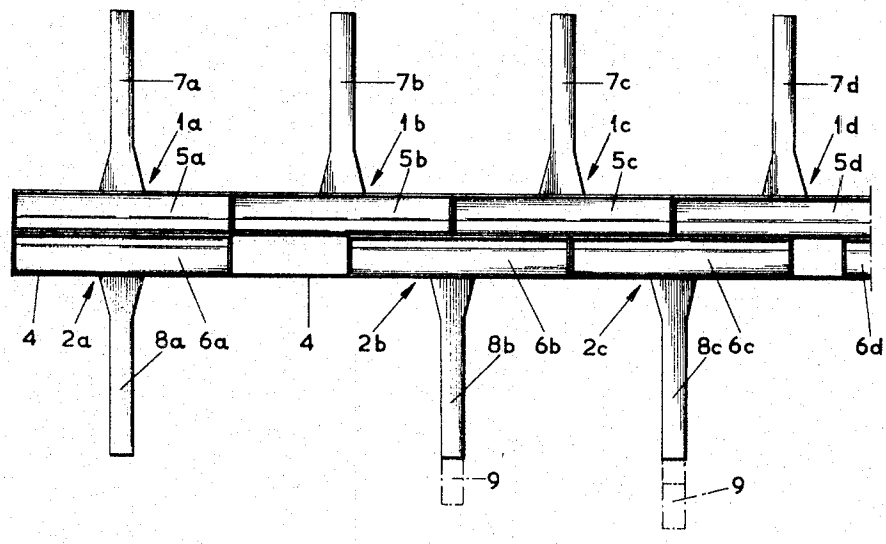
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FLOATING LANDING-STAGE

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Fig. 1



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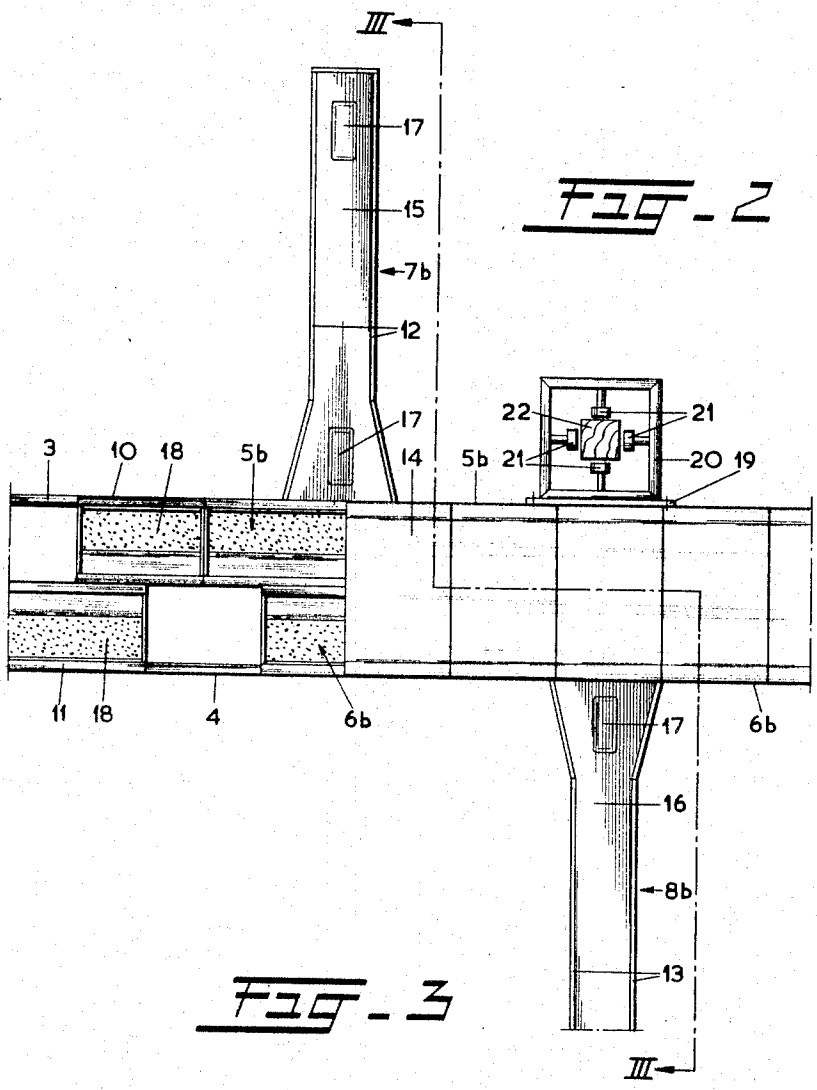
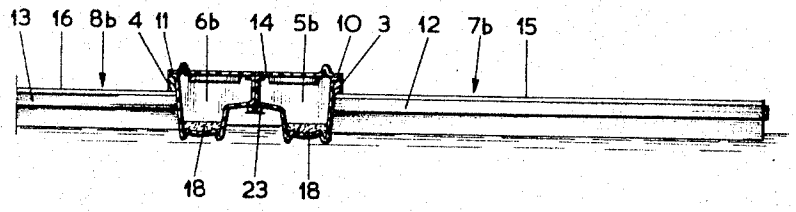


Fig. 2

Fig. 3



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FLOATING LANDING-STAGE

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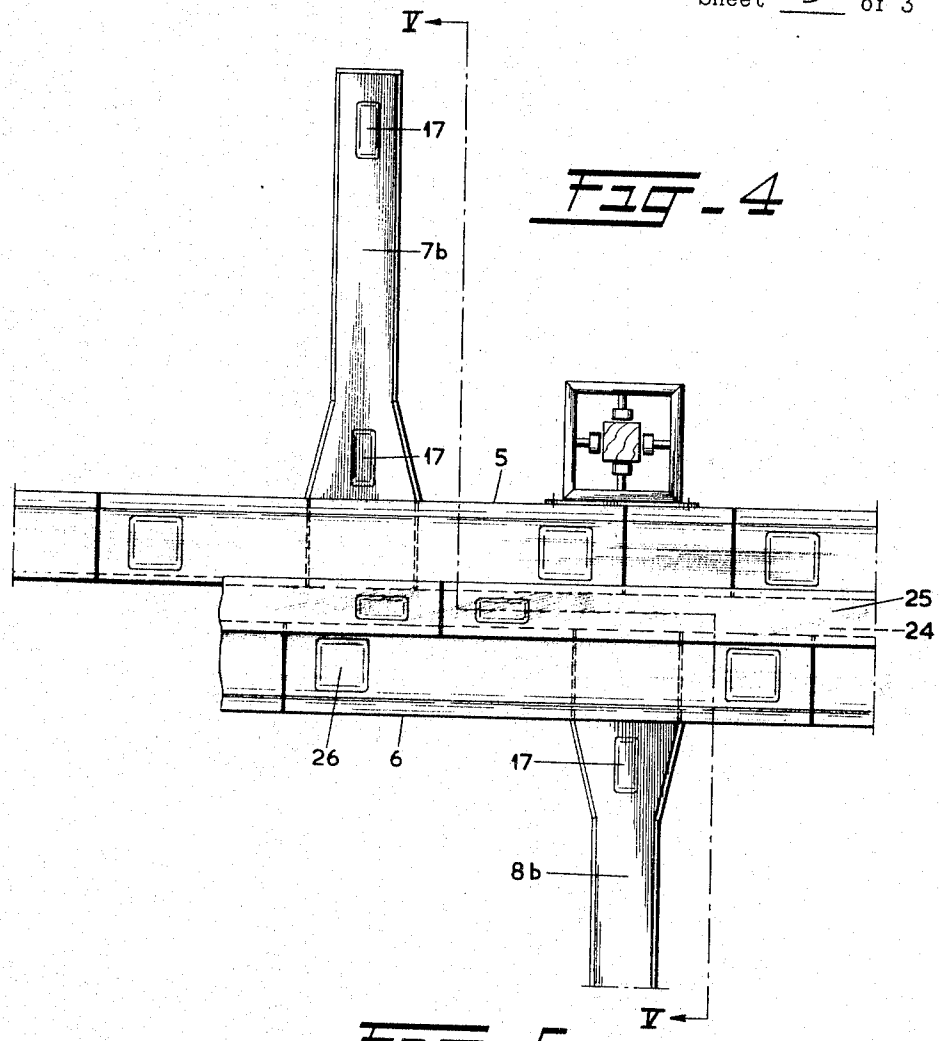


Fig. 4

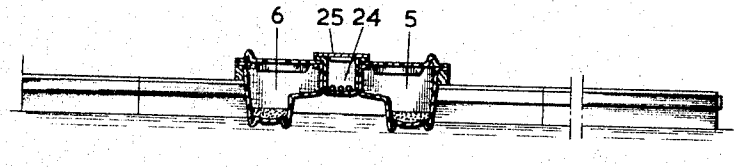


Fig. 5

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FLOATING LANDING-STAGE

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Int. Cl. B63b 35/34
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ABSTRACT OF THE DISCLOSURE

A floating landing stage consists of a plurality of buoyant T-shaped elements whose heads are in alignment in two contiguous parallel rows, the heads of the T's forming the main walkway of the landing stage and the limbs of the T's forming the mooring parts of the stage. Preferably, two parallel beams outwardly bound the heads of the T-shaped elements, and the elements are hollow and box-shaped.

The invention relates to a floating landing-stage, consisting of one or more footways and one or more transverse parts at right angles thereto.

Especially in harbours for recreative purposes, such as yacht-basins, for the mooring of the ships use is made of landing-stages consisting of a main stage with transverse stages at right angles thereto, which in many cases extend on either side of the main stage. Frequently such landing-stages are constructed to float, in which case they usually consist of beams and planks which are secured on flating metal drums. The transverse stages at right angles to the main stage are some distance apart, the distance between two successive transverse stages being determined by the dimensions of the ships which are moored to these stages.

The construction of such landing-stages is rather a time-consuming job, while their stability often leaves much to be desired. It is moreover a disadvantage of the stages constructed in this way that their floating elements (drums) lie in the water at considerable depth, in consequence of which they become ice-bound in winter, and as a result of this are often damaged and have to be repaired or replaced by new drums.

It is a further disadvantage that these stages can be adapted only with great difficulty to changing circumstances in the yacht-basin owing to the construction of the stage. It frequently happens that the dimensions of the ships moored in a given yacht-basin change, because the owners purchase a new (usually larger) yacht. In view of this it is necessary for the distances between the mooring stages to be changed and adapted. In the conventional constructions the transverse stages must be detached from the main stage for this purpose, which is a time-consuming and frequently difficult job.

It is the object of the invention to furnish a floating landing-stage which does not have the above-mentioned disadvantages, and according to the invention this is achieved by the fact that the whole stage is composed of box-shaped elements having buoyancy as a whole, which elements are rigidly interconnected either directly or indirectly.

The landing-stage composed in this way has very great buoyancy, in consequence of which it comes to rest in the water at a much smaller depth than the stages known so far, the result being that in winter, when ice is formed, it fairly comes to rest on the ice and the risk of damage upon freezing-in is very small. Owing to the use of box-shaped elements the landing-stage can be constructed in a

fairly simple way from a number of these elements and be adapted to the circumstances, while the elements can be rigidly interconnected in a fairly simple way either directly or indirectly. Owing to this rigid interconnection a very stable construction is obtained.

In one embodiment according to the invention a floating landing-stage is composed of elements substantially having the form of right-angled parallelepipeds and having buoyancy as a whole, which elements are rigidly interconnected in rows, while in accordance with the requirements a number of rows of elements are at right angles to one or more other rows of elements, the rows of elements being rigidly interconnected.

A very favourable embodiment of a landing-stage according to the invention is one in which the stage is composed of T-shaped elements having buoyancy as a whole, of which elements the head portion as well as the limb portion is box-shaped. In this case the T-shaped elements can be so constructed that one part (the head portion or the limb portion) of an element forms a part of a footway of the stage and the other part, at right angles thereto, forms a transverse stage, as a result of which—because these parts form one unit—great stability of the whole stage is obtained. The transverse stages act as stabilizers.

The use of T-shaped segments as structural elements of a stage creates a simplified possibility for the construction of a stage and for its adaptation to the circumstances for which it is used. The T-shaped elements can be variously arranged in relation to each other.

One embodiment according to the invention consists in that the T-shaped elements are placed with their heads in line with each other.

According to another embodiment the T-shaped elements can be placed with the limbs in line with each other.

Furthermore the T-shaped elements can be fastened together in such a way that invariably the end of the limb or the head of each element adjoins the limb or the head of a preceding and/or succeeding element.

A very efficient arrangement of T-shaped elements is one in which the T-shaped elements are placed with the heads in two parallel rows, the limbs of one row being placed in the opposite direction to the limbs of the other row. The aligned heads or limbs of the T-shaped elements form the main part of the stage, while the parts of the T-shaped elements at right anles thereto form the transverse stages extending on either side of the main part.

Many possibilities for the construction of landing-stages are obtained according to the invention by the use of a combination of T-shaped elements and elements having the form of a right-angled parallelepiped, while the elements can be rigidly interconnected either directly or indirectly.

In this way the footway of a landing-stage composed of two rows of T-shaped elements as described above, for instance, can be widened in an efficient way by the provision of a row of elements having the form of right-angled parallelepipeds, between the parallel rows of heads of the T-shaped elements.

It is also possible to fit between aligned portions of two successive T-shaped elements one or more additional elements having the form of right-angled parallelepipeds, which can be connected with the T-shaped elements. In this way the distance between two transverse stages can be changed and adapted to altered circumstances (such as in the case where a part of the landing-stage must be used for larger ships). The portions of the T-shaped elements which form the transverse stages can moreover be extended to any desired length with the aid of elements having the form of right-angled parallelepipeds.

According to a preferred embodiment of the invention the portions of the elements extending in the longitudinal direction are clamped between two parallel beams of hardwood.

In this embodiment therefore the beams skirt the outer edge of the main part of the landing-stage and in this connection they serve not only as coupling elements between the floating elements, but also as buffer members by which the elements are protected against collision and damage.

When the elements are fastened to beams skirting the entire length of the stage, an extremely stable construction is obtained. An additional advantage consists in that owing to the stability of the whole structure only a small number of guide poles are required for maintaining the stages in their places. This is very important and saves much expense during construction and during dredging operations in the yacht-basin, which become much simpler, and accordingly less expensive, since during the shifting of dredging machines only a small number of poles have to be reckoned with. Owing to the relatively large and regular intervals between the poles some of these poles can even be used for the fastening of guys for the dredging machines, for the shifting of the latter.

At the same time the hardwood beams present the possibility of shifting the floating elements in relation to each other in a simple way, viz. by ensuring that the elements are adjustable between the longitudinal beams. This adjustability can be attained, for instance, when the beams are provided with bolt-holes fitted at regular fixed intervals. It is, however, also possible to secure the beams to struts in the ground, which are interconnected, if necessary, beneath the stage. The beams can also be interconnected at wide intervals by means of crossbeams.

If two elements are fastened to the beam at some distance from each other, the intervening space can be utilized for the mooring of any trailer boats in the space thus formed. This presents the advantage that during the mooring of the boats these trailer boats are not inconveniently in the way. The gap thus formed in the upper surface of the stage is covered by the normal footway.

In landing-stages consisting of two parallel rows of T-shaped elements the elements from one row can be adjusted along the beam skirting them in this way, completely independently of the elements adjustably fastened to the second beam. By this means the distance between two transverse stages can thus be changed and adapted to any altered circumstances in the yacht-basin without any influence being exerted on the distance between the transverse stages extending on the other side of the main stage. In this way it is ensured that the lay-out of the yacht-basin is as efficient as possible.

If there are two rows of T-shaped elements, these rows may adjoin each other, but they may also, as already described above, be separated from each other by a row of elements having the form of parallelepipeds, with a view to widening the footway of the stage.

According to an efficient embodiment, between the rows of elements can be placed a row of channel-shaped elements, intended to accommodate mains and the like, and secured to the heads of the elements.

Especially when the stage is used as a landing-stage for house-boats, this latter construction is very suitable, since the requisite water, gas, and electricity mains can be fitted in the channel-shaped elements.

The floating elements according to the invention preferably consists of T-shaped hollow floats of a synthetic material.

An eminently suitable material of which the T-shaped elements can be made consists of polyester reinforced with glass fibre. This has been found to be a very suitable material requiring very little maintenance. The properties of the material are very favourable, so that the risk of damage is very small. The material moreover is absolutely corrosion-resistant, so that it is not affected by the

corrosive surroundings in which it is present and can also be used very advantageously in sea-ports, without any intensive maintenance being required. Moreover it has been found that accretions of micro-organisms present in the water (fresh water and salt water barnacles) can be very readily removed, e.g. with a stopping knife. A great advantage of the applied material as compared with the conventional materials used up to the present is its great buoyancy. Indeed, this has the consequence that the floating elements of the stages lie in the water at only a very small depth, as a result of which in winter, when ice is formed, the floating elements fairly come to rest on the ice. Moreover the adhesion of ice to the polyester material appears to be very small, so that practically no freezing-in is found to take place.

All the above-mentioned properties of the polyester material are the cause that stage elements made of this material require a minimum of maintenance.

If, however, the landing-stage should be damaged all the same, it is known that the material can be repaired in a very simple way.

The elements can further be provided with an anti-slip coating, so that an anti-slip footway is obtained on the stage. In particular when the elements consist of a synthetic material or of glass fibre-reinforced polyester, the advantage is gained that a completely splinterless surface is obtained.

A footway can be obtained according to a preferred embodiment of the invention by covering the elements, at least above the heads, with adjoining plates, which are covered with an anti-slip coating.

On the main stage these plates can be fastened with their sides to the parallel clamping beams skirting the main stage.

Furthermore the elements may include spaces accessible via hatches, in consequence of which additional service can be offered to the users in that these spaces in the elements can serve as storage spaces for ship's provisions.

The invention will now be explained more fully by reference to the annexed drawings, which illustrate two embodiments of a landing-stage according to the invention.

FIG. 1 is a diagrammatic top view of a landing-stage according to the invention.

FIG. 2 is a top view of a detail of a landing-stage according to FIG. 1.

FIG. 3 is a cross-section of the detail shown in FIG. 2, along the line III—III in FIG. 2.

FIG. 4 is a top view of a detail of a modified construction of a landing-stage.

FIG. 5 is a cross-section of the landing-stage shown in FIG. 4, along the line V—V.

The landing-stage shown diagrammatically in FIG. 1 is composed of a number of hollow T-shaped elements arranged in two rows, indicated in the figure by **1***a*, **1***b*, **1***c*, **1***d* and **2***a*, **2***b*, **2***c*, **2***d*, respectively. the segments **1***a*, **1***b*, **1***c*, **1***d* are adjustably fastened to a beam **3** skirting the head portions (**5***a*, etc.) of the segments, while the segments **2***a*, **2***b*, **2***c*, and **2***d* are adjustably fastened with their head portions (**6***a*, etc.) to a beam **4**. As may be seen from FIG. 1, the hear portions **5** and **6** of the T-shaped segments are in line with each other and form the floating elements for the main part of the landing-stage, while the limb portions **7** and **8** at right angles thereto form the floating elements for the mooring parts of the stage. By adjustment of the T-shaped segments along the beams **3** and **4** the distance between the mooring parts **7***a*, **7***b*, **7***c* and **7***d*, and completely independently thereof the distance between the mooring parts **8***a*, **8***b*, **8***c*, and **8***d*, can be modified. FIG 1 shows a situation in which the segments **1***a*, **1***b*, **1***c*, and **1***d* are continuously fastened along with their head portions **5***a*, etc. to the beam **3**, as a result of which the distances between the limb portions **7***a*, **7***b*, **7***c*, and **7***d* are identical, while, for instance, the segments **2***a* and **2***b* of the other row are fastened some distance apart to the beam **4**, owing to which the distance between the

limb portions 8*a* and 8*b* is larger than the distance between the limbs 7*a*, 7*b*, etc.

The T-shaped segments all have the same dimensions. If desired, the limb portions of the T-shaped segments can be extended by providing in line therewith elements **9** having the form of right-angled parallelepipeds, which elements can be connected with the limb portions in the way described more fully below.

FIGS. 2 and 3 show a detail of the part of the landing-stage of FIG. 1 between the lines of dashes.

The T-shaped segments **1***b* and **2***b* consist of hollow portions **5***b* and **6***b* respectively, open at the top, with at right angles thereto hollow portions **7***b* and **8***b* respectively, open at the top, the upper edges of the portions **7***b* and **8***b* being located at some distance beneath the upper edges of the portions **5***b* and **6***b*. The portions **5***b* and **6***b* are fastened with their outer walls to beams **3** and **4** respectively, skirting the tops of said walls. For this purpose the beams contain, in a way not shown in the drawing, bolt holes fitted at fixed intervals (such as 25 cm.), while on the inside of the outer walls of the portions **5***b* and **6***b*, fastening members provided with holes are fitted, e.g. in the form of angle irons. The portions **5***b* and **6***b* are fastened to the beams by means of bolts, projecting through the holes in the beams and the fastening members of the T-shaped segments, and by nuts. The upper edges of the outer walls of the portions **5***b* and **6***b* are bent outwards, as a result of which they form flanges **10** and **11** respectively, which rest on the top of the beams **3** and **4**. The portions **5***b* and **6***b* are interconnected with their facing inner walls in a way not shown in the drawing. Secured at the upper edge along the outer edges of the limb portions **7***b* and **8***b* are also beams **12** and **13** respectively, said beams serving for the protection of the limb portions and at the same time for the fastening of the footway. The fastening of these beams can take place in the same way as described above for the fastening of the portions **5***b* and **6***b* to the beams **3** and **4**, though no provisions need be made for the adjustment of the portions in relation to the beams. Provided over the portions **5***b* and **6***b* of the T-shaped segments are a number of adjoining polyester plates **14**, which are covered on the upper side with an anti-slip coating. These plates extend from beam **3** to beam **4** and are fastened by their edges to the flanges **10** and **11** on the beams **3** and **4**, with the aid of wood screws. These plates form the footway of the main part of the landing-stage. In the same way footways **15** and **16** respectively are formed for the moorng parts **7***b* and **8***b*. In the footways **15** and **16**, in a number of places hatches **17** have been provided, by means of which the hollow spaces in the portions **7***b* and **8***b* can be reached and be used as storage spaces for ship's provisions. For the protection of the bottom of the portions **5***b* and **6***b*, on the inside a coating of hard foam **18** has been provided, which in turn is covered with glass fibre-reinforced polyester, as a result of which no direct leakage can occur if the bottom surface should be damaged.

The landing-stage can be secured to guide poles in the way shown in FIG. 2. Fitted to the beam **3** is a metal plate **19**, on which is mounted a frame **20**, on the inside of which are provided four runners **21**, extending inwards and located in the vicinity of the outer boundary of a guide pole **22**. This fastening method ensures a flexible and quiet guidance of the stage along the guide pole during the movements of the stage and does not call for any special treatment of the surface of the hardwood guide poles.

With a view to the installation of gas, water, and electricity mains, between the facing inner walls of the portions **5***b* and **6***b* of the segments an I-section **23**, for instance, can be fitted, the web of which extends vertically downwards. In FIGS. 4 and 5 a modified construction according to the invention is shown. In this embodiment the segments **1** and **2** of the two rows are some distance apart, while between the rows extends a channel-shaped element **24**, which is connected by its outer walls, in a way not shown in the drawing, with the facing walls of the segment portions **5** and **6**. This construction is eminently suitable for landing-stages which are used for the mooring of house-boats.

In this construction the channel **24** is employed as a space for the installation of gas, water, and electricity mains, which are safely stored there. The channel **24** can also be covered with plates **25** provided with an anti-slip coating, in which plates in suitable places can be provided hatches **26**, which give access to the space **24**. The channel-shaped elements **24** can be fitted either with or without partitions.

Having described my invention, I claim:

1. A floating landing-stage comprising at least one walkway and a number of transverse parts at right angles to the walkway, the stage being at least mainly composed of T-shaped elements having heads disposed in two parallel rows, the limbs of the T-shaped elements of one row extending outwardly in opposite directions from the limbs of the T-shaped elements of the other row, said T-shaped elements having buoyancy as a whole and each being formed by at least one box-shaped element and means rigidly interconnecting said T-shaped elements.

2. A floating landing-stage as claimed in claim **1**, the elements being hollow and made of glass fiber-reinforced polyester resin.

3. A floating landing-stage as claimed in claim **1**, said T-shaped elements in each said row having heads aligned with each other.

4. A floating landing-stage as claimed in claim **1**, said T-shaped elements in each said row having heads whose ends adjoin each other.

5. A floating landing-stage as claimed in claim **1**, and a row of floating box-shaped elements disposed between said two parallel rows and formed of synthetic resin.

6. A floating landing-stage as claimed in claim **1**, the stage being composed of a combination of T-shaped elements and box-shaped elements which are rigidly connected with the T-shaped elements and are made of synthetic resin.

7. A floating landing-stage as claimed in claim **1**, said T-shaped elements in each said row having heads that are aligned with each other, and two parallel beams between which said heads are secured.

8. A floating landing-stage as claimed in claim **7**, and means for releasably securing said heads at any of a plurality of selected positions between and lengthwise of said beams thereby to permit adjustment of the spacing between said heads.

9. A floating landing-stage as claimed in claim **1**, and adjoining plates covering at least said walkway.

10. A floating landing-stage as claimed in claim **1**, said elements being made of synthetic resin.

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