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(54) Title: PRE-LOADED ADJUSTABLE BALL BEARING GUIDE SYSTEM

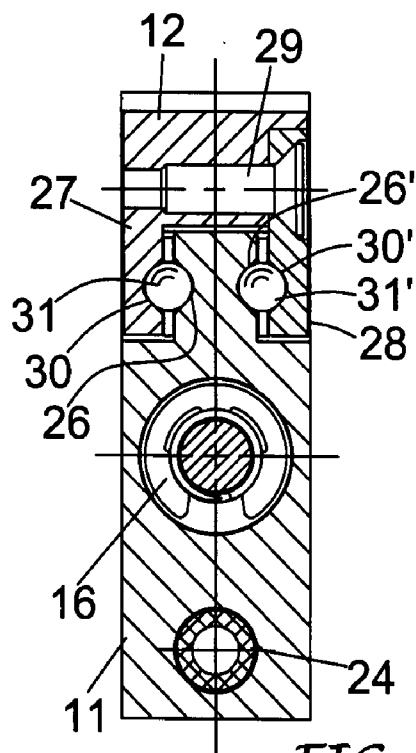


FIG. 5

(57) Abstract: The invention concerns a guide system with rolling elements, in particular ball bearings, for slide devices having a first and a second slide members (11,12) coupled and guided between them, where a slide member (12) is susceptible to alternative linear movements compared with the other slide member (11) with the interposition of two linear sets of ball bearings (31,31'). One of said slide members (12), on at least one of its sides parallel with the movement direction, has an opening which is integrated by a variable clamping finishing cheek (28) to establish an adjustable preload of the two sets of ball bearings between the first and the second slide members.



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"PRE-LOADED ADJUSTABLE BALL BEARING GUIDE SYSTEM"

Field of the Invention

This invention concerns in general to sliding devices, having two coupled elements and guided between them, by an element susceptible to alternating linear movements compared to the other caused by a control unit which is preferably pneumatic. In particular the invention is directed by a guide system with rolling elements, in general ball bearings, for said sliding devices, especially if small sized.

State of the Technique

The sliding devices taken into consideration herein can be pneumatically controlled type and are largely used in numerous sectors, in particular, but not only, for automatic gripping and manipulation operations of various components and elements requiring positioning and assembling. The can also be equipped with a prehensile device, such as a suction cup, controlled pneumatically by means of a duct that extends in the two sliding parts.

According to the known technique, the two parts of the sliding device can be coupled and slide one compared to the other with the interposition of rolling elements, mostly ball bearings. The presence of these elements facilitates the sliding even when the pneumatic control pressure is minimum, but their assembly however requires high

precision operations and consequently time and considerable implementation costs, furthermore without the possibility of adjusting the preload of the coupling.

For some applications, then, it is also important for these slide
5 members to be small in size and light in weight, conditions which are not possible to be followed with the guide and assembly techniques at present adopted in this sector.

Objective and summary of the invention

Therefore, one objective of this invention is to propose a guide
10 system for a slide device of the afore configured type, to simplify both the structure and the assembly method, to eliminate the necessity for precision work, to make possible the external adjustment of the preload of the guide means, to ensure the correct performance and to reduce the overall dimensions of the device, in particular its width, which is to
15 be considered as the thickness measured on the narrowest sides of the slide that extend in the direction of the movement of the mobile element.

Said objective and implicit advantages deriving from it are achieved, according to the invention in a guide system for slide devices
20 of the pneumatic control type according to the preamble in claim 1 and where one of the slide elements, on at least one of its parallel sides in the movement direction, has an opening and is integrated with the hard-facing and fixing in said opening of a finishing cheek, the tightening of which is variable to establish an adjustable preload of the two lines of
25 ball bearings between the two coupled slide elements.

Consequently and favourably, as a whole said inserted finishing cheek has the prerogative of facilitating the assembly of the slide, of completing the structure of the latter, integrating with the relative fixing means, to allow a fine adjustment from the outside of the preload of the coupling of the guide system.

Brief Description of the Drawings

The invention will however be better illustrated in the continuation of the present description made in reference to the enclosed exemplificative, but not limiting drawings, in which:

Fig. 1 shows a blown-up view of the components of a slide device with a guide system according to the invention;

Fig. 2 shows a view of the assembled slide device;

Fig. 3 shows a side view of the device;

Fig. 4 shows an enlarged longitudinal section; and

Fig. 5 shows a cross section according to arrows A-A in Fig. 4 and with the guide system underlined.

Detailed Description of the Invention

In said drawings is indicatively represented a slide device that comprises a first fixed element 11 and a second slide member 12 complementally coupled and guided one with the other by the guide system 13 of the invention.

The slide member 12 is susceptible to alternating linear movements compared to the fixed slide member 11, movements carried out by means of a pneumatic control unit 14. This control unit consists in a fluid chamber 15 provided in the fixed slide element 11 by its

length, and in a piston 16 housed and sealed and sliding in said chamber and equipped with a rod 17, that crosses at least one guide ring 18 held in said chamber 15 by a pin 19 and which extends until it connects up to the slide member 12. The chamber 15 is fed by a fluid
5 under pressure, especially air, alternating through adduction/discharge ducts 20, 20' so as to cause the above movements of the mobile slide element compared with the fixed one.

The slide member 12 can also be equipped, although not shown, with a prehensile member, such as a suction cup, positioned in line with
10 a fluid duct 21 parallel with the chamber 15 for the piston 16, crossing longitudinally the two slide elements and connectable, on the side of the fixed slide element 11, to a vacuum group -non shown- designed to control the action of the a prehensile member. To give continuity to said duct also during the movements of the mobile element compared with
15 the fixed one, a tube 22 is placed between the two slide element, which couples telescopically with one of said elements, in the drawings, the fixed slide element 11.

This slide element 11 is equipped with means 23 for its application, for example, to a manipulator. Along the rod 17 of the
20 piston 16 is placed a spring 24 designed to push the slide member 12 towards the item to be picked up, protecting in this way from time to time the adherence of the prehensile member to the item. A shock absorber 12' is positioned between the two facing parts of the two slide elements.

The guide system 13 proposed in the example shown comprises a guide rib 25 integral with the fixed slide element 11, extending along at least a part of the length of the latter and having two linear tracks 26, 26' along its opposite sides.

5 As regards to the slide member 12 it has a wall 27 that runs along an adjacent side of the guide rib 25 of the fixed element on a side parallel to the movement direction. On the opposite side the slide member 12 has an opening and becomes integrated with the hard-facing in said opening of a finishing cheek 28 running along the
10 opposite side of said guide rib 25. Said finishing cheek is fixed to the slide member 12 by means of screws 29.

On the internal face of the lateral wall 27 of the fixed slide element 11 is provided with a linear track 30 opposite to the facing linear track 26 on the adjacent side of the guide rib 25 of the mobile
15 element; the same applies to the internal face of the inserted finishing cheek 28 where a linear track 30' is provided opposite to the facing linear track 26' on the other side of the rib of said guide 25.

Between the lateral wall 27 of the mobile slide element and the adjacent side of the guide rib 25 of the fixed slide element 11 is
20 positioned a first linear row of rolling elements, in particular ball bearings 31, that are spaced out by a relative ball holder cage 32 and led between the two facing tracks 26, 30 on that side of the slide. Analogously, between the finishing cheek 28 and the other adjacent side of the guide rib 25 of the fixed slide element is positioned a second
25 linear line of ball bearings 31, also spaced out by a relative ball holder

cage 32' and led between the two facing tracks 26', 30' on the other side of the slide.

Thanks to the configuration described above, the two lines of ball bearings 31, 31' can be associated with the fixed and mobile elements 5 11, 12 of the slide before the fixing of the finishing cheek 28 to the mobile slide. Assembly in this way becomes simple and easy to carry out and, however, once done it will be possible to vary the preload of the coupling between the two elements with the two interposed lines of ball bearings, by simply tightening/ loosening the fixing screws 29 of the 10 finishing cheek 28 and by this adjusting the smoothness of the mobile element compared with that of the fixed one according to requirements.

"PRE-LOADED ADJUSTABLE BALL BEARING GUIDE SYSTEM"

C L A I M S

1. A guide system with rolling elements, in particular ball bearings, for slide devices having a first and a second slide members (11, 12) coupled and guided between them, where a slide member (12) is susceptible to alternative linear movements compared with the other
5 slide member (11) with the interposition of two linear sets of ball bearings (31, 31'), characterised in that one of said slide members (12), on at least one of its sides parallel with the movement direction, has an opening and is integrated by a variable clamping finishing cheek (28) which is located and fixed in said opening to establish an adjustable
10 preload of the two sets of ball bearings between the first and the second slide members.

2. A guide system according to claim 1, characterised in that a guide rib (25) is integral with a first slide member (11), extends along at least a part of the length of the latter and has two linear tracks (26, 26')
15 along two opposite sides, in that a lateral wall (27) is integral with the second slide member (12), running along a first side of the guide rib (25) of said first slide member (11) and provided with a linear track (30) opposite the linear track (26) on said first side of said guide rib (25), in that the finishing cheek (28) is fixed on a level with the lateral opening
20 of said second slide member (12) on the opposite part of said lateral wall (27), running along a second side of the guide rib (25) and having a linear track (30') opposite the linear track (26') on said second face of

said guide rib (25), and where a first linear set of ball bearings (31) is guided in the guide tracks (26, 30) between said lateral walls and said first side of the guide rib (25), and a second linear set of ball bearings (31) is guided in the guide tracks (26', 31') between said finishing cheek (28) and said second side of the guide rib (25).

3. A guide system according to claims 1 and 2, characterised in that said finishing cheek (28) is fixed to the second slide member (12) by means of adjustable clamping bolts (29).

4. A guide system according to the previous claims characterised in that the lateral wall (27) and the finishing cheek (28) of the second slide member are parallel to each other, placed on opposite sides of the guide rib (25) of the first slide member and contain the two sets of adjustable preloaded ball bearings.

5. A pneumatically controlled slide characterised by a guide system with rolling elements, in particular ball bearings, according to the previous claims.

