April 21, 1931. F. MELCHER 1,801,875

HULL OR BODY OF CRAFT

Filed May 29, 1930

Fig.1.

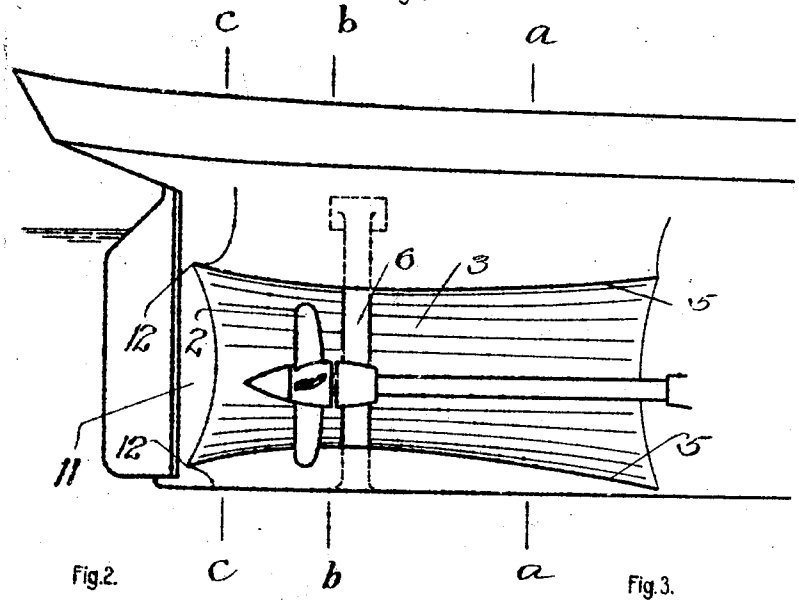
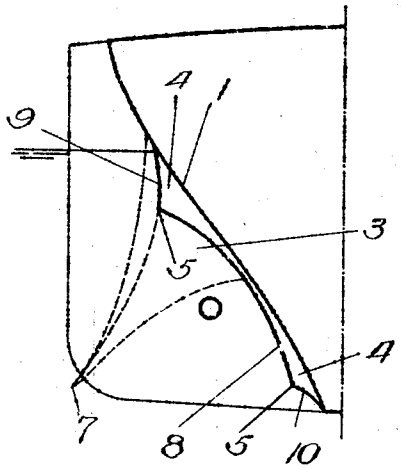


Fig.2.

Fig.3.



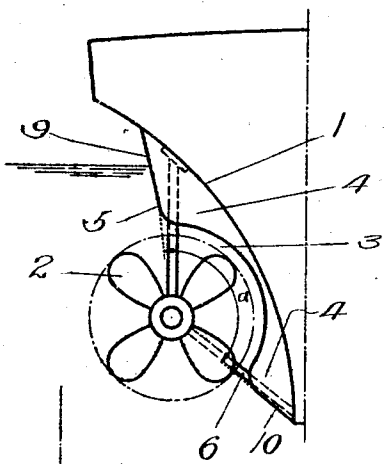
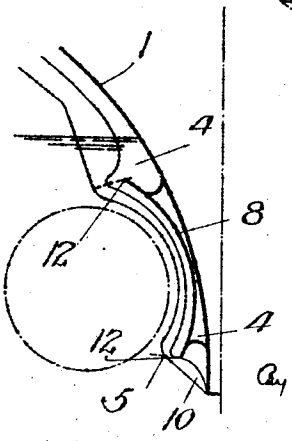


Fig.4.



Inventor,
Franz Melcher,
by
Atty

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UNITED STATES PATENT OFFICE

FRANZ MELCHER, OF VIENNA, AUSTRIA

HULL OR BODY OF CRAFT

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This invention relates to an improved hull or body for water- or air-craft with lateral propelling screws, and consists in the provision on the said hull or body of stream-line furrowed guiding members of a certain definite construction, which are built into or applied to the said hull or body in a certain position in regard to the propelling screws, and are designed to influence and to regulate the flow of the medium concerned up to and past the said screws.

The contours of a ship's hull as also the constructional appendages such as roll-checking fins or bilge keels, stem-shaft bosses, and the like pertaining thereto influence the flow of the water to the screws and also the flow of the screw-jet to an extent which is often considerable, and in a manner which varies according to the trim of the ship.

In the designing of the appendages attention is as a rule mainly directed to the attainment of the minimum of resistance, while the question of screw-jet guidance is neglected or insufficiently considered. Designs have been used embodying regular tunnels or tubes in the ship's bottom for the accommodation of the propeller, but these have been adopted merely as an expedient for enabling, especially in connection with shallow-draught river craft, the largest possible propellers to be employed; the degree of propelling efficiency in the case of all such designs is unfavourable, since the flow to the propeller is impeded. In the furrowed hull designs hitherto made known the depressions provided are directed downward so that the screw water is brought to the screw mainly from below, which implies an increase in the consumption of power; moreover these depressions or hollows are seldom designed in accordance with correct stream-line principles.

The above-mentioned bottom screw-tubes and the lateral or other recesses in the vicinity of the propellers are deleterious to the propelling efficiency in addition to increasing the resistance of the ship, for which reason their employment has been generally abandoned in naval architecture and is only resorted to in particular exceptional cases for shallow-draught vessels. Attempts have also been made to employ longitudinal guiding channels or furrows of cylindrical cross-section and with a lateral slot or opening for the accommodation of propellers, but these again have proved to lead to a disproportionate increase in the resistance of the ship. The unfavourable effect of all these hitherto known expedients is also in part due to the unevenness set up thereby in the flow of the propeller stream and in the freeing of the tail-water, which in its turn gives rise to the formation of eddies and to the increase of the thrust deduction. The proposal has also been made to apply longitudinally fin-like excrescences to the hull or body of water and aircraft in front of the propeller for the purpose of influencing the flow; in this case, however, the sharp longitudinal edges give rise to disturbing eddies which increase the resistance of the ship. Appendages of this nature as hitherto proposed are not adapted to the natural conditions of flow, and can therefore give rise to disturbances in connection with the freeing of the stream from the hull. Further the incorporation of special jet-shaped guiding members of restricted length for the guidance of the propeller stream has also been proposed, but these also produce a disproportionate increase in resistance.

A truly effective guidance of the propeller stream is not ensured by any of the manifold constructional proposals hitherto made in this direction.

The present invention has for its object to provide, primarily in connection with multiple-screw and especially twin-screw ships or aircraft, longitudinal gliding furrows disposed in the range of the flow to and from the propelling member and of a particular design calculated to guide the screw-jet as unobstructedly as possible and to isolate the same as far as possible from the disturbing influence of the adjacent structural portions or appendages of the ship's hull, independently of the trim of the latter, and thus to reduce the thrust deduction (resistance to the indraft or suction of the propeller, the so called thrust deduction) and to increase the degree

of propelling efficiency. A further object of the invention is so to construct that portion of the hull of the water or airship which is most exposed to the impact of the propeller stream that the liquid particles travel through the shortest possible course to and from the propeller along the ship's hull, whereby the vertical stream component is reduced to a minimum.

An example of the embodiment of the invention in a ship with two lateral stern propelling screws is shown in the accompanying drawings, in which:—

Fig. 1 shows in side elevation the portion of the ship's hull concerned, while

Figs. 2, 3, and 4 are transverse sections on the lines *a*—*a*, *b*—*b*, *c*—*c* respectively of Fig. 1.

The side walls 1 of the hull are provided in the region of the propelling screw 2 with longitudinal furrows 3 which serve for the guidance of the propeller stream. Each of these guiding furrows 3 is constituted by the formation on or application to the ship's hull of excrescences 4 which project slightly beyond the mean girth of the ship and are provided with a very gradual transition into the sides of the hull, so that the resistance of the ship is not appreciably increased thereby.

The profile of the inner surface of the furrow or depression thus formed becomes gradually shallower and broader towards both ends away from the propeller in accordance with the reduction in the cross-section of the screw-jet in the vicinity of the propeller. The distance between the resulting arc-shaped longitudinal ridges 5 thus increases gradually from the position occupied by the propeller towards each end of the furrow. These longitudinal ridges must as nearly as possible follow orthogonal trajectories.

It is advisable to employ the excrescences forming the guiding furrows to encase as much as possible of the propeller-shaft supports 6 (see Fig. 3) and of any other auxiliary structural parts included in the design; any longitudinally disposed structural members of the hull or body, such as roll checking fins 7, shaft boss fins or the like, (see Fig. 2) are so placed and constructed that their contours gradually merge into those of the excrescences.

The profile of the guiding furrow in cross-section is a varying arc which in the immediate vicinity of the propeller is concentric to the shaft of the latter. Forward and astern of the propeller this profile is flattened out gradually and finally passes into that of the skin of the hull. The breadth of the furrows is also reduced from the ends towards the propeller in accordance with the gradual acceleration of the propeller stream up to the propeller and with the deceleration of the screw-jet after the propeller, and is least in the region of the greatest constriction of the screw-jet behind the propeller. The described method of construction has the effect of deflecting the propeller stream gradually, and without in any way disturbing or counteracting the natural flow, into the direction of the axis of the propeller before the latter is reached. The screw-jet is directed unobstructedly into comparatively quiet water.

When the distance from the propeller to the stern-post 11 is relatively slight the excrescences forming the guiding furrows can be tapered off at the stern ends by the hollowing-in of the transitional surfaces 9 and 10 between the excrescence proper and the hull skin to form sharp edges 12, whereby the danger of the development of any drag effect at these points is eliminated.

The described means are capable of increasing to a considerable extent the propelling efficiency of ships of every kind, and in particular of such as are provided with lateral stern propelling screws.

Guiding surfaces or furrows constructed on the same principle can also be used in aircraft within the range of the propeller current. No use has hitherto been made at all of guiding furrows for the propeller current in this connection.

I claim:—

1. In the hull of a ship of the type having lateral propelling screws, guiding furrows with restricted portions formed by excrescences on the said hull following orthogonal trajectories, said excrescences being adapted to project slightly beyond the mean girth of the said ship in such a manner that the cross-section of the said furrow exhibits the greatest curvature adjacent the position of the greatest constriction of the screw-jet and becomes gradually wider and shallower towards both ends of the said furrow, for the purpose of causing the water flowing towards the said propeller to be gradually and without violence deflected into an axial direction before entering the said propeller.

2. A hull or body as in claim 1, in which said excrescences encase screw shaft supports of the hull or body at the base of said shafts and within and by the excrescences.

3. A hull or body as in claim 1 in which the stern end of the excrescences form a sharp edge.

In testimony whereof I have signed my name to this specification.

FRANZ MELCHER.