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(71) Applicant: **Amati, Mario**
286 Lungotevere Dante
I-00146 Roma (RM) (IT)

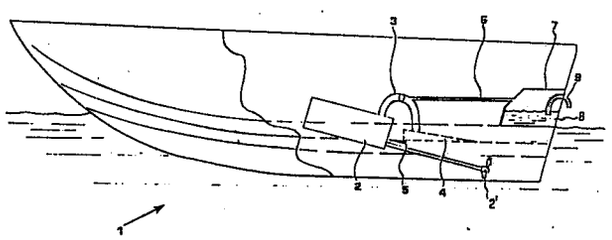
(72) Inventor: **Amati, Mario**
286 Lungotevere Dante
I-00146 Roma (RM) (IT)

(74) Representative: **Bazzichelli, Alfredo et al**
c/o Società Italiana Brevetti S.p.A. Piazza Poli 42
I-00187 Roma (IT)

(54) **Underwater exhaust device for motorboats.**

(57) The underwater exhaust device for motorboats according to the present invention in its broadest embodiment comprises a main exhaust pipe, having at least the final portion below the level of the water line, and a secondary exhaust pipe of a smaller section, which branches off from the main pipe and is entirely located above the water line. The invention refers also to motorboat engines supplied with the above device as well as to motorboats equipped with said motorboat engines.

FIG.1



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Description

"UNDERWATER EXHAUST DEVICE FOR MOTORBOATS"

The present invention refers to an underwater exhaust device for motorboats which is capable of reducing, notwithstanding its being substantially devoid of silencers, the disturbing exhaust noise in neutral and at low speed, and at the same time of overcoming further drawbacks occurring at average and high speed.

As is well known, the conventional exhaust systems, both for diesel and petrol engines, installed on trading, military or pleasure craft are provided with an exhaust pipe situated a hundred percent above the water line, both at transom and at broadside, it being possible in the latter case to provide the hull with external devices to send the exhaust gases abaft.

Obviously all the above systems are provided with silencers along the whole length of the gas carrying pipe, to keep the exhaust noise at acceptable levels.

The problem of reducing such noise has been approached in the past by the provision of underwater exhaust pipes fitted below the hull of the motorboats. Such exhaust devices allow a considerable noise reduction, but they involve a number of drawbacks which can be substantially summarized in two basic disadvantages.

On the one hand at low revolutions counterpressure is noted in the engine; on the other hand in neutral and at low speed the motorboat is continuously jolted because of the discharge of the gas bubbles which build up under the hull.

Such drawbacks can be avoided and at the same time some advantages (mentioned below) can be obtained by virtue of the underwater exhaust device for motorboats, which is the subject matter of the present invention.

The device according to the invention is substantially devoid of silencers. Therefore, it offers many advantages, first of all merely depending on the absence of such silencers. In particular: financial advantages, resulting from the fact that it is not necessary to purchase and to install the silencers; technical advantages, resulting from the increased power due to the absence of counter-pressure, the absence of heat loss in the engine-room (provoked by the increased temperature created by the use of silencers), the absence of the silencers' weight; advantages concerning the space available for other uses, resulting from the increased room in the engine room, which is normally taken up by silencers; ecological advantages, resulting from the decreased exhaust fumes.

All the above advantages can be obtained by means of the underwater exhaust device, which is the subject of the present invention. The exhaust device according to the invention is characterized by the fact that the device is provided with a main exhaust pipe, having at least the final portion below the water line, and a secondary exhaust pipe of smaller section, which branches off from the main pipe and is entirely located above the water line.

The underwater exhaust device according to the present invention can be provided with an expansion chamber, in order to facilitate the emmission of gases from the main exhaust pipe.

This chamber can be created by hollowing the motorboat hull out in the shape of a parallelepiped having the section in the shape of a non-isosceles right-angled triangle, whose shorter side is substantially perpendicular to the water line, whose longer side is substantially parallel to the water line and whose hypotenuse is substantially inclined downwards towards the stern.

The above device can also be provided with a projecting element in the fore portion, on the bow side, of the expansion chamber, in order to increase the pressure drop in the chamber while the motorboat is moving forwards.

The projecting element can be shaped like a parallelepiped having the section in the shape of a non-isosceles right angled triangle, whose shorter side is substantially perpendicular to the water line, whose longer side is substantially parallel to the water line and whose hypotenuse is substantially inclined upwards towards the bow.

The wording "hypotenuse inclined upwards towards the bow" also includes an upwardly curving line going towards the bow, and which is substantially concave in its lower portion.

The end section of the secondary exhaust pipe can be provided with a silencer; the "Acqualift" type would be the most advantageous.

The present invention can be better disclosed by means of an embodiment as per the enclosed figures:

figure 1 shows a side, partially cut-away elevation view of a hull provided with the exhaust device according to the invention;

figure 2 shows a perspective view of an enlarged portion of the hull of figure 1 near the main exhaust pipe outlet.

With reference to the above figures, 1 stands for the motorboat hull provided with the underwater exhaust device according to the present invention.

The main exhaust pipe 3 branches off from the engine 2, which drives the propeller 2' and ends in the expansion chamber 4, created by hollowing the motorboat hull out in the shape of a parellelepiped having the section in the shape of a non-isosceles right-angled triangle, whose shorter side is perpendicular to the water line, whose longer side is parallel to the water line and whose hypotenuse is inclined downwards towards the stern.

A projecting element 5 is located in the fore portion of the expansion chamber 4 in the shape of a parellelepiped, having the section of a non-isosceles right-angled triangle, whose shorter side is perpendicular to the water line, whose longer side is parallel to the water line, and whose hypotenuse is inclined upwards towards the bow.

The main exhaust pipe 3 branches off into the secondary exhaust pipe 6 of smaller section; the latter is entirely located above the water line and before reaching the outside is connected to an

"Acqualift" silencer 7, which contains the column of water 8 and the pipe 9, of which one end is in contact with the column of water 8 and the other end is open towards the outside.

Of course the hull 1 is equipped with superstructures and rudder not shown in the figure.

In neutral and at low speed, owing to the water counterpressure on the outlet of the main exhaust pipe 3, the exhaust gases are discharged from the secondary exhaust pipe 6 only; the latter, due to its small section, causes low noise which is further reduced by the "Acqualift" silencer 7.

At average and high speed (owing to the pressure drop caused in the expansion chamber 4 by the water wake and increased by the projecting element 5 in the fore part of said chamber) the exhaust gases are easily discharged from the main underwater exhaust pipe 3 only, because under these circumstances they cannot overcome the hydrostatic pressure of the water column 8 contained in the "Acqualift" silencer.

The exhaust device according to the present invention is part of more complex systems, that is to say motorboat engines or motorboats themselves.

Since in addition to some embodiments of the device according to the invention, engines supplied with it or motorboats equipped with engines supplied with it may also be available on the market, the above motorboat engines and motorboats are comprised in the present invention and fall within the scope of the appended claims.

Claims

1. An underwater exhaust device for motorboats, characterized by the fact of being provided with a main exhaust pipe, having at least the final portion below the level of the water line, and a secondary exhaust pipe of smaller section, which branches off from the main exhaust pipe and is entirely located above the level of the water line.

2. The underwater exhaust device according to claim 1, which is additionally provided with an expansion chamber in order to facilitate the outcoming of gases from the main exhaust pipe.

3. The underwater exhaust device according to claim 2, in which the expansion chamber is created by hollowing the motorboat hull out in the shape of a parallelepiped having the section in the shape of a non-isosceles right-angled triangle, whose shorter side is substantially perpendicular to the water line, whose longer side is substantially parallel to the water line, and whose hypotenuse is substantially inclined downwards towards the stern.

4. The underwater exhaust device according to claims 2 or 3, in which the hull is provided with a projecting element, in the fore portion, on the bow side, of the expansion chamber, in order to increase the pressure drop resulting in the chamber while the motorboat is moving forwards.

5. The underwater exhaust device according to claim 4, in which the projecting element is shaped like a parallelepiped, having the section in the shape of a non- isosceles right-angled triangle, whose shorter side is substantially perpendicular to the water line, whose longer side is substantially parallel to the water line, and whose hypotenuse is substantially inclined upwards towards the bow.

6. The underwater exhaust device according to claim 5, in which the hypotenuse of the section of the projecting element consists of a downward concave curved line.

7. The underwater exhaust device according to the preceding claims, in which the final portion of the secondary exhaust pipe is provided with a silencer.

8. The underwater exhaust device according to claim 7, in which the silencer is an "Acqualift" silencer.

9. Motorboat engines, characterized by the fact of being provided with the underwater exhaust device according to claims 1 to 8.

10. Motorboats, characterized by the fact of being provided with engines according to claim 9.

FIG.1

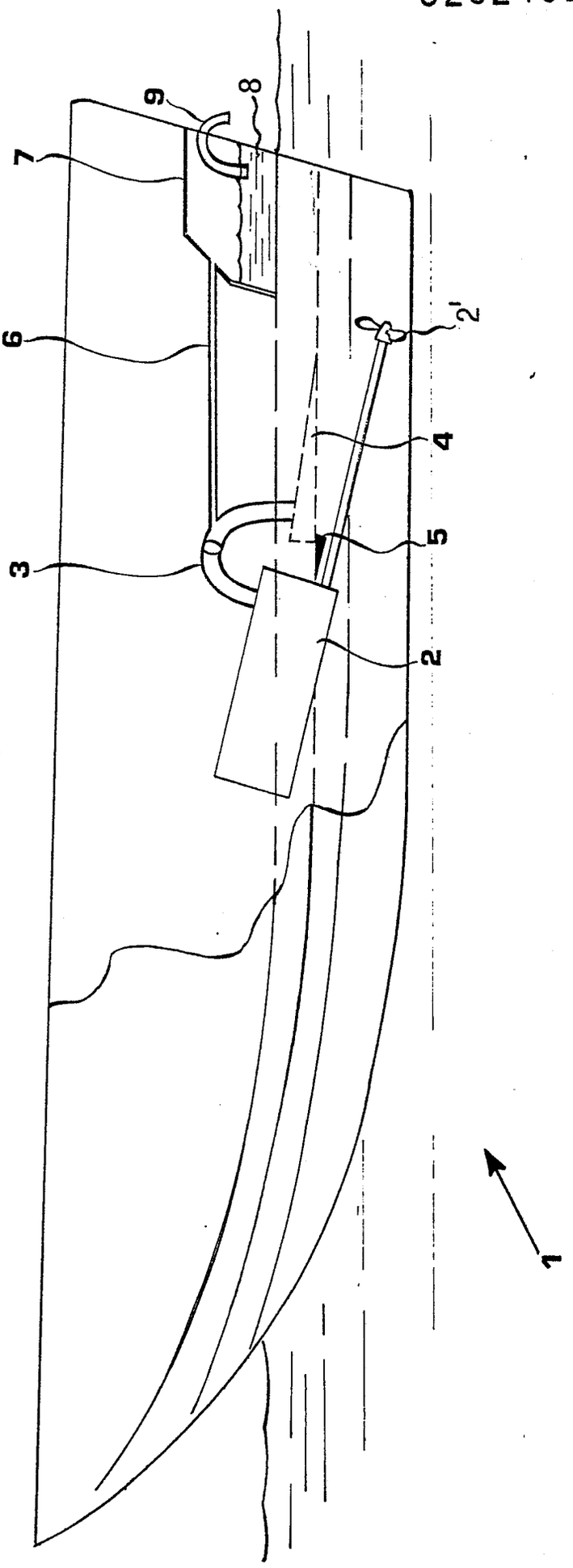
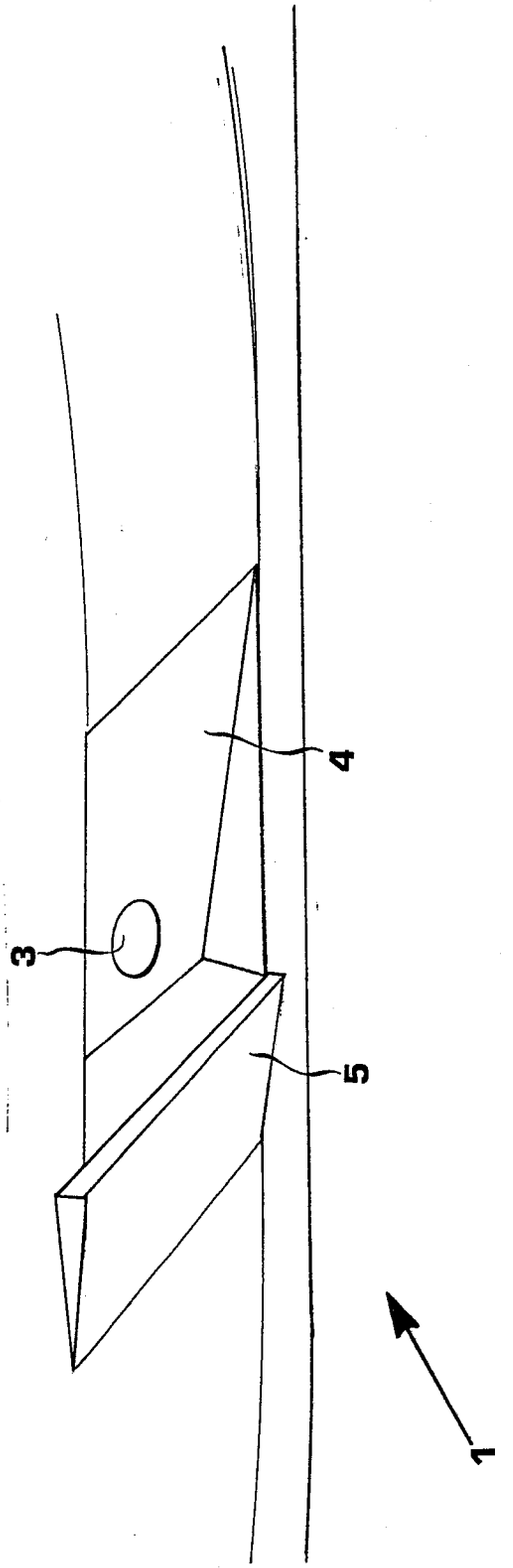


FIG. 2



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EUROPEAN SEARCH REPORT

Application Number

EP 88 83 0085

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.4)
A	US-A-4 002 136 (MICHALAK) * Abstract; figures 1-3 *	1,2,3,7,8,9,10	B 63 B 21/32 F 01 N 7/12
A	GB-A-2 065 036 (HENWOOD) * Abstract; figure 1 *	1,2,4	
A	EP-A-0 088 640 (IKEDA) * Page 5, lines 13-27; figure 1 *	1,2,3,9,10	
A	US-A-4 393 802 (RIZZO) * Abstract; figures 1-3 *	1	

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

F 01 N
B 63 H
B 63 B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	07-06-1988	VISENTIN, M.

CATEGORY OF CITED DOCUMENTS

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