

SPECIFICATION

Improvements in load supporting roller assemblies

- 5 This invention concerns improvements in or relating to load supporting roller assemblies of that kind that are used for engagement with a track or rail to permit movement of a heavy element carrying the roller relative to the track. In particular, but not
10 exclusively, this invention has an application for supporting a door or window for sliding movement along a rail.

- It is already known to provide roller assemblies that are like wheels having some form of axle for
15 mounting the wheels for rotation. It is also known to provide wheels having specially shaped rims, or even tyres for location on a rail track. It is also known to provide roller assemblies made of various materials to resist wear and to reduce friction. However,
20 the known type of roller assembly usually suffers from one distinct disadvantage when used for supporting a heavy element, and this is that there is only a very small area of contact with the rail or track through which the load and pressure is exerted. This
25 load and pressure means that wear and distortion occurs both in the roller and the track, and even the provision of a tyre or special track or rail cannot obviate this in many cases without making the eventual assembly too cumbersome, or too expensive, or even so complex that repair or replacement
30 is impractical.

It is an object of this invention to provide a roller assembly of an improved construction to avoid the foregoing disadvantages.

- 35 According to this invention we provide a roller assembly for mounting on an element for sliding movement on a rail, said roller assembly comprising a carrier for mounting on the element and supporting a roller housing having two complementary
40 parts, each housing part being formed with a respective groove of oval configuration defining an oval continuous path, a plurality of short rollers of right-cylindrical configuration located in the housing for rolling movement along and around said path
45 with their opposed ends each being located in the respective complementary groove, and an elongate slot in the housing opening to a substantially linear portion of said path whereby in use a plurality of rolling contact faces being central portions of the
50 short rollers are presented for rolling engagement with the rail received within the slot.

- As will be understood, the provision of a plurality of rolling contact faces in the roller assembly according to this invention permits the load/pressure
55 to be distributed through a larger contact or bearing area than with a single wheel or roller.

- Conveniently, the roller housing is formed in two similar opposite-handed parts, each with an oval-shaped groove so that when the two parts are
60 assembled together, the grooves define said path. The number and size of short rollers may be varied and may depend on criteria of load, bearing contact and the rail or track.

- In a rail or track of the upstanding type, for
65 example with a rib or bead for engagement with the

rolling contact faces, the opposed side faces of the slot or groove in the roller housing of the invented roller assembly may provide abutment or guide faces to locate the roller assembly on the rail or track.

- 70 Preferably, the roller housing and the short rollers may be made of a low friction material, for example, an acetal resin. The type of resin may be chosen in accordance with the physical properties required,
75 but other materials may be used as compatible with the material used for the track or rail. Acetal resins are particularly suitable for use with aluminium alloys as commonly used in tracks or rails for sliding doors or windows.

- 80 Another problem arising with roller assemblies used for sliding doors or windows is providing for adjustment to accommodate differences in the height of the aperture or rail spacing and to adjust the door or window during fitting.

- 85 Preferably, the roller housing of the invented roller assembly is mounted in the carrier to allow adjustment of the roller housing relative to the carrier.

- In a preferred arrangement, the carrier includes at least one face engaged by the housing and inclined
90 relative to the linear portion of said path of the short rollers, the housing being mounted for adjusting movement on said inclined face to vary the position of the extent of said linear portion so as to enable the member carried by the invented roller assembly to
95 be raised or lowered relative to the track of rail.

- Such adjustment may be achieved by a simple screw or stud arranged to urge or move the housing relative to the carrier along said inclined face.
100 Preferably, there are two such inclined faces which locate the housing on the carrier. An abutment or stop may be provided to restrict movement of the housing.

- Further features of this invention will be explained
105 with reference to the exemplary embodiment shown in the accompanying drawings which depict a roller assembly according to this invention as applied to a member comprising a patio door. In the drawings:-
110 *Figure 1* depicts one corner of a patio door (partly sectioned) mounted by a roller assembly for sliding movement on a track;

- Figure 2* is a view similar to that of *Figure 1* but depicting the roller assembly in an adjusted position to raise or lift the patio door relative to the track;

- 115 *Figure 3* is a partly sectioned detail view of the roller assembly; and

- Figure 4* is an exploded isometric view of the roller assembly.

- 120 With reference to this embodiment of the invention, the drawings of *Figures 1* and *2* depict a conventional upstanding track or rail 1 set down for carrying a patio door having a metal frame comprising a stile 2 and a lower cross member 3. The frame would be glazed, wholly or partly, in known manner,
125 and the lower cross-member 3 would include a section of inverted channel shape inside which the roller assembly 4 would be concealed. Furthermore, the stile 2 would be of hollow section. Usually, the metal frame comprises extruded aluminium sec-

tions.

The roller assembly 4 comprises a carrier 5 adapted by means of countersunk threaded bores 25 for fixing to the frame members of the door by fixing screws 26 and 27. Any suitable fixings may be provided depending on the design and construction of the door.

The carrier 5 is generally of rectangular shape in top plan view but has two opposed similar side portions 6 which are spaced apart and define a channel shaped recess therebetween, in which a housing 7 is received. The carrier 5 is preferably metal, and may comprise a casting, such as a die-casting, or it may be a fabrication.

The housing 7 is formed of two similar opposite-handed parts, 7a and 7b which are held together by a central bolt and nut 8. Each housing part 7a, 7b, includes an oval shaped groove 9a, 9b, respectively, the section of the groove being channel-shaped to receive the ends of a plurality of short cylindrical rollers 10. As will be appreciated, especially as shown in Figures 3 and 4, the grooves 9a, 9b define a path in which the rollers 10 are confined when the housing parts 7a, 7b are connected together.

The rollers 10 are arranged with sufficient clearance to permit their rolling movement around the path. The housing parts 7a and 7b and the rollers 10 may be of a low friction plastics material such as acetal resin.

For convenience in assembly, and for locating the housing parts 7a, 7b together, lugs 11 may be provided on one housing part to be received in complementary holes in the other housing part, or separate pins may be provided. Additionally, the inside face of the carrier is formed with a short longitudinal rib (not shown) which seats in a longitudinal slot formed in the assembled housing 7 by the rebates 12a, 12b, extending on the mating faces of the housing parts 7a and 7b.

The housing parts 7a, 7b also have rebates 13a, 13b extending along their respective lower edges which open to the respective grooves 9a, 9b. In the assembled housing, these rebates 13a, 13b form an elongate slot 13 through which a plurality of the rollers 10 are presented for rolling engagement with the head of the rail 1. The extent of these rollers 10 presented for rolling engagement is substantially linear and each roller 10 provides a bearing face through which loads may be transmitted. This achieves a spreading of the total load along a length of the rail 1 and high point loading is avoided.

Additionally, the opposed side faces of the slot 13 serve to extend on respective sides of the head of the rail, and this assists in locating and guiding the roller assembly carrying the door along the length of the rail during sliding movement.

According to the further feature of this roller assembly, the housing 7 carrying the short rollers 10 may be adjusted relative to the carrier 5 to raise, lower or otherwise adjusted patio door in respect of the rail 1. This may be required during fitting removal, or on settlement or wear of parts.

For this adjustment, each side portion 6 of the carrier 5 is provided with an inclined face 14 against which a similar respective inclined face 15 on each

side of the housing is slidably engaged and located. The end face 16 of the housing assembly is provided with small thrust plate 17 located in an undercut.

This plate 17 is arranged to be engaged by an adjuster screw 18 in threaded engagement with the end wall 19 of the carrier. On rotation of the head of the adjuster screw 18 through a clearance opening provided in the frame stile 2, the housing 7 can be moved along the inclined face so as to vary the position of the housing with respect to the carrier 5. Two extremes of adjustment are shown in Figures 1 and 2.

To hold the roller assembly together, and to limit the adjustment, a stop plate 21 is mounted in an undercut rebate 22 formed in the end face of the carrier 5 opposed to the thrust plate 17. The stop plate 21 is arranged to provide an abutment for engagement by two lugs 23a, 23b formed respectively on the housing parts 5a, 5b. These lugs 23a, 23b are each arranged so as to extend parallel to the inclined face 14 to assist in guiding and location, and to complement supplementary inclined slots with guide faces 24 provided in the side portions 6 of the carrier.

It will be understood that the range of adjustment can be varied by changing the dimensions of the carrier and the housing, and a wide range of load bearing capacities can also be accommodated by changing the length of the roller path, type of material used and other characteristics.

Tests have been carried out on a roller assembly in accordance with the foregoing embodiment in which the housing and roller were of acetal resin. The rollers were made from polyacetal rod of about 8 mm diameter. A pair of roller assemblies were mounted on a door having a weight of 113.6 Kilogrammes and the door was arranged to be moved backwards and forwards on a track length of 1.22 metres. Each cycle representing 2.44 metres of rolling engagement for each roller assembly and the cycles per hour were rated at 420. After 30,000 cycles and a period of rest or static load corresponding to 200 hours, the roller assemblies were inspected, and no visible signs of wear of the rollers or the housing parts forming the path for the roller movement was discernible. Accordingly, an extra load was applied to the door, this being 45.5 Kilogrammes, and a further 10,000 cycles were completed with 50 hours of rest under the static load. Again, after inspection, no discernible sign of wear or damage was found, and both roller assemblies were fit for further service. The tests can be put into usage perspective by noting that 40,000 cycles corresponds to 4 openings and closings of a door each day for a period of 27 years. It is also important to note that the tests included static load periods during which local distortion or stresses could arise, but these were not evident because the load is distributed over a plurality of rollers in engagement with the track.

It will also be appreciated that the roller assembly according to this invention can easily be dismantled or replaced, and servicing like lubrication is not required. Although the housing is preferably made of a low friction material, it could be made of a metal, such as aluminium or zinc alloy, selected to have

suitable compatible wear and friction characteristics for use with the rollers.

- It is also envisaged that the construction of the carrier could be varied, in particular, to provide an open-slided box-like carrier which encloses the housing assembly, and a simple plate to close the side and hold the assembly together. In such an arrangement the box-like carrier would provide the inclined face(s) and complementary grooves or recesses would be provided in both the open-slided part and the side plate.

CLAIMS

1. A roller assembly for mounting on an element for sliding movement on a rail, said roller assembly comprising a carrier for mounting on the element and supporting a roller housing having two complementary parts, each housing part being formed with a respective groove of oval configuration defining an oval continuous path, a plurality of short rollers of right-cylindrical configuration located in the housing for rolling movement along and around said path with their opposed ends each being located in the respective complementary groove, and an elongate slot in the housing opening to a substantially linear portion of said path whereby in use a plurality of rolling contact faces being central portions of the short rollers are presented for rolling engagement with the rail received within the slot.
2. An assembly according to claim 1 wherein the roller housing parts comprise two similar opposite-handed parts, assembled together with the rollers located therebetween in the respective grooves of the two parts.
3. An assembly according to claim 1 or claim 2 wherein said short rollers are formed of a low friction plastics material such as acetal resin.
4. An assembly according to any one of claims 1, 2 or 3 wherein said roller housing is formed of a low friction plastics material.
5. A roller assembly according to any one of the preceding claims wherein the roller housing parts are each formed with a rebate aligned with the linear portion of said path, the opposed rebates of the two roller housing parts providing both the elongate slot in the roller housing and opposed side faces for guiding and locating the assembly on the rail during sliding movement.
6. A roller assembly according to any one of the preceding claims wherein the roller housing is mounted in the carrier for adjustment of the roller housing relative to the carrier.
7. An assembly according to claim 6 wherein the carrier includes at least one face engaged by the housing and inclined relative to said linear portion of said path of the short rollers, and means for adjusting the position of the roller housing along the length of said inclined face.
8. A roller assembly according to claim 7 wherein the carrier comprises two inclined faces each for guiding and locating complementary faces on the roller housing, and the position of the roller housing adjustable along the length of said inclined faces is limited between two extreme positions.

9. An assembly according to claim 7 or claim 8 wherein said adjustment means comprises a threaded element arranged to act between said roller housing and the carrier.

10. An assembly according to any one of the preceding claims wherein said carrier comprises two spaced apart side portions which define a channel-shaped recess in which the roller housing is carried.

11. A roller assembly for mounting an element for movement on a rail and substantially as herein described with reference to the accompanying drawings.

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7. An assembly according to claim 6 wherein the carrier includes at least one face engaged by the housing and inclined relative to said linear portion of said path of the short rollers, and means for adjusting the position of the roller housing along the length of said inclined face.
8. A roller assembly according to claim 7 wherein the carrier comprises two inclined faces each for guiding and locating complementary faces on the roller housing, and the position of the roller housing adjustable along the length of said inclined faces is limited between two extreme positions.

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