United States Patent

Kress et al.

[15] **3,640,642**

[45] **Feb. 8, 1972**

[54] MARINE FLOW THROUGH PROPELLER

[72] Inventors: **Robert F. Kress; Eldon L. Lorenz,** both of Grand Rapids, Mich.

[73] Assignee: **Michigan Wheel Corporation,** Grand Rapids, Mich.

[22] Filed: **Jan. 15, 1971**

[21] Appl. No.: **106,689**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 836,093, June 24, 1969, Pat. No. 3,554,665.

[52] **U.S. Cl.** **416/93**

[51] **Int. Cl.** **B63h 1/16,** B63h 11/14

[58] **Field of Search** 416/93

[56] **References Cited**

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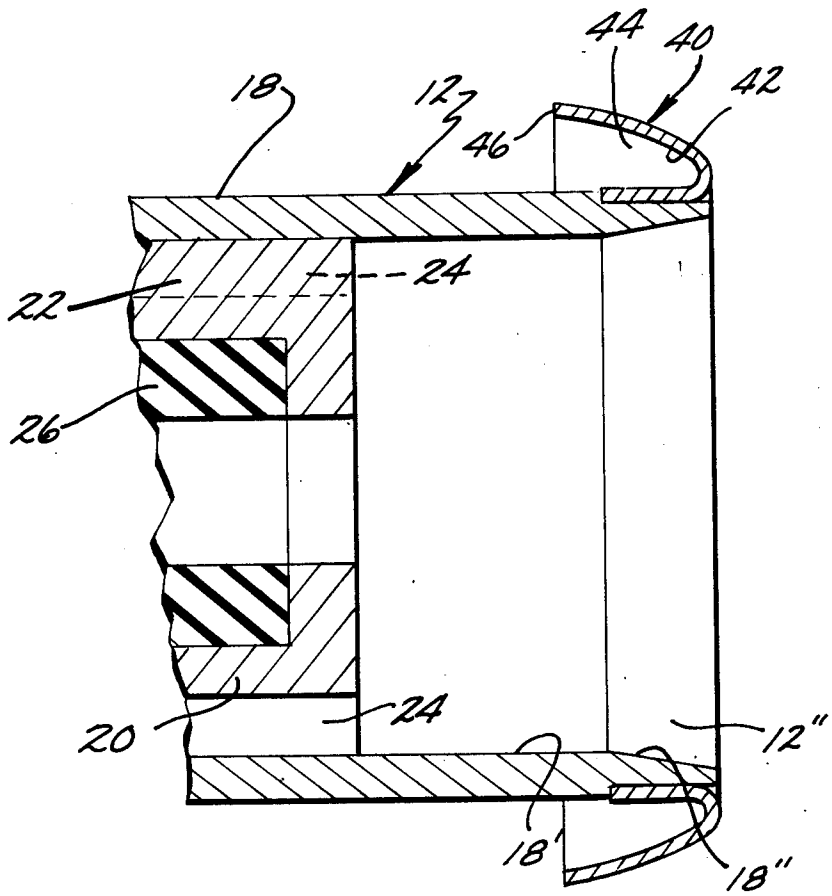
[57] **ABSTRACT**

A flow through marine propeller unit with exhaust creepage barrier structure at the rear of the hub formed of an middle unit. protrusion projecting radially outwardly to define a forwardly oriented dead end pocket.

7 Claims, 3 Drawing Figures



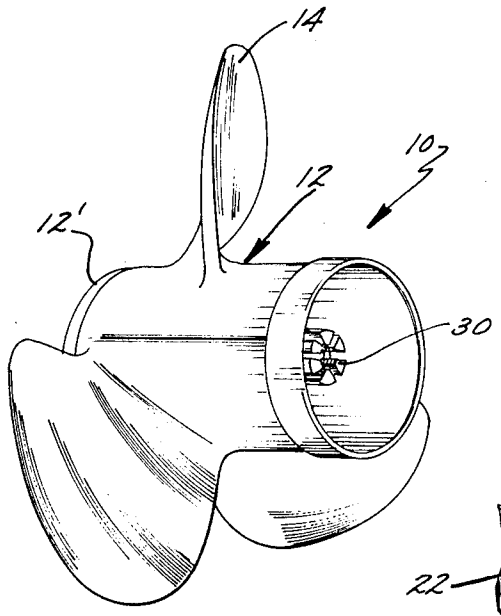


FIG. 1.

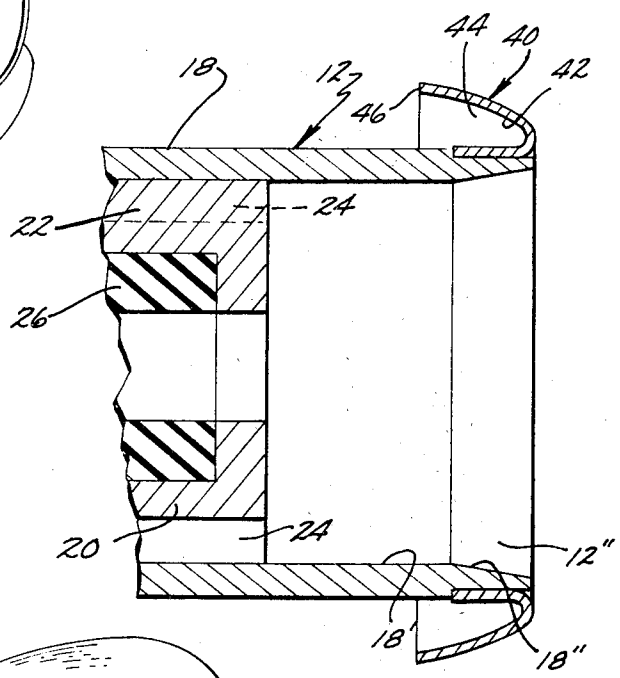


FIG. 2.

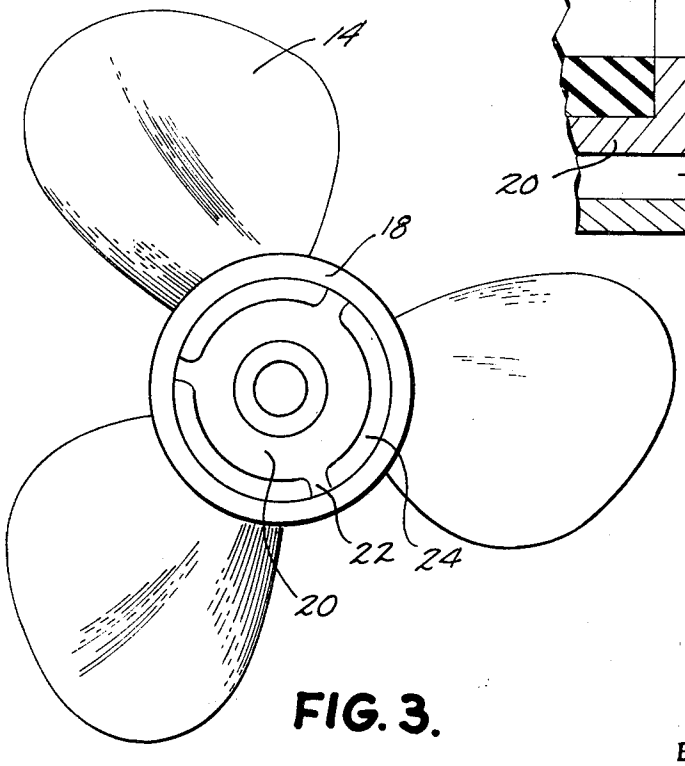


FIG. 3.

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MARINE FLOW THROUGH PROPELLER

RELATED APPLICATION

This is a continuation-in-part of copending application, Ser. No. 836,093 filed June 24, 1969, now U.S. Pat. No. 3,554,665 dated Jan. 12, 1971, and entitled FLOW THROUGH PROPELLER.

BACKGROUND OF THE INVENTION

The invention relates to marine propellers that discharge exhaust gases through a hollow propeller hub.

Cavitation around the blades of a marine propeller has posed a significant problem for many years. Several structures have been devised in efforts to combat this problem.

In the copending application identified above is disclosed a preferred structure for combating cavitation and ventilation around the blades of marine flow through propellers. An annular protrusion with a forward face projects radially from the rear end of the hub, all as set forth therein.

SUMMARY OF THE INVENTION

An object of this invention is to provide an improved version of the cavitation barrier propeller structure in the above-identified copending application. The forward face of the barrier forms part of a special dead end pocket.

Another object of this invention is to provide an improved cavitation inhibiting structure on a flow through marine propeller employing a peripheral protrusion defining a forwardly oriented dead end peripheral pocket means at the rear of the hub.

The novel structure is simple yet effective. The protuberance can be die-formed of metal and welded or swedged to the hub periphery. The hub and protuberance need not be a special complex casting.

These and other objects, advantages, and features of the invention will be apparent upon studying the following specification in conjunction with the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective rear view of the novel propeller unit;

FIG. 2 is an enlarged, fragmentary sectional view through the rear portion of the propeller hub in the unit of FIG. 1; and

FIG. 3 is an elevational rear end view of the apparatus in FIGS. 1 and 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now specifically to the drawings, the propeller unit **10** there illustrated includes an axially elongated generally cylindrical hub **12** having a plurality of propeller blades **14** extending radially outwardly from the periphery thereof. The front end **12'** of the hub is adapted to be positioned adjacent the conventional under water drive structure of an outboard motor, or of a conventional inboard-outboard unit. The rear end **12''** of the hub is open to allow exhausting of engine exhaust gases which flow rearwardly in the direction indicated by the arrow in FIG. 2.

The hub **12** is composed of an outer sleeve **18** spaced from an inner sleeve **20** therewithin by a plurality of radially extending ribs **22**. These ribs define the annular exhaust flow cavity **24** between the sleeves into three like, arcuately shaped segments collectively forming a generally annular flow passage. Within inner sleeve **20** is a rubber bushing **26** for attachment of the propeller unit to the drive shaft (not shown) of the engine. A suitable nut **30** may be used to secure the hub and thus the propeller unit to typical threaded rear end of the drive shaft.

The inner surface **18'** of outer sleeve **18** preferably diverges radially outwardly at the rear end portion of the hub unit as shown at taper **18''**. Around this rear portion and extending radially outwardly from the outer periphery of outer sleeve **18** of the hub is the novel exhaust gas flow barrier structure. This

structure is to combat the migration of exhaust gases that tend to follow the low pressure zone usually existing along the surface of the hub, such gases tending to migrate to the blade area to cause undesirable cavitation and ventilation during operation of the propeller unit. The barrier structure **40** is a ringlike, i.e., annular, protrusion extending radially outwardly from the hub outer periphery. It has a generally U-shaped configuration in cross section, with the open end oriented forwardly of the propeller unit. It is preferably formed from a metal stamping, and is swedged to the hub which is preferably turned down for optimum fit with the attachment stamping. This structure forms a dead end pocket facing forwardly of the propeller unit, with the inner surface being a generally forwardly oriented face **42**, so that this face forms part of the dead end pocket means **44**. One leg of the generally U-shaped protrusion lies along the machined surface of the hub outer sleeve to be swedged thereto. The forward edge portion of the other, outer most leg of the U-shaped element has a shearing edge **46** at the radially outward extremity of the unit. The protrusion preferably curves smoothly from shearing edge **46** to the juncture of the rear terminal edge of the hub. Preferably, inner surface **42** is also similarly curvilinear.

In operation, with the exhaust gases flowing out annular passage **24**, through the cylindrical passage defined by inner periphery **18'**, and out the rear of the propeller hub, and with the water flowing in the same direction over the outer periphery of the hub, (relative to the propeller moving through the water, that is), the novel barrier unit creates a stagnation zone immediately ahead thereof and water shearing action over edge **46** to combat migration of exhaust gases around the rear edge of the hub and forwardly along the surface of the outer sleeve.

It is conceivable that certain details of the novel unit may be modified somewhat without departing from the concept presented herein. Hence, the invention is intended to be limited only by the scope of the appended claims and the reasonably equivalent structures to those defined therein, rather than to the specific preferred embodiment depicted as illustrative of the inventive concept.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A marine propeller unit having a hollow hub with a forward end and a rearward end through which exhaust gases are discharged rearwardly of the hub, and propeller blades extending radially outwardly from said hub, said hollow hub having a portion extending rearwardly of the propeller blades, an annular protrusion projecting radially outwardly from the outer periphery of said rearwardly extending hub portion, said protrusion having an annular forward face and an annular peripheral shearing edge, the improvement comprising: said protrusion being configurated to form forwardly oriented, dead end pocket means at the periphery of said hub portion, with said forward face forming part of said pocket means.

2. The marine propeller unit in claim **1** wherein said forward face has curvilinear portions.

3. The marine propeller unit in claim **1** wherein said forward face includes at least portions at the innermost zone of said dead end pocket means.

4. A marine propeller unit having a hollow hub with a forward end and a rearward end through which exhaust gases are discharged rearwardly of the hub, and propeller blades extending radially outwardly from said hub, said hollow hub having a portion extending rearwardly of the propeller blades, an annular protrusion projecting radially outwardly from the outer periphery of said rearwardly extending hub portion, said protrusion having an annular forward face, the improvement comprising: said protrusion being configurated to form forwardly oriented, dead end pocket means at the periphery of said hub portion, with said forward face forming part of said pocket means.

5. The marine propeller unit in claim **4** wherein said forward face has curvilinear portions.

6. The marine propeller unit in claim 4 wherein said forward face includes at least portions at the innermost zone of said dead end pocket means.

7. A marine propeller unit having a hollow hub with a forward end and a rearward end through which exhaust gases are discharged rearwardly of the hub, and propeller blades extending radially outwardly from said hub, said hollow hub having a portion extending rearwardly of the propeller blades, an annular protrusion projecting radially outwardly from the outer periphery of said rearwardly extending hub portion, the improvement comprising: said protrusion being configurated to form forwardly oriented, dead end pocket means at the periphery of said hub portion.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,640,642 Dated February 8, 1972

Inventor(s) Robert F. Kress and Eldon L. Lorenz

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the Abstract:

"middle unit" should be ---annular---.

Signed and sealed this 5th day of December 1972.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents