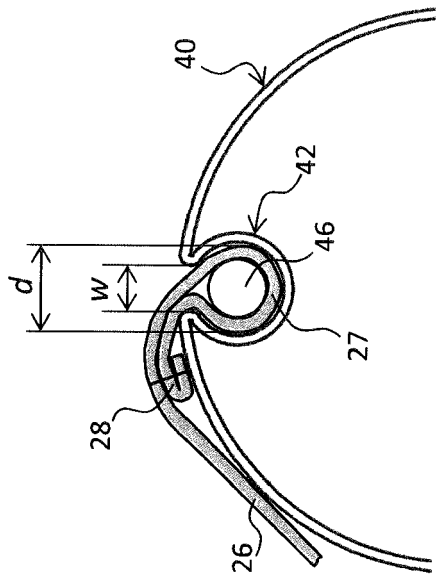

Fig. 11

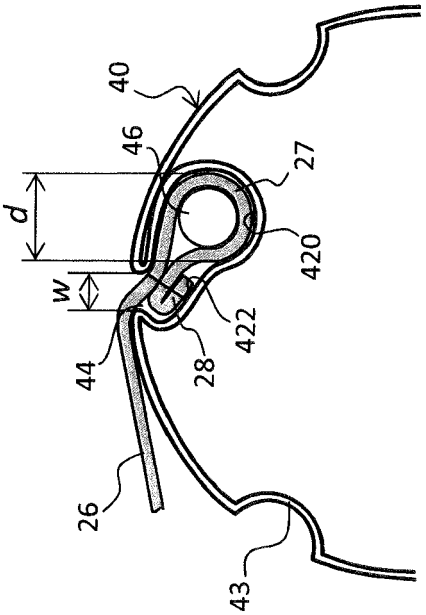

Fig. 12

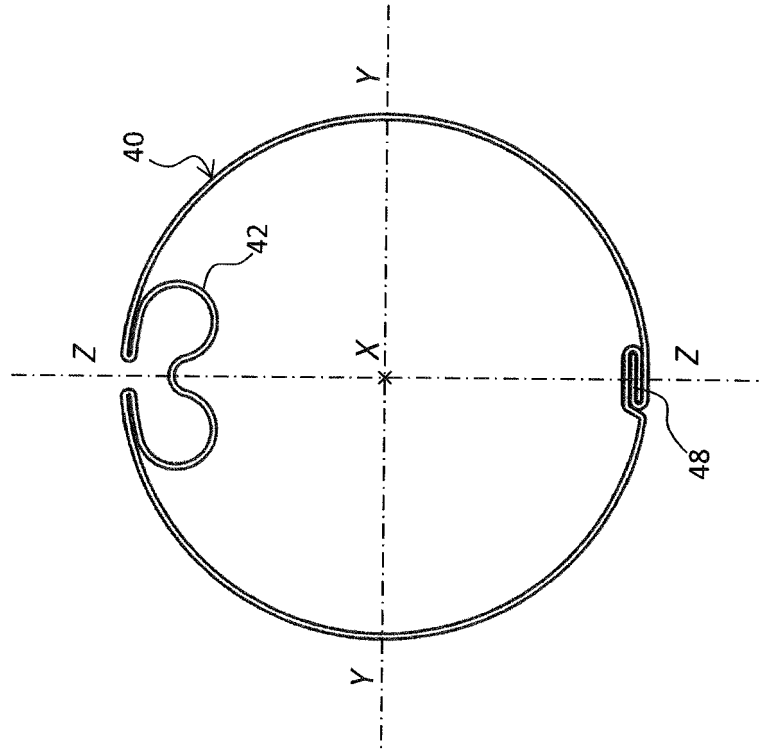

Fig. 15

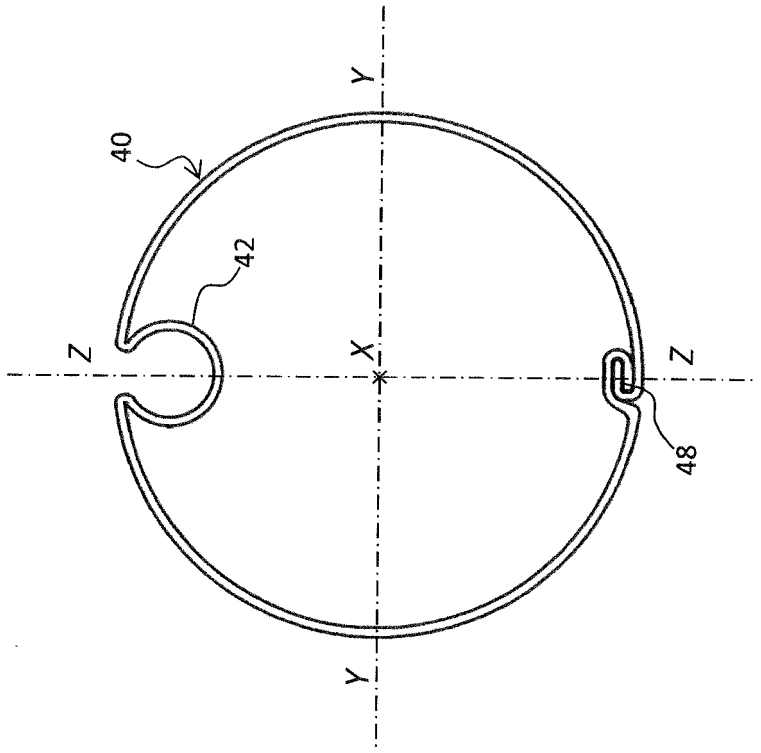

Fig. 14

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EUROPEAN SEARCH REPORT

Application Number
EP 16 15 5804

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	FR 2 955 132 A1 (BRUSTOR NV [BE]) 15 July 2011 (2011-07-15) * figures 1-4 *	1-6	INV. E04F10/06
A	FR 2 365 013 A1 (PROFIL SA IND FINANC LE [FR]) 14 April 1978 (1978-04-14) * figure 1 *	1-6	
A	EP 1 564 363 A1 (BAT ACCESSORI S R L [IT]) 17 August 2005 (2005-08-17) * figures 0-4 *	1-6	

TECHNICAL FIELDS SEARCHED (IPC)
E04F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	12 July 2016	Schwertfeger, C

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12-07-2016

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FR 2955132 A1	15-07-2011	NONE	
FR 2365013 A1	14-04-1978	NONE	
EP 1564363 A1	17-08-2005	NONE	

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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- EP 1564363 A **[0012]**