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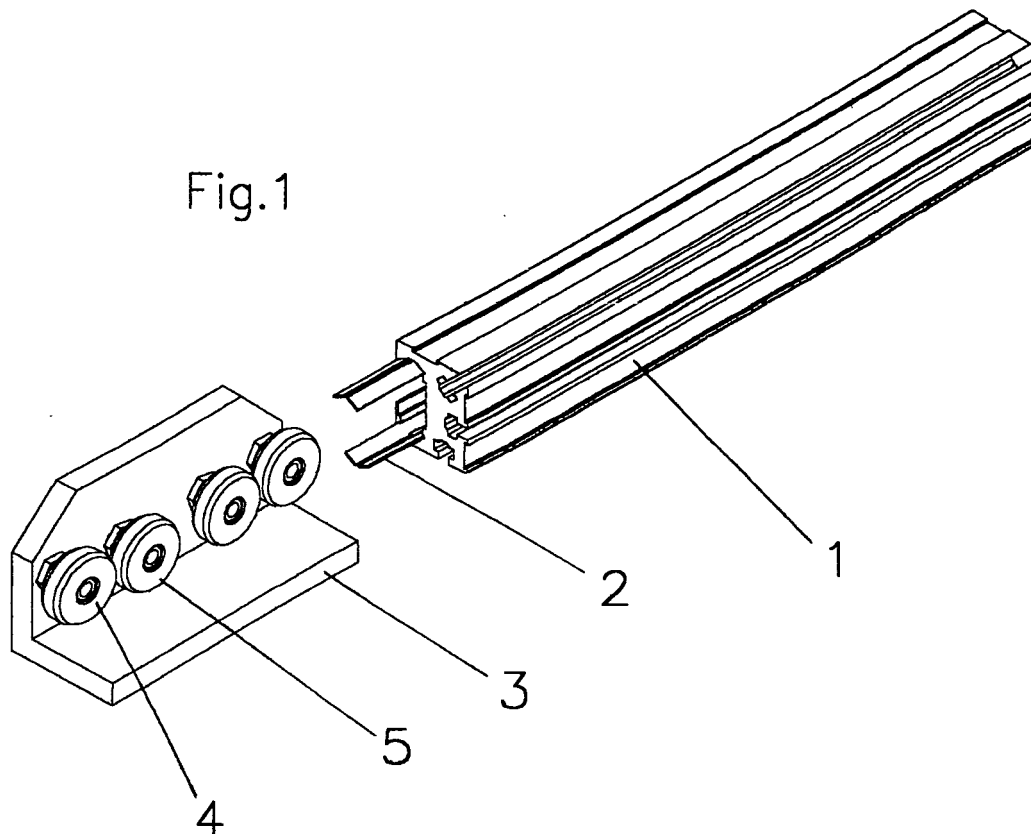
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(54) System to make a trolley slide into a profile and profile so realized

(57) This invention consists of a system and device to make a trolley slide into a profile, particularly in aluminium, with no need to insert into the profile any transferring device for the movement of the trolley, but simply manufacturing the same profile with angle surfaces where steel strips are inserted or applied over which the

angle portions of the wheels of the trolley run, so as to avoid the wear and tear of the material forming the profile in that point. The main sliding trolley, where said system and device is applied, can have a further supporting profile sliding on wheels, connected to the same trolley and perpendicular to the main sliding system, thus allowing the trolley to support greater loads.

Fig.1



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Description

Technical Field

[0001] The present invention concerns the technical sector relating technological products widely used in industrial designs, such as linear sliding units made of self-carrying profiles. In particular, this invention refers to the technical sector of the manufacturing of profiles in aluminium inside which trolleys slide for moving other profiles connected to them.

Background Art

[0002] Nowadays, these profiles are characterized by an extreme manufacturing versatility, both as regards sizes and the consequent loads supported, as well as the manufacturing type of the section of the same profile, more and more suitable to external applications that make its use immediate and convenient in the design realization and simplification of various devices.

[0003] At present, compact assembling systems are used that, by means of suitable interfaces, permit the assembling in more units, either parallel, perpendicular or oblique, which however allow trolleys to slide into a profile on one, two, three or more axes. In addition, the different tracks forming the profile permit the simultaneous internal insertion of transferring devices that allow suitable wheeled trolleys to move inside it. Furthermore, suitable plates directly interface the engine-reducer on the profile, so making the system compact, self-carrying, suitable for several types of design applications, from the easiest one up to the most complex automation systems.

[0004] Obviously, the sliding system, generally consisting of a wheeled trolley where the device to move is attached, needs sliding tracks to be fixed, by means of screws or other, along this profile in aluminium. Said tracks are necessary because the direct sliding of the wheels in steel over the profile in aluminium would cause its wear and tear.

[0005] For this purpose, nowadays, properly shaped steel tracks are used, which are compatible with the profile where they are fixed as well as with the wheels sliding on them.

[0006] Even if these systems are quite simple, and their functional result finally good, the same need to apply these internal profiles however involves a further manufacturing during the assembling and disassembling phase. As a matter of fact, they are fitted to the main profile generally by means of countersunk bolts, which require flaring on the tracks, and they are definitely fixed by means of properly shaped nuts, to be inserted in a track suitably realized on the profile in aluminium, in the same number as the flared holes on the tracks in steel. Even if this assembling results perfect, however it makes the work of the operator more difficult, particularly in the case of profiles for long run or assembling with portals with more axes, which require more profiles.

Disclosure of invention

[0007] The present invention aims at eliminating the above-mentioned and other manufacturing and assembling problems, supplying a profile with tracks geometrically conceived for the immediate insertion of sliding wheels, of such a shape as to be able to support reinforced loads or however loads with any direction.

[0008] The advantages resulting from the present invention essentially consist of the fact that the profile in aluminium does not need any transferring device, as the wheels directly run inside the profile, thus considerably reducing the costs of production; that the assembling and the possible maintenance are easier.

[0009] Reduced to its essential structure and with reference to the figures of the enclosed drawings, a system for making trolleys slide into profiles, according to this invention, comprises:

- means for the insertion of the trolley into the profile, consisting of a longitudinal groove inside the carrying profile shaped like the wheel of the trolley, hollow inside and open in order to allow the free running of the hubs of the wheel;
- means to permit the sliding of the wheel of the trolley and the maintenance of the contact surfaces, consisting of strips in steel (2) inserted or anyway applied inside the profile in suitable angle spaces (2A) at the top and/or bottom of the sliding track;
- means to make the wheels geometrically slide into the tracks, consisting of angle notches (9) on the external diameter of the same wheels.

[0010] Conveniently, the spaces (2A) are so realized as to have a front surface and two flaps by means of which the steel foil is locked inside and cannot escape. As a matter of fact, said foil is inserted from one end of the profile (Fig. 5) and pushed into its space, while its two sides fit into the two flaps of the same space preventing its exit.

[0011] The profile realized for the execution of the above-mentioned system has a groove having at the top and bottom two further notches (2A), inside which the steel strips (2) are inserted or anyway applied as tracks for the sliding of the wheels or shaped bearings supporting the longitudinal sliding trolley. The particularity of this invention is indeed the convenient shape of the inner sliding profile.

[0012] Since the profile is usually in aluminium, and therefore it's subject to easy and fast wear and tear, the insertion of said steel strips is indeed useful to avoid it and however permit an easy running of the wheels into the profile, eliminating all the mechanics that normally must be added to allow this running.

[0013] Conveniently, the rectangular steel foils (2) are four, two at the top and two at the bottom on the sliding track, in slightly angle couples so as to create a sliding groove for the wheels of the trolley.

[0014] Conveniently, every wheel of the trolley has on its external diameter, at the two ends, an angle notch (9) such as to suit to the shape and inclination of the foils making this part (9) of the wheels slide over the foils (2).

[0015] Two eccentric ferrules are used for the vertical clearance inside the track: they are turned out of the trolley during the process and let the inner couple of wheels to move in such a way as to get the precise contact on all the four sliding tracks.

[0016] This system, thanks to its properties, considerably facilitates the assembling of these mechanical devices, largely used in industrial design, supplying a profile for the sliding of longitudinal carrying trolleys.

[0017] Said sliding is carried out by means of a sliding steel plate that can be simply and immediately inserted into the track thanks to their perfect dimension compatibility. These tracks are realized with opposite angles that, together with the existing eccentric system to restore the clearance, make this device possible to be installed at any angle.

[0018] The wheels sliding on the trolley, either fixed or mobile in vertical rotation by eccentric, have on their external diameters similar angle notches as the opposite ones on the steel tracks.

[0019] Conveniently, the sliding trolley (3) has a supporting profile (8) attached, which can hold three or more bearings (9), connected to the same sliding trolley (3), but placed perpendicularly to the main gearings (5) for the linear sliding of the trolley.

[0020] Conveniently, said supporting profile (8) is assembled to the main profile (1) by means of countersunk bolts, embedded in the groove of the same profile, which fit into suitable hammer nuts (11) inserted in the longitudinal tracks on the profile (1). The bearings (9) are connected to the trolley (3) by means of pivots (10); by rotating the eccentric centre of the pivots during assembling, it's possible to restore the clearance between bearings and sliding tracks (2). Said sliding tracks consist of steel strips like the ones used in the main profile and easy to insert thanks to the suitable opposite groove made inside the supporting profile.

[0021] This practical solution is particularly useful in the case the trolley must support, further than the normal radial dynamic and static loads, also possible transversal loads or twisting moments that would excessively charge the main sliding system. This solution permits to use the same basis profile for axial sliding in absence of heavy transversal loads and, when necessary, to easily integrate it, by the simple and immediate assembling of a supporting profile in aluminium plate, capable of holding three or more consecutive bearings. It's possible to use the same sliding tracks, made of steel plate, which can be easily inserted into the profile, such as the assembling system of the main sliding tracks of the trolley. For this purpose, it's possible to use self-lubricated bearings of mass production, which does not need any further action. For the complementary trolley, a similar eccentric system is used for the restore of the clearance and the radial

preload of the bearings, resulting in a reduced coefficient of friction in linear sliding. In the manufacturing of the sliding trolley, an aluminium profile is also used with standard longitudinal tracks, for an easy and immediate assembling, by means of hammer nuts (or other locking systems), of any device needs to be moved, having the possibility of a universal assembling system, thanks to the free arrangement of the nuts along the spaces of the same trolley.

[0022] Conveniently, this system can automatically move, being connected to any actuator, possibly connected in its turn to a circuit having a programmed memory to enable the execution of different movements.

[0023] Conveniently, the profile can take any external shape, as long as the above-mentioned movement system remains unchanged and therefore protected.

[0024] This invention considerably reduces times and costs of assembling, as it does not need to support the steel sliding tracks by means of screws and suitable nuts, which are currently necessary but not functional.

[0025] This system can be applied to any type and size of self-carrying profile in aluminium.

[0026] In practice, the manufacturing details may however equally vary as regards shape, size, position of elements and type of materials used, but still remain within the range of the idea proposed as a solution and consequently within the limits of the protection granted by this patent for invention.

Brief description of drawings

[0027] The present invention can be better understood referring to the enclosed drawings, given as practical examples of the invention, but not to be considered restrictive.

- **Figs. 1 and 2** respectively show an assembled and exploded section view of the sliding system inside the profile (1). Fig. 1 shows the trolley (3), in this case of angular shape, which must support the object to be carried in line and for this purpose includes fastening holes according to the specific needs. Regardless of its shape and size, it has four or more consecutive holes set to hold special hollow rings (6), internally threaded. Fig. 2 specifically shows the consecutive holes on the trolley (3). The two central holes have a larger diameter in order to hold two external eccentric ferrules (7) by means of which the central wheels (5) rotate. On the contrary, the external wheels (4) are fixed in axis to the relative holes. This figure also shows two metal strips (2), as long as the profile (1), made of steel and commonly found on the market.
- **Fig. 3** represents the section of the profile object of this invention, showing its side opening, suitably shaped, with two couples of parallel opposite rectangular notches (2A), at its top and lower ends, which perfectly fit with the sliding strips (2).

- **Figs. 4 and 5** respectively represent the side and perspective view of the assembled system, the latter showing the trolley (3) partially inserted into the profile (1), with the wheels (4) (5) perfectly held in the opening of the profile, laying on the steel tracks (2).
- **Figs. 6 and 7** show that this system can restore the clearance by means of the two eccentric ferrules (7). This feature, though present in traditional systems, in this case, further than the vertical clearance between the wheels in the track, permits also the perfect angular contact of the same wheels on the tracks, thanks indeed to the notch made on the external diameter of the wheels that perfectly fit with the similar groove of the tracks.
- **Fig. 8** shows another practical solution with the supporting profile (8) that can hold three or more bearings (9), connected to the sliding trolley (3), but placed perpendicularly to the main gearings (5) for the linear sliding of the trolley. Fig. 8 represents a section of the assembled system, showing that this further appendage to the sliding trolley is very useful in the case the same trolley must support, further than the normal radial dynamic and static loads, also possible transversal loads or twisting moments that would excessively charge the main sliding system, even if this, thanks to the particular shape of the gearings, is per se able to support light transversal loads.
- **Fig. 10** and the relative longitudinal section of **Fig. 9** show the position of the bearings (9) inside the supporting profile (8), assembled to the main profile (1) by means of countersunk bolts, embedded in the groove of the same profile, which fit into suitable hammer nuts (11) inserted in the longitudinal tracks on the profile (1). The bearings (9) are connected to the trolley (3) by means of pivots (10); by rotating the eccentric centre of the pivots during assembling, it's possible to restore the clearance between bearings and sliding tracks (2). Said sliding tracks consist of steel strips like the ones used in the main profile and easy to insert thanks to the suitable opposite groove made inside the supporting profile.

Claims

1. System to make trolleys slide into profiles, **characterized in that** it comprises:
 - means for the insertion of the trolley into the profile, consisting of a longitudinal groove inside the carrying profile shaped like the wheel of the trolley, hollow inside and open in order to allow the free running of the hubs of the wheel;
 - means to permit the sliding of the wheel of the trolley and the maintenance of the contact surfaces, consisting of strips in steel (2) inserted or anyway applied inside the profile in suitable angle spaces (2A) at the top and/or bottom of the

sliding track;

- means to make the wheels geometrically slide into the tracks, consisting of angle notches (9) on the external diameter of the same wheels.

2. System as claimed in claim 1, **characterized in that** the spaces (2A) are so realized as to have a front surface and two flaps by means of which the steel foil is locked inside and cannot escape. As a matter of fact, said foil is inserted from one end of the profile and pushed into its space, while its two sides fit into the two flaps of the same space preventing its exit.
3. Device as claimed in claim 1, **characterized in that** the profile realized for the execution of said system has a groove having at the top and bottom two further notches (2A), inside which the steel strips (2) are inserted or anyway applied as tracks for the sliding of the wheels or shaped bearings supporting the longitudinal sliding trolley.
4. Device as claimed in claims 1 and 3, **characterized in that** the rectangular steel foils (2) are four, two at the top and two at the bottom on the sliding track, in slightly angle couples so as to create a sliding groove for the wheels of the trolley.
5. Device as claimed in claims 1 and 3, **characterized in that** every wheel of the trolley has on its external diameter, at the two ends, an angle notch (9) such as to suit to the shape and inclination of the foils making this part (9) of the wheels slide over the foils (2).
6. Device as claimed in claims 1 and 3, **characterized in that** the sliding trolley (3) has a supporting profile (8) attached, which can hold three or more bearings (9), connected to the same sliding trolley (3), but placed perpendicularly to the main gearings (5) for the linear sliding of the trolley.
7. Device as claimed in claim 6, **characterized in that** said supporting profile (8) is assembled to the main profile (1) by means of countersunk bolts, embedded in the groove of the same profile, which fit into suitable hammer nuts (11) inserted in the longitudinal tracks on the profile (1). The bearings (9) are connected to the trolley (3) by means of pivots (10); by rotating the eccentric centre of the pivots during assembling, it's possible to restore the clearance between bearings and sliding tracks (2). Said sliding tracks consist of steel strips like the ones used in the main profile.
8. Device as claimed in any of the previous claims, **characterized in that** it can automatically move, thanks to any actuator, possibly connected to a circuit having a programmed memory to enable the ex-

ecution of different movements.

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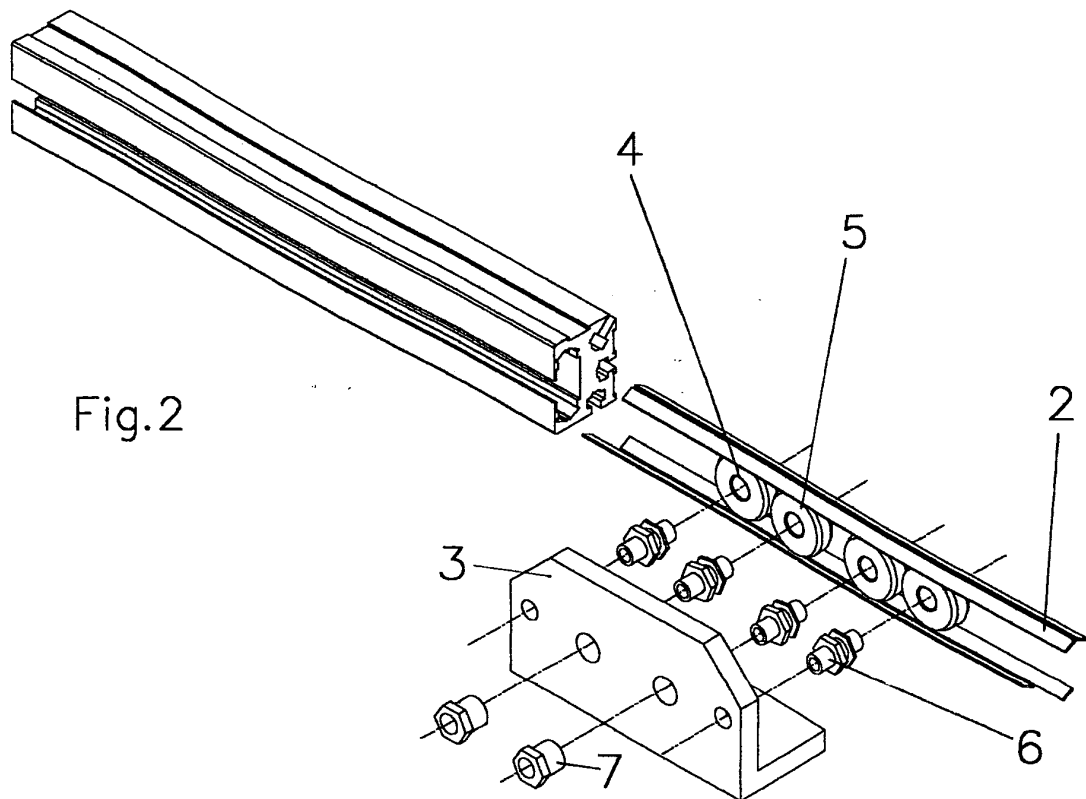
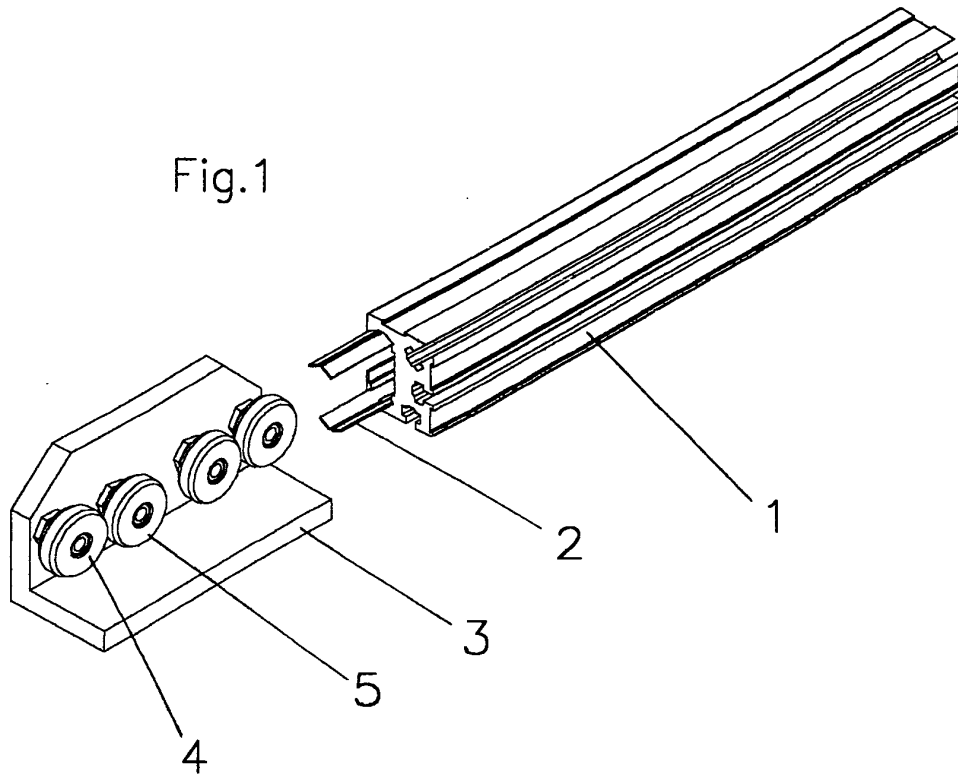
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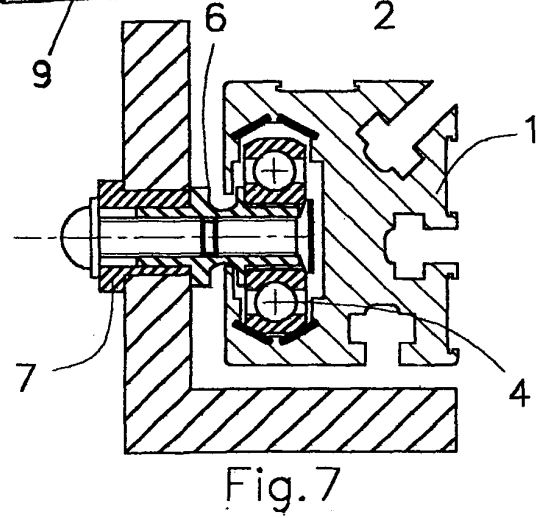
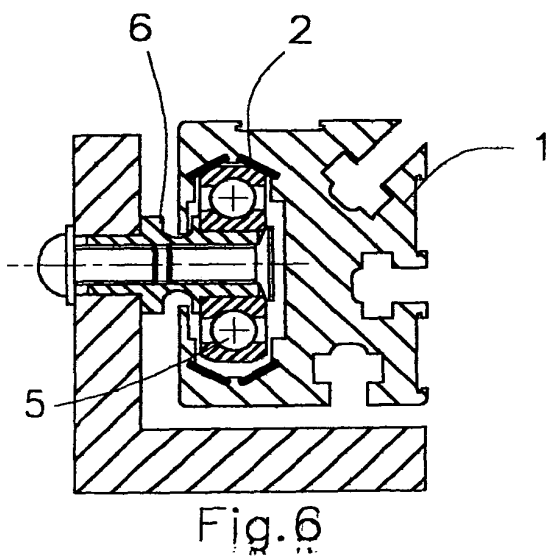
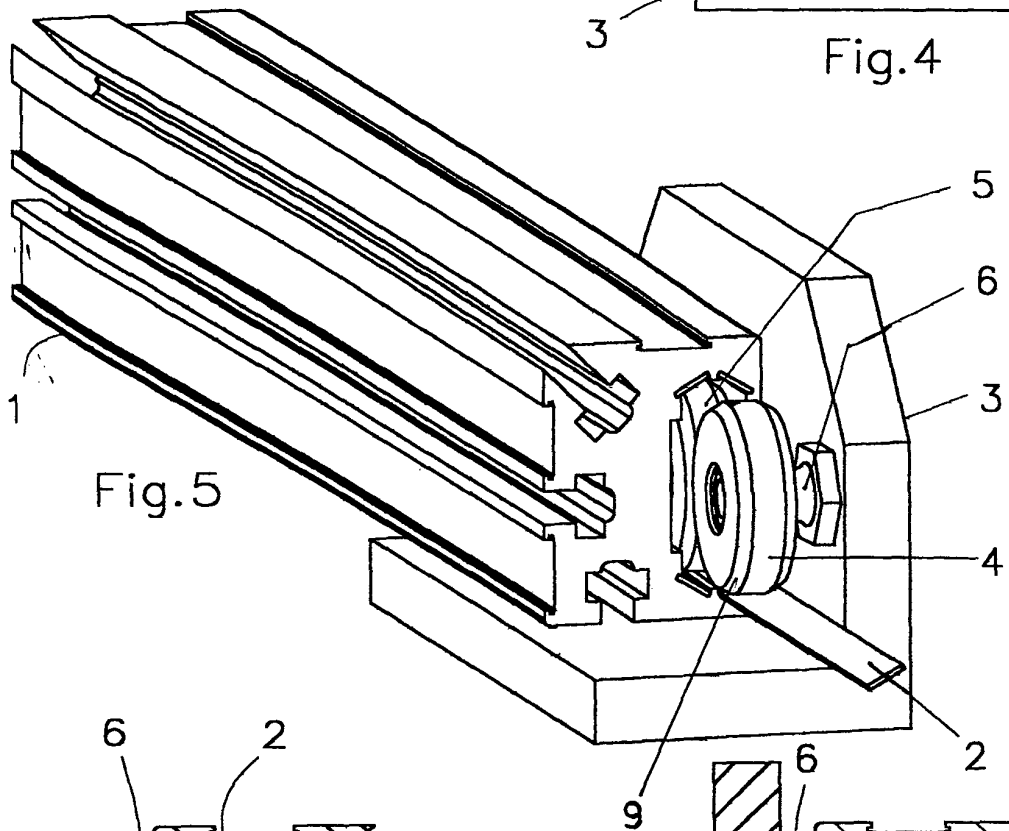
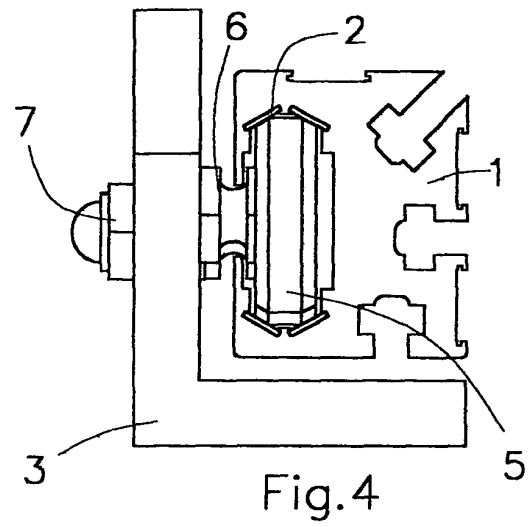
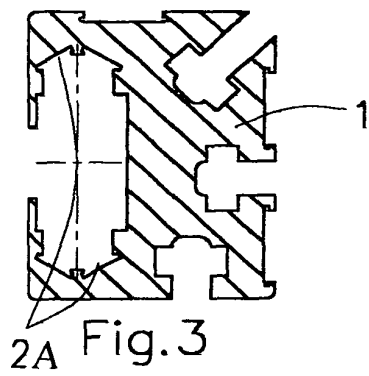
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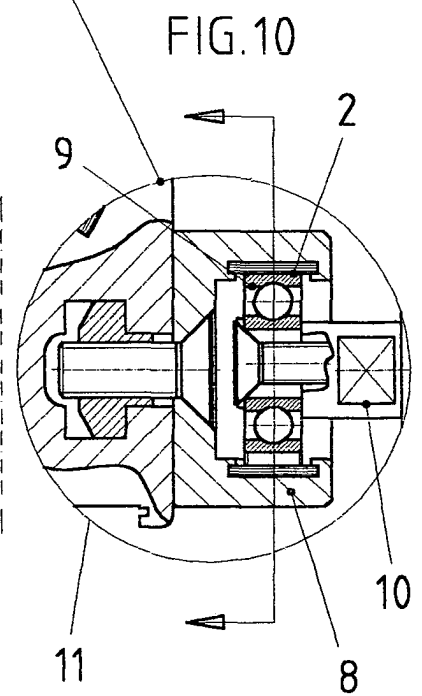
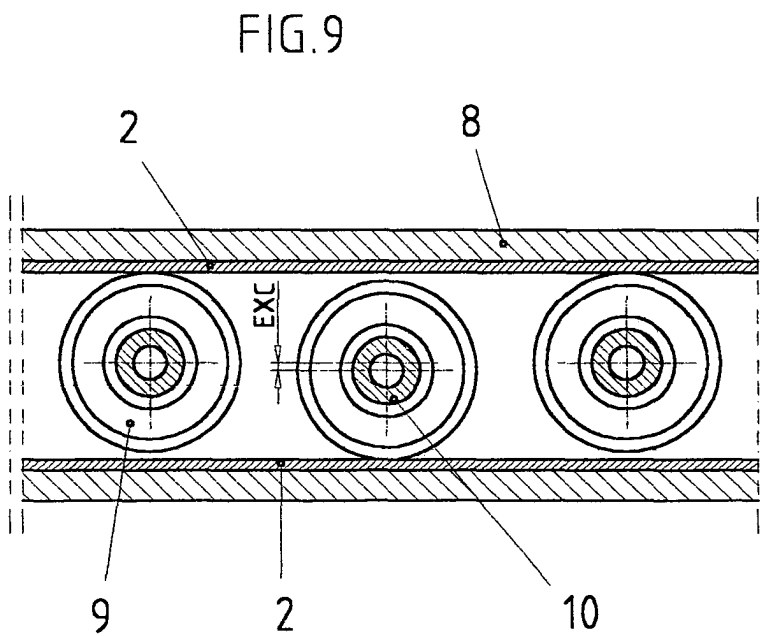
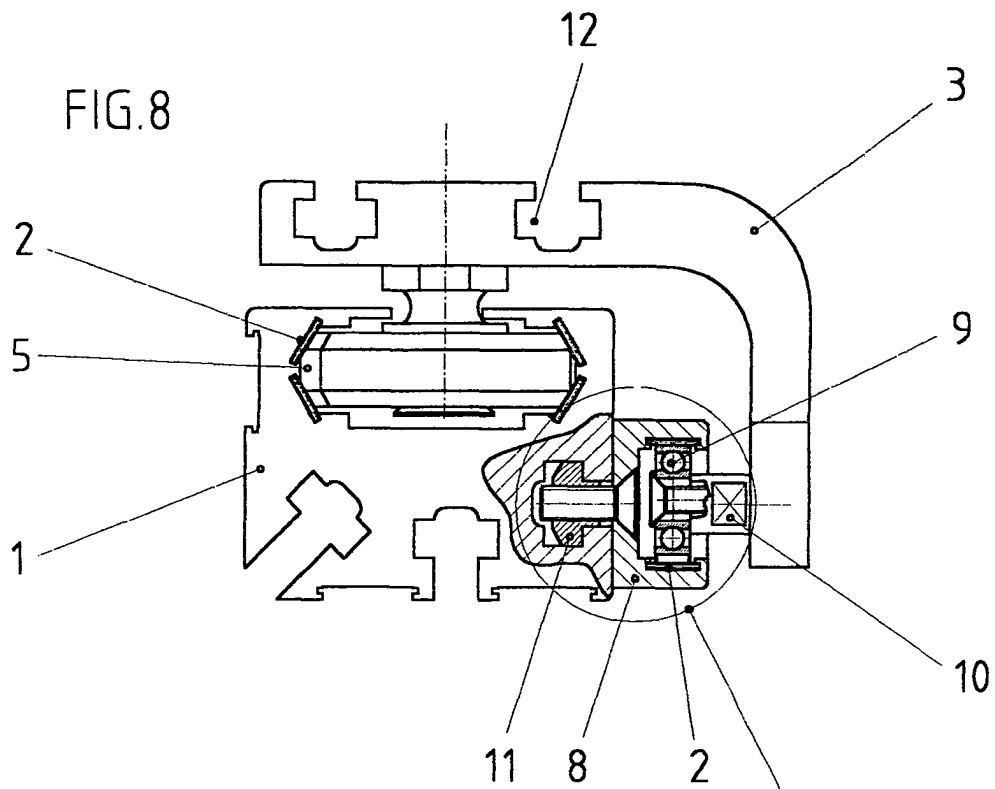
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EUROPEAN SEARCH REPORT

Application Number
EP 04 42 5539

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
Y	DE 197 19 011 A (DORMA GMBH & CO KG) 12 November 1998 (1998-11-12) * column 3, line 26 - line 32 * * column 4, line 6 - line 13; figure 5 * -----	1-6,8	E05D15/06
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			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			E05D
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 19 November 2004	Examiner Witasse-Moreau, C
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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