July 17, 1962 J. CHAJMIK 3,044,559

PROPELLER

Filed July 14, 1959

FIG. 1

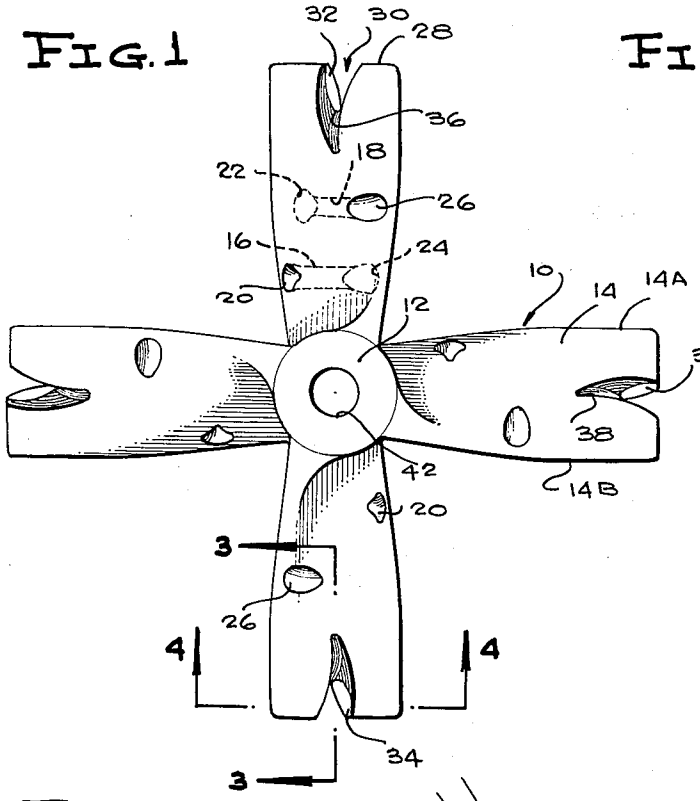


FIG. 2

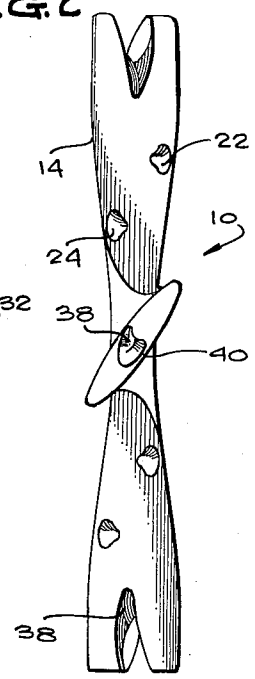


FIG. 3

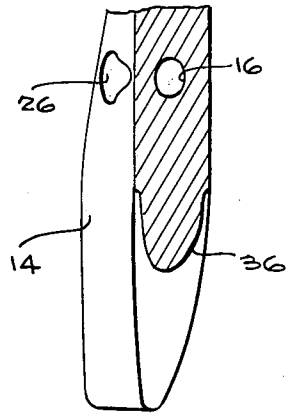
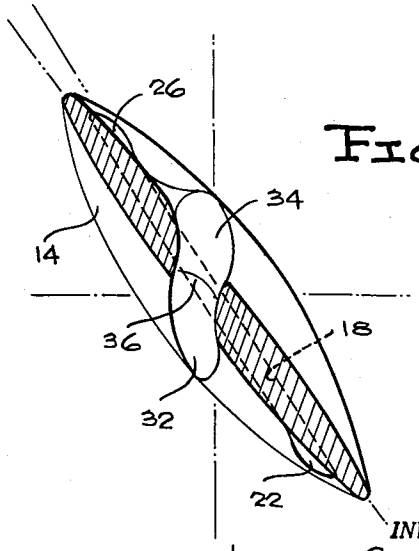


FIG. 4



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PROPELLER

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1 Claim. (Cl. 170—172)

This invention relates to propulsion means and, more specifically, the instant invention pertains to an improved airplane propeller.

One of the primary objects of this invention is to provide a propeller for aircraft or marine vessels which is essentially noiseless in operation and is practical and efficient in its application and use.

Another object of this invention is to provide a fixed pitch propeller with means for reducing cavitation and consequently the vibratory effect thereof.

This invention contemplates, as a still further object thereof, the provision of a propeller which is readily adaptable for creating thrust in both forward and reverse directions.

It is another object of this invention to provide a fixed pitch propeller which is operable in a higher degree of efficiency than propeller blades heretofore known.

This invention contemplates, as a still further object thereof, the provision of an airplane or marine propeller which is non-complex in construction and assembly, inexpensive to manufacture and maintain, and durable in use.

Other and further objects and advantages of the instant invention will become more manifest from a consideration of the following specification when read in conjunction with the annexed drawing, in which:

FIGURE 1 is a front elevational view of an airplane or marine propeller constructed in accordance with the present invention;

FIGURE 2 is a side elevational view of the airplane propeller illustrated in FIGURE 1;

FIGURE 3 is an enlarged detail cross-sectional view taken substantially on the vertical plane of line 3—3 of FIGURE 1, looking in the direction of the arrows; and

FIGURE 4 is an enlarged detail cross sectional view taken substantially on the horizontal plane of line 4—4 of FIGURE 1, looking in the direction of the arrows.

Referring now more specifically to the drawing, reference numeral **10** designates, in general, an airplane or marine propeller constructed in accordance with the teachings of this invention. The propeller **10** is seen to include a central hub **12** for connection to the vehicle drive shaft, the hub **12** having integrally formed blades projecting radially therefrom.

Each of the blades **14** are identical in construction and include a pair of axially spaced bores **16, 18** opening through ports **20, 22** in the leading edges of the blade **14** in opposed sides thereof. The bores **16, 18** open in the trailing end of the blades through ports **24, 26**. As is seen in the several figures, the camber of the upper and lower sides of the blades **14** is substantially the same and hence, the inlet and outlet ports are substantially ovate in configuration.

Each of the blades **14** taper in thickness from its root to the outer end where the latter terminates in a substantially flat edge **28**, and intermediate the leading and trailing edges of each of the blades the flat edge **28** is formed with an inwardly extending recess **30** defined by

a pair of side walls **32, 34** which are substantially parallel and joined at their respective inner ends in a bight portion **36**. The side walls **32, 34** are formed with oppositely disposed and confronting ogive recesses **38, 40**.

The leading and trailing edges **14A** and **14B**, respectively, of each blade lie in a common plane which intersects the hub bore axis at an angle of substantially 45 degrees.

As is well known, airplane propeller noise is caused by the impact of air stream as the same is cut by the leading edge of the propeller. This impaction forms a partial vacuum space which when relieved, is refilled by the divided air column under pressure. This phenomena creates a slapping noise at the trailing edge of the propellers and also tends to set up vibrations therein.

To eliminate this undesirable characteristic, and assuming that the propeller **10** is rotating in a counterclockwise direction as viewed in FIGURE 1, the ports **20** of the leading edge of the blades admit air into and through the bores **16** for discharge on the opposite side of the blade adjacent the trailing edge through the port **24**. Thus the vacuum which would normally be present is substantially filled by the introduction of the air through the bore **16** to substantially fill this otherwise empty space.

In the event the rotation of the propeller **10** is reversed, the fluid medium in which the propeller **10** operates will enter the port **24** and pass through the passage **16** for discharge through the port **20**. Thus, regardless of the direction of the rotation of the propeller **10**, cavitation will be materially reduced.

The passage **18**, connected to opposite sides of the blades **14** through the ports **22, 26** also serves to reduce or prevent vibration or cavitation. Thus, with the propeller **10** turning in a counterclockwise direction as viewed in FIGURE 1, some air will be passed through the port **26** and the passage **18** for discharge through the port **22** to impinge against the front or low pressure side of each blade **14** adjacent the leading edge thereof to insure that both sides of the blade work in the surrounding medium. The direction of flow of the air will, of course, reverse upon reverse turning movement of the propeller **10**.

The notched ends **28** are so constructed to prevent cavitation and torque. Regardless of the direction of rotation of the propeller **10**, air or water will pass from the leading edge of the blade **10** through the notch **30** to eliminate the cavity formed on one of the other sides of the blades **14** thereby making it possible to obtain a substantially solid body of the fluid over the entire surface of the blades. This of course, in addition to the reduction of cavitation, also lessens the tendency of the blades to vibrate.

Having described and illustrated one embodiment of this invention in detail, it will be understood that the same is offered merely by way of example, and that this invention is to be limited only by the scope of the appended claim.

What is claimed is:

A reversible propeller comprising a hub having a plurality of blades extending therefrom in radially spaced relation, each of said blades having a pair of spaced passages extending transversely therethrough, said passages opening in opposed sides of said blade with one of said openings of one passage being disposed on the pres-

sure side adjacent the leading edge of said blade and its other opening being disposed adjacent the trailing edge of said blade, the other of said passages having one of its openings disposed on the pressure side adjacent the trailing edge of said blade and its other associated opening disposed adjacent the leading edge of said blade.

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