(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 380 807 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
19.06.2013 Bulletin 2013/25

(51) Int Cl.:
B63B 27/14 *(2006.01)* ***B63B 1/12*** *(2006.01)*

(21) Application number: **11162304.7**

(22) Date of filing: **13.04.2011**

(54) A landing craft

Landungswasserfahrzeug

Embarcation de débarquement

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

(30) Priority: **23.04.2010 GB 201006805**

(43) Date of publication of application:
26.10.2011 Bulletin 2011/43

(73) Proprietor: **BMT Nigel Gee Limited**
William Street
Southampton
Hampshire SO14 5QL (GB)

(72) Inventors:
- **Dudson, Ed**
  Southampton, Hampshire SO17 1RE (GB)
- **Sime, Rob**
  Southampton, Hampshire SO18 5EE (GB)

(74) Representative: **Wilson, Alan Stuart et al**
Barker Brettell LLP
Medina Chambers Town Quay
Southhampton, Hampshire SO14 2AQ (GB)

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Description

[0001] The present invention relates to a landing craft and particularly but not exclusively relates to a military landing craft for landing military personnel and equipment on a beach or river bank or the like.

[0002] Landing craft are well known and typically comprise a generally flat transport deck mounted on a hull. The underside of such craft is typically formed from a planar bow ramp inclined to the transport deck, and a flat bottomed hull extending from the inclined bow to the stern of the craft. The hull of the craft thus provides stability to the craft when the hull contacts the beach or river bank such that the bow ramp can be lowered to enable personnel and/or equipment to be off loaded from the transport deck. This arrangement is commonplace and has been used without significant modification for decades.

[0003] A problem with such an arrangement is that the flat bottomed hull restricts the craft to a relatively slow speed, particularly in waves. This is aggravated by the necessity for a relatively wide, flat bow ramp that is hinged near the waterline of the craft.

[0004] The current invention stems from some work to try to provide a faster, more efficient craft that retains the ease of off-loadifig provided by a relatively wide, flat bow ramp.

[0005] International patent application WO2004/043 546, which is considered as the closest prior art, discloses a commercial vessel comprising two fixed outer hulls, and a movable centre hull, the centre hull being movable up and down relative to the outer hulls. A transport deck is provided on the movable centre hull.

[0006] According to a first aspect of the invention there is provided a landing craft for landing personnel and/or equipment on a beach or river bank or the like, the craft comprising a hull on which a transport deck is provided, a ramp being provided at the bow of the craft and arranged to be movable from a closed position in which the ramp closes the transport deck to a lowered position in which the ramp opens the transport deck, the hull comprising three sub-hulls that are relatively transversely spaced apart across the landing craft, at least the two outermost sub-hulls having substantially the same draught such that the outermost hulls provide stability to the craft when in contact with a beach or river bank or the like, characterised in that the intermediate sub-hull extends only partially along the length of the craft such that the craft has three sub-hulls for only part of its length, and wherein the bow portion of the intermediate sub-hull terminates behind the bow portions of the two outermost sub-hulls, when viewed from the side, to define an intermediate recessed region at the bow, in which the ramp is hinged, and wherein the ramp, when in the lowered position, is located between the two transversely outermost sub-hulls.

[0007] The longitudinal axes of the outermost sub-hulls may be substantially parallel.

[0008] Preferably the hinge axis of the bow ramp is spaced above the waterline of the craft.

[0009] Preferably the bow ramp is a bi-fold ramp comprising two ramp sections hinged together by an intermediate hinge part way along the length of the ramp.

[0010] Preferably the craft comprises a propulsion system which may comprise a water jet propulsion system.

[0011] Preferably the water jet propulsion system comprises a water jet in each sub-hull.

[0012] Preferably the propulsion system comprises a main propulsion motor in each sub-hull.

[0013] Preferably the top of each main propulsion motor is located below the plane of the transport deck.

[0014] Other aspects of the present invention may include any combination of the features or limitations referred to herein.

[0015] The present invention may be carried into practice in various ways, but embodiments will now be described by way of example only with reference to the accompanying drawings in which:

Figure 1 is a sectional side view of a landing craft in accordance with the present invention with the bow ramp shown in closed, intermediate and lowered positions;

Figure 2 is a sectional view from the top of the landing craft of Figure 1 with the superstructure, transport deck, and ramps removed for clarity;

Figure 3 is a sectional view from the top of the landing craft of Figures 1 and 2, with the ramp in an intermediate position;

Figure 4 is a view from underneath of the hull of the landing craft of Figures 1 to 3;

Figure 5 is a perspective view from the front and underneath of the hull of the landing craft of Figures 1 to 4;

Figure 6 is a view from the front of the hull of the landing craft of Figures 1 to 5; and

Figure 7 is a side view of the hull of the landing craft of Figures 1 to 6.

[0016] Referring to the Figures, a landing craft 1 comprises a hull 3 on which is mounted a superstructure 5 which includes a substantially flat transport deck 7 suitable for carrying a load such as personnel, equipment and/or vehicles for example.

[0017] The superstructure 5 also includes a suitable deckhouse and ancillary structures as are well known.

[0018] The hull 3 comprises three sub-hulls 9, 11 that are transversely spaced across the width of the hull 3 such that the hull 3 comprises a trimaran at the bow. The two outermost sub-hulls 9 each extend along the length of the craft 1 from the bow to the stern, have substantially

parallel longitudinal axes, are symmetrical about the longitudinal axis of the craft 1, and are of identical draught. The lowermost part of each sub-hull 9 comprises a substantially flat surface 10 although differently shaped profiles are envisaged - for example each sub-hull 9 may comprise a V-shaped profile. The two outermost sub-hulls 9 and the underside 13 of the top of the hull 3 define between them a flow channel 15 .

[0019] The sub-hull 11 comprises an intermediate sub-hull positioned between the two outermost sub-hulls 9 to bisect the flow channel 15 to define two adjacent sub-flow channels 15A, 15B. The intermediate sub-hull 11 may be of the same or lesser draught than the outermost sub-hulls 9, and the lowermost part of the intermediate sub-hull 11 may be substantially flat or profiled as required.

[0020] The intermediate sub-hull 11 comprises a tapered bow portion 11A that widens into a substantially cuboidal mid-portion 11B that extends to the stern of the craft 1. The hull 3 is shaped, when viewed from the side, such that underside 13 at the bow of the craft is above the waterline 24, but drops below the waterline aft of the bow of the craft 1 such that the hull 3 at the stern of the craft 1 comprises a mono-hull

[0021] The tapered bow portion 11A of the intermediate sub-hull 11 is spaced behind the bow of the craft 1 as defined by the bow portions 9A of the outermost sub-hulls 11, when the craft 1 is viewed from the side. The bow 11A of the intermediate sub-hull 11 thus terminates before the bow of the craft 1 such that a hull free recessed area 17 is defined at the bow of the craft 1 transversely between the bow portions 9A of the outermost sub-hulls 9.

[0022] The rear margin 19 of the recessed area 17 comprises the front margin of the transport deck 7 and is provided with a hinge 21 on which a bow ramp 23 is mounted. The mounting hinge 21 of the ramp 23 is thus spaced considerably above the waterline 24 of the craft 1, the waterline 24 at its highest being flush with the underside 13 of the top of the hull 3. The relatively high hinge axis allows a lower entrance angle at the waterline 24 resulting in a lower calm water resistance. The high hinge axis also reduces slamming and speed loss in waves.

[0023] The bow ramp 23 comprises a bi-fold ramp comprising two ramp portions 23A, 23B hinged together by hinge 25, the lower ramp portion 23A being hinged to the transport deck 7.

[0024] A suitable ramp drive mechanism is provided to move the ramp portions 23A, 23B between a closed position 26, an intermediate position 27, and a lowered position 29. Such a drive mechanism may comprise an electric motor mechanism or a hydraulic mechanism for example.

[0025] When in the closed position 25, the second ramp portion 23B is folded onto the first ramp portion 23A and the ramp 23 is in a raised condition wherein the plane of the ramp 23 is inclined to the plane of the transport deck 7. In this position the ramp 23 effectively closes the transport deck 7.

[0026] When in the intermediate position 27, the second ramp portion 23B is unfolded from the first ramp portion 23A such that the ramp portions 23A, 23B are co-planar and substantially horizontal. The first ramp portion 23A is positioned between the two outermost sub-hulls 9 with the second ramp portion 23B projecting beyond the bow of the craft 1.

[0027] When in the lowered position, the unfolded ramp portions 23A, 23B are inclined down from the transport deck 7 to the beach or river bank or the like onto which the load is to be off-loaded. Again the first ramp portion 23A is positioned between the two outermost sub-hulls 9.

[0028] In the illustrated embodiment, a water jet propulsion system is provided comprising a propulsion means 31 in each sub-hull 9, 11 each propulsion means 31 comprising a motor 33, gearbox 35, drive shaft 37 and impeller/jet assembly 39. The craft 1 thus comprises three motors 33, one in each sub-hull 9, 11. This enables smaller motors 33 to be used such that the tops of the motors 33 are below the plane of the transport deck 7 thus improving the load area, and level, of the deck 7.

[0029] The motors 33 may be high speed diesel combustion engines although any desired type of motor could alternatively or additionally be used including gas turbines, petrol combustion, electric, hydrogen or hybrid motors.

[0030] The stern end 41 of the transport deck 7 extends beyond the stern of the outermost sub-hulls 9. The water jet outlets are positioned below the extended end 41. The extended end 41 may be provided with a stern ramp 43 that can be moved between closed and lowered positions to enable access to the transport deck 7 from the stern of the craft 1. Again, the hinge axis 45 of the stern ramp 43 is spaced above the waterline of the craft 1.

[0031] In use of the craft 1, the flat, lowermost surfaces of the bows 9A, 9B of the outer hulls 9 rest on the beach or river bank or the like when the craft 1 is positioned to be offloaded. The outer hulls 9 thus stabilise the craft 1 during the offloading process, the bow ramp 23 being moved to the lowered position 29 in between the two outer hulls 9. Likewise the stern portions of the two outermost hulls 9 provide stability for the stern of the craft 1 if in contact with the beach or river bank or the like.

[0032] The intermediate hull 11 may provide additional stability if also in contact with the beach or river bank or the like.

[0033] When moving, the three hulls 9, 11 provide a relatively streamlined, stable hull 3 that enables relatively high craft speeds to be attained whilst still carrying relatively high payloads. The arrangement of the three hulls 9, 11 is such that a large increase in craft speed is still possible, despite the relatively wide bow ramp 23.

[0034] It is envisaged that the sub-hulls 9, 11 be formed from an aluminium material although any other suitable material, including for example, a composite material,

could alternatively be used.

[0035] As non-limiting examples only, it is envisaged that the craft 1 be around thirty metres long with a beam of around eight metres, capable of carrying a payload of around eighty tonnes. The draft of the craft 1 may be around 1.5m. With such approximate dimensions, and three motors 33 each of around six MW, speeds of between twenty and forty knots are envisaged.

[0036] The three hulls 9, 11 define flow channels 15A, 15B between them having relatively fine entrance angles which render the hull 3 relatively streamlined.

Claims

1. A landing craft (1) for landing personnel and/or equipment on a beach or river bank or the like, the craft (1) comprising a hull (3) on which a transport deck (7) is provided, a ramp (23) being provided at the bow of the craft (1) and arranged to be movable from a closed position in which the ramp (23) closes the transport deck (7) to a lowered position in which the ramp (23) opens the transport deck (7), the hull (3) comprising three sub-hulls (9, 11) that are relatively transversely spaced apart across the landing craft (1), at least the two outermost sub-hulls (9) having substantially the same draught such that the outermost hulls (9) provide stability to the craft (1) when in contact with a beach or river bank or the like, **characterised in that** the intermediate sub-hull (11) extends only partially along the length of the craft (1) such that the craft (1) has three sub-hulls (9, 11) for only part of its length, and wherein the bow portion of the intermediate sub-hull (11) terminates behind the bow portions of the two outermost sub-hulls (9), when viewed from the side, to define an intermediate recessed region (17) at the bow, in which the ramp (23) is hinged, and wherein the ramp (23), when in the lowered position, is located between the two transversely outermost sub-hulls.

2. The landing craft (1) of claim 1 wherein the longitudinal axes of the outermost sub-hulls (11) are substantially parallel.

3. The landing craft (1) of any one of the preceding claims wherein the hinge axis (21) of the bow ramp (23) is spaced above the waterline of the craft.

4. The landing craft (1) of any one of the preceding claims wherein the bow ramp (23) is a bi-fold ramp comprising two ramp sections (23A, 23B) hinged together by an intermediate hinge (25) part way along the length of the ramp (23).

5. The landing craft (1) of any one of the preceding claims wherein the craft (1) comprises a water jet propulsion system.

6. The landing craft (1) of claim 5 wherein the water jet propulsion system comprises a water jet (39) in each sub-hull (9, 11).

7. The landing craft (1) of claim 5 or claim 6 wherein the propulsion system comprises a main propulsion motor (33) in each sub-hull (9, 11).

8. The landing craft (1) of claim 5 wherein the top of each main propulsion motor (33) is located below the plane of the transport deck (7).

Patentansprüche

1. Ein Landungswasserfahrzeug (1) zum Anlanden von Personal und/oder Ausrüstung an einem Strand oder Flussufer oder Ähnlichem, wobei das Wasserfahrzeug (1) Folgendes umfasst: einen Schiffsrumpf (3), auf dem sich eine Ladefläche (7) befindet, eine Rampe (23), die sich am Bug des Wasserfahrzeugs (1) befindet und entsprechend angeordnet ist, sodass sie von einer geschlossenen Position, in der die Rampe (23) die Ladefläche (7) schließt, in eine abgesenkte Position bewegt werden kann, in der die Rampe (23) die Ladefläche (7) öffnet, wobei der Schiffsrumpf (3) drei Unterrümpfe (9, 11) umfasst, die relativ querlaufend über das Landungswasserfahrzeug (1) hinweg beabstandet sind, wobei zumindest die zwei äußersten Schiffsrümpfe (9) im Wesentlichen denselben Tiefgang haben, sodass die äußersten Schiffsrümpfe (9) dem Wasserfahrzeug (1) Stabilität verleihen, wenn es mit einem Strand oder Flussufer oder Ähnlichem in Kontakt kommt, **dadurch gekennzeichnet, dass** der dazwischenliegende Unterrumpf (11) sich nur teilweise entlang der Gesamtlänge des Wasserfahrzeugs ausdehnt, sodass das Wasserfahrzeug (1) drei Unterrümpfe (9, 11) aufweist, und worin der Bugabschnitt des unmittelbaren Unterrumpfes (11) hinter den Unterabschnitten der beiden äußersten Unterrümpfe (9) endet, wenn er von der Seite betrachtet wird, um einen unmittelbaren zurückversetzten Bereich (17) am Bug zu definieren, in dem die Rampe (23) aufklappbar ist und worin die Rampe (23), wenn sie abgesenkt ist, sich zwischen den beiden äußersten querverlaufenden Unterrümpfen befindet.

2. Das Landungswasserfahrzeug (1) aus Anspruch 1, worin die Längsachsen der äußersten Unterrümpfe (11) im Wesentlichen parallel verlaufen.

3. Das Landungswasserfahrzeug (1) aus einem der vorhergehenden Ansprüche, worin die Scharnierachse (21) der Bugrampe (23) über der Wasserlinie des Wasserfahrzeugs angeordnet ist.

4. Das Landungswasserfahrzeug (1) aus einem der

vorhergehenden Ansprüche, worin die Bugrampe (23) eine doppelt kippbare Rampe ist, die zwei Rampenabschnitte (23A, 23B) umfasst, welche mittels eines dazwischenliegenden Scharniers (25) teilweise der Länge der Rampe (23) entlang miteinander verbunden sind.

5. Das Landungswasserfahrzeug (1) aus einem der vorhergehenden Ansprüche, worin das Wasserfahrzeug (1) ein Wasserstrahlantriebssystem umfasst.

6. Das Landungswasserfahrzeug (1) aus Anspruch 5, worin das Wasserstrahlantriebssystem einen Wasserstrahl (39) in jedem Unterrumpf (9, 11) umfasst.

7. Das Landungswasserfahrzeug (1) aus Anspruch 5 oder Anspruch 6, worin das Wasserstrahlantriebssystem einen Hauptantriebsmotor (33) in jedem Unterrumpf (9, 11) umfasst.

8. Das Landungswasserfahrzeug (1) aus Anspruch 5, worin das Oberteil jedes Hauptantriebsmotors (33) sich unter dem Niveau der Ladefläche (7) befindet.

Revendications

1. Un engin de débarquement (1) pour le débarquement de personnes et/ou d'équipements sur une plage ou une berge de rivière ou un autre site de même nature, l'engin (1) comprenant une coque (3) sur laquelle un pont de transport (7) est installé, une rampe (23) étant installée au niveau de la proue de l'engin (1) et agencée de façon à être déplaçable à partir d'une position fermée dans laquelle la rampe (23) ferme le pont de transport (7) vers une position abaissée dans laquelle la rampe (23) ouvre le pont de transport (7), la coque (3) comprenant trois sous-coques (9, 11) qui sont espacées les unes des autres relativement transversalement le long de l'engin de débarquement (1), au moins les deux sous-coques les plus extérieures (9) possédant sensiblement le même tirant d'eau de sorte que les coques les plus extérieures (9) fournissent une stabilité à l'engin (1) lorsqu'il est en contact avec une plage ou une berge de rivière ou un autre site de même nature, **caractérisé en ce que** la sous-coque intermédiaire (11) s'étend partiellement seulement le long de la longueur de l'engin (1) de sorte que l'engin (1) possède trois sous-coques (9, 11) pour seulement une partie de sa longueur, et où la partie proue de la sous-coque intermédiaire (11) se termine derrière les parties proue des deux sous-coques les plus extérieures (9) lorsque l'engin est vu latéralement, de façon à définir une zone évidée intermédiaire (17) au niveau de la proue, dans laquelle la rampe (23) est articulée, et où la rampe (23), lorsqu'elle est dans la position abaissée, se situe entre les deux sous-coques transversalement les plus extérieures.

2. L'engin de débarquement (1) selon la Revendication 1 où les axes longitudinaux des sous-coques les plus extérieures (11) sont sensiblement parallèles.

3. L'engin de débarquement (1) selon l'une quelconque des Revendications précédentes où l'axe de charnière (21) de la rampe de proue (23) est espacé au-dessus de la ligne de flottaison de l'engin.

4. L'engin de débarquement (1) selon l'une quelconque des Revendications précédentes où la rampe de proue (23) est une rampe à deux volets pliables comprenant deux sections de rampe (23A, 23B) articulées ensemble par une charnière intermédiaire (25) à mi-chemin le long de la longueur de la rampe (23).

5. L'engin de débarquement (1) selon l'une quelconque des Revendications précédentes où l'engin (1) comprend un système hydropropulsé.

6. L'engin de débarquement (1) selon la Revendication 5 où le système hydropropulsé comprend un jet d'eau (39) dans chaque sous-coque (9, 11).

7. L'engin de débarquement (1) selon la Revendication 5 ou 6 où le système de propulsion comprend un moteur de propulsion principal (33) dans chaque sous-coque (9, 11).

8. L'engin de débarquement (1) selon la Revendication 5 où la partie supérieure de chaque moteur de propulsion principal (33) se situe sous le plan du pont de transport (7).

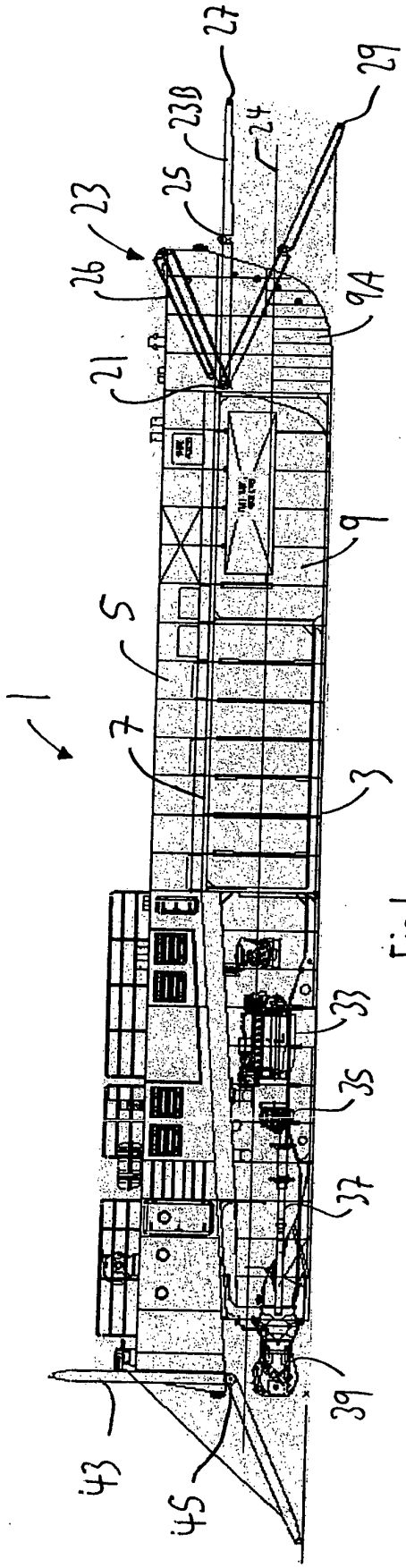

1
3
5
7
9
9A
21
23
25
26
27
29
33
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37
39
43
45

Fig 1

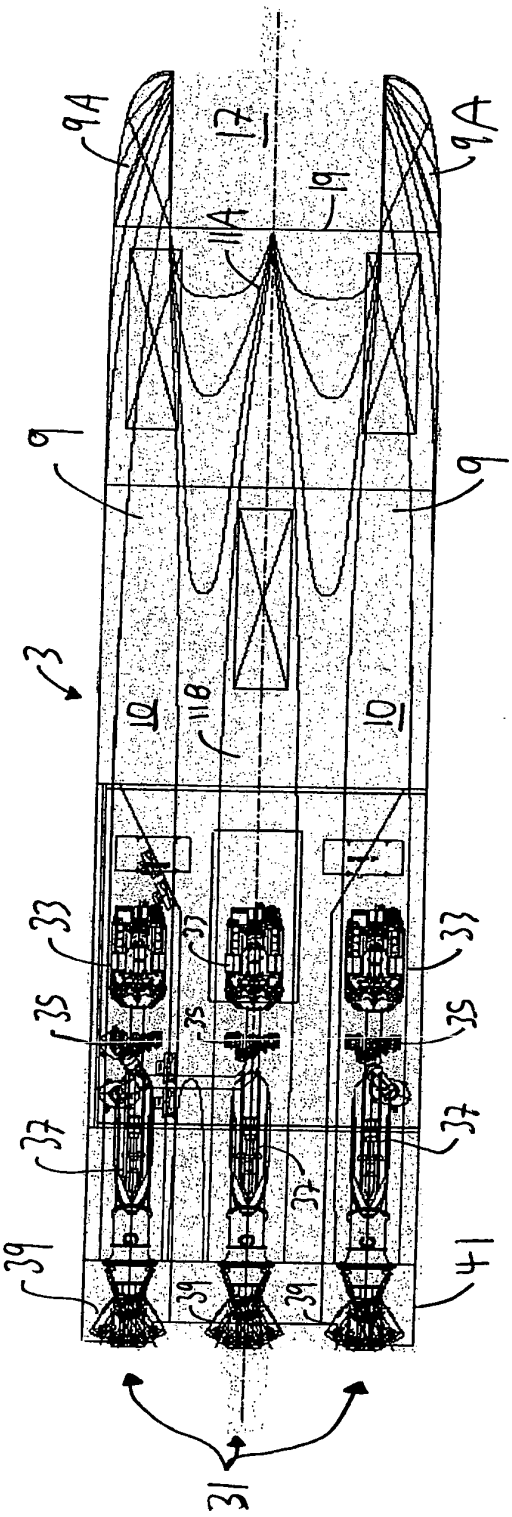

3
9
9A
10
11A
11B
12
33
35
37
39
41
31

Fig 2

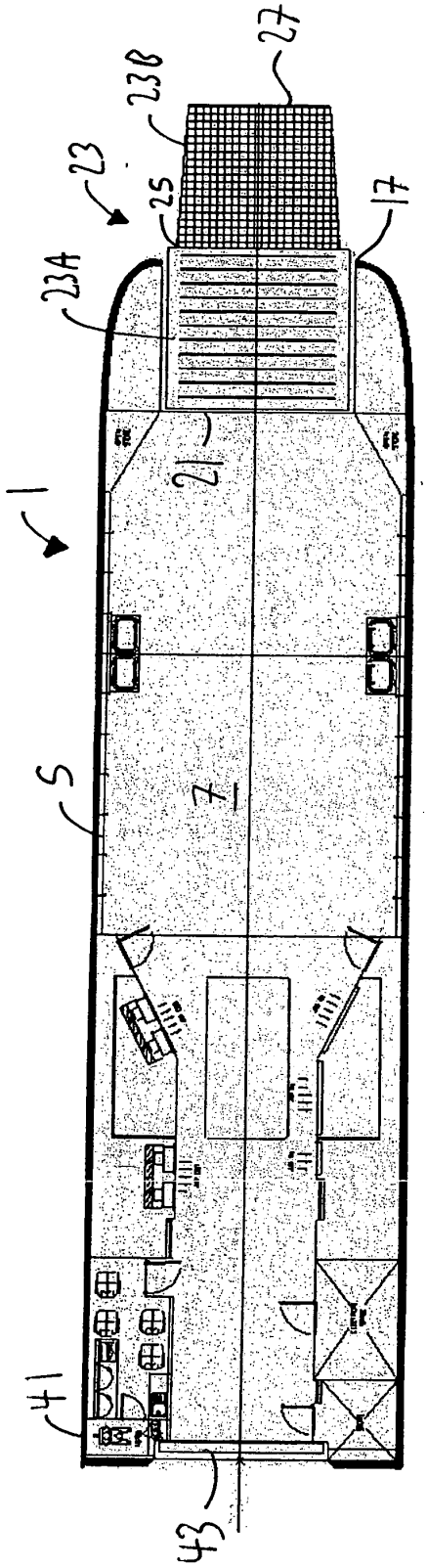


Fig 3

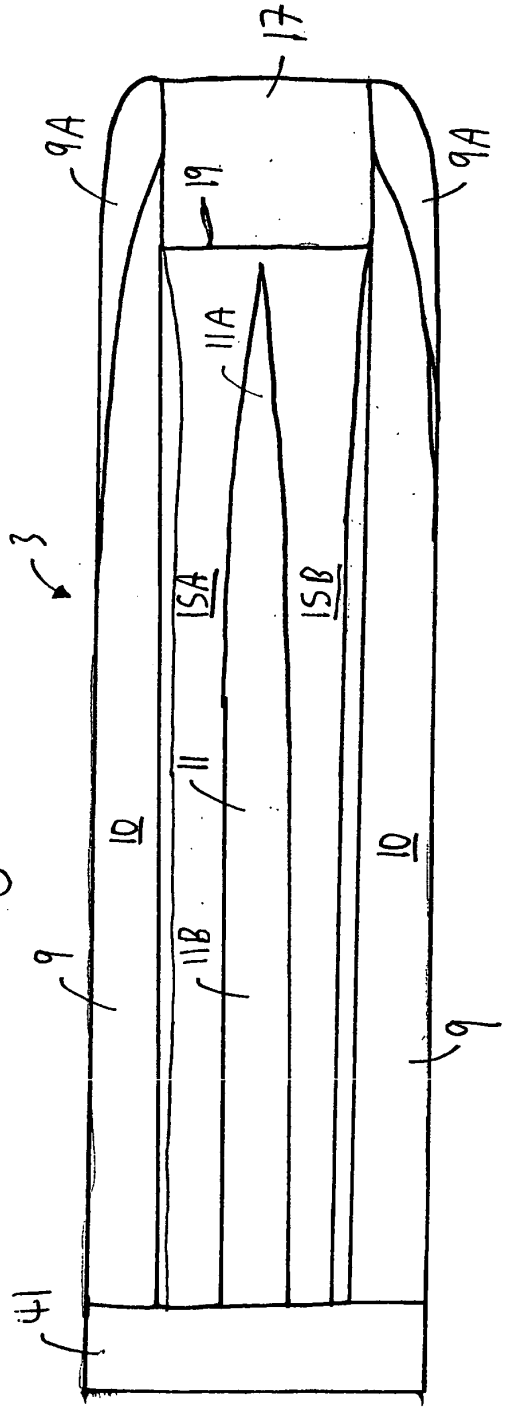


Fig 4

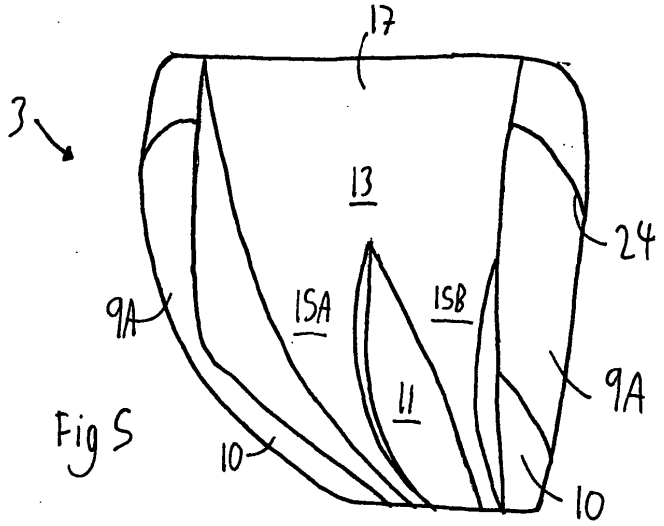


Fig 5

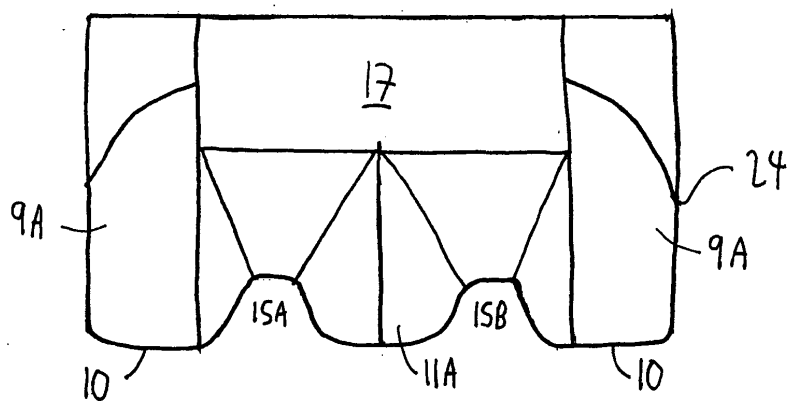


Fig 6

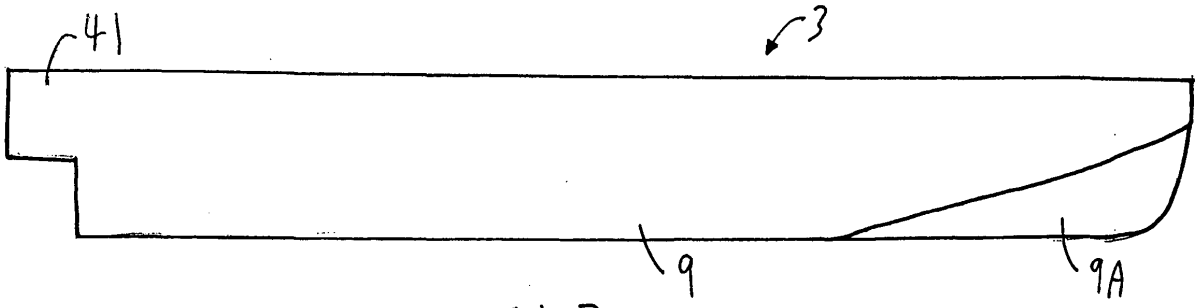


Fig 7

REFERENCES CITED IN THE DESCRIPTION

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