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(54) **Plug connection between a roller blind winding shaft and its head piece**

Steckverbindung in einem aufrollbaren Behang zwischen der Wickelwelle und deren Kopfstück

Connexion enfichable pour un volet roulant entre l'arbre d'enroulement et sa tête

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EP 2 126 267 B1

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Description

[0001] The invention relates to the mechanical connection between the bearing insert and the roller blind tube in a roller blind.

[0002] In traditional roller blinds the roller blind rod was made of wood, and the bearing insert was simply a round nail placed centrally in the wood, which was solid and rod-shaped at one end. As the development began to use tubes to roll a roller blind around, the bearing insert became a plug with a cylindrical metal insert, said plug being pushed or hammered into position for a compression fit. However, as roller blind mechanisms have become more sophisticated, more and more of a mechanical nature is placed inside the tube and in the bearing insert, and it is no longer satisfactory that a plug is pressed into a tube, because it becomes impossible to separate the two sensibly afterwards. There is hence a need for a joint or mechanical connection that is at the same time rigid, if it is desired to make it permanent, but which may be removed against a force that is less than the pulling of a plug that is compression fit into the tube. Ideally, the force to obtain this is in the range 50 to 200 Newton.

[0003] Parts that are suitable for this purpose are indeed manufactured, but the fit obtained when the parts are joined is entirely dependent on the manufacturing tolerances of the parts. The worst cases are the extremes of the tolerances: a tube with an inside diameter that is too small trying to cooperate with a plug that is average, or a plug with an outside diameter that is too large trying to cooperate with an average value inside diameter of the tube. In both cases, the joint will be too tight. Similarly, an inside diameter of the tube at the maximum limit trying to cooperate with an outside diameter of the plug at the minimum limit will not be a joint at all - it will fall apart. However, close tolerances are expensive to obtain in manufacture, and in particular when one part is made of a polymer, the cost becomes unrealistic for a roller blind component.

[0004] US Patent 3,854,517 describes a bearing insert that cooperates with a roller blind tube by means of grooves that engage ribs on the inside of the roller blind tube. These is no mention of frictional engagement, and the construction does not need this feature. It is the purpose of the invention to provide a mechanical connection between the bearing insert and the roller blind tube in a roller blind in which the influence of manufacturing tolerances is minimized. This is obtained in a construction according to the present claim 1. The insert is provided with angularly disposed radial and longitudinal ribs that cooperate with the inner surface of the roller blind tube, said inner surface being provided with longitudinal grooves at an angular spacing that is identical to the angular spacing of said ribs. Such longitudinal grooves may be manufactured by extrusion, if the tube is made of aluminium, or they may be shaped by reaming from one end of the tube, because they need not have a length that exceeds the length of the ribs. In that case even a rolled and welded steel tube may be used.

[0005] The operator fitting the insert into the end of a tube will quickly obtain a feel for the degree to which the fit between the insert and the tube will fulfil the force criteria mentioned above. If the insert moves too tightly in the tube when the ribs engage the inner cylindrical surface of the tube, then it is withdrawn, rotated to place the ribs in the direction of the grooves and re-inserted. In order that there is no risk of too loose fitting in the tube, the tolerances are shifted towards a too tight fit with the cylindrical inside surface of the tube as the average dimension with the given tolerance.

[0006] In an advantageous embodiment the insert as well as the inside of the tube are provided with indexing means that ensure that either the inside cylindrical surface of the tube or the bottom of the longitudinal grooves are reliably engaged. The term "indexing means" has been used, although "registration means" might equally indicate the essence of this feature, namely that a given angular relationship between the roller blind tube and the insert is reliably obtained.

[0007] In a further advantageous embodiment the indexing means of the tube consist of at least one pair of internal longitudinal ribs in the tube, with a distance such that they may be straddled by two consecutive ribs on the insert, while one of the grooves is disposed between said ribs. In this manner, the insertion where the ribs engage the inner cylindrical surface of the tube corresponds to straddling the two internal ribs, whereas the angularly displaced engagement with the grooves in the tube means that one insert rib is fitted beetween the two internal ribs in the tube.

[0008] In a further advantageous embodiment of the invention the indexing means of the tube consist of two inwards-facing dimple-like structures, with a distance such that they may be straddled by two consecutive ribs on the insert (1), while one of said grooves is disposed between said dimple-like structures. Dimples would be simply formed by pressing radially inwards in a tubular material that is otherwise smooth, apart from the grooves.

[0009] In further advantageous embodiments either the ribs or the grooves define a slightly conical surface. This enables a simpler evaluation of the insertion and extraction force to be expected, because the axial penetration without appreciable force will be to a depth that is dependent on the tightness of the fit. If the fit is too tight, then it is easy to retract the insert before it is caught and perform the angular displacement to the grooves. The conical surfaces provide a wedge-like effect.

[0010] It is also desired to protect a use of the mechanical connection by providing a sequence of operations such as that given in claim 7.

[0011] The invention will be further described with reference to the drawings, in which

Fig. 1 shows one type of engagement between insert and tube in cross section,

Fig. 2 shows an enlargement of part of the cross section shown in Fig. 1

Fig. 3 shows the alternative type of engagement between insert and tube in cross section,

Fig. 4 shows an enlargement of part of the cross section shown in Fig. 3, and

Fig. 5 shows a cross section of a groove in still greater enlargement.

[0012] In Fig. 1 is shown an insert 1 inside a roller blind tube 2. The insert is made in a plastic material and the roller blind tube is extruded in an aluminium alloy. It is seen that the insert 1 is provided with a number of ribs 3 that center the insert inside the tube 2 at the radius R and create friction to the inside surface of the tube, i.e. they provide the retaining force against being pulled out. In Fig. 2 is seen an enlargement of this fitting of the insert inside the tube, and the ribs 3' and 3" are shown straddling a structure 2', 2" formed on the inside of the tube. This structure is a set of longitudinal ribs that between them define a space 2s. From inspecting Figs. 1 and 2 it is not possible to determine the strength of the joint between the insert 1 and the tube 2, but it has to be sufficient to prevent falling or even simple pulling out of the insert 1. Rotation is prevented by the engagement beetween the external ribs 3', 3" and the internal ribs 2', 2". In case the outside diameter of the circle defined by the external ribs 3', 3" is too large, the insert 1 cannot be pushed all the way into the tube 2, and this means that the roller blind assembly becomes too long, although the friction force criterion is satisfied.

[0013] Fig. 3 shows how a greater clearance between the insert 1 and the roller blind tube 2 is obtained, but it is more clearly shown in Fig. 4. The inside of the roller blind tube has been provided with longitudinal grooves 4 that locally increase the inside radius of the roller blind tube to R' at angular intervals that correspond to the angular distance between the external ribs 3 on the insert 1. In order to make use of this larger radius, the insert is rotated a half division with respect to the situation described above, so that the rib 3" now engages the space 2s between the ribs 2', 2". The local radius R' also applies to this space 2s. For clarity it is shown that the ribs 3 do not reach the bottom of the grooves 4, which in practice would lead the operator to prefer the previous situation.

[0014] In Fig. 5 is shown an even greater enlargement in order to illustrate the two radii obtained in the same roller blind tube 2. The provision of the choice of two radii is not necessary along the whole length of the roller blind tube, but only near one or both ends. For this reason the grooves may not need to be created by extrusion, but they may be made by other methods known in the trade, such as by a reaming or milling process near the ends. The internal rib structure 2', 2" also does not need to extend the whole length of the tube, because the purpose is a locking against rotation. That may be obtained by the provision of a dimple-like structure near one or both ends of the roller blind tube.

[0015] In practice, it may occur that the experienced operator will begin assembly by trying out the configuration shown in Figs. 3 and 4. If this provides a fit that is too loose, he withdraws the insert 1 from the opening of the roller blind tube 2, rotates it so that two of the external ribs straddle the structure 2', 2" and inserts it agan, pushing it home against a force that is satisfactory.

[0016] Summing up, the end of a roller blind tube has an insert with a bearing arbor. The diameter tolerances on roller blind tubes and inserts are such that the operator meets very variable forces in pressing it in. According to the invention there may be provided a choice of diameters by providing the insert with longitudinal ribs that cooperate either with the original inside surface of the roller blind tube, which is normal, or with longitudinal grooves having slightly increased radius with respect to the axis of the roller blind tube.

Claims

1. A mechanical connection between a bearing insert (1) and a roller blind tube (2) in a roller blind, wherein the insert (1) is provided with angularly disposed radial and longitudinal ribs (3,3', 3"), and wherein the inner surface of the roller blind tube (2) is provided with longitudinal grooves (4) at an angular spacing that is identical to the angular spacing of said ribs (3,3', 3"), **characterized in that** the longitudinal grooves (4) have a slightly increased radius with respect to the axis of the roller blind tube, thus providing a choice of diameters wherein, depending on the diameter tolerances on the roller blind tube (2) and insert (1), the ribs (3, 3', 3") on the insert (1) can frictionally cooperate either with the original inside surface of the roller blind tube or with said grooves (4).

2. A mechanical connection according to claim 1, **characterized i n** that the insert (1) as well as the inside of the tube (2) are provided with indexing means (2', 2"; 3', 3") that ensure that either the inside cylindrical surface of the tube or the bottom of the longitudinal grooves (4) are reliably engaged by the ribs (3, 3', 3").

3. A mechanical connection according to claim 2, **characterized in that** said indexing means of the tube consist of at least one pair of internal longitudinal ribs (2', 2") in the tube, with a distance such that they may be straddled by two consecutive ribs (3', 3") on the insert (1), while one of said grooves is disposed in the bottom of the space (2s) between said ribs.

4. A mechanical connection according to claim 2, **characterized in that** said indexing means of the tube

consist of two inwards-facing dimple-like structures, with a distance such that they may be straddled by two consecutive ribs (3', 3") on the insert (1), while one of said grooves is disposed between said dimple-like structures.

5. A mechanical connection according to claim **1,characterized in that** the ribs on the insert define a slightly conical surface, with the smallest diameter to be inserted first.

6. A mechanical connection according to claim 1, **characterized in that** the grooves (4), at least along a length of inside roller blind tube that corresponds to the longitudinal extension of the insert (1), define a slightly conical surface with an apex inside the roller blind tube.

7. A use of a mechanical connection according to claim 2, **characterized in that** in a first step of installation the insert (1) is set to register with a rib (3") opposite the space (2s) between two consecutive ribs (2', 2") and is pushed axially into the tube (2) until it is held by friction and at the predetermined axial position inside the tube (2),
failing which,
in a second step of installation the insert (1) is again retracted, and
in a third step of installation, it is rotated to register with a pair of ribs (3', 3") straddling the ribs (2', 2") enclosing said space (2s) and is pushed axially into the tube (2) against increasing friction until the insert (1) is at the predetermined axial position inside the tube (2).

Patentansprüche

1. Mechanische Verbindung zwischen einem Lagereinsatz (1) und einem Rollladenrohr (2) in einem Rollladen, wobei der Einsatz (1) mit winklig angeordneten radialen und longitudinalen Rippen (3, 3', 3") versehen ist, und wobei die innere Fläche des Rollladenrohrs (2) mit Längsnuten (4) in einem Winkelabstand versehen ist, der identisch zu dem Winkelabstand der Rippen (3, 3', 3") ist,
dadurch gekennzeichnet, dass
die Längsnuten (4) einen bezüglich der Achse des Rollladenrohrs leicht vergrößerten Radius aufweisen, wodurch eine Auswahl von Durchmessern bereitgestellt wird, wobei die Rippen (3, 3', 3") an dem Einsatz (1) in Abhängigkeit von den Durchmessertoleranzen an dem Rollladenrohr (2) und dem Einsatz (1), entweder mit der ursprünglichen inneren Fläche des Rollladenrohrs oder mit den Nuten (4) reibschlüssig zusammenwirken können.

2. Mechanische Verbindung nach Anspruch 1, **dadurch gekennzeichnet, dass**
der Einsatz (1) wie auch das Innere des Rohrs (2) mit Ausrichtmitteln (2', 2", 3', 3") versehen sind, die sicherstellen, dass entweder die innere zylindrische Fläche des Rohrs oder der Boden der Längsnuten (4) zuverlässig mit den Rippen (3, 3', 3") in Eingriff kommt.

3. Mechanische Verbindung nach Anspruch 2, **dadurch gekennzeichnet, dass**
die Ausrichtmittel des Rohrs aus zumindest einem Paar innerer Längsrippen (2', 2") in dem Rohr mit einem Abstand, sodass zwei aufeinander folgende Rippen (3', 3") an dem Einsatz (1) beidseits von ihnen liegen, bestehen, wobei eine der Nuten in dem Boden des Raumes (2s) zwischen den Rippen angeordnet ist.

4. Mechanische Verbindung nach Anspruch 2, **dadurch gekennzeichnet, dass**
die Ausrichtmittel des Rohrs aus zwei nach innen gerichteten muldenartigen Strukturen mit einem Abstand, sodass zwei aufeinander folgende Rippen (3', 3") an dem Einsatz (1) beidseits von ihnen liegen, bestehen, wobei eine der Nuten zwischen den muldenartigen Strukturen angeordnet ist.

5. Mechanische Verbindung nach Anspruch 1, **dadurch gekennzeichnet, dass**
die Rippen an dem Einsatz eine leicht kegelige Fläche definieren, wobei der kleinste Durchmesser zuerst einzubringen ist.

6. Mechanische Verbindung nach Anspruch 1, **dadurch gekennzeichnet, dass**
die Nuten (4) zumindest entlang einer Länge im Inneren des Rollladenrohrs, die der Längsausdehnung des Einsatzes (1) entspricht, eine leicht kegelige Fläche mit einem Scheitelpunkt innerhalb des Rollladenrohrs definieren.

7. Verwendung einer mechanischen Verbindung nach Anspruch 2, **dadurch gekennzeichnet, dass**
in einem ersten Installationsschritt, der Einsatz (1) zu einer Rippe (3") gegenüber dem Raum (2s) zwischen zwei aufeinanderfolgenden Rippen (2', 2") ausgerichtet und axial in das Rohr (2) gedrückt wird, bis er durch Reibung und an der vorbestimmten axialen Position innerhalb des Rohrs (2) gehalten wird, andernfalls,
in einem zweiten Installationsschritt der Einsatz (1) wieder zurückgezogen wird, und
er in einem dritten Installationsschritt gedreht wird, um zu einem Paar von Rippen (3', 3 ") ausgerichtet zu werden, welche beidseits der Rippen (2', 2"), die den Raum (2s) umschließen, liegen und gegen eine zunehmende Reibung axial in das Rohr (2) gedrückt wird, bis der Einsatz (1) an der vorbestimmten axi-

alen Position innerhalb des Rohrs (2) ist.

Revendications

1. Liaison mécanique entre un insert de support (1) et un tube de store à enrouleur (2) dans un store à enrouleur, dans laquelle l'insert (1) est pourvu de nervures (3, 3', 3") longitudinales et radiales, disposées angulairement, et dans laquelle la surface intérieure du tube de store à enrouleur (2) est pourvue de rainures (4) longitudinales à un espacement angulaire qui est identique à l'espacement angulaire desdites nervures (3, 3', 3"), **caractérisée en ce que** les rainures (4) longitudinales ont un rayon légèrement augmenté par rapport à l'axe du tube de store à enrouleur , fournissant ainsi un choix de diamètres dans laquelle, en fonction des tolérances de diamètre du tube de store à enrouleur (2) et de l'insert (1), les nervures (3, 3', 3") sur l'insert (1) peuvent coopérer par frottement soit avec la surface intérieure originale du tube de store à enrouleur ou avec lesdites rainures (4).

2. Liaison mécanique selon la revendication 1, **caractérisée en ce que** l'insert (1) ainsi que l'intérieur du tube (2) sont munis de moyens d'indexation (2', 2"; 3', 3") qui assurent que soit la surface cylindrique intérieure du tube ou le fond des rainures (4) longitudinales sont en prise de manière fiable avec les nervures (3, 3', 3").

3. Liaison mécanique selon la revendication 2, **caractérisée en ce que** lesdits moyens d'indexation du tube consistent en au moins une paire de nervures longitudinales intérieures (2', 2") dans le tube, avec une distance telle qu'elle peuvent être chevauchées par deux nervures consécutives (3', 3") sur l'insert (1), alors qu'une desdites rainures est disposée dans le fond de l'espace (2s) entre lesdites nervures.

4. Liaison mécanique selon la revendication 2, **caractérisée en ce que** lesdits moyens d'indexation du tube consistent en deux structures en forme de bosse tournées vers l'intérieur, avec une distance telle qu'elle peuvent être chevauchées par deux nervures consécutives (3', 3") sur l'insert (1), alors qu'une desdites rainures est disposée entre lesdites structures en forme de bosse.

5. Liaison mécanique selon la revendication 1, **caractérisée en ce que** les nervures sur l'insert définissent une surface légèrement conique, le diamètre le plus petit étant à insérer en premier.

6. Liaison mécanique selon la revendication 1, **caractérisée en ce que** les rainures (4), au moins le long d'un tronçon de tube de store à enrouleur intérieur qui correspond à l'extension longitudinale de l'insert (1), définissent une surface légèrement conique avec un sommet à l'intérieur du tube de store à enrouleur.

7. Utilisation d'une liaison mécanique selon la revendication 2, **caractérisée en ce que** dans une première étape d'installation l'insert (1) est positionné pour se présenter avec une rainure (3") en face de l'espace (2s) entre deux rainures consécutives (2', 2") et est poussé axialement dans le tube (2) jusqu'à ce qu'il soit maintenu par frottement et dans la position axiale prédéterminée à l'intérieur du tube (2), faute de quoi,
dans une seconde étape d'installation l'insert (1) est encore une fois rétracté, et
dans une troisième étape d'installation, il est tourné pour se présenter avec une paire de nervures (3', 3") chevauchant les rainures (2', 2") entourant ledit espace (2s) et est poussé axialement dans le tube (2) à l'encontre d'un frottement croissant jusqu'à ce que l'insert (1) soit dans la position axiale prédéterminée à l'intérieur du tube (2).

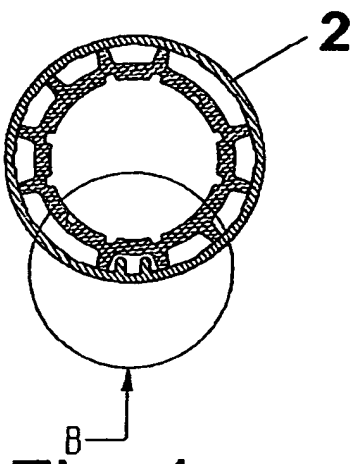


Fig. 1

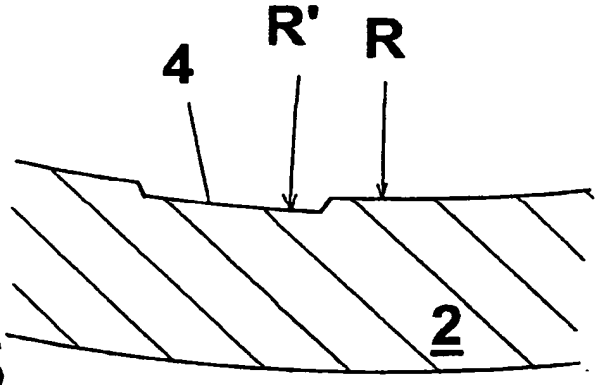


Fig. 5

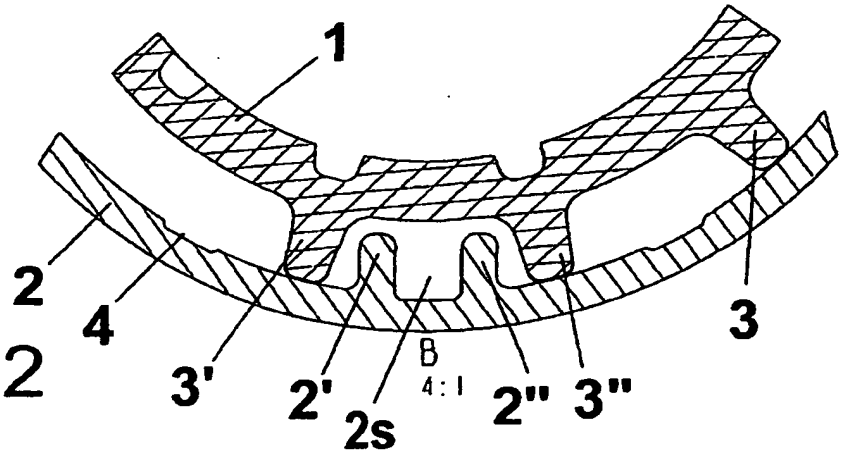


Fig. 2

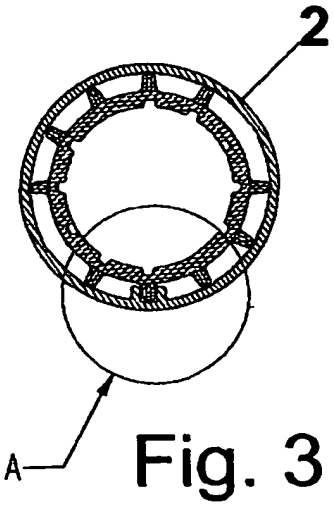


Fig. 3

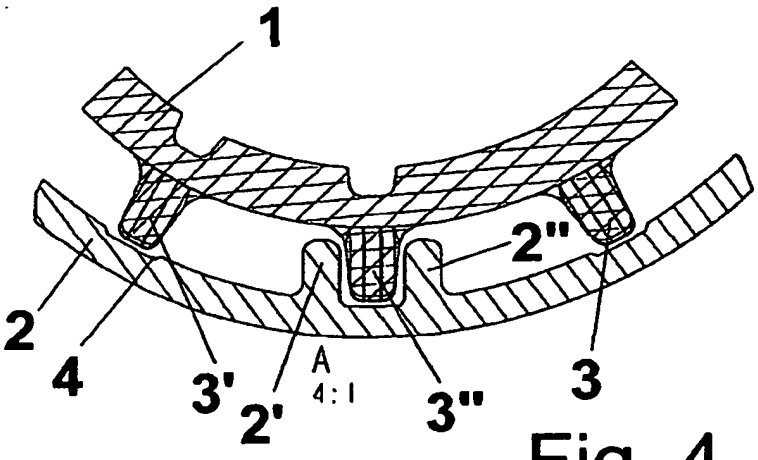


Fig. 4

REFERENCES CITED IN THE DESCRIPTION

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