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DEVICE FOR SLIDABLY SUPPORTING CURTAINS AND THE LIKE

Filed April 4, 1960

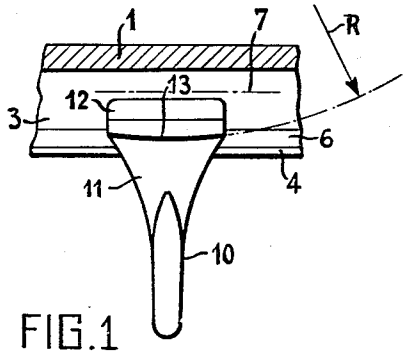


FIG.1

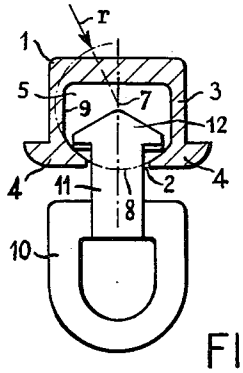


FIG.2

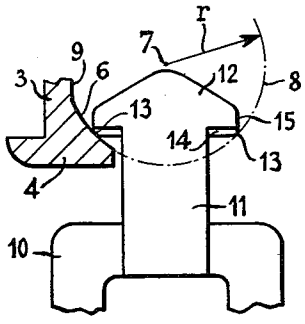


FIG.3

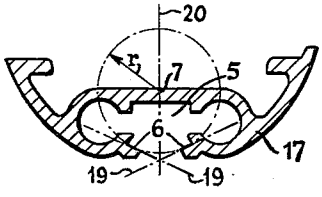


FIG.4

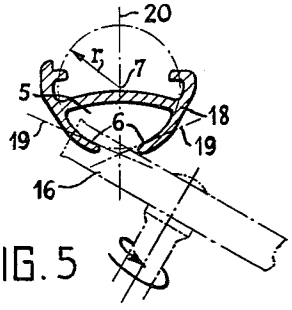


FIG.5

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DEVICE FOR SLIDABLY SUPPORTING CURTAINS AND THE LIKE

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The present invention relates to a device for slidably supporting curtains and the like.

More particularly, the present invention relates to that type of device which comprises an extruded inside runway rail wherein glide members of synthetic-plastic material are movably engaged for slidably supporting a curtain or the like.

Under certain premises it seems to be possible to provide curtain supporting devices the extruded inside runway rails of which can be mounted in sound absorbing grooves of sound proof slabs, if the rail profile is adjusted to the leading dimensions of the cross section of the sound absorbing grooves, whereat the rail may project from the face of the slab only with groove covering flanges. Usually the grooves of standard slabs are about 5/16 inch wide and 1/4 inch deep and give thus he admissible size of the profile of the inside runway rail.

Inside runway rails with such small cross section have consequently extremely narrow slide ways for the glide members, in most cases less than 1/16 inch. Therefore, the specific pressure of the glide members on the slide area of the rail becomes relatively high.

On account of this fact it is an object of the present invention to provide the shape of the sliding areas of both the rail and the glide members in such a manner and in conformity with the materials employed that a smooth and silent run of the glide members in the extruded inside runway rail is guaranteed.

Almost noiseless running suspension equipments for curtains are known. They comprise a metal rail and glide members of polyamide, for instance nylon, Grilon and other synthetic-plastics. Experiments brought out that glide members which remain stationary under the load of the curtain for days, become deformed in the bearing area contacting the rail runway. These deformations increase until the corpuscular tension of the polyamide molecules is in equilibrium with the local load. Inasmuch as the glide members do not always take the same position relative to the slide ways of the rail, the primary completely uniform slip surface of the glide members becomes subdivided by irregularly distributed and differently inclined deformation faces which are of only microscopical size, but cause a cricketlike noise when the curtain is drawn, mainly due to the rolling tendency of the glide members having a fairly great lateral clearance in the rail slot. Even when drawing the curtain with normal speed the cricketlike noise is intolerable in hospitals, surgeries, theaters, cinemas and private rooms. Experiments however cleared up that a glide member with an allround homogeneous contact surface practically cannot produce any noise during the whole slipping movement.

Other experiments have clarified the deformability of

the bearing areas of polyamide bodies in contact with a harder counterface. It could be observed that a dead load corresponding to the weight of a curtain exerted on a rectangular polyamide edge by a metal surface of a "sugar-finish" quality causes in a few hours a certain flattening of the edge. Evidently, the flattening will be broader with a greater load. It could be observed that the flattened area of the polyamide edge adopts the surface quality "super-finish" of the metal counterface and that the simultaneous molecular compression of the polyamide increases its wearability to a considerable extent.

Moreover, by accurate observation it has been found that on extruding metal rails, especially of aluminium, the formation of a so-called extrusion skin is created which is permeated by microscopically fine and hard grains protruding from the rail surface. If the bearing surface of the rail is not finished to a "super-finish" quality, it is possible, particularly due to the above mentioned deformation of the bearing area of polyamide glide members, that such grains of the extrusion skin are seized and sheared by glide members. The grains stick then very firmly to the polyamide body which has a high tensile strength, so that by drawing the curtain they begin to scrape and finally they ruin the smooth sliding surface of the rail runway.

From these experiments it has been concluded that extruded inside runway rails for slidably supporting curtains by means of glide members have to fulfill two conditions: The runway areas of the rail must be finished to a "super-finish" quality in order to remove completely the extrusion skin despite the possible smallness of the cross section of the rail and the profile of the rail must be of such shape that the rail portions carrying the inside runway are accessible through the rail slot for permitting the finishing of the runway surface, and that the deformation occurring on the glide members will create exclusively a homogeneous gliding surface of increased wearing resistance. It is an object of the present invention to provide the technical solution to this problem.

According to the invention the extruded inside runway rail has formed in the runway channel sliding areas or surfaces or strips which serve as support for the glide members and which are established on both sides of the rail slot as parts of a common dish-shaped or cylindrical form of the rail profile, in such a manner that these sliding areas have a slope towards the rail slot located at the base of the dish-shaped form. On these areas each glide member bears by means of linear narrow marginal parts of convex shape which extend in the longitudinal direction of the rails. Each glide member consists of a synthetic-plastic material having strengthening qualities obtainable by molecular compression and is thereby enabled to undergo a surface hardening and a uniform adjustment of its contact area to the sliding areas of the rail, transversely to the direction of sliding, through the action of the sliding contact pressure and sliding friction, with the result that the glide member, which is adapted to move transversely according to its clearance in the rail slot and to roll, is constantly acted upon by the effective static and motive forces on both sliding areas of the rail and runs therefore noiselessly.

The invention will become apparent from the following description of an embodiment taken in connection with the accompanying drawing, in which

FIG. 1 shows a longitudinal section through a portion of an inside runway rail with an inserted glide member,

FIG. 2 shows the cross section to FIG. 1,

FIG. 3 shows one marginal part of the rail cross section with an inside part of a glide member as seen in FIG. 2, on a larger scale, and

FIGS. 4 and 5 show two modifications of rail profiles for a draw cord curtain and a sling curtain, respectively.

The inside runway rail **1** according to FIGS. 1 and 2 is manufactured by extrusion of metal, for instance aluminum alloy, and has a longitudinal rail slot **2** defined by two opposed supporting flanges **4** projecting from the side walls **3** of the rail **1**. The areas **6** of the flanges **4** facing the runway channel **5** of the rail form strips of a common hollow cylindrical area **8** in such a manner that the geometrical axis **7** of the cylinder lies in the plane of symmetry of the rail slot **2**. Both cylindrical strips **6** have a slope towards the rail slot **2** and are at least as wide as the transversal clearance of the glide member **10** in the rail slot. These strips **6** of the supporting flanges **4** serve as rail sliding surfaces for the curtain glide members **10** and merge into the inner area **9** of the side walls **3** of the rail. The radius *r* of the hollow cylinder area **8** is preferably as great as the average distance between the median lines of both sliding surfaces **6** in order to render to about 30° the average angle of gradient between the sliding surfaces and the symmetry plane of the rail slot **2**. In this manner the sliding surfaces remain fairly well accessible for manufacturing control and for the finishing operation, for instance by means of rotating burnishing tools, thus permitting the attainment of a "super-finish" surface quality. An average angle of gradient of the sliding surfaces **6** from 20° to 50° is considered as an appropriate range.

The glide member **10**, manufactured of polyamide, traverses with its neck **11** the longitudinal rail slot **2** into the runway channel **5** of the rail **1** and has on the inside end of the neck a head **12** of a saddle roof shape. This head is provided with two linear narrow bearing portions **13** projecting laterally from the neck and extending in the longitudinal direction of the rail as longitudinal roof margins which have a convex-roundedged profile. The glide member **10** rests with these edges **13** on the sliding strips **6** of the rail **1** and has formed also in the longitudinal direction of the rail a slightly convex cyclic bend with a radius R which is a multiple of the radius *r* of the hollow cylinder area **8** in order to allow the glide member to tilt. The polyamide glide member inserted in the rail **1** is slowly cold deformed and adjusts to the shape of the hollow cylindrical area **8** of the supporting surfaces **6** of the rail through the action of the load provided by the curtain and through the sliding friction between the bearing projections **13** of the glide member and the supporting surfaces **6** of the rail, normally promoting a molecular compression of the synthetic-plastic material at the projections **13**, thereby effecting an age-hardening and an increase of the wearability of the bearing area.

Due to the slope of the sliding areas **6** towards the rail slot **2**, forces of reaction are originated in the glide member projections **13** when under load. These forces are directed perpendicularly to the bearing area into the body of the glide member **10** on the respective spots. When the glide member is slipping in the rail, it executes rolling, vibratory movements transversely to the rail slot and tilting motions longitudinally to the rail, thus promoting a certain widening or flattening of the convex-linear profiled gliding edges **13** along their whole length. This deformation process includes a slow accommodation to the hollow cylindrical curve of the supporting areas **6** of the rail **1**, together with an increase of the surface quality, until the strengthening reaches a point in which the molecular tension in the glide edges is in equilibrium with the deformation forces.

In unused condition of the glide member **10** the glide edges **13** are formed by two surfaces **14** and **15** preferably oriented perpendicularly. After being used the so formed edges move a little towards the neck **11** of the glide member and a narrow contacting area is formed by successive accommodation to the supporting area of the rail **1**.

The described arrangement of the sliding areas **6** inside of the supporting rail flanges **4** provides the possibility, if necessary, to finish at least these parts, and suitably the remaining parts of the inner surface **9** of the runway channel **5** too, in order to eliminate the extrusion skin. This may be done for example with rotary polishing brushes **16**, producing a "super-finish" surface quality. The sliding areas **6** of the rail may also be eloxidized, i.e., electrolytically oxidized, and, moreover, impregnated with silicon oil, besides the polishing thereof. The glide surfaces of the head projections undergo a completely steady rounding off as they conform to the highly polished hollow cylindrical sliding surfaces of the rail and the molecular strengthening by stationary and sliding contact with the inside runway of the rail yields a high wearability of the bearing edges of the glide members.

FIGS. 4 and 5 show the formation of hollow cylindrical sliding surfaces **6** on a rail profile of the draw cord type **17** and of a sling drapery type **18**, respectively. It is evident that these types too have a good accessibility for controls and eventual finishing operations by means of rotary burnishing tools **16**.

If curtain rails with an extremely reduced cross section are to be inserted into grooves of very small width, such as grooves of sound absorbing panels, the sliding surfaces of the rails are usually less than ⅛ inch wide and correspond therefore only approximately to the hollow cylindrical area **8**. In this case the two sliding areas of the rail may be by choice parts of the set of plane-pairs **19**, tangential to the hollow cylinder area, which lie symmetrically to the plane **20** determined by the cylinder axis **7** and the symmetry axis of the rail slot.

What I claim is:

1. A supporting assembly for curtains or the like, comprising, in combination, an elongated rail having a pair of substantially parallel wall portions spaced from each other and defining a longitudinal slot between themselves, said wall portions having next to said slot concave inner surfaces substantially forming part of a cylinder whose axis is on the same side of said wall portions as said concave surfaces, said cylinder axis extending substantially parallel to said slot; and at least one glide member having an intermediate neck portion extending with substantial clearance through said slot, having beyond said rail an outer portion connected to said neck portion, and having an inner portion extending across and beyond said slot and having in engagement with said inner surfaces on opposite sides of said slot, respectively, a pair of curved convex edge portions each of which extends substantially along a circle whose center is in an axis on the same side of said wall portions as said cylinder axis and extending substantially perpendicularly to said cylinder axis, whereby said glide member will have smooth, noiseless sliding contact with said rail irrespective of the direction of tilt of said glide member in relation to said rail.

2. The assembly according to claim 1 wherein said glide member consists of pressure deformable material and said rail, at least at said inner surfaces thereof which engage the edge portions of said glide member, consists of material that is non-deformable relative to said glide member, so that the edge portions of said glide member are compressed and surface-hardened by the sliding contact pressure and friction between said glide member and the inner surfaces of said rail when a curtain supported by said glide member is repeatedly opened and closed whereby said edge portions are conformed to the inner surfaces of said rail.

3. The assembly according to claim 2 wherein the radius of said circle along which said pair of curved convex edge

portions substantially extend is substantially greater than the radius of said part of a cylinder formed substantially by the concave inner surfaces of said rail wall portions.

4. The assembly according to claim 2 wherein said rail has a longitudinal plane of symmetry passing through said longitudinal slot, the axis of said part of the cylinder lying in said plane of symmetry.

5. The assembly according to claim 2, wherein said inner concave surfaces forming said part of a cylinder define longitudinally parallel rail strips one on each side of said slot, the radius of said cylinder part being substantially equal to the average distance between said strips.

6. The assembly according to claim 5 wherein the width of said rail strips is at least as great as the clearance of said glide member in said slot.

7. A supporting assembly for curtains or the like, comprising, in combination, an elongated rail having a pair of substantially parallel wall portions spaced from each other and defining a longitudinal slot between themselves, said wall portions having next to said slot concave inner surfaces substantially forming part of a cylinder whose axis is on the same side of said wall portions as said concave surfaces, said cylinder axis extending substantially parallel to said slot; and at least one glide member of polyamide composition having an intermediate neck portion extending with substantial clearance through said slot, having beyond said rail an outer portion integral with said neck portion, and having an inner portion extending across and beyond said slot and having in engagement with said inner surfaces on opposite sides of said slot, respectively, a pair of curved convex edge portions each of which extends substantially along a circle whose center is in an axis on the same side of said wall portions as said cylinder axis and extending substantially perpendicularly to said cylinder axis, whereby said glide member will have smooth, noiseless sliding contact with said rail irrespective of the direction of tilt of said glide member in relation to said rail.

8. A supporting assembly for curtains or the like, comprising, in combination, an elongated metal rail having a pair of substantially parallel wall portions spaced from each other and defining a longitudinal slot between themselves, said wall portions having next to said slot concave inner surfaces substantially forming part of a cylinder whose axis is on the same side of said wall portions as said concave surfaces, said cylinder axis extending substantially parallel to said slot; and at least one glide member of polyamide composition having an intermediate neck portion extending with substantial clearance through said slot, having beyond said rail an outer portion integral with said neck portion, and having an inner portion also integral with said neck portion extending across and beyond said slot and having in engagement with said inner surfaces on opposite sides of said slot, respectively, a pair of curved convex edge portions each of which extends substantially along a circle whose center is in an axis on the same side of said wall portions as said cylinder axis and extending substantially perpendicularly to said cylinder axis, whereby said glide member will have smooth, noiseless sliding contact with said rail irrespective of the direction of tilt of said glide member in relation to said rail.

9. A supporting assembly for curtains or the like, comprising, in combination, an elongated rail having a pair of substantially parallel wall portions spaced from each other and defining a longitudinal slot between themselves, said wall portions having next to said slot concave inner surfaces substantially forming part of a cylinder whose axis is on the same side of said wall portions as said concave surfaces, said cylinder axis extending substantially parallel to said slot; and at least one glide member having an intermediate neck portion extending with substantial clearance through said slot, each of said concave inner surfaces of said wall portions being at least as wide as the clearance of said neck portion of said glide member in said slot, having beyond said rail an outer portion connected to said neck portion, and having an inner portion extending across and beyond said slot and having in engagement with said inner surfaces on opposite sides of said slot, respectively, a pair of curved convex edge portions each of which extends substantially along a circle whose center is in an axis on the same side of said wall portions as said cylinder axis and extending substantially perpendicularly to said cylinder axis, whereby said glide member will have smooth, noiseless sliding contact with said rail irrespective of the direction of tilt of said glide member in relation to said rail.

10. A supporting assembly for curtains or the like, comprising, in combination, an elongated rail having a pair of substantially parallel wall portions spaced from each other and defining a longitudinal slot between themselves, said wall portions having next to said slot concave inner surfaces substantially forming part of a cylinder whose axis is on the same side of said wall portions as said concave surfaces, said cylinder axis extending substantially parallel to said slot; and at least one glide member having an intermediate neck portion extending with substantial clearance through said slot, having beyond said rail an outer portion connected to said neck portion, and having an inner portion extending across and beyond said slot a distance substantially equal to the radius of curvature of said concave inner surfaces of said wall portions and having in engagement with said inner surfaces on opposite sides of said slot, respectively, a pair of curved convex edge portions each of which extends substantially along a circle whose center is in an axis on the same side of said wall portions as said cylinder axis and extending substantially perpendicularly to said cylinder axis, whereby said glide member will have smooth, noiseless sliding contact with said rail irrespective of the direction of tilt of said glide member in relation to said rail.

11. A supporting assembly for curtains or the like, comprising, in combination, an elongated hollow rail having on one side of its axis a wall formed with a longitudinal slot and having concave inner surfaces directed toward said axis and substantially forming part of a cylinder whose axis is on the same side of said wall as said concave surfaces, said cylinder axis extending substantially parallel to said slot; and at least one glide member having an intermediate neck portion extending with substantial clearance through said slot, having beyond said rail an outer portion connected to said neck portion, and having an inner portion extending across and beyond said slot and having in engagement with said inner surfaces on opposite sides of said slot, respectively, a pair of curved convex edge portions each of which extends substantially along a circle whose center is in an axis on the same side of said wall portions as said cylinder axis and extending substantially perpendicularly to said cylinder axis, whereby said glide member will have smooth, noiseless sliding contact with said rail irrespective of the direction of tilt of said glide member in relation to said rail.

12. A supporting assembly for curtains or the like, comprising, in combination an elongated hollow rail of metal having on one side of its axis a wall formed with a longitudinal slot and having concave inner surfaces directed toward said axis and substantially forming part of a cylinder whose axis is on the same side of said wall as said concave surfaces, said cylinder axis extending substantially parallel to said slot; and at least one glide member of polyamide composition having an intermediate neck portion extending with substantial clearance through said slot, having beyond said rail an outer portion integral with said neck portion, and having an inner portion also

integral with said neck portion extending across and beyond said slot and having in engagement with said inner surfaces on opposite sides of said slot, respectively, a pair of curved convex edge portions each of which extends substantially along a circle whose center is in an axis on the same side of said wall portions as said cylinder axis and extending substantially perpendicularly to said cylinder axis, whereby said glide member will have smooth, noiseless sliding contact with said rail irrespective of the direction of tilt of said glide member in relation to said rail.

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