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(54) **Movement system, in particular for moving roofs of boats**

(57) An improved movement system, in particular for moving roofs of boats, of the type comprising a central motor (51), which transfers the motion to relevant central driving shafts (4), connected to respective outer shafts (19), for supporting respective return pulleys (18), for moving the moving roof or top along respective side

guides; in particular, the motion transmission between the central shafts (4) and the outer shafts (19) is obtained by respective driving bushes (2), connected to the respective central (4) and outer shafts (19), inside which the relevant ends of a square spring (3) are connected for driving the motion.

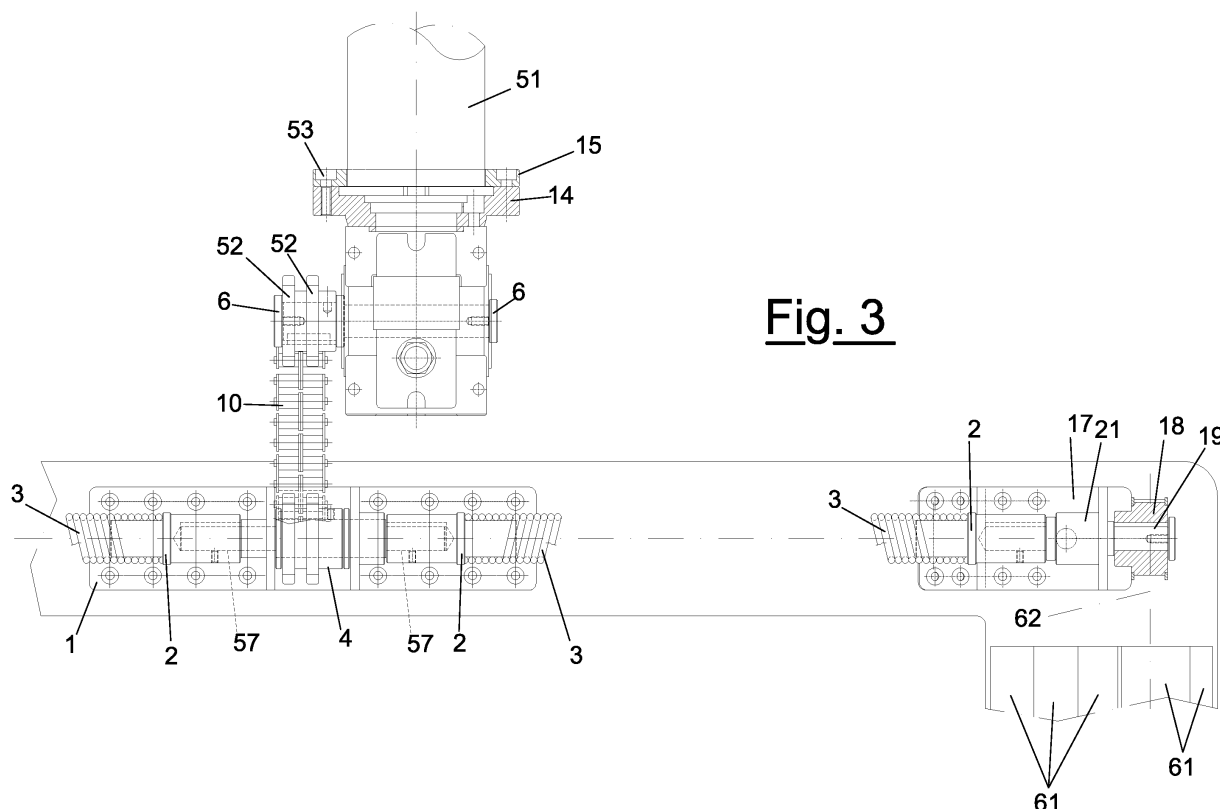


Fig. 3

Description

[0001] The present invention relates to an improved movement system, in particular for moving roofs of boats.

[0002] Among the accessories for sailing, the moving roofs or tops for covering the boats are important; they are used for allowing partial or total covering of the top portion of the boats.

[0003] They generally have a rectangular plan, which shapes and sizes that adapt to the boat frame, whereas the construction types and the materials used are varied.

[0004] Also telescopic recessed roofs exist, with manual and/or automatic actuation, according to whether they can be opened or closed manually or through electrical actuators and driving belts.

[0005] Telescopic recessed roofs, generally automatic, are especially used, above all in view of the fact that the same require minimal space occupied on the boat.

[0006] In some cases, they are fully recessed, that is, they can be telescopically retracted, through suitable movement carriages, into special seats recessed into the boat.

[0007] The selection of the materials arises from technical and aesthetic considerations, according to the functional requirements; in any case, light alloys and with various levels of surface finish, hardened crystals, engineered polymers and/or Plexiglas on aluminium frame, are used.

[0008] The roof movement generally takes place thanks to the use of a central motor, whose driving shaft imparts the motion, through a toothed rim, to respective central driving shafts connected to further outer shafts, which support respective side pulleys, used for returning the motion on the side guides of the roof; moreover, since the cross profile of the boat hull generally takes on a curvilinear pattern, it is necessary to envisage the use of respective universal joints, adapted for transmitting the motion between the central driving shafts and the outer shafts, which are misaligned with respect to one another.

[0009] However, the use of the above universal joints for transmitting the motion implies considerable disadvantages, above all of construction type and those relating to the considerable production and operating cost of such components.

[0010] The object of the present invention therefore is to obviate the disadvantages mentioned above and in particular, to obtain an improved movement system, in particular for moving roofs of boats, highly reliable and effective, from the functional point of view, and substantially less expensive and less structurally complex as compared to the conventional movement systems of the known type.

[0011] These and other objects are achieved by an improved movement system, in particular for moving roofs of boats, according to the annexed claim 1; the further dependent claims include other detailed technical features.

[0012] Further features and advantages of the present

invention will appear more clearly from the following description relating to an indicative and preferred but non-limiting example of embodiment thereof, and from the annexed drawings, wherein:

- figure 1 shows a partial side view of an improved movement system, in particular for moving roofs of boats, according to the present invention;
- figure 2 shows a section view taken along line II-II of figure 1;
- figure 3 shows a partial plan top view of an improved movement system, in particular for moving roofs of boats, according to the present invention.

[0013] It is noted that the following description, relating to a preferred embodiment, refers to a special application of a movement device, of the carriage type, and in particular it refers to a movement system for moving roofs of boats.

[0014] It is also clear that, alternatively and without distinction, the movement system subject of the present invention can be further applied also to different types of products and in any case, it can be made for all those systems adapted for moving panels or in general, extended surfaces.

[0015] With particular reference to figures 1-3, which show in detail the movement system, according to the present invention, in particular fixed on moving roofs of boats, normally made of Plexiglas, crystal or fibreglass, reference numeral 50 generally denotes a portion of hull of the boat, to which the movement device is fixed, comprising in particular a plate 1 for supporting a first dual driving toothed chain or rim 10, which in turn engages with a further dual toothed chain or rim 13, associated by a washer 11 and respective fastening screws 52, to the driving shaft 12 of a motor unit 51, complete with gearmotor.

[0016] The motor unit 51 is mechanically connected to shaft 12 by a flange 14, applied to the driving shaft 12 thanks to the interposition of a head washer 6 and fixed to the bottom of motor 51 through a contrast ring 15, associated to flange 14 through respective screws 53.

[0017] The dual toothed chain or rim 10 is mechanically connected, through a support tongue 8 and a spacer washer 9, to a central shaft 4, fixed to plate 1 through suitable spacers 56 and provided with dowels 54 and fixing tabs 55, which transfers the motion, through suitable rotation bushes 57 associated to shaft 4 thanks to the interposition of suitable shaped bushes 5, 7, in a direction parallel to the cross development of hull 50.

[0018] On the side of central shaft 4 and facing the longitudinal sides, along which the moving roof shifts, there are mounted relevant return pulleys 18, supported by respective outer shafts 19, in turn fixed to a base plate 17 through suitable spacers 16.

[0019] Each outer shaft 19 is mechanically connected to respective rotation bushes 21, through support tongues 20, and lies on supports 58, provided with dowels

59 and fixing tabs 60, adapted for the mechanical connection with the central shaft 4.

[0020] Downstream of the side return pulleys 18 there are preferably mounted respective side sliding blocks (made of plastic material, non-hygroscopic, and not shown in the annexed figures), sliding on shaped guides 61 and placed in shifting through drives of known type, such as belt motors 62, connected to the respective pulleys 18 (as shown in detail in figure 3).

[0021] The shaped sliding blocks are also connected to relevant articulated systems, preferably shaped as a carriage (not shown), as well as fixing systems to the moving roof for moving the latter.

[0022] The fixing system for moving the moving roof of boats can be provided outside the roof, or as an alternative, it can be provided recessed into the roof, for applications on Plexiglas or crystal roofs, on a frame preferably made of aluminium.

[0023] According to the present invention, in place of the conventional universal joints, which are normally mounted between the ends of the central shaft 4 and the facing ends of the outer shafts 19 supporting the return pulleys 18, in order to obtain a correct transmission of the motion between misaligned components (as they are fixed to a curvilinear profile, such as that of hull 50 of the boats), a square spring 3 is used as motion driving device, whose ends are respectively connected to the central shaft 4 and to the outer shafts 19, through respective driving bushes 2.

[0024] The use of the square section spring 3 allows perfect connection, through bushes 2, to the central shaft 4 and to the outer shafts 19 for transmitting the motion, with square section as well, and moreover allows driving the motion also according to inclined and/or curvilinear trajectories because, once the section of spring 3 has been designed for the desired use and the material for such use has been selected, the malleability and elasticity of the component allow full torsion thereof, while maintaining the possibility of transmitting the motion, without any danger of breakage.

[0025] Moreover, the use of an elastic component, in place of each universal driving joint, normally used in the movement systems of known type, allows drastically reducing both production and operating costs of the movement system and the installation difficulties and complications of the motion transmission device.

[0026] The features of the improved movement system, in particular for moving roofs of boats, which is the subject of the present invention, as well as the advantages thereof, appear clearly from the above description.

[0027] Finally, it is clear that several more variations can be made to the subject movement system without departing from the novelty principles of the inventive idea, as well as it is clear that in the practical embodiment of the invention materials, shapes and sizes of the illustrated details may be whatever according to the requirements and the same may be replaced with technically equivalent ones.

Claims

1. An improved movement system, in particular for moving roofs of boats, of the type comprising at least one motor unit (51), located at the centre of the system, which transfers the motion to relevant central driving shafts (4), connected to respective outer shafts (19), for supporting respective return pulleys (18), for moving the moving roof or top along respective side guides, **characterised in that** at least one elastic element (3) for the motion transmission is arranged between said central shafts (4) and said outer shafts (19).
2. A movement system according to claim 1, **characterised in that** said elastic element (3) is mechanically connected to said central shaft (4) and to said outer shafts (19) through respective driving bushes (2), inside which there are connected the relevant ends of said elastic element (3).
3. A movement system according to claim 1, **characterised in that** said elastic element (3), adapted for driving and transmitting the motion, consists of at least one square spring (3), having predetermined section.
4. A movement system according to claim 1, **characterised in that** said central shafts (4) and said outer shafts (19) are connected to at least one portion of hull (50) of the boat, through at least one support plate (1, 17) and/or suitable spacers (16, 56).
5. A movement system according to claim 1, **characterised in that** said motor unit (51), complete with gearmotor, is mechanically connected to at least one driving shaft (12), to which at least a first dual driving toothed chain or rim (13) is associated, on which at least a second dual driving toothed chain or rim (10) engages.
6. A movement system according to claim 4, **characterised in that** said second dual toothed chain (10) is mechanically connected, through at least one support tongue (8), to said central shaft (4), adapted for transferring the motion, through suitable rotation bushes (57), in a direction parallel to the cross development of the hull (50) of the boat.
7. A movement system according to claim 1, **characterised in that** said return pulleys (18) are arranged at the side of said central shaft (4) and facing the longitudinal sides of the boat, along which the moving roof shifts, said return pulleys (18) being connected to actuating devices (62) of elements shifting on guides (61).
8. A movement system according to claim 1, **characterised in that**

terised in that said each outer shaft (19) is mechanically connected to respective rotation bushes (21) and lies on supports (58), adapted for the connection with the central shaft (4).

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Fig. 2

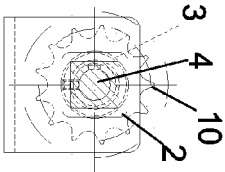


Fig. 1

