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SHIP'S PROPELLER

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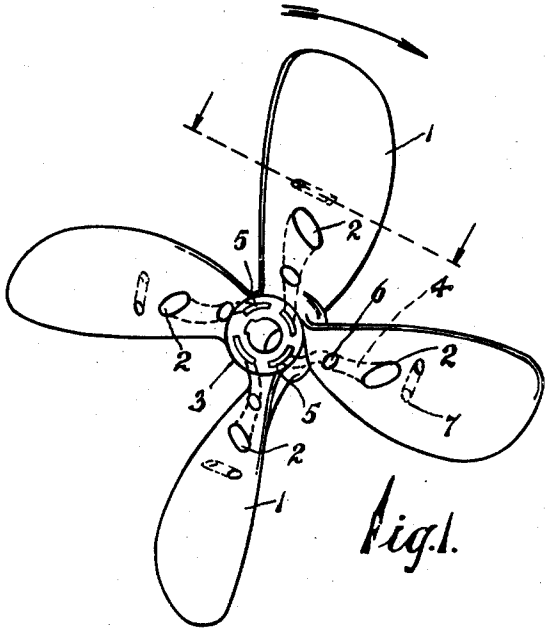


Fig. 1.

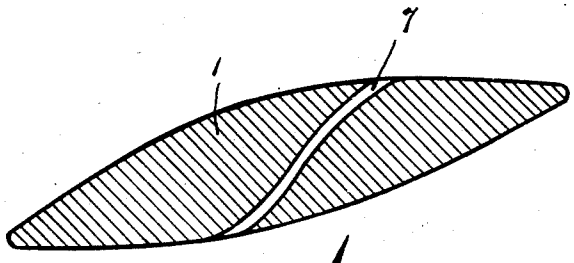


Fig. 2.

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SHIP'S PROPELLER

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12 Claims. (Cl. 170—172)

Our invention relates to ships' propellers of the type having curved water conducting passages extending through the metal of which the propeller is formed from inlets at or in the blades to outlets in the rear end of the boss, such passages being generally formed right-handed for right-handed propellers, and left-handed for left-handed propellers.

As heretofore constructed, the main inlet to each passage has been formed at the root of the blade, with a supplementary or feeding inlet located some distance up the blade, say, at about a third of the length of the blade.

Such propellers give improved results over the old style of solid blade propeller and the object of this invention is to still further improve the efficiency of this type of propeller and to that end it consists in dispensing with the inlet at the root of the blade and providing two or more inlets arranged at suitably spaced distances along the radial length of the blade, and so shaped and arranged that they give better results than hitherto. The invention further consists in providing means for ensuring a maximum supply of water to the blade by forming a channel in each of the blades which discharges water in the vicinity of the aperture and increases the effectiveness of the passage which discharges at the rear of the boss.

The accompanying drawing illustrates a propeller constructed according to our invention, Fig. 1 being an elevation and Fig. 2 an enlarged sectional view through one of the blades.

In the drawing, the blades 1 are each provided with apertures 2 formed in the rear side or working face of the blades at a point approximately one third of the distance between the root and the tip of the blade. These apertures are substantially oval and are arranged with their major axes at a substantial angle preferably from 35° to 45° to a radius through the axis of the boss 3 instead of being at right angles to such a radius as hitherto. By so placing these apertures, the head due to the relative velocity between the blade and fluid is effectively used to increase the flow through passages 4 which connect apertures 2 with outlets 5 in the rear of the boss. At a point preferably about mid-way between the apertures 2 and the boss we provide a further set of apertures 6 in each blade. These are also oval in shape and have their major axes at an angle to the normal, preferably parallel to the major axes of the apertures 2. Apertures 6 also communicate with the passages 4 in the propeller blade.

The passages 4 feed water from the vicinity of apertures 2 and 6 to the space at the rear of boss 3, thereby preventing cavitation at the rear of the boss 3. A considerable volume of water is moved through passages 4 which produces a tendency toward cavitation in the vicinity of the apertures 2 and 6, decreasing the effectiveness of the propeller and also decreasing the effectiveness of passages 4.

With the object of insuring a maximum supply of water to the blades and also of increasing the effectiveness of passages 4, we provide in the leading or cutting edge of the blade a number of channels 7, (Fig. 2) extending from the forward to the rear side of the blade in the vicinity of apertures 2; these channels 7 preferably do not extend directly through the thickness of the blade, but are inwardly curved or crescent shaped, so that the water passing through them from the forward side of the blade is directed by the curvature of the channels so that it impinges against the curved rear surface of the blade and still further prevents cavitation. By increasing the water supply in the vicinity of apertures 2 the passages 4 are made more effective and the performance of the propeller improved. While we have illustrated a preferred form of channel, any channel may be used which cooperates with the passage 4 by discharging water in the vicinity of the apertures 2 or 6.

While we have shown the aperture 2 as being located substantially centrally of the blade this is not a necessary limitation. In the illustrated embodiment applicants' invention is shown as applied to a propeller having a working face curved in a transverse direction but it will be readily understood that the invention is also applicable to propellers having a substantially flat working face.

With a propeller constructed as above described we find that we can obtain greater ship speed with the same engine and that vibration is very considerably reduced owing to the smoother thrust action obtained. Cavitation is almost entirely eliminated even at speeds in excess of those normally used.

Although this invention has been described as applied to marine propellers it is not limited to such use as it is applicable to propellers for other purposes.

What we claim is:—

1. A propeller including a plurality of blades mounted on a boss, a passage within each blade and the boss extending from an aperture in the working face of the blade to an opening at the rear of the boss, the leading edge of the aperture

in the blade being at a distance from the axis of the boss substantially less than that of the trailing edge of the aperture whereby the effectiveness of the aperture is increased.

2. In a propeller the combination of a boss, a plurality of blades mounted on said boss, each of the blades having an aperture formed in the working face thereof, the aperture being substantially oval in shape and having its major axis lying at a substantial angle to a radius through the axis of the boss and an internal passage formed in the blade and boss communicating with said aperture and having an outlet at the rear of said boss.

3. In a propeller the combination of a boss, a plurality of blades each having a working face and mounted on said boss, each of the blades having a substantially oval aperture formed therein intermediate the root and the tip, said aperture being positioned angularly with respect to a radius through the axis of the boss to take advantage of the head due to the relative velocity between the fluid and the blade to force the fluid through said passage, an internal passage formed in the blade communicating with said aperture, an opening in the rear of the boss and a passage formed in the blade communicating with said opening and with the passage in the blade.

4. In a propeller the combination of a boss, a plurality of blades mounted on said boss, each of the blades having an aperture formed in the working face thereof the aperture being substantially oval in shape and having its major axis lying substantially at an angle of from 35° to 45° to a radius through the axis of the boss, an internal passage formed in the blade communicating with said aperture, an opening in the rear of the boss and a passage formed in the boss communicating with the passage formed in the blade and with the opening in the rear of the boss.

5. In a propeller the combination of a boss, a plurality of blades mounted on said boss, each blade having an aperture in it intermediate the root and the tip, an internal passage formed in the blade and boss communicating with the aperture and having an opening at the rear of the boss, and a curved channel formed in the blade having an entrance near the leading edge of the blade and an exit on the rear of the blade in the vicinity of said aperture.

6. In a propeller the combination of a boss, a plurality of blades mounted on said boss, each blade having an aperture in it intermediate the root and the tip, an internal passage formed in the blade communicating with the aperture, an opening at the rear of the boss, a passage formed in the boss communicating with the passage formed in the blade and with the opening formed in the rear of the boss and a curved channel formed in the blade having its entrance near the leading edge of the blade and its exit on the rear of the blade in the vicinity of said aperture.

7. A propeller including a plurality of blades mounted on a boss, a passage within each blade and the boss extending from an aperture in the blade to an opening at the rear of the boss, a channel formed in the blade having its entrance on the forward side of the blade and its exit on the rear of the blade in the vicinity of said aperture.

8. A propeller including a plurality of blades mounted on a boss, a passage within each blade and the boss extending from an aperture in the blade to an opening at the rear of the boss, said passage discharging water at the rear of the boss to prevent cavitation, a channel formed in the blade having an outlet in the vicinity of said aperture to feed water to the vicinity of said aperture and thereby render said passage more effective.

9. In a propeller the combination of a boss, a plurality of blades mounted on said boss, a passage formed in each of said blades and leading from a plurality of apertures in the working face of each of said blades to an opening at the rear of the boss, said apertures being substantially oval in shape and having their major axes inclined at an angle of from 35° to 45° to a radius through the axis of the boss.

10. In a propeller the combination of a boss, a plurality of blades mounted on said boss, each of the blades having an aperture formed in the working face thereof, the aperture being substantially oval in shape and having its major axis lying at a substantial angle to a radius through the axis of the boss so that the projected area upon a plane normal to a second plane passing through the edges of the blade is greater than the projected area of a like aperture symmetrically located with respect to the same radius, and an internal passage formed in the blade and communicating with said aperture and having an outlet at the rear of said boss.

11. In a propeller the combination of a boss, a plurality of blades, each having a working face curving transversely toward the leading edge and mounted on said boss, each of the blades having a substantially oval aperture formed at least partially in said curved portion of said face intermediate the root and the tip, said aperture being positioned angularly with respect to a radius through the axis of the boss to take advantage of the head due to the relative velocity between the fluid and the blade to force the fluid through said aperture, an internal passage formed in the blade communicating with said aperture, an opening in the rear of the boss and a passage formed in the blade communicating with said opening and with the passage in the blade.

12. In a propeller the combination of a boss, a pluarlity of blades mounted on said boss, each having a working face curved transversely toward the leading and trailing edges respectively with a substantially oval aperture formed therein, said aperture having its major axis lying at a substantial angle to a radius through the axis of the boss, and being located substantially centrally of the width of the blade and an internal passage formed in the blade and boss communicating with said aperture and having an outlet at the rear of said boss.

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