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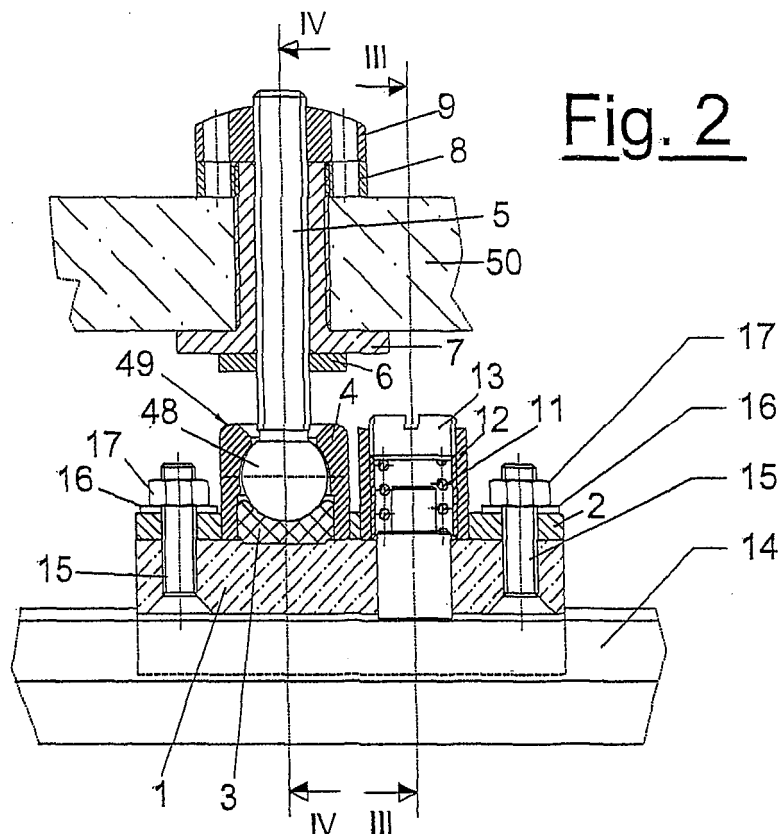
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Via Borgonuovo, 10
20121 Milano (IT)**(54) **Trolley moving system, in particular for mobile roofs of boats**

(57) A trolley moving system, in particular for mobile roofs (50) of boats, of the type comprising means for moving at least one trolley-shaped element, which is fixed to an attachment system (51, 52) to the mobile portion (50); in particular, the trolley-shaped element includes at least

one sliding block (1), capable of sliding on at least one respective shaped guide (14), which is mechanically connected to an articulated system (49), comprising a ball socket joint (48), in turn mechanically connected to the attachment system (51, 52) of the mobile portion (50) for the relative movement.

**Fig. 2**

Description

[0001] The present invention refers to a trolley moving system, in particular for mobile roofs of boats.

[0002] In the field of boating accessories, mobile roofs or canopies for covering boats are of great importance; they are used to allow the top portion of boats to be partially or totally covered.

[0003] Generally, they have a rectangular plan, with shapes and sizes that adapt to the frame of the boat, whereas the types of construction and the materials used can be various.

[0004] There are also retractable telescopic canopies, manually and/or automatically actuated, according to whether they can be opened or closed manually or by means of electrical actuators and drive belts.

[0005] Generally automatic retractable telescopic canopies are particularly used, above all considering the fact that they take up little space on the boat.

[0006] In some cases, they are totally retractable, i.e. they can withdraw telescopically, by means of suitable moving trolleys, in suitable housings built in to the boat.

[0007] The selection of the materials derives from technical and aesthetic considerations, respecting the functional requirements; in any case, light alloys with various levels of surface finish, tempered crystals, technological polymers and/or Plexiglas on an aluminium frame are used.

[0008] However, due to the vibrations of the structure of the boat during navigation and the crashing against the waves, especially when the canopy is partially or totally open, conventional moving systems are subject to operating anomalies and to rapid wear; moreover, such induced vibrations cause a lot of noise due to the inevitable tolerances of the various components of the moving system.

[0009] Another serious drawback of the moving system of canopies of boats currently known consists of the fact that their continuous exposure to salty air results in the formation of a surface crust on the various components, responsible for a rapid degradation of the moving parts, also making it difficult for these parts to slide.

[0010] The purpose of the present invention is, therefore, to avoid the aforementioned drawbacks and, in particular, to make a trolley moving system, in particular for mobile roofs of boats, which allows rapid structural degradation of said mobile roofs to be avoided, above all in partially or totally open position, due to the vibrations caused both by the crashing of the structure of the boat against the waves and by the operation of the boat's engine.

[0011] Another purpose of the invention is to make a trolley moving system, in particular for mobile roofs of boats, which allows a reduction of the noise due to the knocking of the moving parts of the system during navigation or with the engine switched on.

[0012] A further purpose of the invention is to make a trolley moving system, in particular for mobile roofs of

boats, which, despite the formation of the salty surface crust that is normally created on the various components and on the moving parts of the system, due to the continuous exposure to the salty air and/or to humidity in general, makes it easier for the trolley to slide without much impediment, indeed carrying out a sort of cleaning of the surfaces of the sliding guide.

[0013] These and other purposes are accomplished by a trolley moving system, in particular for mobile roofs of boats, according to the attached claim 1; the further dependent claims include other detailed technical characteristics.

[0014] Further characteristics and advantages of the present invention shall become clearer from the following description, relative to a preferred but not limiting example embodiment, and from the attached drawings, in which:

- figure 1 is a partial plan view from above of a trolley moving system, in particular for mobile roofs of boats, according to the present invention;
- figure 2 is a section view taken along the line II-II of figure 1;
- figure 3 is a section view taken along the line III-III of figure 2;
- figure 4 is a section view taken along the line IV-IV of figure 2;
- figure 5 shows a constructive detail of the attachment system shown in figure 4, according to an alternative embodiment to the attached system illustrated in figure 4;
- figure 6 is a plan view from above of a complete trolley moving system, in particular for mobile roofs of boats, according to the present invention;
- figure 7 is a side view, partially in section, of the trolley moving system according to figure 6, according to the present invention;
- figure 8 is a front view of the trolley moving system according to figure 7, according to the present invention.

[0015] It should be noted at this point that the following description, relative to a preferred example embodiment, refers to a particular application of the trolley moving system, according to the invention and, specifically, it refers to a use for mobile canopies for pleasure boats.

[0016] It is also clear that, alternatively and irrespectively, the trolley moving system, object of the present invention, can also be applied to different types of product and in any case can be made for all systems suitable for moving panels or, in general, extensive surfaces.

[0017] With particular reference to figures 1-5, which show the moving system according to the invention in detail, fixed, in particular onto mobile canopies of boats, normally made from plexiglass, crystal or fibreglass, reference numeral 50 generically indicates a portion of mobile canopy, to which a sliding block 1 is fixed, capable of sliding on a shaped aluminium guide 14, which has a

profile 53 shaped like a sharp edge and is made from non-hygroscopic plastic material and, preferably, polyethylene; the sliding block 1 is made to translate by known actuations (such as belt motors) and is connected to an articulated system 49, shaped like a trolley, as well as, furthermore, to an attachment system to the mobile canopy 50 for moving the latter.

[0018] The attachment system for moving the mobile canopy 50 can be made on the outside of the roof 50, as represented in figures 1-4 and generically indicated with reference numeral 51, or else, alternatively, it can be made built in to the roof 50, as illustrated in detail in figure 5 and generically indicated with reference numeral 52, for applications on plexiglass or crystal roofs, on a frame preferably made from aluminium.

[0019] The articulated system 49 comprises a base plate 2, used for the sliding of the sliding block 1, which is fixed to the sliding block 1 through fixing means, such screws 15, washers 16 and lock nuts 17, and a cap 4, which incorporates a ball socket joint 48.

[0020] The ball socket joint 48, in turn, is damped, thanks to the presence of a shaped silicon rubber insert 3, which rests at the bottom on the sliding block 1; the articulation 48 is also connected to a pin 5, complete with lower locking washer 6, for the connection to the attachment system to the roof 50.

[0021] In the case illustrated in figures 1-4, such an attachment system (in this case outside of the roof 50) comprises a threading bushing 7, which extends between the pin 5 and the structure of the canopy 50, and, on top, to shaped locknuts 8, 9.

[0022] Alternatively, the attachment system built in to the roof 50 (figure 5) includes a first threaded bushing 18, which is inserted in contact with the pin 5, opposite a second shaped bushing 21, closed on top by a polyethylene plug 22, which is inserted in contact with the crystal of the roof 50, through the interposition of a silicon rubber cup gasket 20; closing is carried out by means of a nut 19, tight on the pin 5.

[0023] The use of a sliding block 1, made from non-hygroscopic plastic material and able to slide on the guide 14, determines a substantial reduction, if not a complete elimination, of the salty surface crust, normally present on the components of the moving system and responsible for serious and frequent malfunctions; in particular, the sharp edge of the sliding block 1, which slides in contact with the matching profile of the guide 14, is responsible for a complete cleaning, since the guide 14 is, in this way, self-cleaning at each passage of the sliding block 1, during the moving of the canopy 50.

[0024] Moreover, the described attachment systems to the mobile roof 50 are substantially easy to mount, since they are based upon the use of a ball socket joint, which can also have damping means for coupling with the sliding block 1.

[0025] In further preferred but not limiting example embodiments of the present invention, the trolley moving system described up to now also foresees the use of a

mechanical brake (figure 3), as anti-vibration system, made thanks to the use of a polyethylene pad 10, pressed inside a through hole made on the plate 2 and on the sliding block 1; the pad 10 is subject to the pressing action of a fixing grain 13, contained inside a threaded bushing 12, which pushes on a cylinder 54, through the interposition of a spring 11.

[0026] In this way, the pad 10 makes contact with the guide 14 and can be pushed more in contrast to it, suitably adjusting the grain 13, for a greater braking action on the guide 14.

[0027] With particular reference to figures 6-8, which show a particular belt-driven moving system for mobile roofs of boats, according to the present invention, the same components shown in figures 1-5 are indicated with the same reference numerals; in particular, figures 6-8 show, as a non-limiting example, a moving system comprising a ball socket joint 48 of an articulated system and damped 49, of the type of those illustrated in figures 1-5, and an attachment system 51, visible in figure 4, which is structural, adjustable (even separately from the ball socket joint 48) and outside the mobile roof 50, of the type of those illustrated in figures 1-4.

[0028] Moreover, the sliding block 1 is used as a means for pulling the belt 13, moved through the wheel 34, the idle sheave 21 (complete with sheave bracket 23 and attachment pin 24) and the toothed pulley 14, the latter fixed in position by means of the key 15 and the pin 16 and supported by the bracket 17, in turn fixed to the central drawplate 45, through the screw 18.

[0029] The central drawplate 45 is then connected to the base guide 32 by means of the connection drawplate 47, whereas a C-shaped sliding block 31 for supporting the geared motor 26 is mounted on the base guide 32. The geared motor 26 also foresees a pin 22 for the actuation imparted by the motor 42, equipped with encoder; such actuation is determined by the movement of the tie rods 30, connected to compression springs 40 that push on respective front plates 38, thanks to the attachment of the nuts 37, 41.

[0030] Finally, all of this can be enclosed inside an optional casing 43.

[0031] The structure described above allows the knocks transmitted to the belt 13, usually made from rubber, possibly with added Kevlar® fibres, during navigation to be damped, safeguarding its integrity.

[0032] Moreover, the tension of the belt 13 can be easily modified by acting upon the nuts 37, 41, which are thus used in order to obtain a correct adjustment of the tension.

[0033] From the description that has been made the characteristics of the trolley moving system for mobile roofs, in particular for boats, object of the present invention, are clear, just as its advantages are also clear.

[0034] Finally, it is clear that numerous other variants can be brought to the moving system in question, without for this reason departing from the novelty principles inherent to the inventive idea, just as it is clear that, in the

practical embodiment of the invention, the materials, the shapes and the sizes of the illustrated details can be whatever according to the requirements and they can be replaced with others that are technically equivalent.

Claims

1. Trolley moving system, in particular for mobile roofs (50) of boats, of the type comprising means for moving at least one trolley-shaped element, said trolley-shaped element being fixed to an attachment system (51, 52) to at least one mobile portion (50), **characterised in that** it includes at least one sliding block (1), capable of sliding on at least one respective shaped guide (14), said sliding block (1) being connected to an articulated system (49), which furthermore is mechanically connected to said attachment system (51, 52) for the relative movement of the mobile portion (50). 5 10 15 20
2. Moving system according to claim 1, **characterised in that** said attachment system (51, 52) to said mobile portion (50) is made on the outside of the mobile portion (50) or else built in to the mobile portion (50). 25
3. Moving system according to claim 1, **characterised in that** said mobile portion (50) includes at least one mobile boat roof or canopy made from plexiglass, fibreglass and/or crystal. 30
4. Moving system according to claim 1, **characterised in that** said sliding block (1) has a profile (53) with a sharp edge, which couples with the matching profile of said guide (14). 35
5. Moving system according to claim 1, **characterised in that** said sliding block (1) is made from non-hygroscopic plastic material, preferably polyethylene. 40
6. Moving system according to claim 1, **characterised in that** said articulated system (49) comprises at least one base plate (2), used for the sliding of said sliding block (1) and fixed to the sliding block (1) through fixing means (15, 16, 17), and at least one protective element (4), which entirely incorporates at least one ball socket joint (48). 45
7. Moving system according to claim 6, **characterised in that** said ball socket joint (48) is mechanically connected to at least one damping element (3), which rests upon the sliding block (1), and to at least one pin (5) for connection to the attachment system (51, 52) to the mobile portion (50). 50 55
8. Moving system according to claim 1, **characterised in that** said sliding block (1) has at least one through hole, inside of which at least one shaped element (10) made from plastic or thermoplastic material is pressed, said shaped element (10) being subject to the pressing action of at least one grain (13), through the interposition of at least one elastic element (11), so that a suitable adjustment of said grain (13) determines a braking action on said guide (14), in order to obtain an anti-vibration system. 5
9. Moving system according to claim 1, **characterised in that** said means for moving said trolley-shaped element include at least one motorised belt actuation (13), said sliding block (1) being used as means for dragging the belt (13), said belt (13) being actuated, by means of at least one wheel (34), of at least one idle sheave (21) and at least one pulley (14), through at least one motor (42) and/or at least one geared motor (26). 10 15 20 25 30 35 40 45 50 55

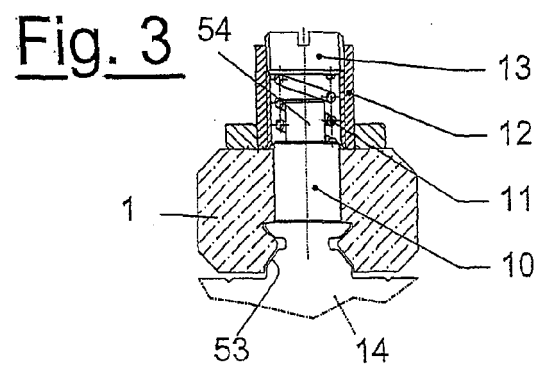
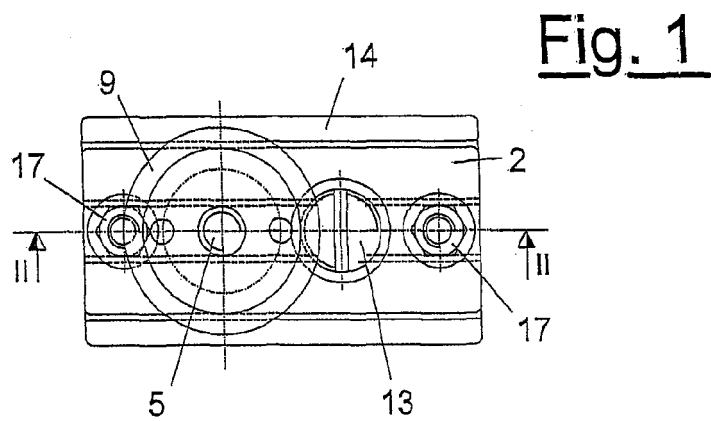
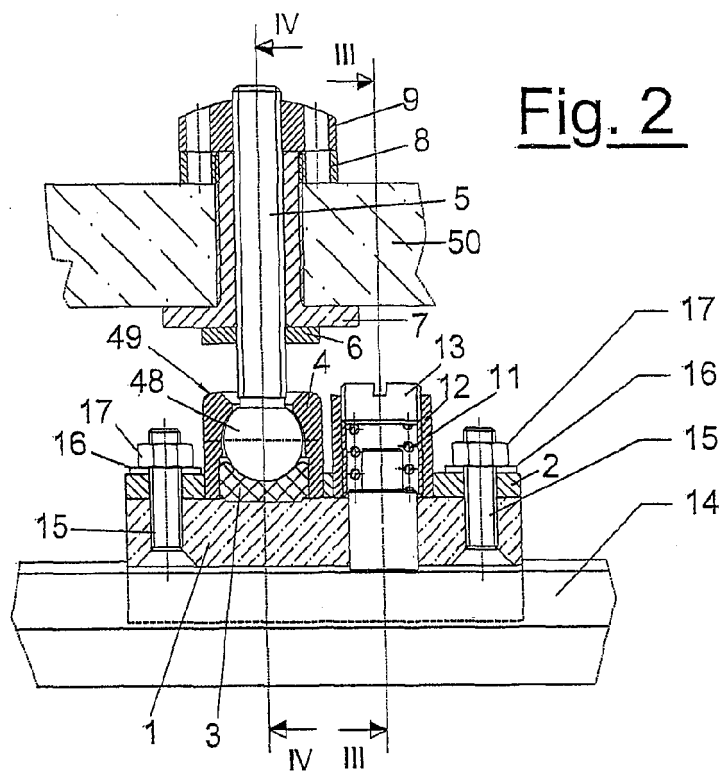


Fig. 4

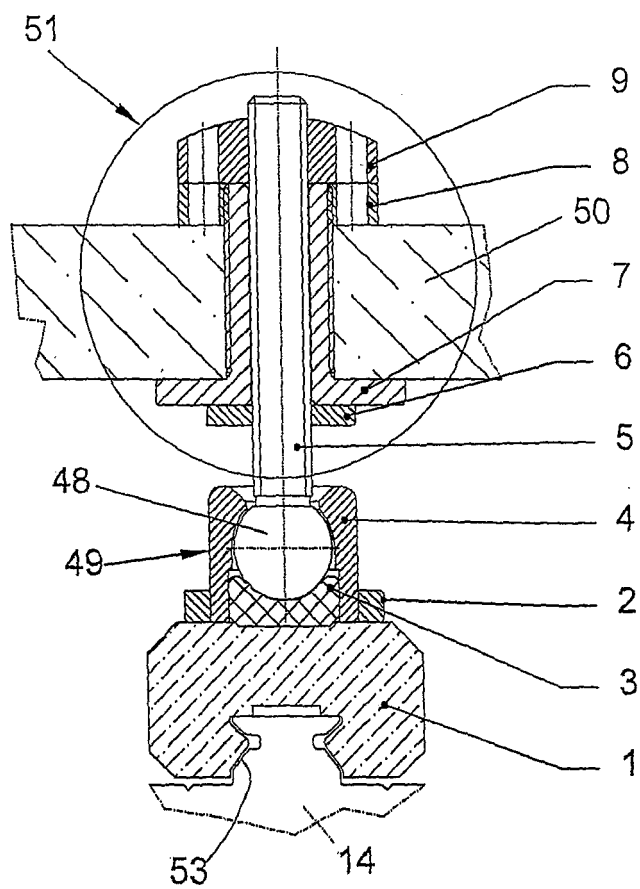


Fig. 5

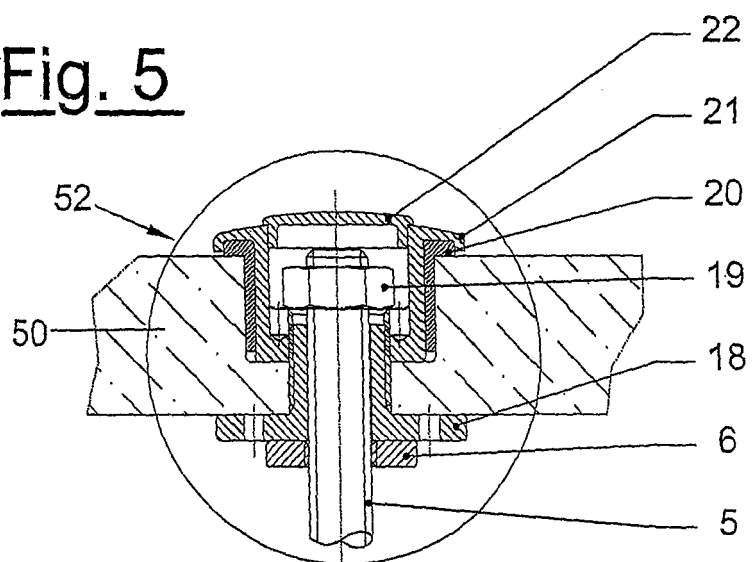


Fig. 8

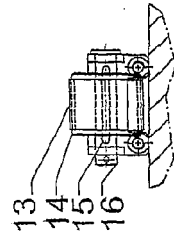


Fig. 7

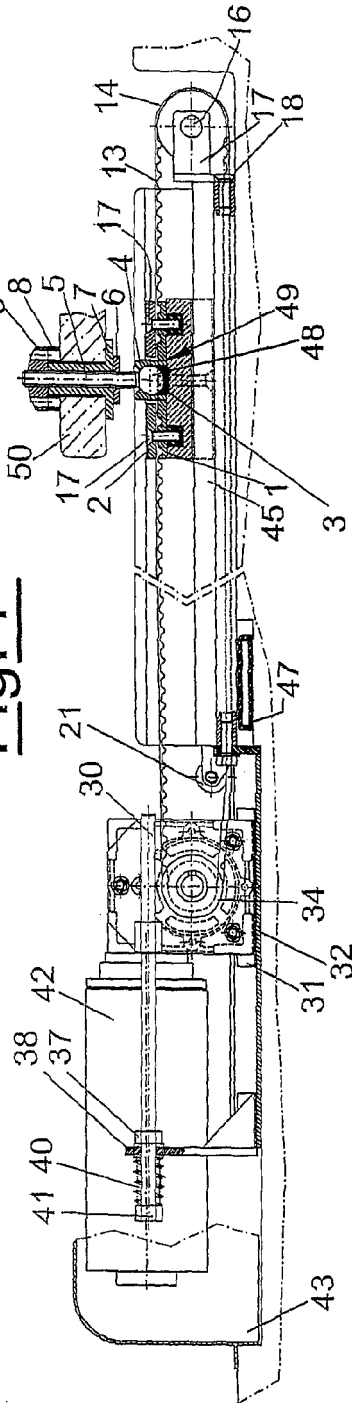


Fig. 6

