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(71) Applicant: **Fracasso S.p.A.**
30032 Fiesso d'Artico (VE) (IT)

(72) Inventors:
- **Fracasso, Oreste**
  30032 Fiesso D'Artico (IT)
- **Veronesi, Augusto**
  35135 Padova (IT)

(74) Representative: **Jorio, Paolo et al**
STUDIO TORTA
Via Viotti 9
10121 Torino (IT)

(54) Mobile barrier for temporary closing of channels and port entrances

(57) A mobile barrier (1) for temporary closing of channels and port entrances essentially formed by a base (2) extending on the seafloor of the port entrance, and by a series of mobile floodgates (3) of a substantially rectangular shape, which are hinged edgewise on the base (2) adjacent to one another so to be able to swing around a substantially horizontal axis of rotation (A); each mobile floodgate (3) being connected to the base (2) by means of a pair of disconnectable hinges (4), which are made up of a fixed portion (4a) stably anchored to the base (2), and of a mobile portion (4b) which is fixed on the flank of the mobile floodgate (3) and incorporates the joint for articulation of the hinge about the axis of rotation (A); the fixed portion (4a) of the disconnectable hinge (4) being formed by an engagement platform (8) designed to be positioned bearing upon the surface of the base (2) for hermetic closing of a well (7) present in the base (2) itself, and by a plurality of anchoring tie rods (10) which connect the base (2) with plane appendages (12) projecting in cantilever fashion from the sides of the engagement platform (8).

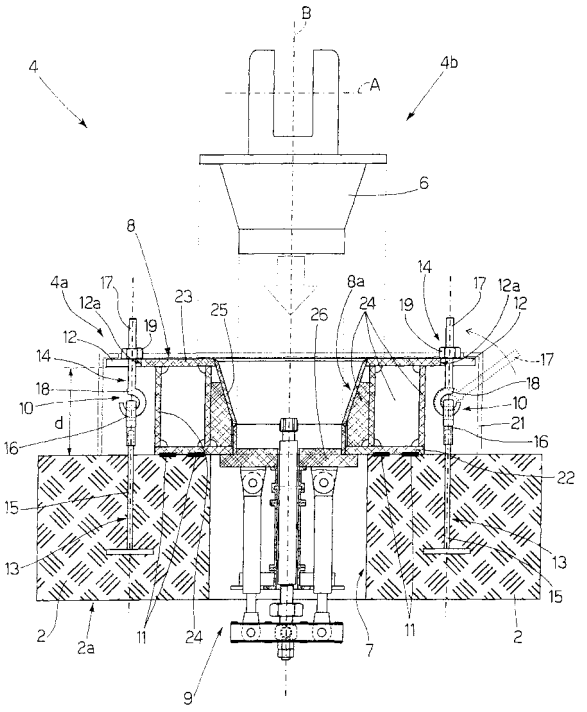

Fig. 2

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Description

[0001] The present invention relates to a mobile barrier for temporary closing of channels and port entrances.

[0002] In greater detail, the present invention relates to a submergible mobile weir specifically structured for being positioned in a point corresponding to a navigable port entrance that connects a closed lagoon to the immediately adjacent open sea so to be able, if need be, to block the flow of water that from the sea flows towards the lagoon and vice versa, preventing only in this case the naval traffic that passes through the access to the port.

[0003] As is known, the level of the sea water is subject to periodic fluctuations (traditionally referred to as tides), which, in coincidence with other atmospheric events of extraordinary intensity, can pour into the lagoon such a large amount of water as to raise the level of the water within the lagoon itself to such a high value as to jeopardize the static stability of the buildings and of the building works distributed along the coast and/or overlooking the lagoon itself.

[0004] The US patents Nos. US-3756032 and US-4836711 and the European patent No. EP-0397609 propose a solution to this problem with the use of a mobile barrier made up of a reinforced-concrete base, which extends on the seafloor of the port entrance for the entire width of the entrance itself, and of a series of plane rectangular mobile floodgates, which are hinged edgewise on the reinforced-concrete base adjacent to one another so as to occupy the entire width of the port entrance without solution of continuity, and are able to swing with respect to the base about a horizontal reference axis common to all the floodgates.

[0005] In greater detail, the mobile floodgates are able to swing between a lowered position, in which the floodgates rest on the seafloor in a substantially horizontal position, and a raised position, in which the floodgates extend in cantilever fashion from the base in a direction substantially perpendicular to the seafloor of the port entrance so as to emerge partially above the surface of the water and form a barrage that extends without solution of continuity for the entire width of the port entrance so as to prevent the passage of the water through the port entrance itself.

[0006] As regards, instead, the displacement of the mobile floodgates, swinging of the floodgates from the lowered position to the raised position and subsequent return into the lowered position are obtained by appropriately varying the buoyancy of the individual floodgates.

[0007] Each of the floodgates is in fact provided internally with a tank for regulation of the position, which, in a way similar to the compensation tanks or ballast tanks present in submarines, is designed to be filled with water and/or pressurized air so to be able to regulate the buoyancy of the floodgate, and the mobile weir is provided with a system for supply of pressurized air, which, upon command, is able to send into the tank for regulation of the position of each mobile floodgate an amount of air sufficient to produce a buoyant force higher than the weight of the floodgate itself so as to cause slow and progressive raising of all the mobile floodgates from the lowered position to the raised position and the consequent constitution of the barrage.

[0008] To facilitate installation of the individual mobile floodgates and the maintenance operations of the weir, in the U.S. patent No.US-4836711 and in the European patent No. EP-0397609 there is moreover envisaged connection of each mobile floodgate to the reinforced-concrete base by means of a pair of disconnectable hinges, each of which is made up of a fixed portion, which is stably anchored to the reinforced-concrete base immediately on top of an internal service compartment, and a mobile portion, which is instead stably fixed on the side of the mobile floodgate, incorporates the hinge articulation joint, and is finally structured so to be coupleable to the fixed portion in a stable, but easily releasable, manner, guaranteeing in any case the necessary structural stiffness.

[0009] In greater detail, the mobile portion of the disconnectable hinge is basically made up of a plane appendage, which extends in cantilever fashion from the side of the mobile floodgate, an intermediate fork hinged so that it is free to turn on the distal end of the plane appendage by means of a transverse pin perpendicular to the plane of lie of the plane appendage itself, and finally an engagement head substantially shaped like a truncated cone, which is rigidly fixed on the end of the trunk of the intermediate fork.

[0010] The fixed portion of the disconnectable hinge is, instead, basically made up of an anchorage platform, which is embedded in or in any case anchored to the reinforced-concrete wall of the base in an unmovable way, and is provided with a central seat that has a shape complementary to that of the engagement head of the mobile portion of the hinge, and with an engagement and clamping member, which is designed, in sequence, to engage the engagement head of the mobile portion of the hinge and then to withhold the engagement head so that it bears upon the central seat of the anchorage platform exerting a tensile force of a pre-set value.

[0011] Even though it is theoretically very advantageous, the structure of the fixed portion of the disconnectable hinge described in the U.S. patent No. US-4836711 and in the European patent No. EP-0397609 has presented *in situ* a series of drawbacks that render it unsuitable for continuous use in a non-experimental installation.

[0012] In greater detail, the fixed portion of the disconnectable hinge thus obtained has proven extremely difficult to maintain, with all the drawbacks that this implies.

[0013] The aim of the present invention is hence to provide a mobile barrier for temporary closing of channels and port entrances that will be free from the drawbacks mentioned above and that at the same time will be inexpensive to produce.

[0014] According to the present invention, a mobile barrier for temporary closing of channels and port entrances is obtained as specified in Claim 1 and preferably, but not necessarily, in any one of the dependent claims.

[0015] The present invention will now be described with reference to the annexed drawings, which illustrate a non-limiting example of embodiment thereof and in which:

- Figure 1 is a schematic perspective view of a mobile barrier for temporary closing of channels and port entrances obtained according to the teachings of the present invention;
- Figure 2 is a partially exploded front view of a part of a disconnectable hinge used in the mobile barrier illustrated in Figure 1, with parts in cross section and parts removed for reasons of clarity; whilst
- Figure 3 is a partially exploded front view of a variant embodiment of the disconnectable hinge illustrated in Figure 2, with parts in cross section and parts removed for reasons of clarity.

[0016] With reference to Figures 1 and 2, designated as a whole by 1 is a mobile barrier for temporary closing of channels and port entrances specifically structured for being positioned on the seafloor F of a navigable port entrance connecting a closed lagoon to the immediately adjacent open sea.

[0017] The mobile weir 1 essentially comprises a base 2 made of reinforced-concrete or the like, which extends on the seafloor F of the port entrance for the entire width of the entrance itself, and a series of plane mobile floodgates or flap gates 3 of a substantially rectangular shape, which are hinged edgewise on the base 2 adjacent to one another so as to occupy without solution of continuity the entire width of the port entrance, and so to be able to swing about a horizontal axis A common to all the mobile floodgates 3.

[0018] In greater detail, the mobile floodgates 3 are able to swing about one and the same horizontal axis A between a lowered position, in which the mobile floodgates 3 rest on the seafloor F of the port entrance in a substantially horizontal position, and a raised position (see Figure 1), in which the mobile floodgates 3 extend in cantilever fashion from the base 2 in a direction substantially perpendicular to the seafloor F of the port entrance so as to emerge partially above the surface of the water and form a barrage that extends without solution of continuity from one bank of the port entrance to the other so as to prevent the passage of the water through the port entrance itself.

[0019] In particular, with reference to Figure 1, each mobile floodgate 3 is connected to the base 2 by means of at least one pair of disconnectable hinges 4 (just two of which are visible in Figure 1), which are positioned on the side of the mobile floodgate 3 so as to enable swinging of the mobile floodgate 3 itself about the axis A, and has a box structure so as to form inside it at least one tank 5 for regulation of the position, or ballast tank, which is designed to be filled with water and/or pressurized air so to be able to regulate the buoyancy of the mobile floodgate 3.

[0020] In greater detail, in the example illustrated, the tank 5 for regulation of the position of each mobile floodgate 3 is in communication with the outside by means of a series of through openings 5a, through which the sea water can enter and exit freely from the tank 5.

[0021] In addition to what has been said above, the mobile weir 1 is moreover also provided with a system for supply of pressurized air (not illustrated), which, upon command, is able to pump into the tank 5 for regulation of the position of each mobile floodgate 3 an amount of pressurized air sufficient to empty the tank 5 at least partially of the water that fills it in order to generate a buoyant force higher than the weight of the mobile floodgate 3 itself. Said buoyancy is hence able to cause progressive raising of all the mobile floodgates 3 from the lowered position to the raised position and the consequent creation of the aforesaid barrage.

[0022] As regards, instead, the disconnectable hinges 4, each of them is made up of a fixed portion 4a that it is stably anchored to the base 2 immediately above an internal service compartment 2a, and a mobile portion 4b (schematically illustrated in Figures 1 and 2), which is instead stably fixed on the side of the mobile floodgate 3, incorporates the joint for articulation of the hinge about the axis A and is finally structured so to be coupleable to the fixed portion 4a in a stable, but readily releasable, manner.

[0023] In greater detail, with reference to Figures 1 and 2 the mobile portion 4b of the disconnectable hinge 4 is provided with an engagement head 6, which is substantially shaped like a funnel and is designed to fit into the fixed portion 4a of the disconnectable hinge 4 in a stable, but readily releasable, manner, providing at the same time a fluid-tight coupling.

[0024] The fixed portion 4a of the disconnectable hinge 4 is instead set so that it closes a preferably, but not necessarily, circular through well 7, which extends through the vault of the internal service compartment 2a of the base 2, sharing a substantially vertical axis B that intersects the axis A.

[0025] With reference to Figures 1 and 2, the fixed portion 4a of the disconnectable hinge 4 is basically made up of: a preferably, but not necessarily, rectangular engagement platform 8, which is provided with a central seat 8a, which is shaped so to be able to receive the engagement head 6 of the mobile portion 4b, and is set bearing upon the base 2 so as to close the well 7, with the central seat 8a aligned to the well 7 itself and with the interposition of one or more annular seals 11 that surround the inlet to the well 7 itself; an engagement and clamping member 9, which is fixed on the engagement platform 8 in a position corresponding to the bottom of the central seat 8a, and is structured so to be able, in sequence, to engage the head 6 of the mobile portion 4b

of the hinge and then withhold the same head 6 bearing upon the central seat 8a, exerting a tensile force of a pre-set value; and finally a series of anchoring tie rods 10, which are structured so as to withhold the engagement platform 8 bearing upon the base 2 with the interposition of the annular seals 11 so as to provide a fluid-tight coupling.

[0026] Unlike the currently known solutions, the engagement platform 8 is, however, provided with a series of projecting fins or plane appendages 12 extending in cantilever fashion from the sides of the platform, at a given distance from the underlying surface of the base 2, and the anchoring tie rods 10 are appropriately distributed about the well 7, on the outside of the annular seals 11, and are structured so as to connect the plane appendages 12 of the engagement platform 8 directly to the immediately underlying base 2.

[0027] In greater detail, with reference to Figure 2 the various fins or plane appendages 12 that project from the sides of the engagement platform 8 are appropriately distributed along the external perimeter of the engagement platform 8, and are located at a distance d from the surface of the base 2 of between 0.15 and 1.5 metres, whilst each anchoring tie rod 10 is divided into two independent portions 13 and 14, which are made of corrosion-resistant metal material (for example, stainless steel), and are structured so to be mutually engageable in a stable, but readily releasable, manner, by means of an uncoupleable mechanical joint that is resistant to tensile force. The portion 13 is anchored in a stable and unmoveable way on the base 2 so as to project partially from the latter, underneath a corresponding plane appendage 12 of the engagement platform 8, whilst the portion 14 extends in cantilever fashion from the plane appendage 12 immediately overlying the portion 13, and is designed to engage the underlying portion 13 in a stable, but readily releasable, manner, by means of the aforesaid uncoupleable mechanical joint resistant to tensile force.

[0028] In particular, in the example illustrated, the bottom portion 13 is made up of a stainless-steel log bolt 15, which is embedded partially in the base 2, in the immediate vicinity of the well 7, and of a stainless-steel terminal hook or ring 16, which is firmly fixed on the free end of the bar of the log bolt 15 projecting outside of base 2. The upper portion 14 is instead made up of: a stainless-steel threaded bar 17, which is mounted so that it passes through the fin or plane appendage 12 that overlies the portion 13, remaining substantially perpendicular to the surface of the base 2 and to the plane of lie of the plane appendage 12; a stainless-steel terminal hook or ring 18, which is firmly fixed to the bottom end of the threaded bar 17 and is sized so to be able to engage in a stable, but readily releasable, manner, to the hook or ring 16 of the portion 13 to form the aforesaid uncoupleable mechanical joint resistant to tensile force; and finally one or more washers and locknuts 19, which are screwed on the threaded bar 17, on top of the plane appendage 12, and are designed to be carried so that they bear upon the body of the plane appendage 12 that overlies the portion 13, on the opposite side of the base 2 so as to pull the hook or ring 18 towards the plane appendage 12 bringing the entire structure into tension.

[0029] With reference to Figure 2, to facilitate insertion of the threaded bars 17 within the various plane appendages 12 of the engagement platform 8, in the example illustrated each plane appendage 12 is provided with one or more transverse through notches 12a, which extend from the side edge of the appendage itself towards the centre of the engagement platform 8, in a direction preferably, but not necessarily, perpendicular to the side edge of the plane appendage 12 itself. Each through notch 12a is aligned above the hook or ring 16 of the bottom portion 13 of a respective anchoring tie rod 10, and the uncoupleable mechanical joint of each anchoring tie rod 10 is structured so as to enable the upper portion 14 to pivot on the top of the bottom portion 13, i.e., on the hook or ring 16 set on the top of the log bolt 15, remaining substantially coplanar to a vertical reference plane so as to insert the threaded bar 17 within the through notch 12a aligned with the top of the portion 13 through a swinging movement.

[0030] Preferably, but not necessarily, the fixed portion 4a of the disconnectable hinge 4 is finally provided with a removable frame or external protective casing 21, which is designed to be fitted on the engagement platform 8 so to surround the various fins or plane appendages 12 that project in cantilever fashion from said platform, and delimit with the surface of the base 2 and with the sides of the engagement platform 8 a closed space that encloses the anchoring tie rods 10 almost completely, and is designed to be filled integrally with closed-cell polyurethane foam or other protective plastic material.

[0031] Finally, as regards the engagement platform 8, in the example illustrated it is made of corrosion-resistant metal material (for example, stainless steel), and is basically made up of: a bottom plane plate 22, designed to be set bearing upon the surface of the base 2 with interposition of the annular seals 11; a top plane plate 23, which is set parallel to and facing the bottom plane plate 22, at a pre-set distance from the latter; and a series of intermediate connection plates 24, which are welded edgewise on the bottom plane plate 22 and on the top plane plate 23 so as to form a rigid box structure.

[0032] The bottom plane plate 22 and the top plane plate 23 are both provided with a circular central through hole, which it is aligned with the axis B of the well 7 when the engagement platform 8 is positioned on the base 2, covering the well 7, and the engagement platform 8 also comprises a central tubular body 25, which has a profile complementary to that of the head 6 of the mobile part 4b of the hinge, is inserted between the bottom plane plate 22 and the top plane plate 23 aligned with and coaxial to the central holes of both of the aforesaid plates, and finally has the two axial ends welded edgewise on the bottom plane plate 22 and the other on the top plane plate 23 so as to form a cavity that is positioned at the

centre of the box structure, and defines the central seat 8a of the platform.

[0033] In particular, in the example illustrated, the bottom plane plate 22 and the top plane plate 23 both have a substantially rectangular shape so as to form with the intermediate plates 24 a rigid substantially parallelepipedal box structure, and the projecting fins or plane appendages 12 are made up of some portions of the top plane plate 23 that extend in cantilever fashion beyond the perimeter of the bottom plane plate 22.

[0034] As regards, instead, the central tubular body 25, in the example illustrated it has the bottom stretch cylindrical and the top stretch shaped like a truncated cone diverging outwards.

[0035] With reference to the figures, the engagement platform 8 finally comprises also a closing plate or bottom 26, which is fixed on the bottom end of the central tubular body 25 so as to close hermetically the cavity of the tubular body approximately in a position corresponding to the bottom plane plate 22, and is centrally provided with a central through hole, which is designed to be engaged by the mobile stem of the engagement and clamping member 9, which, in the example illustrated, extends in cantilever fashion within the well 7 made in the base 2.

[0036] The engagement and clamping member 9 is a hydraulic-actuation device already widely known in the sector and will not be described further.

[0037] Operation of the mobile barrier 1 can be readily deduced from what has been said above, and does not require any further explanation.

[0038] The advantages deriving from the adoption of the disconnectable hinges 4 described and illustrated above are considerable: the anchoring tie rods 10 that withhold the engagement platform 8 bearing upon the surface of the base 2 are on the outside of the annular seals 11 and terminate within the base 2, eliminating any risk of leakage of the water towards the internal service compartment 2a. The anchoring tie rods 10 are in fact appropriately distributed around the well 7, on the outside of the annular seals 11.

[0039] The fact that each anchoring tie rod 10 is divided into two independent portions 13 and 14 engaged to one another through an uncoupleable mechanical joint resistant to the tensile force moreover facilitates enormously the maintenance operations that require the complete replacement of the fixed portion 4a of the disconnectable hinge 4.

[0040] In addition, the particular structure of the fixed portion 4a of the disconnectable hinge 4 enables replacement of the engagement platform 8 to be carried out in conditions of safety, without forcing the technical staff to operate within the service compartment 2a whilst the latter is flooding. The detachment of the engagement platform 8 envisages in fact first removal of the frame or external protective casing 21, and then loosening of the lock nuts 19 to enable extraction of the threaded bars 17 from the plane appendages 12 or, subordinately, direct cutting of the threaded bars 17 immediately above the hook or ring 18, in all cases operating from outside.

[0041] Finally, it is clear that modifications and variations can be made to the mobile barrier 1 described and illustrated above, without thereby departing from the scope of the present invention.

[0042] For example, with reference to Figure 3, in a different embodiment the uncoupleable mechanical joint resistant to tensile force that connects the two portions 13 and 14 of the anchoring tie rod 10 together is constituted by an internally threaded sleeve 27, which is screwed in a stable, but readily removable, manner on the free threaded end of the bar of the log bolt 15 projecting outside of base 2, and on the threaded bottom end of the threaded bar 17, instead of the hooks or rings 16 and 18.

[0043] In other words, the threaded bar 17 of the upper portion 14 is coaxial to the bar of the log bolt 15 of the bottom portion 13, and the sleeve 27 is set straddling the two bars so as to connect the two portions 13 and 14 rigidly to one another.

[0044] In this variant, the transverse through notches 12a present on the various plane appendages 12 of the engagement platform 8 can be replaced by a series of through holes 12a, each of which is, obviously, aligned on top of the free end of a corresponding log bolt 15 projecting from the base 2.

[0045] Optionally, also the bottom plane plate 22 of the engagement platform 8 can be provided with a series of through holes 22a, appropriately aligned to the through holes 12a present on the plane appendages 12. The through holes 22a are designed to be engage by the free ends of the bars of the log bolts 15 that project from the base 2, all around the engagement platform 8.

Claims

1. A mobile barrier (1) for temporary closing of channels and port entrances comprising a base (2) extending on the seafloor of the port entrance, and a series of mobile floodgates (3) which are hinged edgewise on the base (2) adjacent to one another so to be able to swing around a substantially horizontal axis of rotation (A) between a lowered position, in which the mobile floodgates (3) rest on the seafloor (F) of the port entrance, and a raised position, in which the mobile floodgates (3) extend in cantilever fashion from the base (2) in a direction substantially perpendicular to the seafloor (F) so as to emerge partially above the surface of the water and form a barrage designed to prevent the passage of the water through said port entrance;
each mobile floodgate (3) being connected to the base (2) by means of a plurality of disconnectable hinges (4) which are made up of a fixed portion (4a) stably anchored to the base (2), and of a mobile portion (4b) which is instead fixed to the mobile floodgate (3), incorporates the joint for articulation of the hinge

about said axis of rotation (A), and is finally structured so to be coupleable to the fixed portion (4a) in a stable, but readily releasable, manner;
the fixed portion (4a) of at least one of said disconnectable hinges (4) comprising an engagement platform (8) designed to be positioned bearing upon the surface of the base (2) for hermetic closing of a well (7) present in the base (2) itself, and a plurality of anchoring tie rods (10), structured so as to withhold the engagement platform (8) bearing upon the base (2),
and the mobile barrier (1) being **characterized in that** said engagement platform (8) is provided with a series of plane projecting appendages (12) extending in cantilever fashion from the sides of the platform, at a given distance from the underlying surface of the base (2), and the anchoring tie rods (10) are appropriately distributed around the well (7), and are structured so to connect said plane projecting appendages (12) directly to the immediately underlying base (2).

2. Mobile barrier according to Claim 1, **characterized in that** each anchoring tie rod (10) is divided into a first (13) and a second portion (14) which are structured so to be mutually engageable in a stable, but readily releasable, manner, by means of an uncoupleable mechanical joint (16, 18; 27) resistant to tensile force; the first portion (13) being anchored in a stable and unmoveable way on said base (2) so as to project partially from the latter underneath a corresponding plane projecting appendage (12); the second portion (14) projecting in cantilever fashion from the plane projecting appendage (12) overlying the first portion (13), and being designed to engage to the underlying first portion (13) in a stable, but readily releasable, manner, by means of said uncoupleable mechanical joint (16, 18).

3. Mobile barrier according to Claim 2, **characterized in that** said first portion (13) comprises a log bolt (15) embedded partially in the base (2), in the immediate vicinity of the well (7), and a sleeve (27) fixed in a stable, but readily removable, manner on the end of the log bolt (15) projecting outside of the base (2); said second portion (14) comprising, instead, a threaded bar (17) which is mounted through the plane projecting appendage (12) overlying said first portion (13), and has the bottom end fitted on said sleeve (27) in a stable, but readily removable, manner, and at least one locknut (19) screwed on the threaded bar (17) above said plane projecting appendage (12).

4. Mobile barrier according to Claim 2, **characterized in that** said first portion (13) comprises a log bolt (15) embedded partially in the base (2), in the immediate vicinity of the well (7), and a terminal hook or ring (16) firmly fixed on the end of the log bolt (15) projecting outside of the base (2).

5. Mobile barrier according to Claim 2 or 4, **characterized in that** said second portion (14) comprises a threaded bar (17) mounted through the plane projecting appendage (12) overlying the first portion (13), and a terminal hook or ring (18) which is firmly fixed to the bottom end of the threaded bar (17) and is sized so to be able to engage in a stable, but readily releasable, manner, with the hook or ring (16) of the first portion (13) to form said uncoupleable mechanical joint (16, 18); the second portion (14) moreover comprising at least one locknut (19) screwed on the threaded bar (17) above the plane projecting appendage (12).

6. Mobile barrier according to Claim 4 or 5, **characterized in that** said plane projecting appendages (12) are provided with transverse through notches (12a), each of which extends from the side edge of the corresponding plane projecting appendage (12) towards the centre of the engagement platform (8), and is aligned above the first portion (13) of a respective anchoring tie rod (10), and the uncoupleable mechanical joint (16, 18) of said anchoring tie rod (10) is structured so as to enable the second portion (14) to pivot on the top of said first portion (13), remaining substantially coplanar with a vertical plane.

7. Mobile barrier according to any one of the preceding claims, **characterized in that** the fixed portion (4a) of said disconnectable hinge (4) also comprises an external protective casing (21), which is designed to be fitted on the engagement platform (8) so as to surround the various plane projecting appendages (12) for delimiting with the surface of the base (2) and with the sides of said engagement platform (8) a closed space, designed to be filled integrally with foamed plastic material.

8. Mobile barrier according to any one of the preceding claims, **characterized in that** the engagement platform (8) is designed to be positioned bearing upon the surface of said base (2) with the interposition of at least one seal ring (11) which surrounds the inlet of said well (7), and **in that** said anchoring tie rods (10) are appropriately distributed around the well (7), on the outside of said at least one seal ring (11).

9. Mobile barrier according to any one of the preceding claims, **characterized in that** the mobile portion (4b) of said disconnectable hinge (4) comprises an engagement head (6), structured so to be fittable in the fixed portion (4a) of the disconnectable hinge (4) itself in a stable, but readily releasable, manner, and **in that** said engagement platform (8) is provided with

a central seat (8a), which is shaped so to be able to receive said engagement head (6), the engagement platform (8) being positioned bearing upon the base (2) with said central seat (8a) aligned to the well (7) present on the base (2).

10. Mobile barrier according to any one of the preceding claims, **characterized in that** said plane projecting appendages (12) are located at a distance of between 0.15 and 1.5 metres from the surface of said base (2).

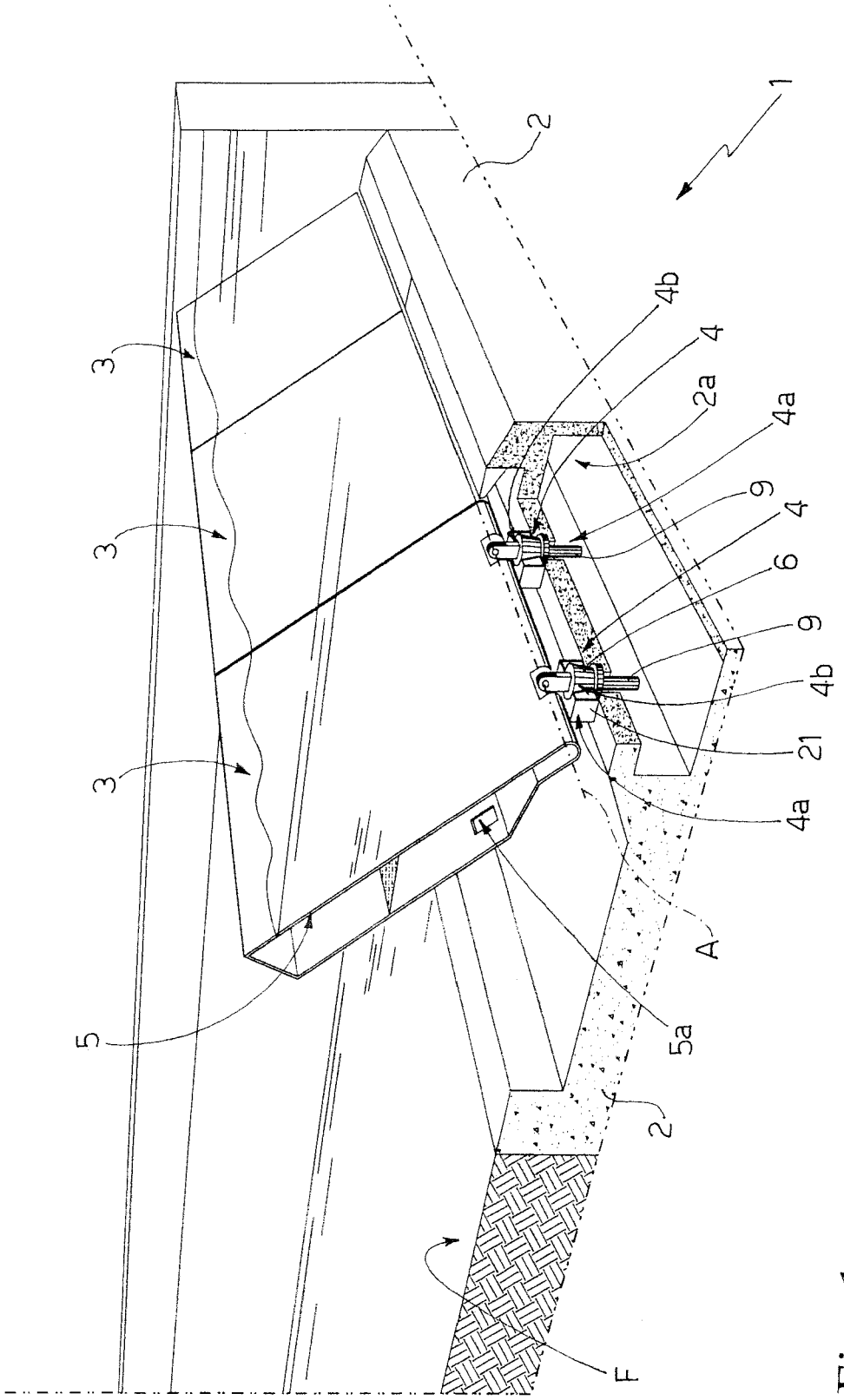

Fig. 1

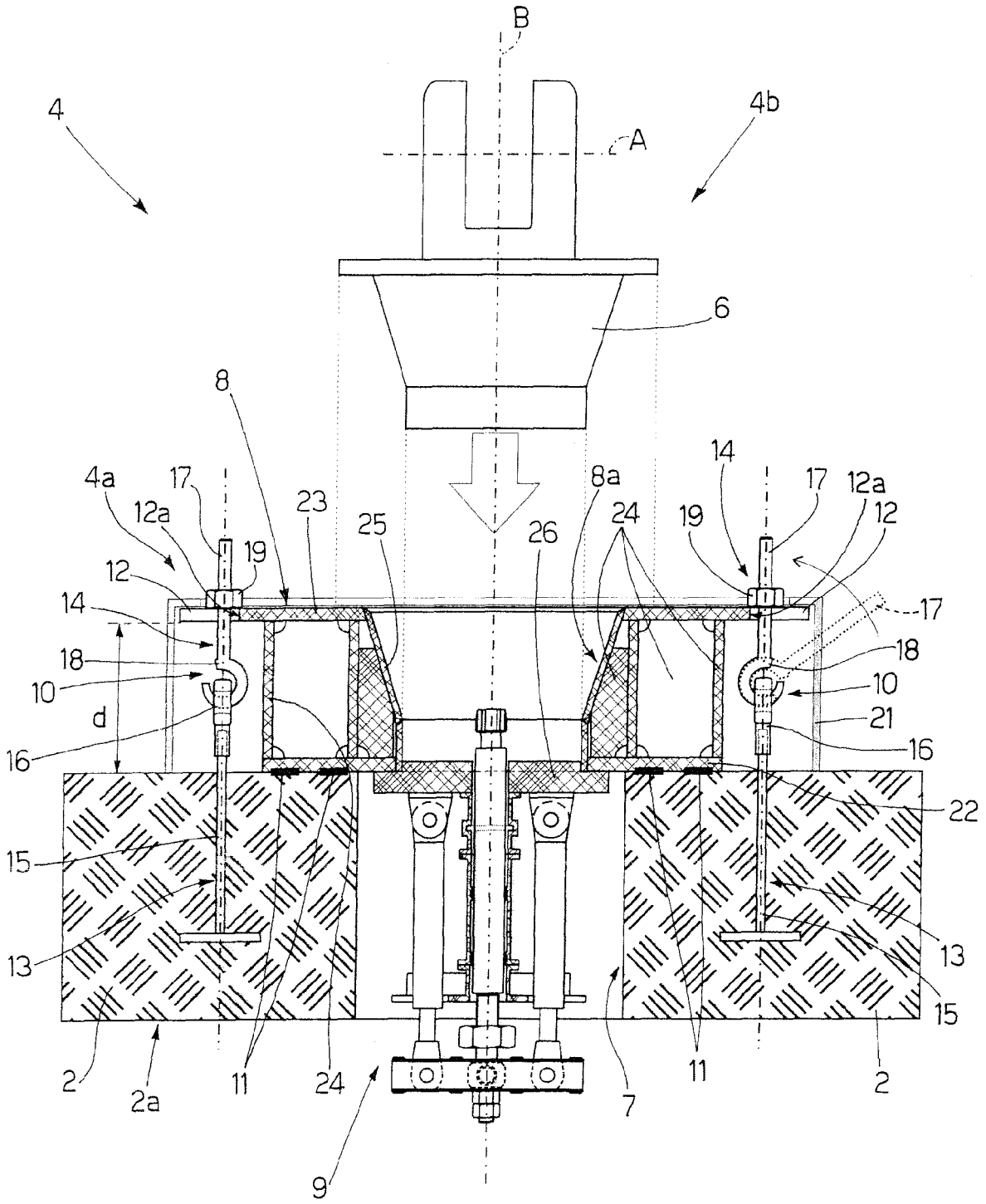
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Fig. 2

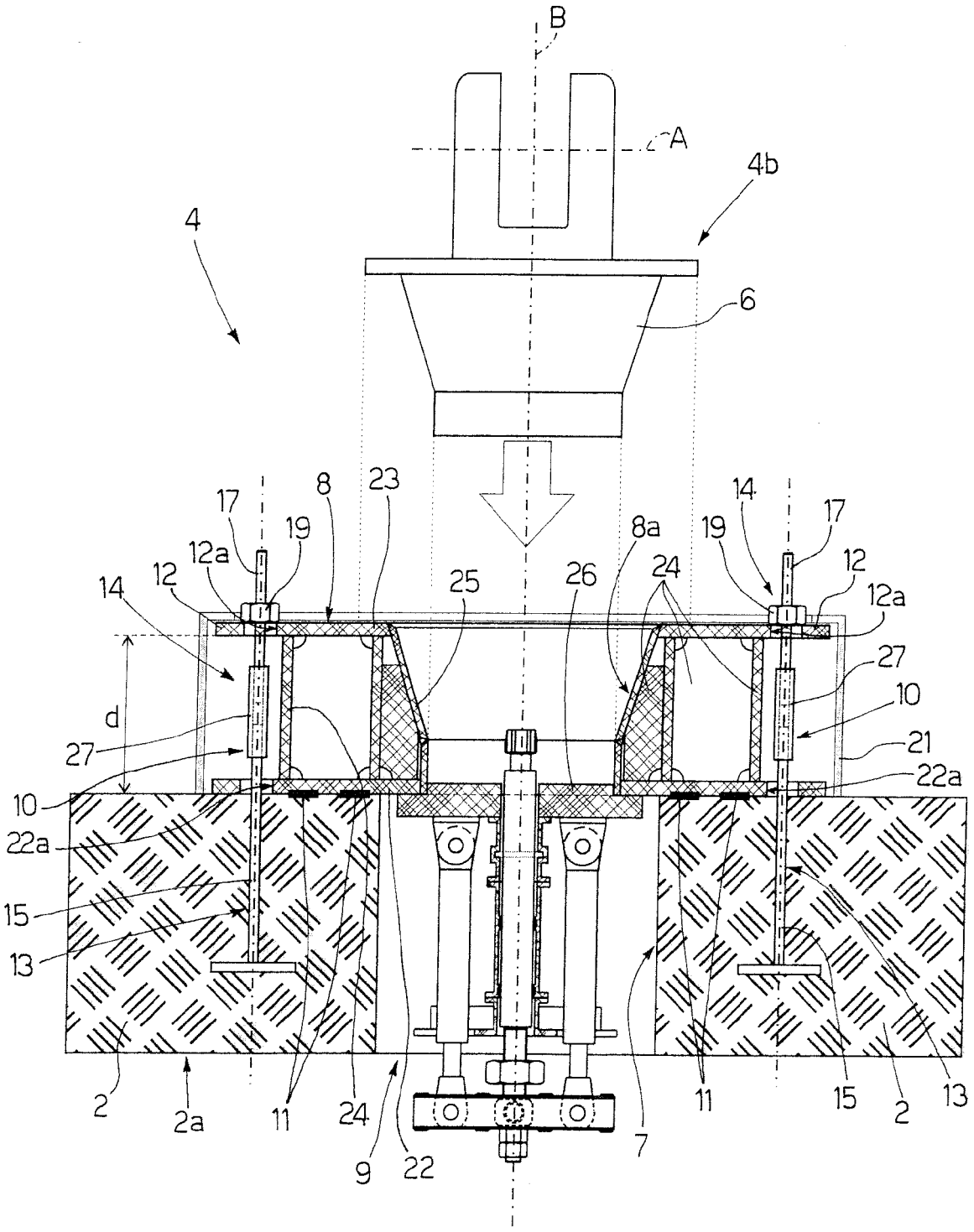
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Fig. 3

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 08 15 7697

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
D,A	EP 0 397 609 A (RIVA CALZONI SPA [IT]) 14 November 1990 (1990-11-14) * figure 6 *	1	INV. E02B7/44 ADD. E02B3/10
A	EP 1 726 717 A (FRACASSO METALMECCANICA [IT] FRACASSO S P A [IT]) 29 November 2006 (2006-11-29) * column 5, line 11 - line 12; figure 2 *	1	

TECHNICAL FIELDS SEARCHED (IPC)

E02B

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Place of search	Date of completion of the search	Examiner
Munich	15 September 2008	Flygare, Esa

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