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(71) Applicants:
• **Oto Melara S.p.A.**
19136 La Spezia (IT)
• **Besenzoni S.p.A.**
24067 Sarnico (Bergamo) (IT)

(72) Inventors:
• **Franceschi, Giuliano**
19100 La Spezia (IT)
• **Borzoni, Andrea**
54100 Massa (Massa Carrara) (IT)
• **Maracci, Marco**
19020 Bolano (La Spezia) (IT)
• **Besenzoni, Giovanni**
24067 Sarnico (Bergamo) (IT)
• **Besenzoni, Giorgio**
25030 Paratico (Brescia) (IT)

(74) Representative: **Fusina, Gerolamo et al**
Ing. Barzanò & Zanardo Milano S.p.A,
Via Borgonuovo, 10
20121 Milano (IT)

(54) **Access gangway for boats made of titanium**

(57) Access gangway for boats comprising a plurality of base elements which are movable with respect to each other so to make such gangway extendable. Such base elements comprise a trolley (2) which determines the binding of the gangway to the boat, a fixed frame (3)

bound in an articulated manner to the end of such trolley having the possibility to carry out raising or lowering motions with respect to such trolley by means of movement means, and a movable frame (4) associated with the fixed frame (3) and telescopically slidable with respect thereto.

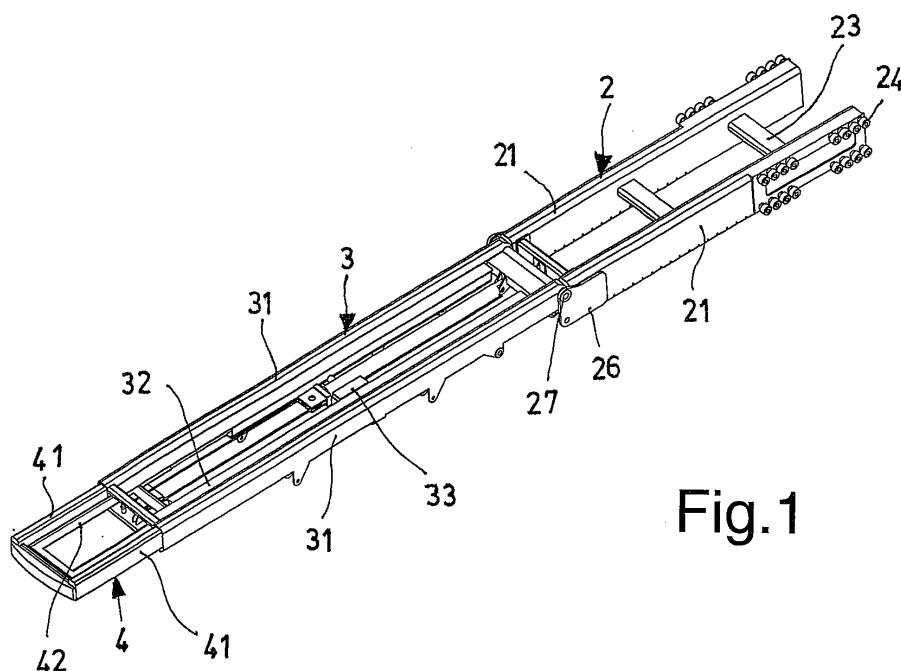


Fig.1

Description

[0001] The present invention refers to an access gangway for boats, for example a recreation boat also with the added functionality of small crane for loading tender ships or heavy materials in general on board.

[0002] In nautical production, normal hydraulic gangways currently exist, ranging from the simplest to the most complex, with the function of allowing the embarking and disembarking of passengers from the units moored in port. In practice they represent the extension of the boat up to the port dock. Often, above all on medium- or large-size boats equipped with tenders, the same gangways also become cranes capable of lifting and moving loads.

[0003] On the other hand, still in the production of nautical accessories, there are known systems such as stanchions and stays, "lifelines" and which work together to safeguard and protect the passenger from the possibility of falling in the sea.

[0004] Basic requirements for such structures are lightness and robustness. Lightness since the gangway, positioned at the stern end, significantly affects the overall weight of the boat and must be moved both manually and in a motorised manner, avoiding spending considerably amounts of energy, for example by supplying power to big power electric motors or hydraulic pistons, and the robustness since the people must move over it with complete safety.

[0005] In addition, the gangway itself must be transformed into a small crane capable of lifting considerably loads.

[0006] The present invention refers to a gangway structure which attains the abovementioned objects by means of the use of titanium as main use material for the various parts of the gangway, rather than traditional steel, achieving an object with considerable strength and mechanical characteristics while at the same time ensuring a considerably improvement in terms of weight, corrosion resistance in the absence of particular treatments and elimination of periodic need for surface painting operations.

[0007] Moreover, the particular conformation of the multiple-module structure contributes to the obtainment of the abovementioned characteristics.

[0008] One aspect of the present invention regards an access gangway for boats comprising a plurality of base elements which are slidable with respect to each other so to render such gangway extendable, characterised in that such base elements comprise a trolley which determines the binding of the gangway to the boat, a fixed frame bound in an articulated manner to the end of such trolley having the possibility to carry out raising or lowering motions with respect to such trolley by means of moving means, and a movable frame associated with the fixed frame and telescopically slidable with respect thereto.

[0009] The characteristics and advantages of the

gangway for boats according to the present invention will be clearer from the following exemplifying and non-limiting description of an embodiment with reference to the attached figures, in which:

Figure 1 is a perspective view of the gangway according to the present invention;

Figure 2 is a perspective view of the trolley of the gangway according to the present invention;

Figure 3 is a perspective view of the fixed frame of the gangway according to the present invention.

[0010] With reference to the mentioned figures, the gangway according to the present invention preferably comprises a plurality of base elements which are movable with respect to each other so to form an extendable gangway.

[0011] Preferably, the gangway comprises a movable frame 4, a fixed frame 3 and a trolley 2. The entire system can telescopically slide on guides, integral with the boat, so to exit from and re-enter the stern of the latter.

[0012] The trolley determines the binding of the gangway to the boat, the fixed frame is bound in an articulated manner to the end of such trolley and can carry out raising and lowering motions under the thrust of movement means; the movable frame is associated with the fixed frame and is telescopically slidable with respect thereto.

[0013] In figure 2, an embodiment is illustrated of such trolley 2 comprising two longitudinal members 21, preferably U-bent, reinforced by a lower flange plate 22 and transversely connected by crossbars 23 made from bent sheet metal.

[0014] On the outer side surface of such longitudinal members, preferably only in the rear zone thereof, a plurality of wheels 24 are obtained which are aligned with each other and organised along two parallel longitudinal rows, by means of which the gangway is inserted on the boat.

[0015] Moreover, on the lower edge of such longitudinal members, a plurality of rollers 25 are made which contribute to guiding the trolley (and consequently the entire gangway) in the step of engaging and disengaging with the boat and at the same time for limiting the deflection under load.

[0016] At the front end of such trolley, articulatable binding means are obtained to the fixed frame, comprising a pair of plates 26 which are bound, for example welded, to the longitudinal members 21, on which plates 26 an overturning hinge 27 is made.

[0017] Moreover, the movement means of the fixed frame with respect to the trolley preferably comprise two hydraulic cylinders (not shown), connected on one side to the trolley and on the other side to the fixed frame. Such configuration allows a convenient amplitude of the inclination angle between trolley and fixed frame, in the range of about -12 to +15 degrees.

[0018] The fixed frame 3 is also preferably made like

the trolley by means of longitudinal members 31 preferably U-bent and reinforced by a lower flange plate 32 and transversely connected by crossbars 33.

[0019] In figure 3, the fixed frame is illustrated, with particular reference to its lower surface, on which load lifting means are made comprising a cylinder 34 defined "cable puller" which operates on a cable 35, for example a stranded cable, by means of a first pulley 36. The latter, by utilising a further transmission, allows lifting the load by operating on a second pulley 37 installed at the end of the fixed frame, for example on the last two crossbars of the fixed frame.

[0020] In order to increase the resistant section in the zones of greater stress under load, unlike the trolley, the connection crossbars 33 of the fixed frame have an important structural function since they directly sustain the load to be lifted during the functioning step of the gangway, like a lifting crane.

[0021] The movable frame 4, last appendage of the gangway, is interfaced on the fixed frame 3 by means of a prismatic guide made inside the structure of the same fixed frame. The translation motion of the movable frame is preferably hydraulically commanded by means of a piston which operates between the fixed frame and the slidable frame. Such movable frame preferably comprises a pair of longitudinal members 41, preferably U-bent, reinforced by a lower flange plate 42 and possibly transversely connected by reinforcing crossbars.

[0022] During sailing, the gangway is located entirely inside the boat and is made to exit outside thereof in the disembarking stage by means of a hydraulic cylinder, for example a multi-element telescopic cylinder which pushes the entire structure by utilising an interface made on the front crossbar of the trolley in the disembarking stage. The described load-bearing parts of the gangway structure, object of the present invention, i.e. the longitudinal members, the crossbars and the plates, are made of titanium (for example T1Cp2, i.e. Pure Grade 2 titanium). A similar gangway, if made in pure stainless steel, would have an approximately 40% greater weight.

[0023] One such weight savings by using the titanium permits considerably increasing performances (lower consumption with cruising speed being equal) of the boat on which it is installed, moreover ensuring greater stability due to the critical position in which it is positioned.

[0024] The substitution of the steel with titanium makes possible the possibility of supporting higher load levels (with respect to steel), resistant section being equal. Though the yield strength is higher, titanium has a modulus of elasticity which is about half that of stainless steel, with consequent increase of the deflection under load with section being equal.

[0025] The appropriate sizing of the gangway sections has allowed limiting the elastic deformations under load, maintaining the deflection at acceptable levels from the ergonomic standpoint (use as gangway for embarking/disembarking from the boat) and at the same time also under load (for example nominal tonnage of 680 Kg).

Claims

1. Access gangway for boats comprising a plurality of base elements which are movable with respect to each other so to make such gangway extendable, **characterised in that** such base elements comprise
 - a trolley (2) which determines the binding of the gangway to the boat,
 - a fixed frame (3) bound in an articulated manner to the end of such trolley having the possibility to carry out raising or lowering motions with respect to such trolley by means of moving means,
 - a movable frame (4) associated with the fixed frame (3) and telescopically slidable with respect thereto.
2. Gangway according to claim 1, wherein such trolley, such fixed frame and such movable frame are made by means of a pair of longitudinal members (21, 31, 41) preferably U-bent, reinforced by a lower flange plate (22, 32, 42) and transversely connected by reinforcing crossbars (23, 33).
3. Gangway according to claim 2, wherein such longitudinal members, such flange plates and such crossbars are made of titanium.
4. Gangway according to claim 3, wherein such trolley has, on the outer side surface of such longitudinal members, a plurality of wheels (24) aligned with each other and organised on two parallel longitudinal rows, by means of which the gangway is inserted on the boat.
5. Gangway according to claim 3, wherein the movement means of the fixed frame with respect to the trolley comprise two hydraulic cylinders connected on one side to the trolley and on the other side to the fixed frame.
6. Gangway according to claim 1, wherein the fixed frame comprises lifting means for a load.
7. Gangway according to claim 6, wherein such lifting means for a load comprise a cylinder (34) which operates on a cable (35) by means of a first pulley (36) which operates on a second pulley (37) installed at the end of the fixed frame and which allows lifting the load itself.
8. Gangway according to claim 3, wherein the movable frame is interfaced on the fixed frame by means of a prismatic guide made inside the structure of the same fixed frame.

9. Gangway according to claim 8, wherein the translation motion of the movable frame is hydraulically commanded by means of a piston which operates between the fixed frame and the movable frame.

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10. Gangway according to the preceding claims, **characterised in that** it is used as a lifting crane for loads.

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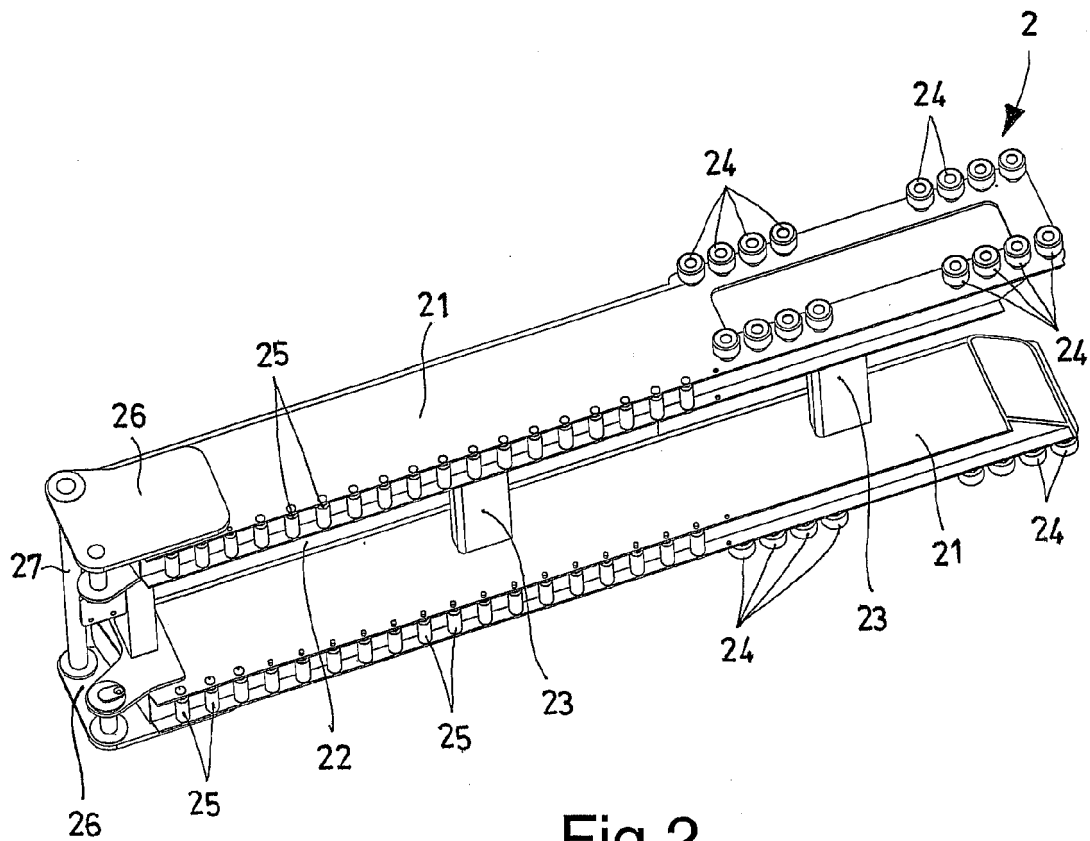
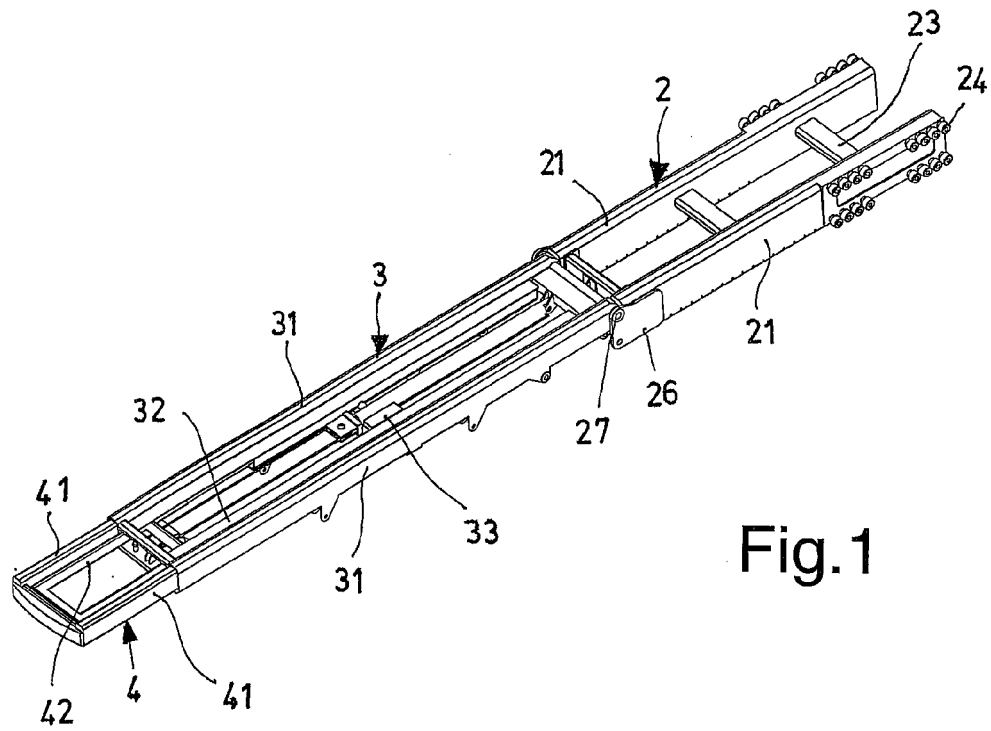
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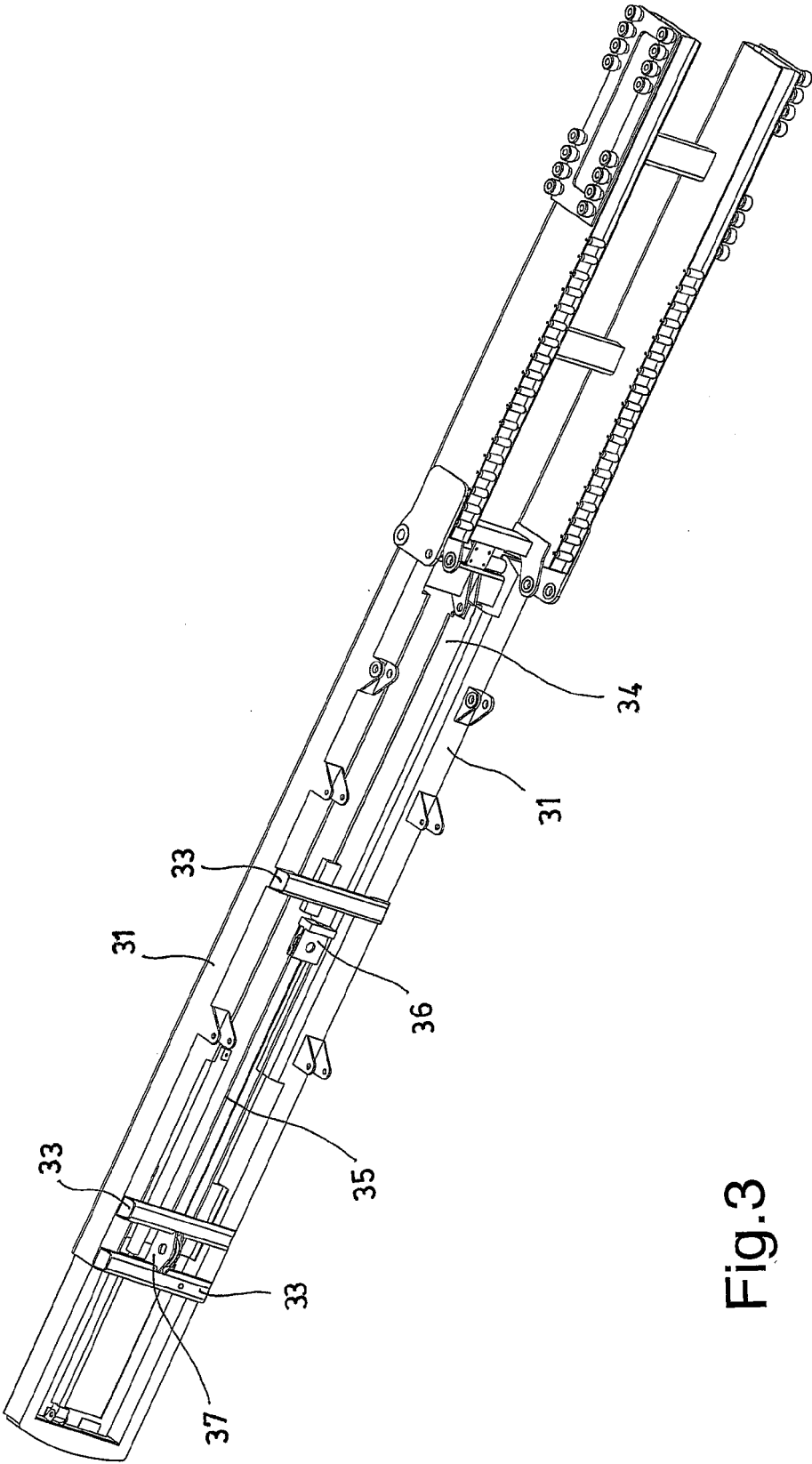


Fig.3