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(54) **Movement device, in particular for sliding doors of boats**

(57) A movement device, in particular for sliding doors (54) of boats, suitable for allowing the opening and closing actuation of the sliding door (54) according to a direction substantially parallel to the longitudinal development of the boat; the device essentially uses a motor-driven hinge, which is manually adjustable into position,

even over time, relative to the door (54), through adjustment means (31, 32, 33), positioned inside shaped slots (55, 56, 57), in turn obtained onto respective plates (13, 17, 19) and/or self-centering disks (22, 23, 24), mounted at the sides of the hinge, so as to ensure complete adaptability and adhesion of the sliding door (54) to the hull (53) of the boat.

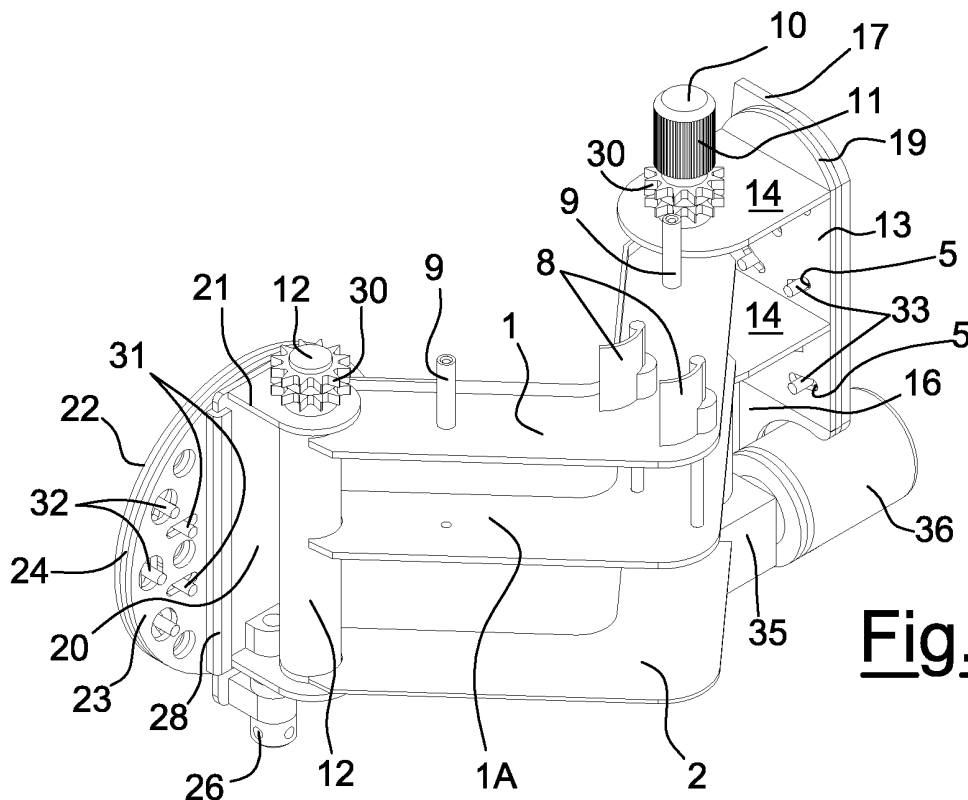


Fig. 1

Description

[0001] The present invention relates, in general, to a movement device, in particular for sliding doors of boats.

[0002] More in particular, the invention relates to a movement mechanism for sliding doors present on board of boats, which allows the opening and closing actuation of the door, according to a direction substantially parallel to the longitudinal development of the boat, ensuring complete adaptability and adhesion to the hull, thanks to the use of suitable adjustment means mounted on board of a hinge.

[0003] The sliding doors still existing on the boats provide for the use, for the movement thereof, of a guide track, generally located on top of the access opening, on which gearing adapted for guiding the door panel in a direction parallel to the opening slides.

[0004] However, such embodiment exhibits installation difficulties; moreover, it is necessary to provide for the installation of the above guide tracks, which besides implying considerable production and operating costs, of course, require a significant space, to be provided laterally to the access opening, for the installation thereof.

[0005] Finally, the proposed solution cannot ensure perfect seal of the closing panel at the access opening, since it does not allow adapting such panel to the boat hull, once the panel has been installed. The object of the present invention therefore is to obviate the disadvantages mentioned above and in particular, to obtain a movement device, in particular for sliding doors of boats, which should allow obtaining perfect adaptability and adhesion of the sliding door to the boat hull, at the access opening where it is installed. Another object of the present invention is to obtain a movement device, in particular for sliding doors of boats, which should allow adjusting the position of the sliding door, at the relevant access opening, on all the three reference Cartesian axes.

[0006] A further object of the invention is to obtain a movement device, in particular for sliding doors of boats, which should be highly effective, reliable and functional, at relatively low cost, as compared to the traditional solutions and in relation to the advantages achieved. These and other objects are achieved by a movement device, in particular for sliding doors of boats, according to the annexed claim 1; the further dependent claims include other detailed technical features.

[0007] 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 perspective overall view of an adjustable hinge, which constitutes the movement device, in particular for sliding doors of boats, according to the invention;
- figure 2 shows a top view of the adjustable hinge of figure 1, according to the invention;

- figure 3 shows a side, partly section and partly cut-away view of the adjustable hinge of figure 1, according to the invention;
- figure 4 shows a section view taken along line IV-IV of figure 3;
- figure 5 shows a section view taken along line V-V of figure 3;
- figure 6 shows a perspective view of the movement device, according to the present invention, applied to a sliding door of a boat, in a first operating position (with half open door);
- figure 7 shows a perspective view of the movement device, according to the present invention, applied to a sliding door of a boat, in a second operating position (with fully closed door).

[0008] It is noted that the following description and the annexed figures, relating to a preferred embodiment, refer to a special application of the movement device according to the present invention and in particular, they refer to a use for sliding doors of pleasure boats.

[0009] It is also clear that, alternatively and without distinction, the movement device 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 doors, panels or extended surfaces in general.

[0010] With particular reference to the above figures 1-7, the movement device, according to the invention, essentially consists of a single motor-driven and adjustable hinge, the construction details of which are shown in figures 1-5.

[0011] In particular, the above hinge comprises a series of L shaped longitudinal plates, such as a top plate 1, overlapped, at the end of the installation, by a cover protection 1B, in turn secured to plate 1 by pins 9, a middle plate 1A and a bottom plate 2, enclosed into respective vertical plates, an inner one (since, when the hinge is installed, it is arranged in front of the inner portion 52 of the sliding door 54), generically indicated with reference numeral 3, and an outer one (whose surface, when the hinge is installed, is visible from inside hull 53 of the boat), generically indicated with reference numeral 4.

[0012] The plates of the L shaped hinges indicated with reference numerals 1, 1A and 2 are laterally connected, on one side, to a first main movement pin 10, provided with a hub 5 and with a top knurled knob 11 and mounted at a vertical fixing bulkhead 50, provided at the access opening 51, closable by sliding door 54, of hull 53; on the other side, plates 1, 1A and 2 are fastened to a second pin 12, mounted at the inner portion 52 of the sliding door 54 (as can be seen in detail in the annexed figures 6 and 7).

[0013] Pin 12 is seated into a perforated bar 6, through a guide bush 7, whereas the main movement pin 10 receives the motion from the electrical motor 36, through gearmotor 35 and is keyed into hub 5, thanks to the interposition of a guide bush 15.

[0014] Respective chain tightener plates 8, fixed to plate 1 through relevant welded nuts 37 and screws 38, are positioned on top plate 1 of the hinge, at the point of contact of the sides of the L, and used as pre-tensioners of a dual roll chain 42, which develops on the entire surface of plate 1, according to the path indicated in detail in figure 3, between the respective dual pinions, indicated with reference numeral 30, of the main movement pin 10 and of pin 12 arranged at the side of sliding door 54.

[0015] Such chain timing system prevents unavoidable clearance and oscillations of the system and contributes to obtaining a parallel movement of sliding door 54, which remains aligned relative to hull 53, during the movement, also ensuring the adhesion of the above door 54 to hull 53 in closed door position over time.

[0016] The motor-driven hinge is further provided with a plate 20, adjacent pin 12 and always at the side fixed to door 54, sliding through guides 28 on door 54, which is connected to pin 12 through tongue 21; the vertical sliding of plate 20 takes place through the adjustment pin 26, which slides inside the threaded block 27 and is kept into position by the threaded washer 29.

[0017] The adjustment pin 26 further supports a block 25, which is welded to plate 43, in turn integrally fixed to the circular plate 23, adapted for the side adjustment of the hinge relative to sliding door 54.

[0018] Adjacent the circular plate 23 there are connected further circular plates, having the same shape and same dimensions as the above plate 23; in particular, there is a circular plate 22, fixed to door 54, and a circular plate 24, arranged between the two plates 22, 23, adapted for the vertical adjustment of door 54.

[0019] The above circular plates 22, 23, 24 exhibit, at predetermined and suitable positions, a series of slots, inside which there are inserted respective adjustment screws.

[0020] In particular, the screws indicated with reference numeral 31 are welded on the intermediate plate 24 and protrude from plate 23, thanks to the presence of the concentric slots 55, and, similarly, the screws indicated with reference numeral 32 are welded on the end plate 22 and also protrude from plate 23, thanks to the presence of the concentric slots 56; in the latter case, considering the more extended size of slots 56, it is also possible to use one or more covering washers 40 to lock screws 32.

[0021] Similarly, the hinge is fixed to the wall or separator 50 of hull 53 of the boat by further overlapped plates, as shown in detail in the annexed figures 1-3.

[0022] In particular, a shaped plate 13 can be seen, which is connected through tongues 14 and reinforcement square 16 to hub 5 of the movement pin 10.

[0023] Also plate 13 is provided with slots 57, usable for the side and/or angular adjustment of the hinge, and is overlapped to a further plate 19, having the same shape and dimensions as plate 13 and usable for the vertical adjustment of the hinge, on which screws 33, which protrude from the concentric slots 57, are welded; also in

this case, it is possible to use one or more covering washers 41 of slots 57 (usually applied at slots 57 of relatively small size) and one or more locking nuts 39 for screws 33.

[0024] Adjacent to plate 19, finally, there is provided an end connecting plate 17, welded to separator 60 and screwed to bulkhead 50, on which the above plates 13 and 19 are adjustable into position, through screws 33.

[0025] Such embodiment allows, in the practice, to use a hinge provided, both at the hinge side connected to sliding door 54 and at the opposite side (connected to bulkhead 50 of hull 53 of the boat), with three self-centering disks or plates, which allow making suitable manual adjustments of the hinge, relative to sliding door 54 and to hull 53 of the boat, according to predetermined angles and in the three space directions.

[0026] Such adjustments, that can be carried out manually by the respective screws 31, 32, 33, are also repeatable over time, in order to obtain the utmost adaptability of the device to hull 53, even in the case the movement device of sliding door 54 and/or the structure of hull 53 undergo deformations and/or crookedness over time (for example due to negligence, atmospheric agents and/or simply to the boat exposure to a salty environment), which cause undesired clearance and oscillations of door 54 at the access opening 51.

[0027] Moreover, the parallel movement of door 54 relative to hull 53 is further ensured, as already described, by the chain system, which allows a synchronous and precise movement of the shaped vertical plates 3 and 4 of the hinge, so as to obtain a precise alignment of the inner portion 52 of door 54, at opening 51, both during the closing step and during the opening step of door 54.

[0028] The features of the movement device, in particular for sliding doors of boats, which is the subject of the present invention, as well as the advantages thereof, appear clearly from the above description.

[0029] Finally, it is clear that several more variations can be made to the subject movement device 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. A movement device, in particular for sliding doors (54) of boats, suitable for allowing the opening and closing actuation of the sliding door (54) according to a direction substantially parallel to the longitudinal development of the boat and for ensuring complete adaptability and adhesion of the sliding door (54) to the hull (53) of the boat, of the type comprising at least one shaped hinge, which is fixed, at a first end thereof, to at least one portion of said hull (53) of the boat, and, at a second end thereof, to at least one

portion of said sliding door (54), **characterised in that**, at said first and second ends of said hinge, there are provided respective first plates or disks (17, 22), fixed and integral, respectively, to said portion of the hull (53) and to said portion of the sliding door (54), said first plates or disks (17, 22) being constrained to further plates or disks (13, 19, 23, 24), which are at least partly overlapped to said first plates or disks (17, 22), by the interposition of adjustment means (31, 32, 33), fixed to at least one of said plates or disks (13, 17, 19, 22, 23, 24) and seated inside shaped slots (55, 56, 57) obtained on said plates or disks (13, 17, 19, 22, 23, 24).

2. A movement device according to claim 1, **characterised in that** said hinge exhibits a structure comprising a series of L shaped plates (1, 1A, 2) and enclosed by vertical closing plates (3, 4), said L shaped plates (1, 1A, 2) being connected to respective tongues (14, 21) for the connection to at least one of said plates or disks (13, 17, 19, 22, 23, 24). 15
3. A movement device according to claim 2, **characterised in that** between said connecting tongues (14, 21) and said L shaped plates (1, 1A, 2), there are arranged at least one movement pin (10), motor-driven by at least one electrical motor (36) and arranged at the end of the hinge fixed to said portion of the hull (53), and at least one return pin (12), arranged at the end of the hinge fixed to said portion of the sliding door (54). 25 30
4. A movement device according to claim 3, **characterised in that** said movement pin (10) and said return pin (12) include respective pinions (30), on which at least one roll chain (42) engages, arranged on top of at least one of said L shaped plates (1, 1A, 2) and having a development that follows the geometry of said L shaped plate (1, 1A, 2). 35 40
5. A movement device according to claim 4, **characterised in that** said roll chain (42) takes on a suitable tightening thanks to the use of respective chain tightener plates (8), provided with adjustment means (37, 38), arranged on said L shaped plate (1, 1A, 2). 45
6. A movement device according to claim 2, **characterised in that** at least one (21) of said connecting tongues (14, 21) is indirectly connected to said plates or disks (13, 17, 19, 22, 23, 24), through at least one sliding plate (20), contained within suitable sliding guides (28) and actuable by a relevant adjustment pin (26), said sliding plate (20) being provided at the end of the hinge fixed to said portion of the sliding door (54). 50 55
7. A movement device according to claim 1,

characterised in that said plates or disks (13, 17, 19, 22, 23, 24) exhibit, at least in pairs, same shape and dimensions.

- 5 8. A movement device according to claim 1, **characterised in that** said adjustment means (31, 32, 33) allows adjusting the setup of said sliding door (54) in the space, according to the three orthogonal axes and according to predetermined angles. 10
9. A movement device according to claim 6, **characterised in that** said adjustment pin (26) exhibits at least one block (25) integral to at least one shaped plate (43), which is in turn fixed to at least one of said plates or disks (13, 17, 19, 22, 23, 24) arranged at the end of the hinge fixed to said portion of the sliding door (54). 15 20

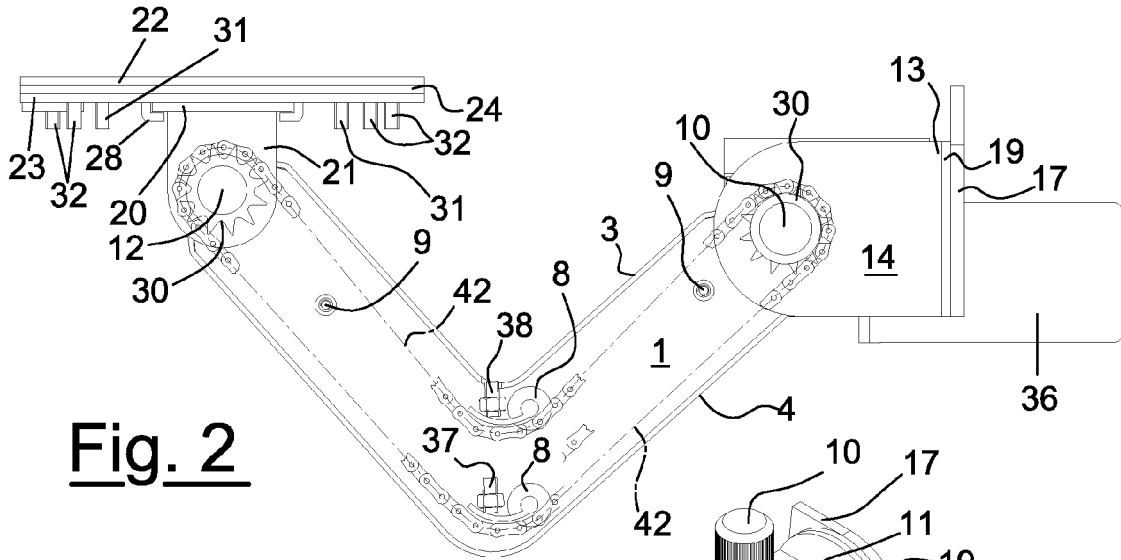


Fig. 2

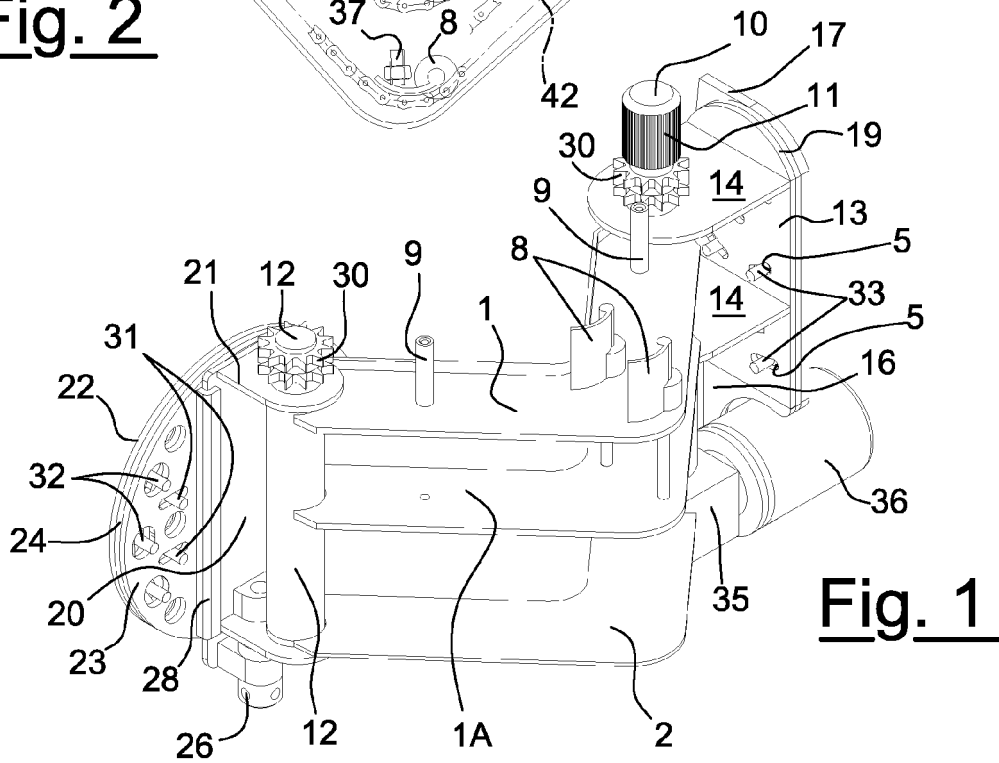


Fig. 1

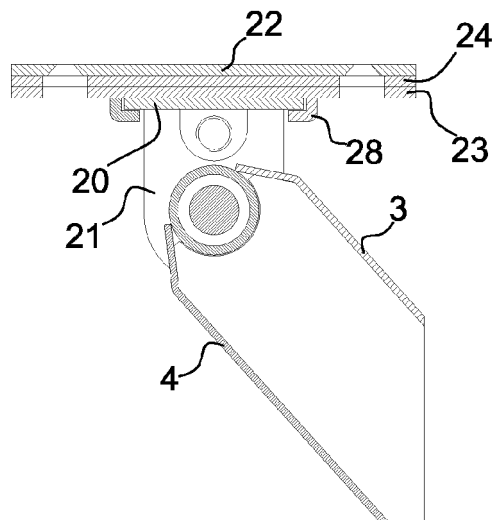


Fig. 5

Fig. 4

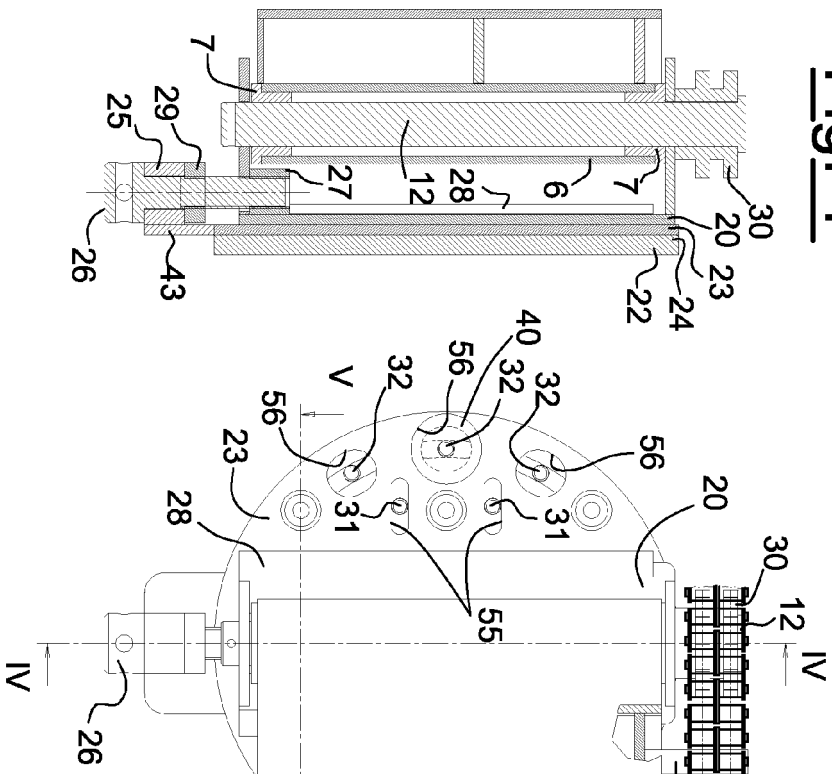


Fig. 3

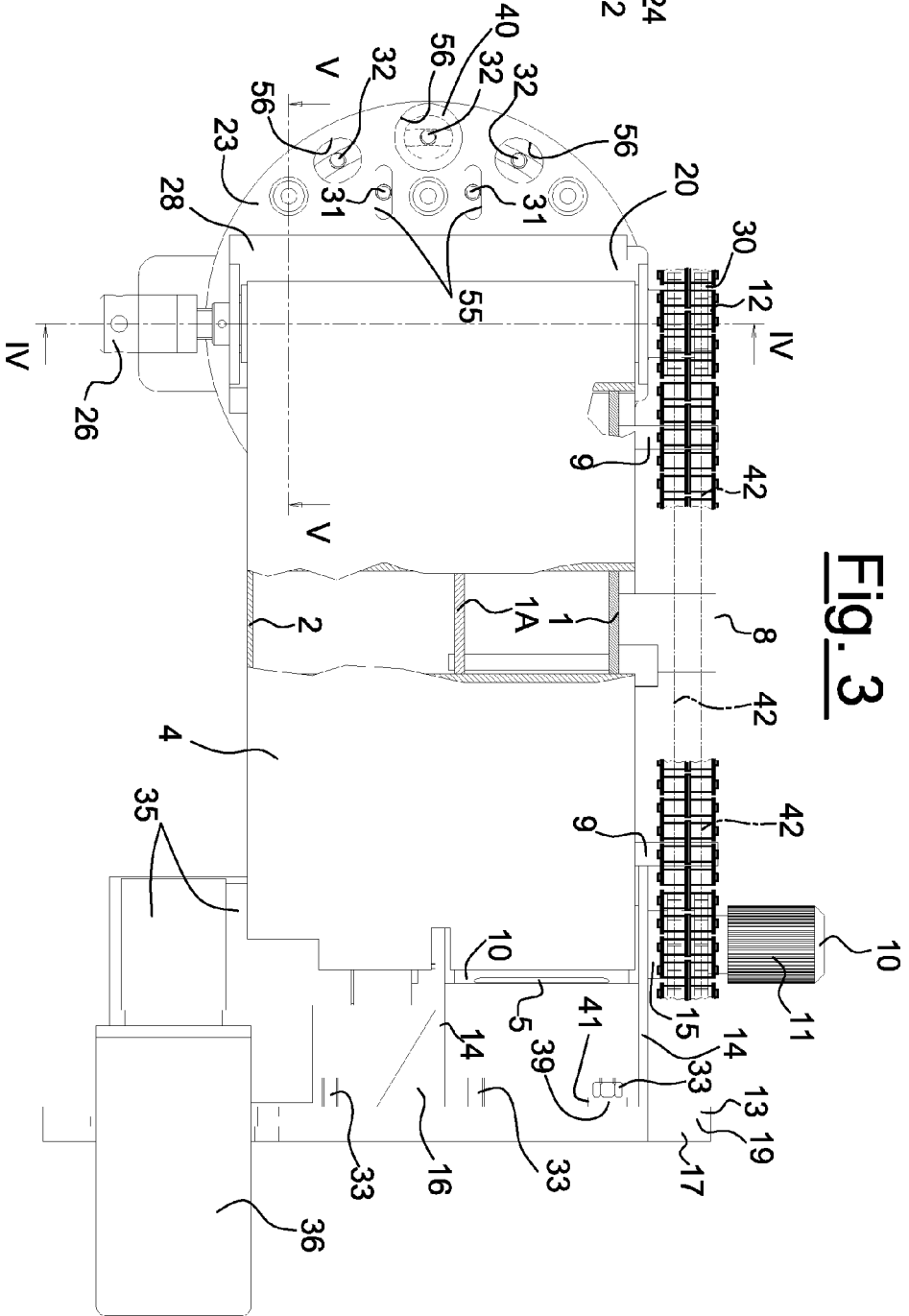


Fig. 6

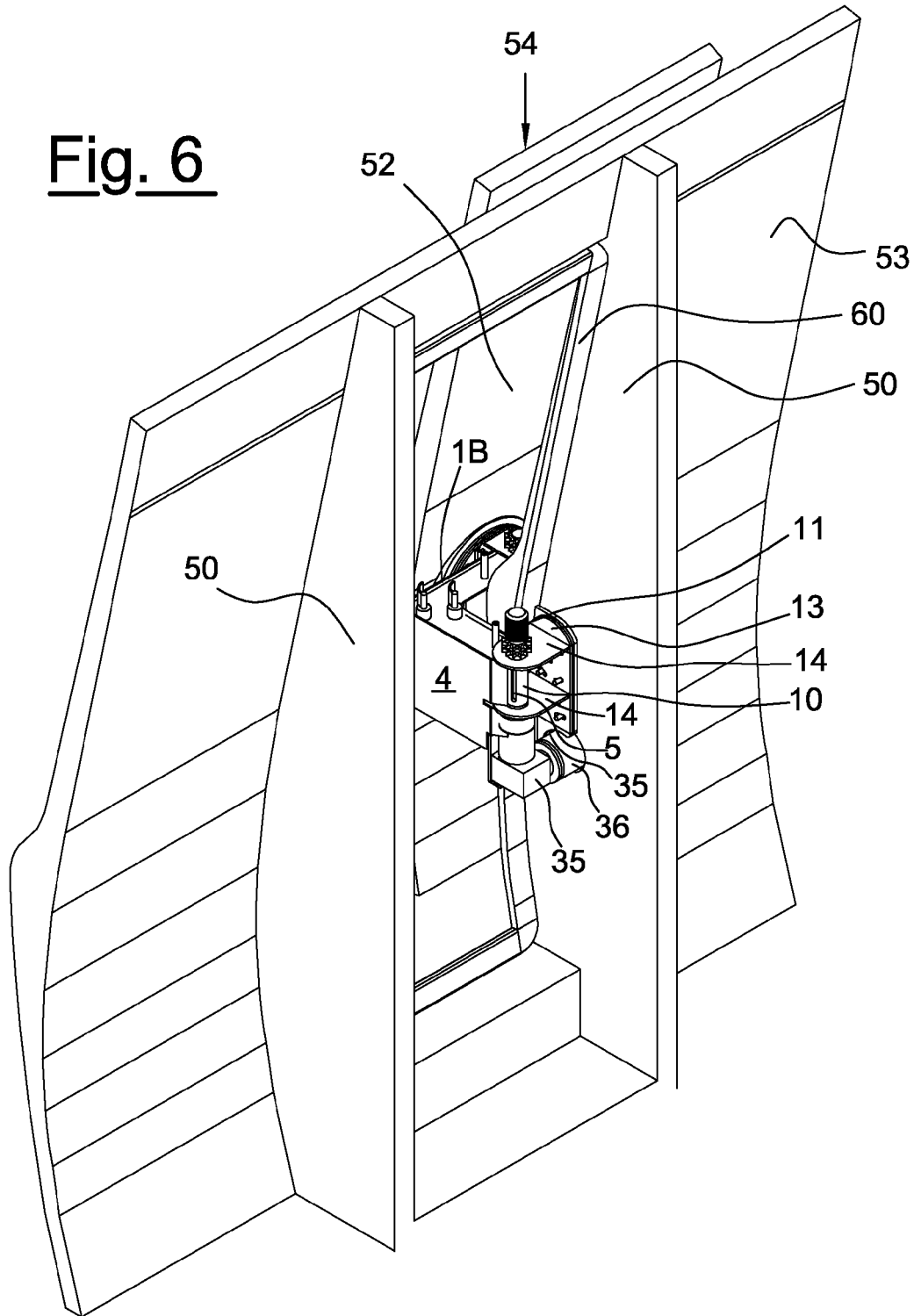


Fig. 7

