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(54) **A SUSPENSION UNIT FOR VERTICAL SLAT BLINDS**

AUFHÄNGEVORRICHTUNG FÜR VORHANG AUS VERTIKALLAMELLEN

DISPOSITIF DE SUSPENSION POUR STORE A LAMELLES VERTICALES

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Description

[0001] The invention relates to a suspension for vertical slat blinds comprising trucks, an adjustment device common to the trucks, and elements which are adjustable therewith.

[0002] Vertical slats are used for slat blinds in that they are rotatably suspended at the upper end and possibly only loosely connected by means of strings or the like at the bottom. A slat may typically consist of an upper plastic rail in which a textile strip is wedged and a short rail as a weight at the lower end. The turning is performed by turning a nearly vertically disposed rotatable element in a small truck which serves as a bearing for the suspension and which may be moved sideways along suspension rails. In one main operating position the slats maintain such a distance along the window or other placement that they can overlap by turning one or the other way around a vertical axis (closing), and in the other operating position they are retracted, so that they take up minimum space in the light area of the window, when they are tightly drawn together perpendicular to the plane of the window. Turning may e.g. occur by transferring a rotation of a horizontally disposed shaft to the rotatably disposed element. Retraction occurs by pulling the outermost truck against its neighbour, upon which more and more trucks with slats are pulled to one side of the window or some other suitable parking position. Covering of the window occurs by removing the outermost truck from its neighbour. A type of truck which permits close retraction is described in DK Patent No. 143.516 in which a longitudinal rod with a spur wheel profile is used, but trucks may also be constructed with helical gears which drive vertical spur wheels.

[0003] The closest retraction is obtained when the trucks touch, and the thickness of the suspension of the slats correspond to this, but only when they are perpendicular to the plane of the window. In other angular positions the distance between the suspension points of the slats will be greater, because of the thickness of the suspension of the slats, and this means that the free area obtained in retraction will be reduced. It is regarded as a disadvantage that it is necessary to put the slats in the perpendicular position before retraction. Correspondingly singly-operated slat blinds are particular in that retraction does not occur before the movement has been used for turning to one or the other extreme position, i.e. the opposite of the perpendicular position required above. Hence there is in all cases a desire to obtain a close retraction from a position where the slats are closed by overlapping. If such a retraction is performed by means of known constructions, a considerably increased friction will occur, the consequence of which may be a breakdown of the mechanical parts. A possible solution to this problem is to limit the angular position in the truck, but this means on the other hand that complete closure is not obtained, neither when the curtain is pulled in front of the window or when partly

retracted.

[0004] GB 20 80 864A describes a suspension means for vertical slats wherein the slat holder of the suspension means is designed so as to prevent the unintentional springing out of the slats from the slat holder, and to guarantee a twist-proof orientation of the slats in the slat holder. This is obtained by means of the flat upper end of the suspension means which engages two spring tongues provided in the spur wheel. This is a construction which will definitely prevent springing out, but on the other hand it is difficult to disengage when it is needed.

[0005] It is the purpose of the invention to provide a solution to this problem which consists of the disadvantages of the prior art. This is obtained by a suspension unit which is particular in that elements are interposed between the adjustable element in each truck and each slat suspension, the elements comprising surfaces oriented such that deviations of the suspension from a position of rest with respect to an element occur against a restoring force.

[0006] The connection between an adjustable element of the truck and the suspension for the slat may consist of two parts with cooperating surfaces which are arranged such that a turning of the slat causes a lifting of the same above a position of rest. The position of rest is the position that the slat will take with respect to the rotatable part of the truck and is hence the lowest position of the slat, and thus the force of gravity is utilised for obtaining the position of rest.

[0007] The cooperating surfaces may consist of an essentially horizontal and cylindrical part of the truck in the form of a hook and two surfaces disposed in a horizontal hole in a carrier for the slat, in planes which in the assembled condition intersect vertically above the cylindrical part. Thus the position of rest is obtained when the two surfaces are tangential planes to the cylindrical part of the hook of the truck. Any turning of the slat suspension with respect to the hook will cause the suspension to lift, and hence the restoring force is obtained by means of the component of the force of gravity along the surface on either side of the hook.

[0008] The truck may carry an element with a given thickness and a horizontal hole, the lower part of which consists of two surfaces in planes which intersect vertically below the truck, for cooperating with a hook with a horizontal part which is fitted to the suspension of the slat. Any turning of the hook of the slat suspension with respect to the element on the truck will cause the hook to be lifted, and thus the restoring force is obtained by the component of the force of gravity along the surface on either side of the hook. This embodiment may best be described in that it comprises the same elements as above, only in the opposite order.

[0009] Further embodiments are advantageous in that a ring is used instead of a hook, and in that there is furthermore provided a slit in the surround of the hole so that the elements may be joined.

[0010] In a particularly advantageous embodiment of the invention the edge of the ring is wedge-shaped on the part which engages the slit in order to facilitate the opening of the slit, whereby the ring enters the hole.

[0011] An advantageous embodiment is particular in that the cylindrical part of the hook, respectively the ring, is slightly curved. Hereby an action similar to a universal joint is obtained for the transfer between the hook or the ring and the corresponding hole.

[0012] A further embodiment is particular in that the slat and its suspension are in one piece, and in that the horizontal hole is disposed in the slat itself.

[0013] The invention will be described in detail with reference to the drawing, in which

Fig. 1 shows the mechanical parts of a slat blind,

Fig. 2 shows a single truck with a hook and a slat suspension,

Fig. 3 shows a hook and the corresponding cog-wheel in enlargement,

Fig. 4 shows an enlarged representation of the engagement of hook and hole in the position of rest,

Fig. 5 shows a corresponding enlarged representation of the engagement when the slat suspension is turned with respect to the hook,

Fig. 6 shows a ring at the lower part of a truck,

Fig. 7 shows a slat suspension with a hole and slit, and

Fig. 8 shows a particular disposition of a ring.

[0014] Fig. 1 is an isometric representation of the complete mechanical part of a slat blind according to the invention, albeit in a shortened version, in that the horizontal shaft 1 is very short, and only four trucks 2a, 2b, 2c, 2d are shown, each being fitted with two wheels, where the wheel 3a has been identified on the drawing. The wheels carry the trucks and are able to roll on tracks or rails which are not shown. The horizontal shaft 1 is carried in bearings at both ends 4 and 5 and has a drive, which is not shown, at one end 4, in order that it can rotate one way or the other. In the present embodiment the whole shaft is shaped as a very long spur wheel. The rotation of the shaft is transferred to gear rims built into the trucks. The trucks may be moved sideways along the shaft 1 by means of a cord drive which attaches to each of the trucks 2a, 2b, 2c, 2d. Each truck has a slat suspension 6a, 6b, 6c, 6d associated with it.

[0015] In Fig. 2 is shown a single truck in isometric representation in a direction towards the end of the end part 5 of the slat blind. Hereby the individual components are clearly visible, e.g. the hole 1a in the truck

through which the shaft 1 passes and the gear rim T which is turned when the shaft 1 turns. The hook 8a is firmly connected. The invention relates in particular to the cooperation between the hook 8a of the truck and the suspension hole 7a on the slat suspension 6a.

[0016] In Fig. 3 is shown the rotatable element in the truck. It consists essentially of the gear rim, i.e. a part of a gear wheel T, a rotatably supported part B and a hook 8a. The "ideal" retraction of the slat blind leaves all hooks oriented in a plane which also comprises the shaft/spur wheel 1 (as shown in Fig. 1) which also is the centre position of the gear rim T. However, the retraction of the slat blind, at least in the case of a singly-operated slat blind, will always take place with all hooks having the same angular position to one or the other side. This does not prevent all the trucks 2a, 2b, 2c, 2d from being very close after all.

[0017] In Fig. 4 is seen a section through the engagement between the suspension hole 7a and the hook 8a in the "ideal" retracted position. Sections in the plane of the hook and perpendicular thereto are shown. The suspension hole is disposed as two slanted surfaces R1 and R2 which are joined at the top by a cylindrical piece which has the same radius as the material of the hook. In Fig. 5 is shown corresponding sections in the engagement in the case that the slat suspension and hence the slat are turned with respect to the hook in the "ideal" case. Thereby the surfaces R1 and R2 are lifted on the hook until the bottom part of the hole abuts the lower side of the hook 8a. The far end of the hook will still ensure that the slat suspension 6a is not separated from the hook.

[0018] An action corresponding the one described above may be obtained in that the joint between the hook 8a and the gear rim T is made resilient but with a clear centre position, so that the turning of the slat does not occur at the suspension hole 7a and the hook 8a but instead in the rotatable element in the truck, e.g. as shown at the hub H in Fig. 3.

[0019] In Fig. 6 a truck such as in Fig. 2 from below and supplied with a ring 8' in stead of a hook. The ring has a cylindrical or weakly toroidal surface on the inside of the downward facing part of the ring corresponding to the hook 8a, and on the outside a wedge shape W, in order that the ring has an edge facing downwards.

[0020] In Fig. 7 is shown a slat suspension 6a with a hole 7' which, however, has a slit S in its upper part. This slit is disposed at an angle, whereby two advantages are obtained in cooperation with the wedge W on the ring 8' which is to engage the hole 7'. The advantages consist in that there is an overlapping of the two parts of the edge of the hole which is to be carried by the ring, and that these parts are bent sideways during assembly. Hence the wedge W does not need to overcome a large force, and a permanent deformation of the two parts separated by the slit S is avoided.

[0021] In Fig. 8 is shown a particular embodiment of the wedge W, in that its edge is shaped like a sickle in

order that its ability to create a passage for the ring 8' through the slit S to the inside of the hole 7' is enhanced.

Claims

1. A suspension unit for vertical slat blinds comprising slat suspensions (6a, 6b, 6c, 6d), trucks (2a, 2b, 2c, 2d), an adjustment device (1) common to the trucks, and elements (T, B) which are adjustable therewith, **characterised in that** elements are interposed between the adjustable element (T, B) in each truck and each slat suspension, the elements comprising surfaces oriented such that deviations of a slat suspension (6a, 6b, 6c, 6d) from a position of rest with respect to an adjustable element (T, B) occur against a restoring force.
2. A suspension unit according to claim 1, **characterised in that** the connection between an adjustable element (T, B) in each truck (2a, 2b, 2c, 2d) and the slat suspension (6a, 6b, 6c, 6d) for the slat consists of two parts (8a, 7a; 8b, 7b; 8c, 7c; 8d, 7d) with cooperating surfaces (R1, R2) which are arranged such that a turning of a slat causes a lifting of the same above a position of rest.
3. A suspension unit according to claim 2, **characterised in that** the cooperating surfaces consist of an essentially horizontal and cylindrical part of each truck in the form of a hook (8a) and two surfaces (R1, R2) disposed in a horizontal hole (7a) in each slat suspension for the slat, in planes which in the assembled condition intersect vertically above the cylindrical part.
4. A suspension unit according to claim 2, **characterised in that** the cooperating surfaces consist of an essentially horizontal and cylindrical part of each truck in the form of a ring (8') and two surfaces (R1, R2) disposed in a horizontal hole (7') in each slat suspension, in planes which in the assembled condition intersect vertically above the cylindrical part, the upper edge of the horizontal hole (7') being provided with a slit (S), preferably, in a slanted direction for introducing the ring (8') into the hole (7').
5. A suspension unit according to claim 1, **characterised in that** each truck (2a, 2b, 2c, 2d) carries an element with a given thickness and a horizontal hole (7'), the lower part of which consists of two surfaces in planes which intersect vertically below each truck, for cooperating with a ring (8') fitted to the slat suspension (6a, 6b, 6c, 6d), with a horizontal part having a cylindrical surface facing downwards, the lower edge of the horizontal hole being supplied with a slit (S) in a preferably slanted direction for introducing the ring (8') into the hole (7').

6. A suspension unit according to claim 5, **characterised in that** the outside of that part of the ring (8') which suspends the slat is wedge shaped (W) for cooperating with the slit (S) during the introduction of the ring (8') into the hole (7').
7. A suspension unit according to claim 1, **characterised in that** that each truck carries an element with a given thickness and a horizontal hole (7a), the lower part of which consists of two surfaces in planes which intersect vertically below the truck, for cooperating with a hook (8a) with a horizontal part fitted to each slat suspension (6a, 6b, 6c, 6d).
8. A suspension unit according to claim 3 or 4, **characterised in that** the cylindrical part of the hook (8a) or the ring (8') respectively is weakly curved and thereby approximates a part of a torus.
9. A suspension unit according to claim 3, **characterised in that** a slat may be in one piece with the slat suspension, the horizontal hole (7a, 7') being disposed in the slat itself.

Patentansprüche

1. Aufhängevorrichtung für Vorhang aus Vertikallamellen, umfassend Lamellenträger (6a, 6b, 6c, 6d), Laufkatzen (2a, 2b, 2c, 2d), eine Einstellvorrichtung (1) für alle Laufkatzen gemeinsam, und Bauelemente (T, B), die damit einstellbar sind, **dadurch gekennzeichnet, dass** Bauteile zwischen den einstellbaren Bauelementen (T, B) in jeder Laufkatze und jeden Lamellenträger eingeschaltet sind, dass die Bauteile Oberflächen umfassen, die so gerichtet sind, dass Abweichungen eines Lamellenträgers (6a, 6b, 6c, 6d) aus einer Ruhestellung mit Bezug auf einem einstellbaren Bauelement (T, B) gegen einen Rückstellkraft statt finden.
2. Aufhängevorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Verbindung zwischen einem einstellbaren Bauelement (T, B) in jeder Laufkatze (2a, 2b, 2c, 2d) und dem Lamellenträger (6a, 6b, 6c, 6d) aus zwei Teilen (8a, 7a; 8b, 7b; 8c, 7c; 8d, 7d) mit zusammenwirkenden Flächen (R1, R2) besteht, die so angeordnet sind, dass eine Drehung einer Lamelle ein Heben derselben in Verhältnis zu einer Ruhestellung verursacht.
3. Aufhängevorrichtung nach Anspruch 2, **dadurch gekennzeichnet, dass** die zusammenwirkenden Flächen aus einer im wesentlichen waagerechten, zylindrischen und hakenförmigen (8a) Teil von jeder Laufkatze und zwei Flächen (R1, R2) bestehen, die in einem waagerechten Loch (7a) in jedem Lamellenträger angebracht sind, in Ebenen, die sich

in der zusammengebauten Zustand senkrecht oberhalb den zylindrischen Teil schneiden.

rechte Loch (7a, 7') in der Lamelle selbst angeordnet ist.

4. Aufhängevorrichtung nach Anspruch 2, **dadurch gekennzeichnet, dass** die zusammenwirkenden Flächen aus einer im wesentlichen waagerechten, zylindrischen und ringförmigen (8') Teil von jeder Laufkatze und zwei Flächen (R1, R2) bestehen, die in einem waagerechten Loch (7') in jedem Lamellenträger angebracht sind, in Ebenen, die sich in der zusammengebauten Zustand senkrecht oberhalb den zylindrischen Teil schneiden, worin die obere Kante des waagerechten Loches (7') mit einem vorzugsweise schräg gerichteten Schlitz (S) versehen ist, um die Einführung des Rings (8') in dem Loch (7') zu ermöglichen.

5. Aufhängevorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** jede Laufkatze (2a, 2b, 2c, 2d) ein Element trägt mit einer vorgegebenen Dicke und einen waagerechten Loch (7'), deren unteren Teil aus zwei Flächen besteht, in Ebenen, die sich lotrecht unter jeder Laufkatze schneiden, um zusammenwirken mit einem Ring (8') an den Lamellenträger (6a, 6b, 6c, 6d), mit einem waagerechten Teil, den eine nach unten gerichtete zylindrische Oberfläche ausweist, worin die untere Kante des waagerechten Loches mit einem vorzugsweise schräg gerichteten Schlitz (S) versehen ist, um die Einführung des Rings (8') in dem Loch (7') zu ermöglichen.

6. Aufhängevorrichtung nach Anspruch 5, **dadurch gekennzeichnet, dass** die Aussenseite des Teils des Rings (8'), den die Lamelle trägt, keilenförmig (W) gestaltet ist, um mit dem Schlitz (S) während der Einführung des Rings (8') im Loch (7') zusammenzuwirken.

7. Aufhängevorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** jede Laufkatze ein Element trägt mit einer vorgegebenen Dicke und einen waagerechten Loch (7a), deren unteren Teil aus zwei Flächen besteht, in Ebenen, die sich lotrecht unter jeder Laufkatze schneiden, um zusammenwirken mit einem Haken (8a), mit einem waagerechten Teil an jeden Lamellenträger (6a, 6b, 6c, 6d) verbunden.

8. Aufhängevorrichtung nach den Ansprüchen 3 oder 4, **dadurch gekennzeichnet, dass** der zylindrische Teil des Hakens (8a), beziehungsweise des Rings (8') schwach gekrümmt ist, und dadurch einen teilweisen toroidalen Form annähert.

9. Aufhängevorrichtung nach Anspruch 3, **dadurch gekennzeichnet, dass** eine Lamelle einstückig mit den Lamellenträger sein kann, wobei das waage-

5 Revendications

1. Dispositif de suspension pour store a lames verticales, comprenant des supports des lames (6a, 6b, 6c, 6d), des chariots (2a, 2b, 2c, 2d), un dispositif de réglage pour tous les chariots, et des éléments (T, B) réglé par le dispositif, **caractérisé en ce que** des éléments sont interposés entre l'élément réglable (T, B) dans chaque chariot et chaque support de lame, les éléments comprenant des surfaces orientées tels que les déviations d'un support de lame (6a, 6b, 6c, 6d) d'une position de repos en ce concerne un élément réglable (T, B) ont lieu contre une force de restauration.

2. Dispositif selon la revendication 1, **caractérisé en ce que** le raccord entre un élément réglable (T, B) dans chaque chariot (2a, 2b, 2c, 2d) et le support de lame (6a, 6b, 6c, 6d) pour la lame consiste de deux parts (8a, 7a; 8b, 7b; 8c, 7c; 8d, 7d) avec des surfaces (R1, R2) coopérant tels qu'une rotation d'une lame cause une élévation du lame au dessus d'une position de repos.

3. Dispositif selon la revendication 2, **caractérisé en ce que** les surfaces coopérants consistent d'une partie du chaque chariot essentiellement horizontale et cylindrique en forme de crochet (8a) et deux surfaces (R1, R2) dans un trou horizontale (7a) dans chaque support de lame, dans deux plans qui s'intersectent verticalement au dessus de la partie cylindrique.

4. Dispositif selon la revendication 2, **caractérisé en ce que** les surfaces coopérants consistent d'une partie du chaque chariot essentiellement horizontale et cylindrique en forme d'anneau (8') et deux surfaces (R1, R2) dans un trou horizontale (7') dans chaque support de lame, dans des plans qui s'intersectent verticalement au dessus de la partie cylindrique, l'arête supérieur du trou horizontal (7') étant fournis d'une entaille (S), préféablement dans une direction oblique, pour introduire l'anneau (8') dans le trou (7').

5. Dispositif selon la revendication 1, **caractérisé en ce que** chaque chariot (2a, 2b, 2c, 2d) porte un élément d'une épaisseur prévue et un trou horizontal (7'), la partie inférieure duquel consiste en deux surfaces dans des plans qui s'intersectent verticalement au dessous de chaque chariot, pour coopérer avec un anneau (8') joint au support de lame (6a, 6b, 6c, 6d), avec une partie horizontale possédant une surface cylindrique dirigé vers le bas, l'arête in-

férier du trou horizontale étant fournis d'une entaille (S), préférablement dans une direction oblique, pour introduire l'anneau (8') dans le trou (7').

6. Dispositif selon la revendication 5, **caractérisé en ce que** la partie extérieure du anneau (8'), qui porte la lame, est en forme de cale (W) pour coopérer avec l'entaille (S) pendant l'introduction de l'anneau (8') dans le trou (7'). 5
7. Dispositif selon la revendication 1, **caractérisé en ce que** chaque chariot porte un élément d'une épaisseur prévue et un trou horizontal (7a), la partie inférieure duquel consiste en deux surfaces dans des plans qui s'intersectent verticalement au dessous du chariot, pour coopérer avec un crochet (8a) avec une partie horizontale jointe à chaque support de lame (6a, 6b, 6c, 6d). 10 15
8. Dispositif selon les revendications 3 ou 4, **caractérisé en ce que** la partie cylindrique du crochet (8a) ou anneau (8'), respectivement est légèrement courbé, ainsi approximant une partie d'une tore. 20
9. Dispositif selon la revendication 3, **caractérisé en ce qu'une** lame peut être d'une seule pièce avec le support de lame, le trou horizontal (7a, 7') étant réalisé dans la lame propre. 25

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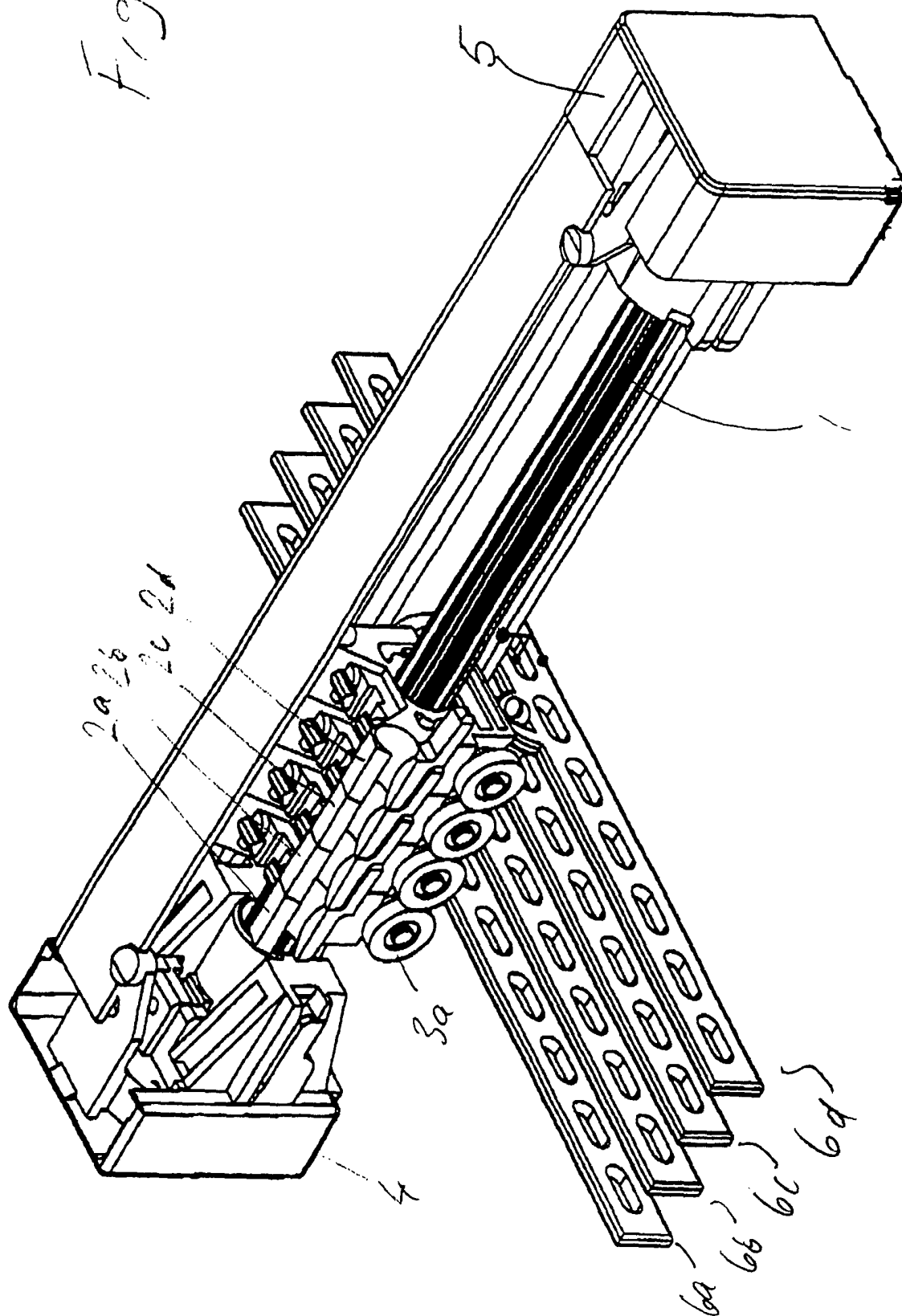
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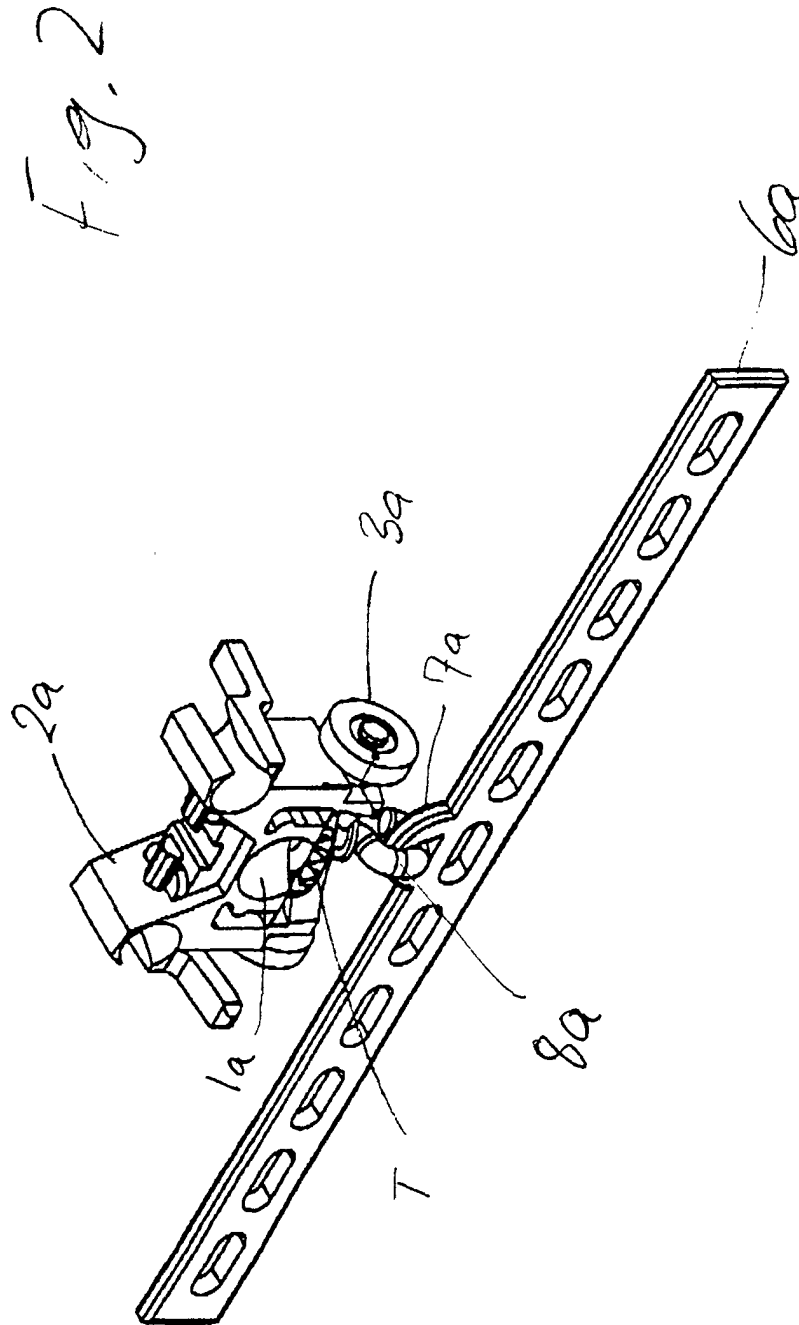
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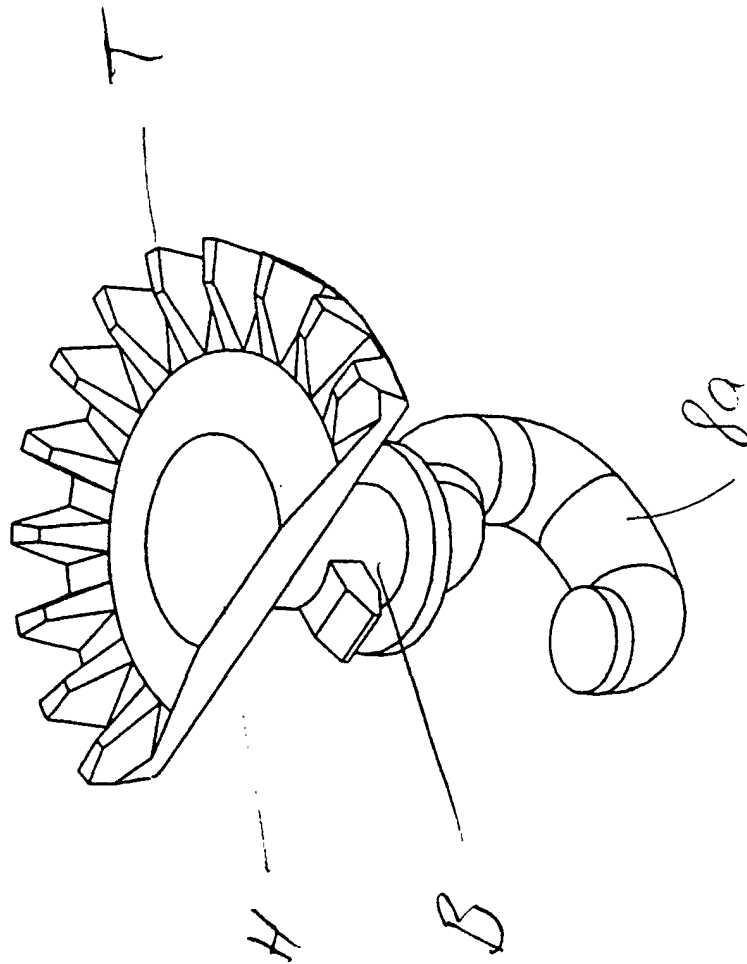


Fig. 3

Fig. 4

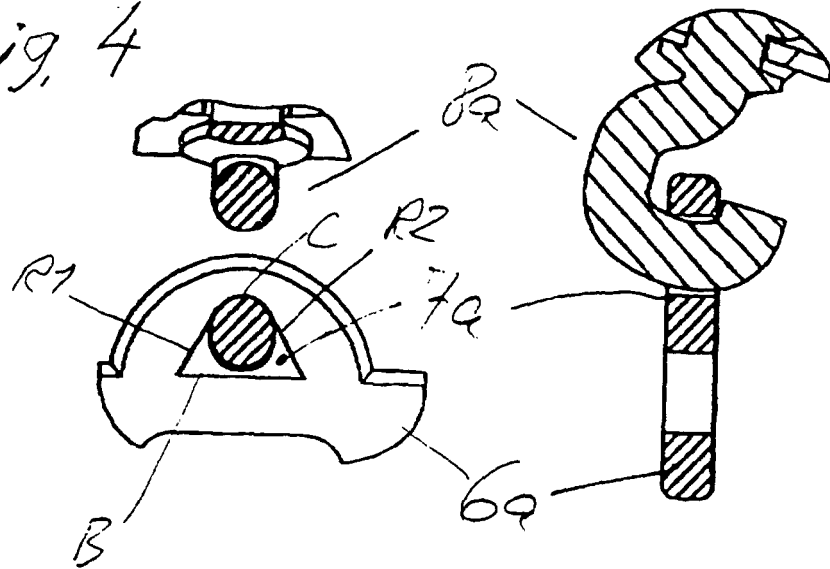


Fig. 5

