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(54) Quick means of transport in water

(57) Quick means of transport (1) in water are described, that are composed of an external casing (5) and of an internal casing (7) (or a carrier structure) with a cylindrical shape with fluido-dynamic and functional support taperings; the external casing (5) contains therein the internal casing (7) and rotates around the internal casing (7) that contains a load to be transported, and moreover the external casing (5) is equipped on its external surface with one or more sinusoidal projecting profiles (15) that allow a spinning in water of the external casing (5) and therefore of the means of transport (1) due to an action of a propulsor (16) placed in the internal casing (7).

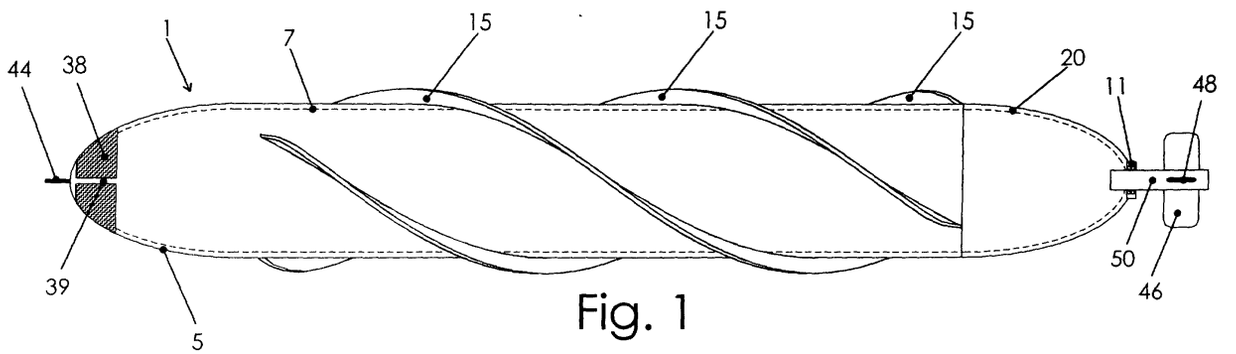

Fig. 1

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Description

[0001] The present invention refers to quick means of transport in water, and in particular to submarine quick means of transport for passengers and goods.

[0002] While in the field of transport on roads, on tracks and on planes the technology allowed and allows continuous improvements under all aspects, in the field of sea transports, though arranging always more and more up-to-date and functional boats, optimum speed conditions cannot be obtained, since modern boats continue to be subjected to constraints created by the sea surface, such as different wave motions and propulsions limits.

[0003] Nowadays there are no arrangements that allow exploiting the vast surfaces of seas and oceans, to realise a high-speed submarine navigation.

[0004] Object of the present invention is solving the above prior-art problems by providing a means of transport in water, in particular a submarine one, that allows reaching high speeds, is of a simple construction and can immediately be built, and is totally independent from external sea conditions, such as for example highly-dimensioned wave motions, storms, winds, etc.

[0005] The above and other objects and advantages of the invention, as will appear from the following description, are obtained by a means of transport in water as claimed in Claim 1 or 2. Preferred embodiments and non-trivial variations of the present invention are claimed in the dependent Claims.

[0006] The present invention will be better described by some preferred embodiments thereof, given as a non-limiting example, with reference to the enclosed drawings, in which:

- Figure 1 is a side view of an embodiment of the means of transport of the present invention;
- Figure 2 is a front view of the means of transport in Fig. 1;
- Figure 3 is a top broken-away view of the means of transport in Fig. 1; and
- Figure 4 is a side broken-away view of the means of transport in Fig. 1.

[0007] With reference to the Figures, a preferred, but not limiting, embodiment of the means of transport 1 in water of the present invention is shown, applied to passengers transport. It will be immediately obvious to a skilled person in the art that numerous construction and realisation variations could be made to such means of transport 1 (for example derived by its application for transporting goods) without departing from the scope of the invention as claimed in the enclosed Claims.

[0008] As shown in the Figures, the invention relates to a means of transport 1 in water that runs in immersion. The navigation height at low depths depends on the wavy motion of navigated waters, but means can also be designed, for special uses, that navigate at hundreds of meters below the water level. Departure and arrival of the boat occur when it emerges, for loading and unloading operations of passengers and goods. The sizes of the means 1 can widely change depending on the use that can be designed, for example for transporting few people 3, as well as for hundreds of passengers 3 or for transporting goods. The speed of the means 1 is greater than the one of a boat on sea surface and can be constant, not being conditioned by the surface status along its travel.

[0009] The means 1 are characterised by the construction of two casings 5, 7 with a cylindrical shape with fluido-dynamic and functional support taperings. The external casing 5 rotates around the internal casing 7 that contains the load, on stern rolling bearings 9 and bow roller bearings 11. The internal casing 7 maintains a stable attitude because it is built with an eccentric longitudinal weight 13, placed inside the internal casing 7 and integral therewith. Such ballast weight 13 can be made of heavy metal, for example lead. In this way the internal casing 7 will always keep a plane, or slightly slanted, attitude for frictions generated by the motion transmission system.

[0010] Motion transmission is provided by the external casing 5 that is equipped on its external circumference with one or more protruded sinusoidal profiles 15 (in the embodiment shown the profiles 15 are three, mutually offset by 120° on the surface of casing 5) that allow its spinning in water due to the action of a propulsor 16 placed in the internal casing 7. The propulsor 16 transmits the motion to the external casing 5 from the central axis of the means 1 (through the shaft 18) or also tangentially to a directrix circumference of its internal surface. Pitch and shape of revolving profiles 15, and their number, are widely variable depending on design, type and size of means 1, on power of propulsor 16 and on the speed that has to be obtained. For departure and arrival manoeuvres of the means 1 in harbours with the means 1 emerging, it will be possible to use the same system or equip the means 1 with an auxiliary engine (not shown), with a propeller going out of bow.

[0011] Between the two casings 5, 7, both computed for resisting to the operating pressures of the external casing 5, there is an air interspace some centimeters long. The internal casing 7 can be built with watertight compartments (not shown), for example with a double wall, divided onto planes that are normal to the axis of means 1 in order to form a plurality of annular watertight chambers. The communication ports 22, 24 between the inside and the outside of the means 1 are of the watertight type, similar to those used in aircrafts. The port 24 of the external propulsor casing 5 can be opened outwards, while the port 22 of the internal cabin casing 7 can be opened inwards. When the external casing 5 is stopped and idle, a suitable system (not shown), for example a magnetic system, makes the external casing 5 partially rotate and makes the openings of the two ports 22, 24 coincide. The port threshold will be at a level that

is higher that the cabin floor that will be reached through a ladder. The possible positioning of accesses to the means 1 through central openings in the internal casing 7 vault. will allow reducing the volume of ballast water tanks, reducing the global size of the means 1 at the advantage of other characteristics of the unit. The central opening, moreover, is the practically compulsory arrangement for means 1 designed for few passengers 3 or for goods transport means.

[0012] The water tanks 26, 28 for immersion/emersion manoeuvres of the means 1 can be placed at stern or at bow, over the ballast weight 13 (as shown in Fig. 4) or also along the flanks of the internal casing 7. The tanks can be filled-in or emptied with pumps or with compressed air inserted in watertight tanks (not shown), through a pipe 30 going out from bow. Under emergency situations, in small means 1 for few passengers 3, the tanks will also have to be able to be manually emptied.

[0013] The engine 16 can be of the combustion type, with rechargeable batteries, or the electric type with fuel cells supply or also of the atomic type; in case of a combustion engine, diesel or the like, the means 1 will be equipped with a schnorchel 32 for exhausting burnt gases and exhausted air and for procuring air for all uses. It is also possible to insert air regenerating apparata (not shown).

[0014] For a means 1 used for transporting passengers, the arrangement in a cabin will be similar to the one of an airline aircraft. Pilots 34 will sit at stern and will have an outside visibility through portholes 36, next to which an annular portion 38 of the external casing 5 will rotate and will be made of toughened or safety glass or other transparent material. Such annular portion 38 will be interrupted by arms 39 of the same material of the external casing 5, adapted to transmit motion to the casing 5 itself, where it is not possible or it is too costly to build a transparent continuous ring adapted to safely transmit the rotation to the external casing 5. Through portholes 40 placed more downwards, the means 1 will be able to be equipped with headlights 42 for night navigation. The state of the art also allows having an indirect external vision, without transparent openings obtained in casings 5, 7, for example through a camera and a lighting system (not shown) arranged along a stern axis and transmitting images on an internal screen. The means 1 will be equipped with an antenna 44 that can be used by the various communication and sonar and hydrophone systems (not shown) for locating ships and obstacles along the route.

[0015] Depth rudders 46 and directional rudders 48 and related controls (not shown) will be arranged on bow, for example with a tubular cylindrical extension 50 on the axis of means 1 and integral with the internal casing 7. Under this possible arrangement, on the outside of cylinder 50, the bow rolling bearing 11 of the external casing 5 would be keyed-in. The outside of cylinder 50 would be the abutment of bow sealing gaskets between the two casings 5, 7 and would be used for securing the schnorchel 32. At the cylinder 50 end, the water intake and ejection mouth would be placed, through a downward-facing pipe 52, in order to allow the draft when the means is emerging.

[0016] The shaft 19 of the engine unit 16, with motion transmission to external casing 5, could be placed under the pilots cabin floor and, through a similar central tubular cylinder projection on stern, could allow keying-in the rolling bearing 11 of the external casing 5 and could be an abutment of the front sealing gasket between the casings 5, 7, where the external casing 5 is not designed as a single piece integral with the transmission shaft 18. The propulsor 16 would be behind the pilot 34, between him and the passengers 3.

[0017] According to the size and use of the means 1, services 54, possible dining units 56, etc. will be arranged.

[0018] In case of means for transporting passengers 3, the lack of external visibility could be for somebody a psychological obstacle to using the means 1. The problem does not occur for vehicles equipped with few passengers 3, that enjoy the same direct or indirect visibility allowed to the pilots 34 of a greater means 1. The minimum solution could be made of TV screens placed in the passengers 3 cabin, on which the outside vision can be transmitted. A possible hypothesis is building the external casing 5 of a transparent material and equip the passengers 3 cabin of a porthole like those used in aeroplanes.

[0019] Fig. 4 shows an arrangement of the means 1 such that a technical compartment 58 is provided at stern, containing the main controls and technical systems of the means 1, and a baggage compartment 60 at bow that can be accessed through ports 62, 64 similar to the ports 22, 24 previously described for passengers 3.

[0020] Special means 1 could be designed and built for particular uses, such as for example submarine exploration or vision. In general, the design of means 1 will be able to suit to different uses and internal construction solutions, leaving unchanged the principles of the two cylindrical and concentric, mutually moving casings 5, 7, the internal casing 7 being made longitudinally heavier to guarantee a stable attitude, the external casing 5 providing for the motion transmission to the means 1.

[0021] As regards the foreseen uses for submarine means 1 built according to the principles of the invention, the following can be provided: small units, parallel to cars, for short- and medium-range displacements: in addition to be used as pleasure, they would allow many inhabitants in islands or having activities in coastline places that are one near the other going by water, but that are one far away from the other moving from land, to be self-sufficient in a way that nowadays cannot be thought of. As regards the transport of passengers, many interesting solutions can be foreseen for short and medium voyages, lasting from 1 hour to 10/12 hours: and this neglecting the sea conditions, with reduced

travelling times with respect to ferry-boats, with a reduced capacity with respect to them and with a consequent practicability in every season of the year, by navigation companies with higher frequencies, alternative to aeroplanes that are often not available or that are available with double flights, etc. The means 1 can be conveniently used for transporting goods and can help reducing traffic on roads and railways. The means 1 can also be equipped to load and transport containers from 20 to 40 feet and for staying several days on sea for reaching far away destinations. The arrangement can also be applied to radio-controlled toy means.

[0022] According to an embodiment that is much lighter and much less costly, even if less safe, of the means of transport 1 of the present invention, it is possible to remove the internal casing 7 and to realise an internal carrier structure in which the cabin floor is made integral with the ballast water tanks 26, 28 and all that the internal casing 7 is aimed to contain under and above the floor; everything is suspended on stern and bow bearings 9, 11. Side walls (not shown) protect passengers 3 and crew from the contact with the internal wall of the casing 5 that rotates.

Claims

1. Quick means of transport (1) in water, **characterised in that** it is composed of an external casing (5) and of an internal casing (7) with a cylindrical shape with fluido-dynamic and functional support taperings, said external casing (5) containing therein said internal casing (7) and rotating around said internal casing (7) that contains a load to be transported, said external casing (5) being equipped on an external surface thereof with one or more sinusoidal projecting profiles (15) that allow a spinning in water of said external casing (5) and therefore of said means of transport (1) due to an action of a propulsor (16) placed in said internal casing (7).

2. Quick means of transport (1) in water, **characterised in that** it is composed of an external casing (5) with a cylindrical shape with fluido-dynamic and functional support taperings, said external casing (5) containing therein a carrier structure and rotating around said carrier structure that contains a load to be transported, said external casing (5) being equipped on an external surface thereof with one or more sinusoidal projecting profiles (15) that allow a spinning in water of said external casing (5) and therefore of said means of transport (1) due to an action of a propulsor (16) placed in said carrier structure.

3. Quick means of transport (1) in water according to claim 1 or 2, **characterised in that** said external casing (5) is rotatingly connected to said internal casing (7) or said carrier structure through stern rolling bearings (9) and bow rolling bearings (11).

4. Quick means of transport (1) in water according to claim 1 or 2, **characterised in that** said internal casing (7) or said carrier structure keeps a stable attitude being further equipped with an eccentric longitudinal weight (13), placed inside said internal casing (7) or said carrier structure and integral with said internal casing (7) or said carrier structure.

5. Quick means of transport (1) in water according to claim 4, **characterised in that** said ballast eccentric longitudinal weight (13) is made of an heavy metal, for example lead.

6. Quick means of transport (1) in water according to claim 1 or 2, **characterised in that** said sinusoidal projecting profiles (15) are three and are mutually offset by 120° on the surface of said external casing (5).

7. Quick means of transport (1) in water according to claim 1 or 2, **characterised in that** it is further equipped with an auxiliary engine with propeller projecting on bow.

8. Quick means of transport (1) in water according to claim 1, **characterised in that** said internal casing (7) is built with watertight compartments.

9. Quick means of transport (1) in water according to claim 1, **characterised in that** it further comprises communication ports (22, 24) of a watertight type between inside and outside the means (1), the communication port (24) of said external casing (5) opening outwards, while the port (22) of said internal casing (7) opens inwards, said external casing (5) being equipped with a system (for example a magnetic system) to perform a partial rotation of said exernal casing (5), when said external casing (5) is in an idle or stopped position, and to make the openings of the two ports (22, 24) coincide.

10. Quick means of transport (1) in water according to claim 1, **characterised in that** it comprises a pair of ports centrally placed in a vault of said external casing (5) and said internal casing (7).

11. Quick means of transport (1) in water according to claim 1 or 2, **characterised in that** it is further equipped with tanks (26, 28) adapted to be filled-in/emptied of water for immersion/emersion manoeuvres of the means (1).

12. Quick means of transport (1) in water according to claim 11, **characterised in that** said tanks (26, 28) are further equipped with a second emptying sys-

tem, that inserts compressed air in the watertight tanks (26, 28).

13. Quick means of transport (1) in water according to claim 11, **characterised in that** said tanks (26, 28) are further equipped with manual pumps for emptying them under emergency situations.

14. Quick means of transport (1) in water according to claim 1 or 2, **characterised in that** said propulsor (16) is composed of an engine of a combustion type, or an electric type with rechargeable batteries, or an electric type with fuel cells supply or an atomic type, said engine (16) when it is of the combustion type being equipped with a schnorchel (32) for exhausting burnt gases and exhaust air and for procuring air.

15. Quick means of transport (1) in water according to claim 1 or 2, **characterised in that** it is equipped on stern with a plurality of portholes (36, 40), the upper ones (36) of said portholes (36, 40) serving for an external vision by pilots (34), while the lower ones (40) of said portholes (36, 40) serving for an external lighting through lighting means (42).

16. Quick means of transport (1) in water according to claim 15, **characterised in that**, next to said upper portholes (36), an annular stern portion (38) of the external casing (5) rotates, said portion (38) being made of toughened glass or safety glass or other transparent material, said annular portion (38) being possibly interrupted by arms (39) made of a same material as of the external casing (5) adapted to transmit motion to the external casing (5).

17. Quick means of transport (1) in water according to claim 1 or 2, **characterised in that** it is further equipped with a camera and a lighting system arranged on stern axis and transmitting images on an internal screen, and **in that** it is equipped with an antenna (44) that can be used by various communication and sonar and hydrophone systems for locating obstacles.

18. Quick means of transport (1) in water according to claim 1 or 2, **characterised in that** it is used for transporting passengers (3) and it is therefore equipped with a plurality of seats, services (54), possible dining units (56), and a baggage compartment (60).

19. Quick means of transport (1) in water according to claim 1, **characterised in that** it is used for transporting goods and it is therefore equipped with a goods compartment.

20. Quick means of transport (1) in water according to claim 1, **characterised in that** it is used as a radio-controlled toy means.

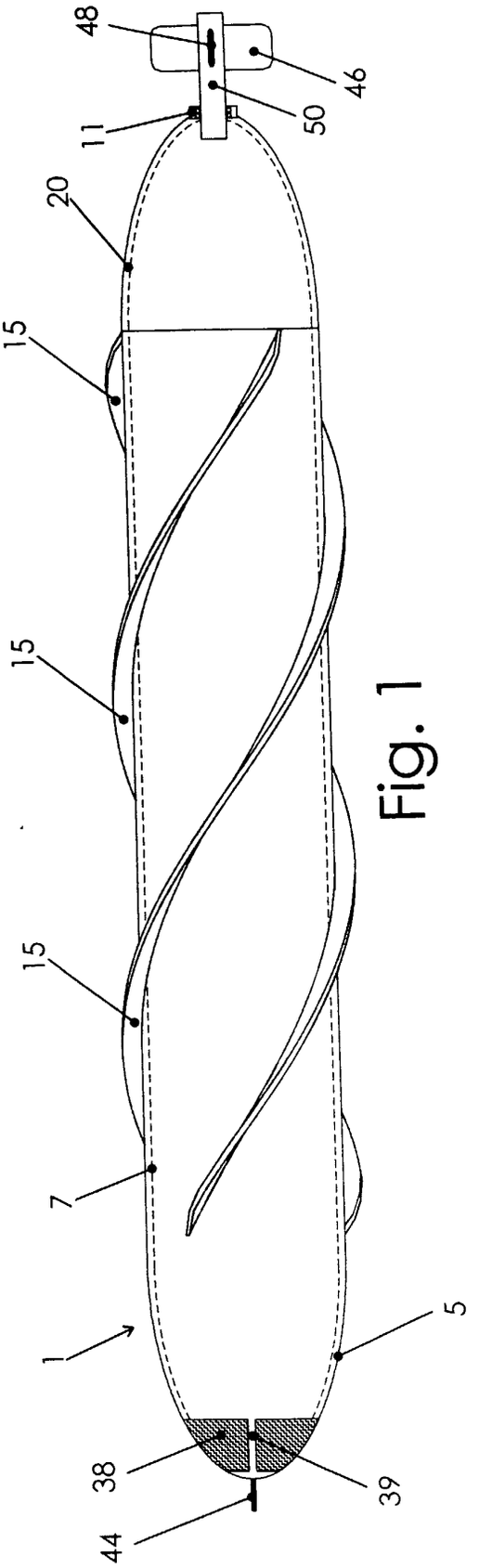

Fig. 1

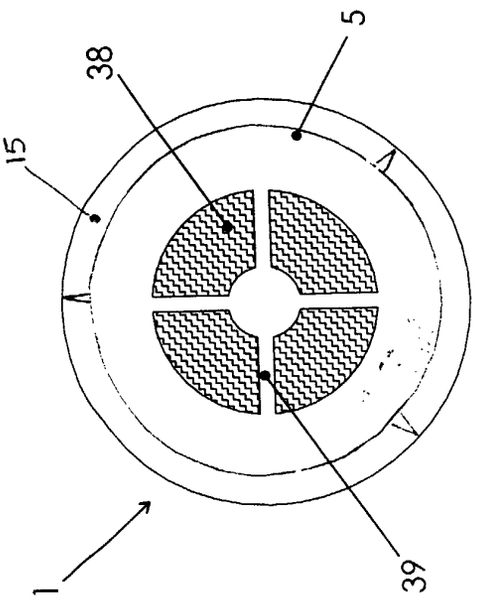

Fig. 2

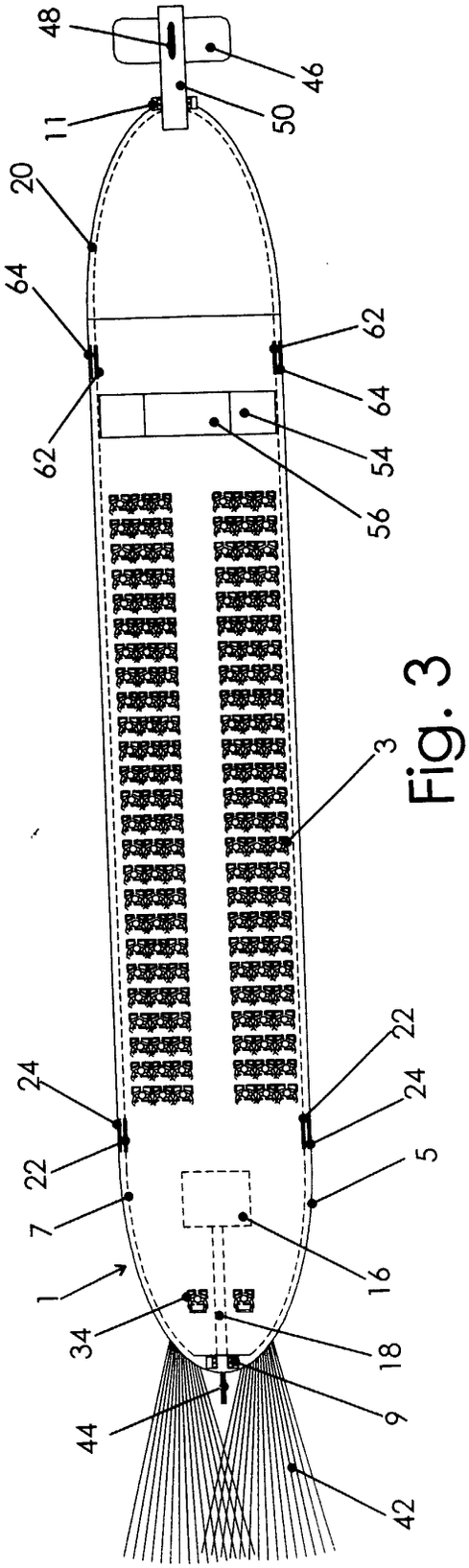
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Fig. 3

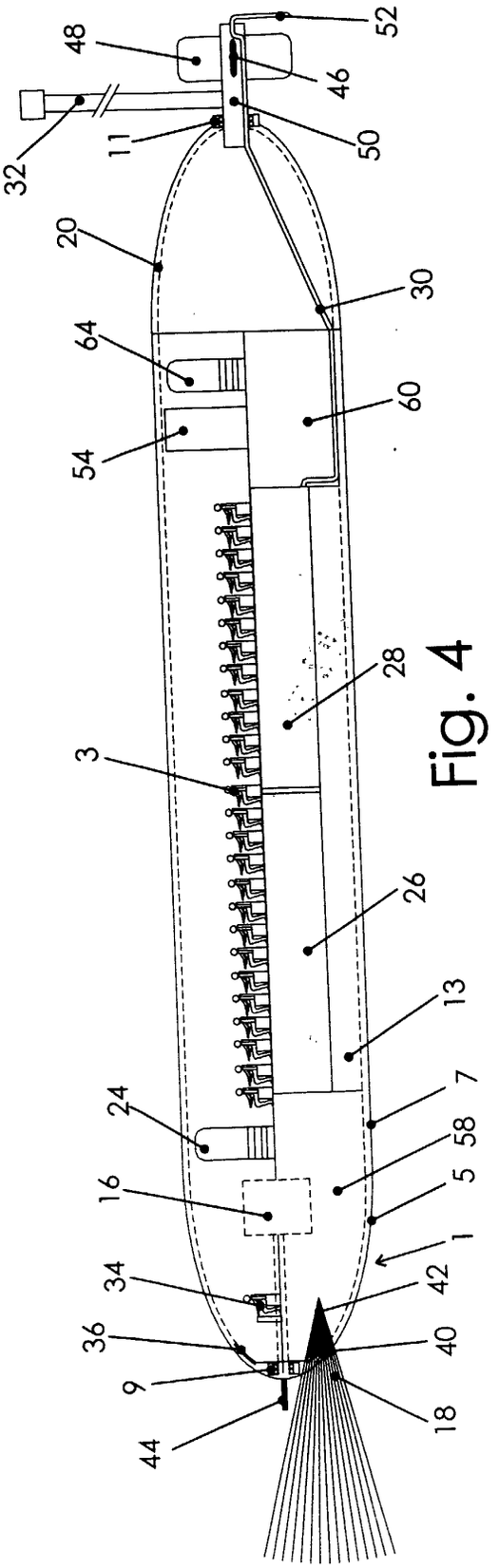
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Fig. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 01 83 0453

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	DE 37 13 550 A (GYOERY KALMAN) 10 November 1988 (1988-11-10)	1-6, 8-11,13, 15-19	B63G8/08 B63G8/00
Y	* the whole document *	7,12,14	
Y	US 3 999 499 A (KITABAYASHI SEIICHI) 28 December 1976 (1976-12-28) * figures 1-4 *	7	
Y	US 4 421 050 A (WEINERT FRIEDRICH) 20 December 1983 (1983-12-20) * column 3, line 25 - line 33; figures 1-9 *	12,14	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

B63G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	31 January 2002	DE SENA HERNAND.., A

CATEGORY OF CITED DOCUMENTS

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