

April 18, 1967

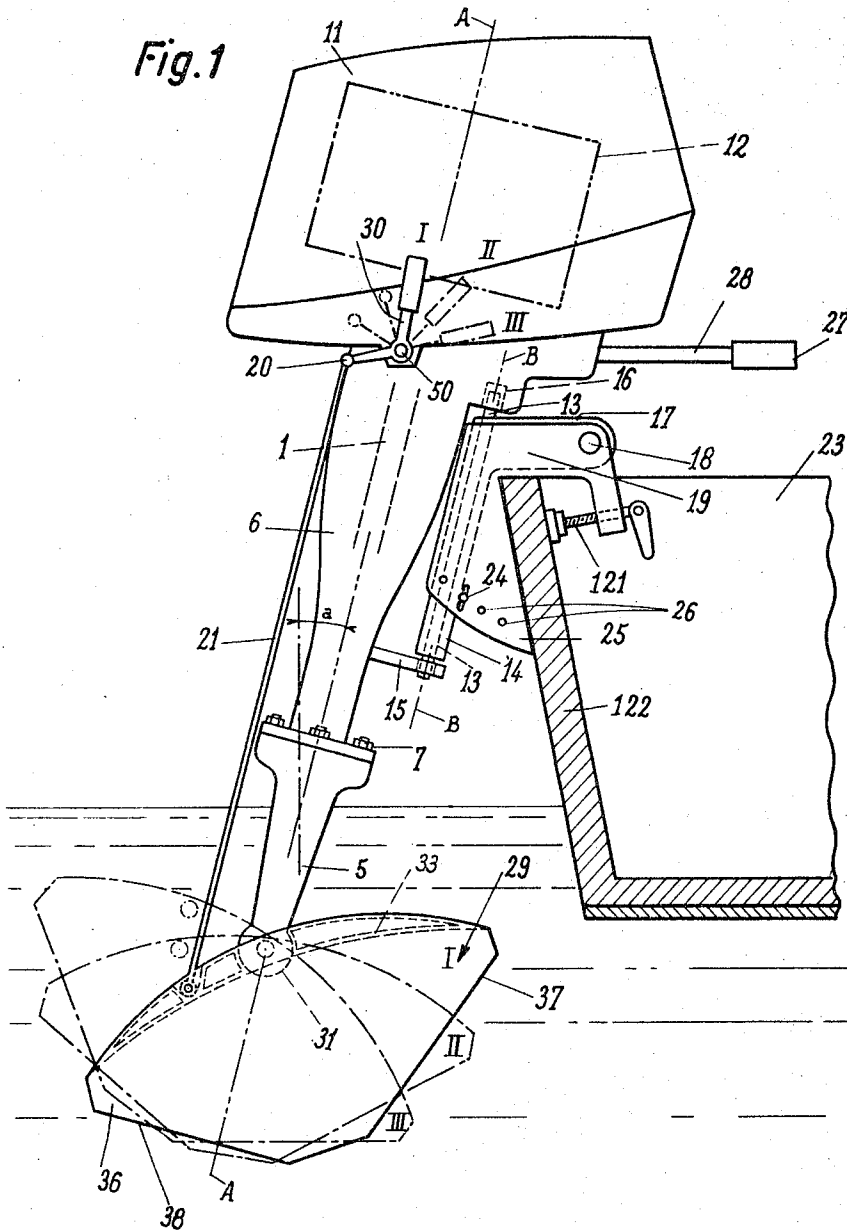
J. MOLAS ETAL

3,314,392

HYDRODYNAMIC PROPULSION UNIT FOR BOATS

Filed March 22, 1965

5 Sheets-Sheet 1



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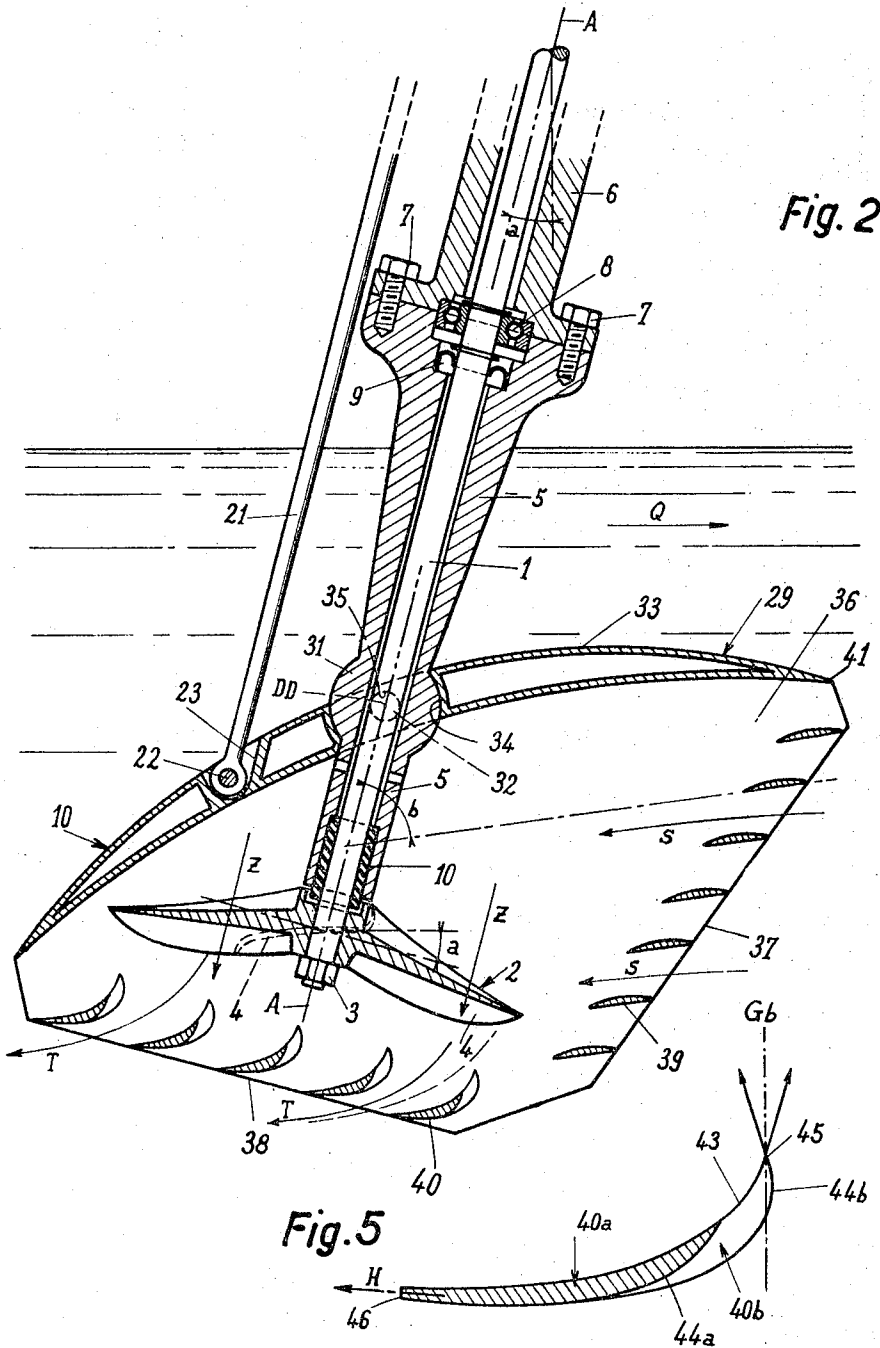
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5 Sheets-Sheet 3

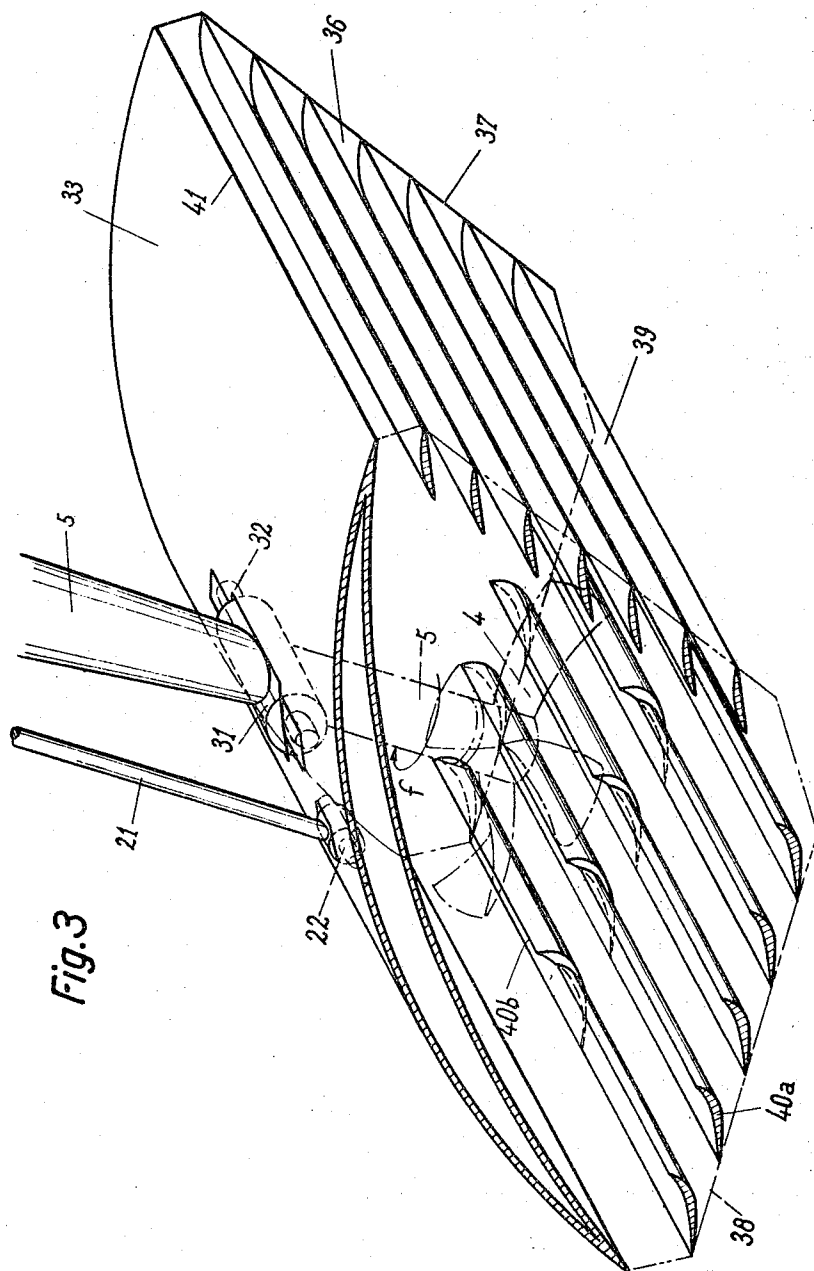


Fig. 3

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HYDRODYNAMIC PROPULSION UNIT FOR BOATS

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5 Sheets-Sheet 4

Fig.4

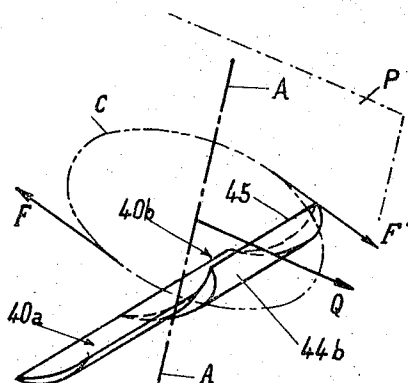
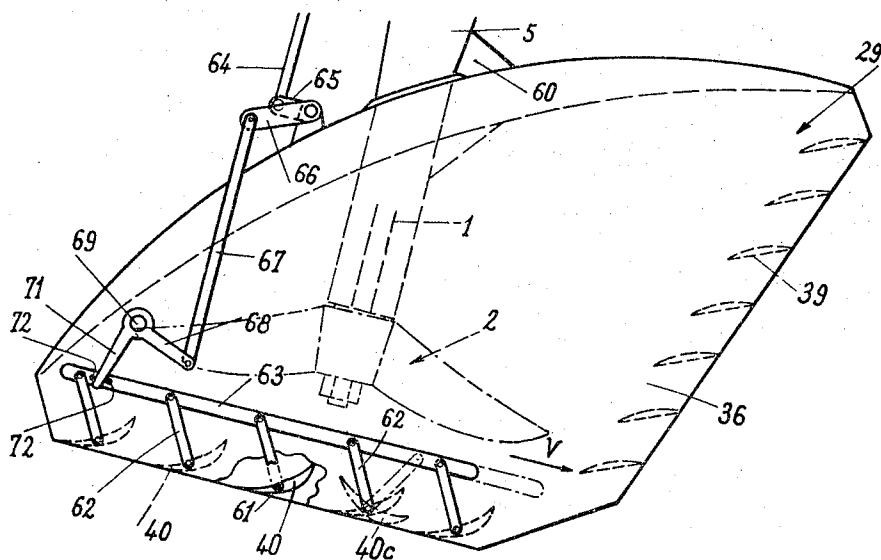


Fig. 12



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HYDRODYNAMIC PROPULSION UNIT FOR BOATS

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5 Sheets-Sheet 5

Fig. 6

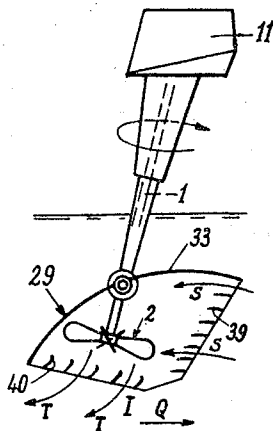


Fig. 7

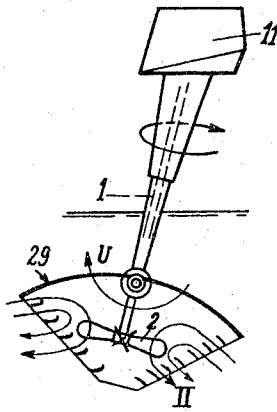


Fig. 8

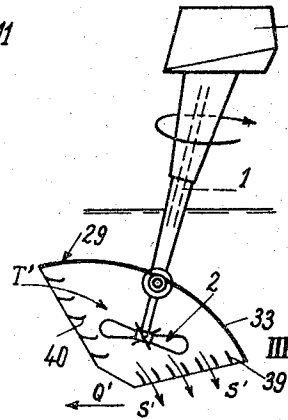


Fig. 9

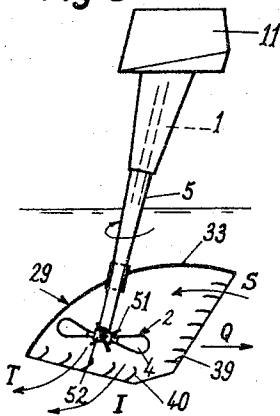


Fig. 10

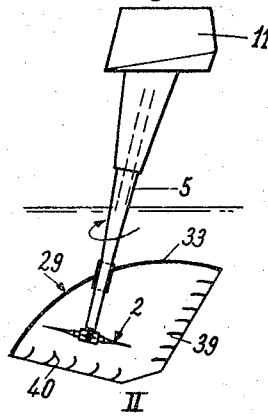
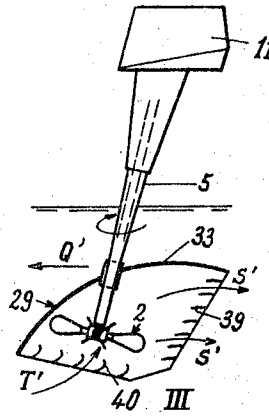


Fig. 11



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1

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HYDRODYNAMIC PROPULSION UNIT FOR BOATS

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19 Claims. (Cl. 115-18)

The present invention relates to a hydrodynamic propulsion unit having a propeller, intended for boats of any type, but preferably for those of limited tonnage, such as motor boats, yachts, and pleasure craft. This propulsion unit may be of the in-board or out-board type, and when it is operatively fitted on a boat the driving shaft bearing said propeller is vertical or only slightly inclined with respect to the vertical.

A large number of marine engines are already known which are designed for the propulsion of boats and which have a substantially vertical propeller shaft. Engines of this type are usually provided with a bevel-gear drive which is fitted at the lower end of the vertical driving shaft and which serves to drive a screw-propeller having a horizontal axis.

This very well known bevel gear drive arrangement is subject to a disadvantage in that it entails the need for a gearing system housed within an immersed casing which must also contain anti-friction bearings and thrust-bearings, as well as the necessary watertight sealing and lubricating devices, all of which have to be accommodated in a restricted space in order to reduce the resistance to forward motion through water. The result is that this part of the propulsion unit is delicate, expensive and fragile, and that its mechanical efficiency is often unsatisfactory. In this known propulsion unit the propeller is not protected and may be damaged by contact with foreign bodies, or may cause injury to a swimmer who accidentally comes in contact with it.

In order to overcome these drawbacks it has been suggested to make direct use of the vertical driving shaft in order to drive a turbine with a centrifugal rotor which sucks in water at its centre and expels the same into a horizontal direction. The jet propels the boat on the reaction principle.

A device of this kind is simpler than that described previously. However, in order to obtain good propulsive efficiency it is important to deliver large quantities of liquid at a low pressure. These requirements are not satisfactorily met by the centrifugal turbine, which requires the presence of conduits for the admission and discharge of water as well as a bulky stator which surrounds the rotor and gives rise to internal and external friction thereby dissipating a large proportion of the motive force. The turbine also has to be protected from the ingress of foreign bodies by means of devices such as gratings, by which the load losses are increased still further. The degree of efficiency obtained in these types of apparatus is therefore not satisfactory, so that in practice they have usually been rejected in favour of the device first mentioned.

One of the objects of the present invention is to remedy these drawbacks and limitations. This invention relates more especially to a marine propulsion unit directly using a vertical or only slightly inclined driving shaft without any bevel-drive system, gear-wheels or the like, the said propulsion units having an efficiency at least equal to that of bevel-drive propulsion units and higher than in the case of propulsion units using a centrifugal effect.

A further object of the invention is to provide a design of propulsion unit in which the propeller is protected

2

against shocks resulting from contact with extraneous objects, this protection being provided without having recourse to any additional passive protecting means by which energy can be dissipated.

A still further object of the invention is to provide a propeller enabling the direction of propulsion to be reversed by very simple means without the need for any clutch on the driving shaft.

These and further objects of the invention will be made apparent when the specification proceeds.

According to the invention, the hydrodynamic propulsion unit for boats which comprises a substantially vertical rotary driving shaft on the lower end of which is directly mounted a propeller of which the means plane of rotation is perpendicular to the aforesaid shaft, is characterized in that it comprises a shield which partially surrounds the propeller and on which are mounted on each side of the mean plane of rotation of the propeller respectively a series of inlet deflector blades by which the streams of water are directed towards the propeller, and a series of outlet deflector blades by which the streams of water are conveyed beyond the propeller, the blades of these two series extending transversely in relation to the driving shaft.

In the propulsion unit in accordance with the invention, the motive thrust is produced by the action on the outlet deflector blades of the axial flow of water which is driven by the propeller and deflected by the front faces and back faces of the said blades.

The main function of the inlet deflector blades is to assist the inflow to the propeller blades, in order to prevent cavitation at high speeds. Besides when the speed of the boat is lower than that which usually corresponds to the normal running speed of the propeller, the inlet deflector blades are subjected to a reduced pressure thus developing additional forward thrust.

In a preferred embodiment of the invention the shield of the propulsion unit comprises a deflector panel provided above the propeller, the said panel being enclosed between two lateral cheeks interconnected by the two series deflector blades, at least a certain number of the said blades having a curved profile.

Three embodiments, of the invention now to be described, allow the direction of propulsion of the boat to be reversed without reverse motion of the propeller.

In the preferred embodiment, the shield surrounding the propeller is hinged around a shaft perpendicular to the driving shaft and to cheeks fitted on said deflector panel.

It is thus possible by altering the slope of the deflector panel by means of a control device, to change over from forward to reverse propulsion, with an intermediate zero propulsion or dead center position, while the propeller still rotates in the same direction.

Further features of the invention will be made apparent from the description below.

In the appended drawings, given by way of non-limitative examples:

FIG. 1 is a side diagram of a propulsion unit mounted on the stern of a boat.

FIG. 2 is a cross section of the propulsion unit, through the plane of symmetry passing through the driving shaft.

FIG. 3 is a perspective diagram of the propulsion unit after removal of the shield's right cheek.

FIG. 4 is a perspective diagram of one of the deflector blades.

FIG. 5 is a side view at the end of the blade of FIG. 4.

FIGS. 6-8 are diagrams explaining the operation of the propulsion unit.

FIGS. 9-11 are similar diagrams for another embodiment, and

FIG. 12 is a side view of an alternative embodiment.

In the preferred embodiment of the invention described in reference to FIGS. 1-8, 11 is the bonnet protecting the motor unit 12, which is similar to an out-board motor and which drives a shaft 1 hereinafter termed the driving shaft, which is directed downwards.

The driving shaft 1 takes the substantially vertical direction A—A. By substantially vertical is meant throughout in the present specification that the axis A—A is inclined with respect to the vertical at an angle α which does not practically exceed about 30° .

The lower end of the shaft 1 bears the propeller 2 of which the pitch, in the example described, is constant and which is directly secured thereto by a nut 3. The propeller 2 rotates only in one direction f (FIG. 3).

The mean plane of each blade 4 of propeller hereinafter termed the mean plane of the propeller 2 makes an angle approximately equal to α with respect to the plane perpendicular to shaft 1 containing the centre of said propeller.

By "propeller" in the present specification is meant any device provided with radial active surfaces which are oblique in relation to the driving shaft and which are adapted to impart to the streams of water a movement having a component parallel to the said axis A—A. The shaft 1 is housed in a tubular casing consisting of two superimposed elements 5 and 6, secured by bolts 7. At the junction of elements 5 and 6 is provided a thrust bearing 8 for shaft 1 and a watertight joint 9.

The driving shaft 1 is guided at the lower part of the tubular element 5 by a plastic anti-friction ring 10.

The motor assembly and its attachments are mounted as in the case of a usual outboard motor and the mounting means is described below solely for illustration. The upper tubular element 6 is integral with the bonnet 11 and the system is arranged to rotate about an axis B—B parallel to the axis A—A and consisting of a bar 13 rotatably mounted in a sleeve 14 and journaled in a bracket 15 and a pivot bearing 16 belonging to the element 6.

The sleeve 14 is integral with a bracket 17 hinged by a shaft 18 to an angle support 19 secured by an adjustable vice screw 121 to the frame 122 of the stern of the boat 23. The sleeve 14 rests against a movable dowel 24 which passes through the two branches 25 of the angle support 19, which branches are located on each side of the said sleeve. The dowel 24 is inserted in one of the holes 26 of a series of holes provided in the branches 25 and can be moved from one hole to another in order to give to the shaft 1 the angle of inclination α desired.

The swivelling of the motor assembly around the axis B—B is controlled in the known manner by a handle 27 integral with an arm 28 secured to the element 6. The handle 27 enables the operating conditions of the motor 12 to be controlled.

In accordance with the present invention, the tubular element 5 is fitted with a cylindrical swivel 31 bearing two radial and horizontal trunnions 32, which are orthogonal to the shaft 1 and on which pivots the deflector panel 33 of a shield 29 partially surrounding the propeller 2. The panel 33, which may consist of a hollow metal casting, has a curved surface arranged in such a manner that its concave side faces towards the propeller 2. A central cylindrical boring 34 is provided in the panel 33 and fits the swivel 31. The panel 33 includes also sockets 35 to accommodate the trunnions 32. The rod 21 adapted to control the slope of the panel 33 with respect to the driving shaft 1 is located in the plane of symmetry P of the shield 29 and behind the driving shaft 1 with respect to the direction of the forward propulsion Q. The rod 21 is hinged on the panel 33 by a shaft 22 accommodated in a recess 23 provided in the said panel.

The rod 21 is linked by a link 20 to a crank handle 30 hinged on a fixed shaft 50 of the bonnet 11. The

handle 30 serves to control, as will be seen, the forward or the rearward motion of the boat 23.

The deflector panel 33, which is symmetrical with respect to the axis D—D of the trunnions 32, is provided with two side cheeks 36, which are perpendicular to the axis D—D. The free edges 37 and 38 of the cheeks 36 converge towards each other on the side opposite to the panel 33. In other words, the cheeks 36 have a substantially triangular contour.

Between the cheeks 36 project two groups of deflector blades 39 and 40 located on the same side as the edge 37 and the edge 38 respectively. The blades 39, termed inlet deflector blades, are substantially flat, parallel to one another and parallel to the plane tangent to the driving edge 41 of the panel 33. In the position of FIG. 2 which corresponds to the forward propulsion, the angle b between the mean plane of the blades 39 and the axis A—A is substantial and is approximately equal to the complement of the angle α .

The blades 40 of the other group, termed outlet deflector blades have a more complex shape. As may be seen in FIGURES 2-5, the profile of each blade 40 is altered between both cheeks 36 from the plane of symmetry P passing through the shaft 1 and equidistant of the cheeks 36. Each blade 40 thus consists of two joint elements 40a and 40b. The alteration of the shape of each blade 40 is designed as will be seen later in accordance with the directions F, F' the tangential speeds of the propeller blades 4 in two particular positions thereof, said directions F, F' being appreciated with respect to the direction Q of forward propulsion imparted to the boat. Said propeller blades positions are those where the blades are perpendicular to the plane P as hereinabove defined. The diagram of FIG. 4 shows the central path C of the propeller 2, the axis A—A and the directions F, F' and Q.

In accordance with one of the features of the invention the blades 40a which project from the side of plane P facing that part of path C where the tangential speed F is opposite to the direction of forward propulsion Q have a slightly curved profile (FIGURE 5), the concavity of which is contrary to that of the panel 33. The spread of blades 40a is comparable to that of the blades 39. The blades 40b projecting from the other side of plane P have a substantially larger spread. Their inner profile or intrados is flush with that of the blade 40a and extends the same by a strongly curved zone 43. The curvature of the blades 40b on the driving edge side is considerably greater than in the case of the blades 40a. The mean plane Gb of the blades 40b about the driving edge 45 is slightly inclined to the axis A—A.

The outer profile 44b or extrados of the blades 40b connects up with the outer profile 44a of the blades 40a on the side corresponding to the water escape edge 46. Along said edge, the mean plane H of both profiles is the same and is substantially parallel to the mean plane of the inlet blades 39. The plane H is therefore considerably inclined in relation to the axis A—A. For a reason which will be explained farther on, it is also provided that the gap between the inlet blades 39 is smaller than that between the outlet blades 40. It is also noticeable that the outlet blades 40 are centred along a plane substantially parallel to the mean plane of the propeller 2 (and parallel to the edges 38). The direction of propulsion Q makes therefore an angle α with the said plane. The arrangement of the blades 40 causes the water streams to be deflected into a direction T substantially parallel to Q but in the opposite direction so that the motive thrust exerted on said blades by said streams is maximum. Since, moreover, the blades 40 are arranged at the same level with regard to the water flow moved by the propeller 2, the motive thrust exerted on the deflector blades 40 is substantially the same.

The propulsion unit operates as follows, assuming that the deflector panel 33 is held by the rod 21 in the position

5

shown in FIGURE 2 (position I in FIGURE 1), the handle 30 being secured in the corresponding position, the propeller 2, being driven in the direction F, causes water to circulate downwards as shown by Z parallel to the axis A—A. The water streams S which enter into the shield 29 are deflected towards the axis A—A, at first by the blades 39 and thereafter essentially by the panel 33. The water streams then reach the blades 4 of the propeller 2 with an angle of incidence suitable to the efficiency of the latter.

It will be noticed that since the angle of inclination α of axis A—A with respect to the vertical corresponds to that of the propeller blades 4 with respect to the plane perpendicular to axis A—A, the blades 4 are practically horizontal in the area of path C where the tangential speed F' of said blades has the same direction as the forward direction Q of the boat and tends to interfere with the forward motion thereof. Consequently, the resistance opposed to forward motion by rotation of the propeller in this area is very slight.

The streams of water expelled by the propeller 2 meet thereafter the outlet deflector blades 40 which, owing to their substantial curvature, deflect the water streams and convey said streams towards the rear, as shown by T, in a substantially horizontal direction, i.e. in a direction aiding to the forward propulsion of the boat.

Owing to the particular shape of the part 40b of the blades 40 the water streams expelled by the propeller are deflected to a greater extent in that part of the streams where the tangential speed of the propeller is F', and tends to act in the direction opposite to Q. Under these conditions the kinetic energy of these streams is nevertheless converted into propulsive energy.

It will also be noticed that the propulsive force derives from the thrust of the water streams flowing along Z on the deflector blades 40, which in turn transmit to the shield 29 a thrust in the same direction as direction Q. Additionally, the blades 39 and the panel 33 contribute to the propulsive action when, by the suctional action of the propeller the water mass housed in the shield 29 above the propeller 2 is depressed with respect to the rest of water. Such an action causes especially on the deflector panel 33 a suctional force suitable to the propulsion. Circumstances of this kind arise when the propeller is driven at high speed and when the forward speed of the propulsion unit is too slow for the hydrodynamic pressure derived from such a motion to balance out the depression deriving from the rotation of the propeller.

The direction of the water flow in the shield 29 creates also a reaction partly relieving the stern of the ship to which the propulsion unit is secured, whereby the vessel is kept in its normal water lines.

As the upstream edges 37 of the cheeks 36 are oblique with respect to the vertical, as shown in FIGURE 2, as a result of the triangular shape of said cheeks, any foreign bodies which may strike against the blades 39 tend to be expelled downwards on account of the thrust exerted thereon by the water streams S. Such an effect helps to keep the inlet blades 39 steadily clear.

If the size of the foreign bodies is so small that they may enter into the shield 29 by passing through the blades 39 it is certain that they are thereafter expelled from the shield 29 owing to the thrust of the propeller 2 and also owing to the larger gap provided between the blades 40. It is therefore impossible for the propulsion unit to be choked up.

It appears consequently that the propeller is completely protected by the devices which functionally play a part contributing to propulsion without any need for supplementary passive protecting devices. The invention therefore avoids any risk of damaging the propeller and also yields a protection for any living beings which may be present near the propeller. Such an effect is an important safety factor attached to the use of the propulsion

6

unit of the kind contemplated by the invention which therefore does not require any special caution or limitation of use.

When the lever 30 is moved downwards a pull is exerted on the rod 21, whereby the shield 29 is caused to pivot around the trunnions 32 and to reach position II of FIGURE 7 wherein the panel 33 is positioned symmetrically with respect to the shaft 1. In such a position no propulsive thrust is exerted by the water streams emanating from propeller 2, said streams swirling within the shield 29 without effect (FIG. 7). It is thus possible to obtain the zero thrust or dead centre for the propulsion unit without uncoupling the motor or varying the operating conditions thereof.

When the panel 33 is fully tilted by thoroughly lowering the lever 30 (FIGURE 8) in order to move the shield 29 into a position substantially symmetrical of that of FIG. 7 with respect to the axis A—A, as shown in FIG. 1 (position III), the water streams drawn by the propeller 2 enter into the shield 29 through the blades 40 and are conveyed towards the blades 39. The water flow T'S' resulting therefrom tends to move the whole unit into the direction Q' opposite to Q. Reverse motion may thus be obtained simply by tilting the shield 29. The propulsion unit according to the invention thus fulfills all operating conditions required by the drive of the boat without altering the driving conditions of propeller 2.

When the shield 29 is struck by a bulky foreign body about the inlet blades 39, the shield tends to pivot in the direction U as shown by FIGURE 7 and to automatically assume the dead centre position or even the reverse motion position of FIGURE 8. Such a property corresponding to an automatic safety device in the operation of the boat is very advantageous.

According to another embodiment of the invention (FIGURES 9-11) the shield 29 is rigidly mounted on the element 5 but it houses a propeller 2 of reversible pitch whereof the blades 4 are in a well known manner, carried by pivots 51 rotatably fitted on a core 52 integral with the driving shaft 1. A device, not shown on the drawing but of well known structure and accommodated within the casing of the shaft 1 serves to control the slope of the blades 4 with respect to the axis A—A.

When the blades 4 of the propeller are in the position shown in FIGURE 9, the driving direction of the shaft 1 being not altered the boat is caused to move along Q. When the blades 4 are turned down to a position orthogonal to the axis A—A the propulsion unit is in the dead centre (FIGURE 10). The reverse inclination of the blades 4 (FIG. 1) sets up the reverse motion (direction Q') by reversing the direction along which the streams of water circulate through the shield 29.

In the alternative embodiment shown in FIGURE 12 the shield 29 is likewise rigidly fitted (for example, by means of the brackets 60) to the tubular casing 5 of the shaft 1. The blades 39 fitted to the oblique front opening of the shield 29 are rigidly mounted thereon. On the other hand, the blades 40 are hinged around journals 61 perpendicular to the cheeks 36. The journals 61 are integral with levers 62 linked to an oscillating bar 63 the position of which is controlled from the boat by means of a sliding rod 64 parallel to the shaft 1. The rod 64 operates a swingle-tree 65 of which the end-arms 66 are connected by rods 67 to side crank-levers 68, 71 hinged by shafts 69 on the cheeks 36. The arms 71 of the crank-levers are engaged between pins 72 projecting from the oscillating bar 63.

The blades 40 being assumed in the position shown in full lines in FIGURE 12 the propulsion unit causes the boat to move along the direction Q. If the rod 64 is moved upwards by the driver the bar 63 is translated along the direction V and the levers 62 consequently swing round forwards causing the blades 40 to rotate into the position 40c. It will be appreciated that the direc-

tion of the water streams moved by the propeller 2 is thereafter reversed so as to reverse the direction of propulsion which then corresponds to Q'. The boat is thus caused to move in the reverse direction. The dead centre is obtained in an intermediate position of the blades 40.

Nevertheless, the embodiment shown in FIGURE 2, comprising a rotary panel 33 is preferred owing to its mechanical simplicity and to the automatic protection afforded thereby as explained.

What is claimed is:

1. A hydrodynamic propulsion unit for boats comprising a driving shaft having a substantially upright position when said unit is operatively fitted on a boat, a propeller mounted on said driving shaft, said propeller having a mean plane of rotation perpendicular to said shaft, a nonrotating casing fitted around said driving shaft, a shield mounted on said casing only partially surrounding said propeller, a series of substantially aligned inlet deflector blades and a series of substantially aligned outlet deflector blades borne by said shield, said blades of both series extending in transverse directions with respect to said driving shaft, said inlet deflector blades having in forward motion a profile adapted to guide the streams of water towards said propeller, whereas said outlet deflector blades have a profile adapted to convey the streams of water beyond said propeller and wherein in forward motion a part at least of said inlet deflector blades is located above said propeller mean plane of rotation and a part at least of said outlet deflector blades is located below said plane.

2. A propulsion unit according to claim 1 wherein said inlet deflector blades have a substantial angle of inclination with respect to said driving shaft and are centered in a plane substantially parallel to said driving shaft.

3. A propulsion unit according to claim 1 wherein said outlet deflector blades are centered in a plane substantially parallel to said propeller mean plane of rotation.

4. A propulsion unit according to claim 1 wherein said driving shaft is inclined in relation to the vertical by an angle substantially equal to the angle of inclination of the mean plane of each of said propeller blades with respect to said propeller mean plane of rotation.

5. A hydrodynamic propulsion unit for boats comprising a driving shaft having a substantially upright position when said unit is operatively fitted on a boat, a propeller mounted on said driving shaft, said propeller having a mean plane of rotation perpendicular to said driving shaft, a nonrotating casing fitted around said driving shaft, a deflector panel located above said propeller at an angle with said driving shaft and mounted on said casing, two side cheeks fitted on said deflector panel, a series of inlet deflector blades and a series of outlet deflector blades borne by said side cheeks and extending therebetween in transverse directions with respect to said driving shaft, said inlet deflector blades having in forward motion a profile adapted to guide the streams of water towards said propeller, whereas said outlet deflector blades have a profile adapted to convey the streams of water beyond said propeller, and wherein in forward motion a part at least of said inlet deflector blades is located above said propeller mean plane of rotation and a part at least of said outlet deflector blades is located below said mean plane.

6. A hydrodynamic propulsion unit according to claim 5 wherein said deflector panel has a curved surface of which the concavity faces towards said propeller.

7. A hydrodynamic propulsion unit according to claim 5 wherein said deflector panel has a driving edge transverse to said driving shaft and wherein said edge is substantially parallel to said inlet deflector blades.

8. A hydrodynamic propulsion unit according to claim 5 wherein said side cheeks are substantially triangularly

shaped and have edges converging into a direction opposite to said deflector panel.

9. A hydrodynamic propulsion unit for boats comprising a driving shaft having a substantially upright position when said unit is operatively fitted on a boat, a propeller mounted on said driving shaft, said propeller having a mean plane of rotation perpendicular to said shaft, a nonrotating casing fitted around said driving shaft, a shield hinged on said casing about an axis perpendicular to said driving shaft, said shield partially surrounding said propeller, means to control the angular position of said shield with respect to said driving shaft, a series of inlet deflector blades and a series of outlet deflector blades borne by said shield, said blades of both series extending in directions parallel to said shield articulation axis and being rigidly secured to said shield, said inlet deflector blades having in forward motion a profile adapted to guide the streams of water towards said propeller, whereas said outlet deflector blades have in forward motion a profile adapted to convey the streams of water beyond said propeller and wherein in forward motion a part at least of said inlet deflector blades is located above said propeller mean plane of rotation and a part at least of said outlet deflector blades is located below said mean plane.

10. A propulsion device according to claim 9 wherein said hinged shield comprises a deflector panel located above said propeller and wherein said means to control the angular position of said shield comprise means to move said deflector panel to either one of two extreme angular positions wherein said deflector panel has substantially opposite inclinations with respect to said driving shaft, one of said positions corresponding to the forward motion of the boat and the other one to the reverse motion, said deflector panel further having an intermediate stationary position, substantially orthogonal to said driving shaft.

11. A hydrodynamic propulsion unit for boats comprising a driving shaft having a substantially upright position when said unit is operatively fitted on a boat, a propeller mounted on said driving shaft, said propeller having a mean plane of rotation perpendicular to said shaft, a nonrotating casing fitted around said driving shaft, a shield mounted on said casing only partially surrounding said propeller, said shield comprising a deflector panel located above said propeller, said panel having a fixed angle of inclination with respect to said driving shaft, two series of deflector blades borne by said shield, said blades extending in directions transverse to said driving shaft, the deflector blades of one of said series being fixedly fitted on said shield, being located at least in part above said propeller mean plane and having in forward motion a profile adapted to guide the streams of water towards said propeller, the deflector blades of the other series being rotatably mounted on said shield and being located at least in part below said mean plane, said unit further comprising means to control the angle of said last cited deflector blades with respect to said driving shaft.

12. A hydrodynamic propulsion unit for boats comprising a driving shaft having a substantially upright position when said unit is operatively fitted on a boat, a propeller mounted on said driving shaft, said propeller having a mean plane of rotation perpendicular to said shaft, said propeller comprising blades angularly controllable with respect to said driving shaft and being of the reversible pitch type, a non-rotating casing fitted around said driving shaft, a shield fixedly mounted on said casing, said shield only partially surrounding said propeller, a series of inlet deflector blades and a series of outlet deflector blades borne by said shield, said blades extending in directions transverse to said driving shaft, said inlet deflector blades having in forward motion a profile adapted to guide the streams of water towards said

propeller, whereas said outlet deflector blades have in forward motion a profile adapted to convey the streams of water beyond said propeller, and wherein a part at least of said inlet deflector blades is located above said propeller mean plane of rotation and a part at least of said outlet deflector blades is located below said mean plane, said unit further comprising means to control said propeller blades angular position.

13. A hydrodynamic propulsion unit according to claim 1 and means to control the angular position of at least said series of outlet blades with respect to said driving shaft.

14. A hydrodynamic propulsion unit according to claim 5 wherein said inlet deflector blades are rigidly secured to said side cheeks, and means to control the angular position of said outlet blades with respect to said driving shaft.

15. A hydrodynamic propulsion unit according to claim 5 wherein said side cheeks are limited by edges angularly disposed with respect to said deflector panel and wherein said outlet blades are mounted on said side cheeks along said edges.

16. A hydrodynamic propulsion unit for boats comprising a driving shaft having a substantially upright position when said unit is operatively fitted on a boat, a propeller mounted on said driving shaft, said propeller having a mean plane of rotation perpendicular to said shaft, a non-rotating casing fitted around said driving shaft, a shield mounted on said casing partially surrounding said propeller, and a series of inlet deflector blades and a series of outlet deflector blades borne by said shield and extending transversally to said driving shaft, said inlet deflector blades having a profile adapted to guide the streams of water towards said propeller, whereas said outlet deflector blades having a profile adapted to convey the streams of water beyond said propeller, wherein in forward motion a part at least of said inlet deflector blades is located above said propeller mean plane of rotation and a part at least of said outlet deflector blades is located below said plane, said shield comprising two spaced side cheeks and wherein said outlet deflector blades extend between said cheeks and have a curved profile, the concavity of which faces towards said propeller, said profile being altered from one of said cheeks to the other one in such a manner that the spread of said blades is greater on the side on which the tangential speed of said propeller is directed forwards.

17. A hydrodynamic propulsion unit for boats comprising a driving shaft having a substantially upright position when said unit is operatively fitted on a boat, a propeller mounted on said driving shaft, said propeller having a mean plane of rotation perpendicular to said shaft, a non-rotating casing fitted around said driving shaft, a shield mounted on said casing partially surrounding said propeller, and a series of inlet deflector blades and a series of outlet deflector blades borne by said shield and extending transversally to said driving shaft, said inlet deflector blades having a profile adapted to guide the streams of water towards said propeller, whereas said outlet deflector blades have a profile adapted to convey the streams of water beyond said propeller, wherein in forward motion a part at least of said inlet deflector blades is located above said propeller mean plane of rotation and a part at least of said outlet deflector blades is located below said plane, said shield further comprising two spaced side cheeks and wherein said outlet deflector blades extend

between said cheeks, said outlet deflector blades further having a curved profile, the concavity of which faces towards said propeller, said profile being altered from one of said cheeks to the other one in such a manner that the spray of said blades is greater on the side on which the tangential speed of said propeller is directed forwards, each of said outlet deflector blades having a driving edge nearer the propeller and a water escape edge opposite to said driving edge and wherein the mean direction of said blade in the vicinity of said driving edge is slightly inclined with respect to said driving shaft whereas the mean direction of said blade in the vicinity of said water escape edge is substantially inclined with respect to said driving shaft.

18. A hydrodynamic propulsion unit for boats comprising a driving shaft having a substantially upright position when said unit is operatively fitted on a boat, a propeller mounted on said driving shaft, said propeller having a mean plane of rotation perpendicular to said shaft, a non-rotating casing fitted around said driving shaft, a shield mounted on said casing partially surrounding said propeller, and a series of inlet deflector blades and a series of outlet deflector blades borne by said shield, said blades of both series extending in transverse directions with respect to said driving shaft, said inlet deflector blades having in forward motion a profile adapted to guide the streams of water towards said propeller, said outlet deflector blades having in forward motion a profile adapted to deflect the streams of water from a direction substantially parallel to said propeller axis into a direction substantially transverse thereto, a part at least of said inlet deflector blades in forward motion being located above said propeller mean plane of rotation and a part at least of said outlet deflector blades in forward motion being located below said plane, said inlet deflector blades in forward motion being disposed in a generally upright row and said outlet deflector blades in forward motion being disposed in a row that extends generally from front to rear, the lowermost inlet blades being substantially closer to the front outlet blades than the uppermost inlet blades are to the rear outlet blades.

19. A hydrodynamic propulsion unit as claimed in claim 18, said two rows of blades being disposed in generally L-shaped configuration as viewed endwise of the blades, the bend of the L in forward motion being the lower front portion of the L.

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