Aug. 16, 1960 D. A. FORTUNE 2,949,092

PROPELLER SHROUD

Filed March 9, 1959 2 Sheets-Sheet 1

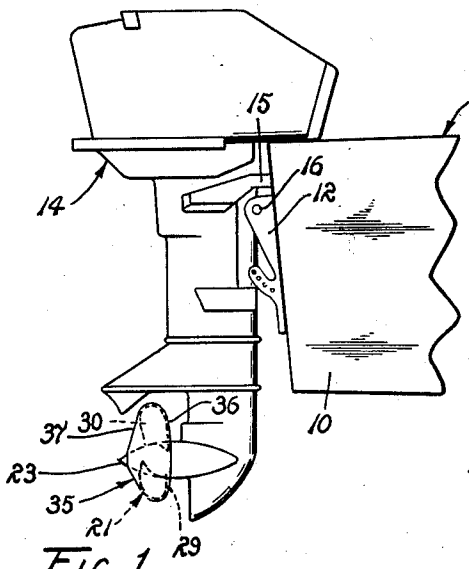


FIG. 1.

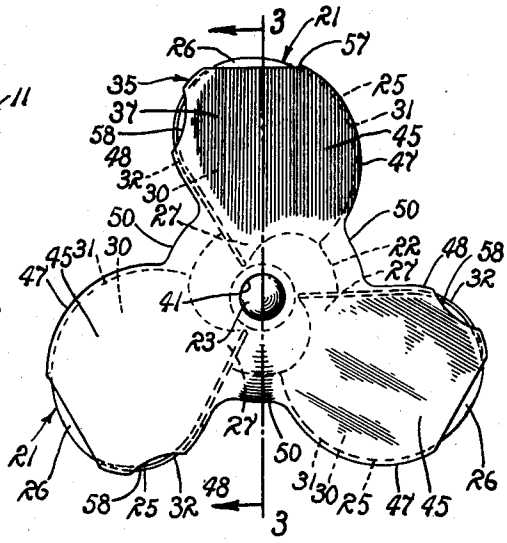


FIG. 2.

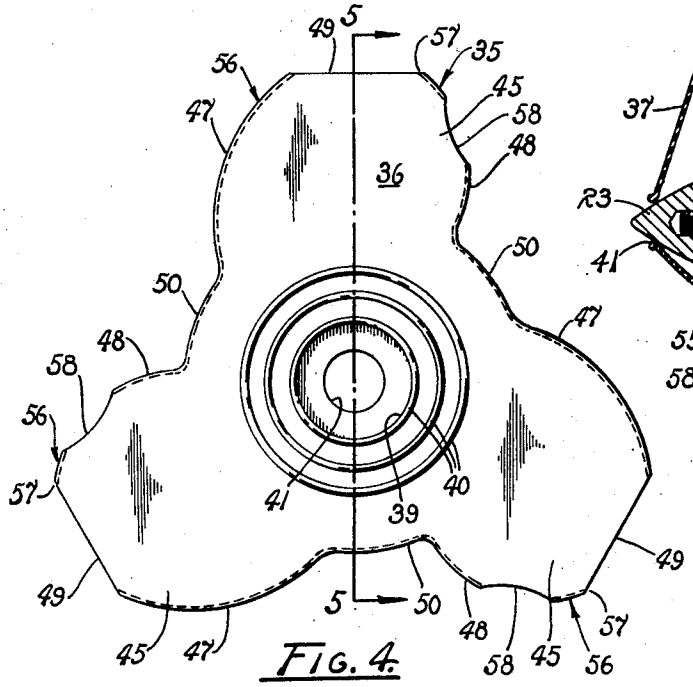


FIG. 4.

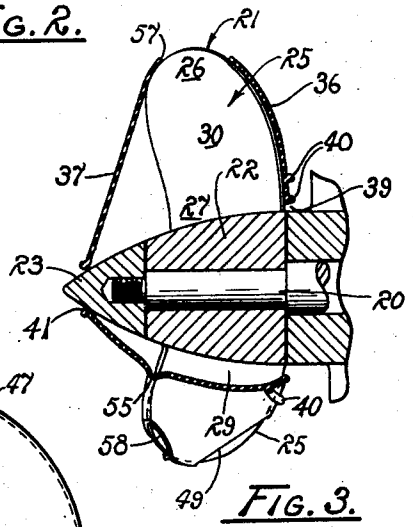


FIG. 3.

DONALD A. FORTUNE
INVENTOR
HUEBNER & WORREL
ATTORNEYS
BY
Richard M. Worrel

Aug. 16, 1960 D. A. FORTUNE 2,949,092

PROPELLER SHROUD

Filed March 9, 1959 2 Sheets-Sheet 2

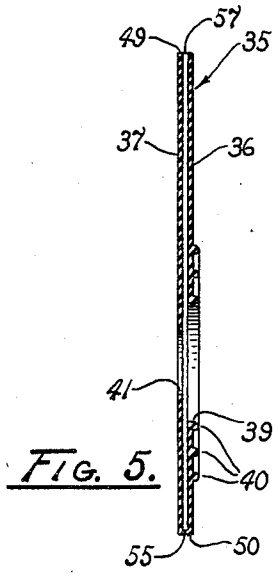


FIG. 5.

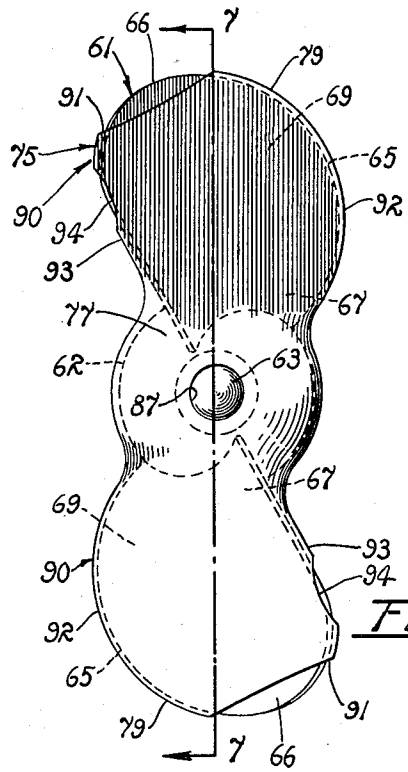


FIG. 6.

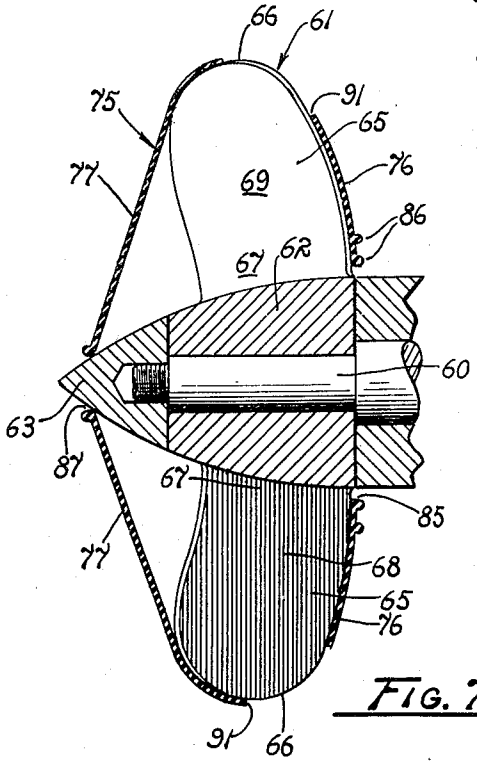


FIG. 7.

DONALD A. FORTUNE
INVENTOR
HUEBNER & WORREL
ATTORNEYS
BY Richard M. Worrel

United States Patent Office

2,949,092

Patented Aug. 16, 1960

2,949,092

PROPELLER SHROUD

Donald A. Fortune, 1284 Wilson Ave., Fresno, Calif.

Filed Mar. 9, 1959, Ser. No. 798,203

11 Claims. (Cl. 115—18)

The present invention relates to a propeller shroud and more particularly to a propeller envelope or cover for reducing the efficiency of the propeller rotating in a fluid, such as a propeller employed in a motorboat, whereby the surface speed of the boat can be reduced to an extent greater than the maximum reduction otherwise attainable with the motor in operation.

The subject matter of the present invention relates to that disclosed in my prior copending application filed October 27, 1958, and bearing Serial No. 769,690. As was explained in this prior application, motorboats normally employed for water skiing, racing, and other high speed operations conventionally are not readily adaptable for use in trolling, or other types of low speed travel. Prior to the development of my propeller shroud, it has been the usual practice to employ entirely separate boats for trolling and high speed purposes.

The shroud of my prior application is essentially an annular elastic envelope adapted to be fitted over the blades of the propeller and to remain thereon as the propeller rotates in the water. With the propeller shrouded, its efficiency is reduced and the speed of the boat reduced with respect to speed of propeller rotation. The present invention is a further development in such a propeller shroud. The shroud of my prior application is found excellently suited to the purpose so long as the propeller on which it is mounted is rotated at a normal or slow speed. However, when through inadvertence or other cause the propeller is rotated at a high speed, water accumulated within the shroud is rotated at such a high speed that the resultant centrifugal force throws the shroud outwardly and even dislodges the shroud from the propeller.

It is an object of the present invention to enable the use of high speed motorboats for trolling purposes.

Another object is to enable the use of the same motor on a boat for both high speed and low speed operations.

Another object is to cover the blades of a propeller so as to reduce its propelling efficiency in the fluid medium in which it operates with a shroud which is easily positioned on the propeller and removed therefrom.

Another object is dependably to maintain such a shroud on the propeller during rotation thereof.

Another object is to provide a propeller shroud having openings adjacent to the tips of the propeller blades through which water is allowed to pass radially outwardly of the propeller to relieve centrifugal force tending to distend the shroud.

Other objects are to provide a shroud of the character described which is simple and economical to construct and use, dependable and durable.

These, together with other objects, will become more fully apparent upon reference to the following description and accompanying drawings.

In the drawings:

Fig. 1 is a fragmentary side elevation of a motorboat, of a motor including a propeller mounted on the stern of

the boat, and of a shroud covering the propeller and embodying the principles of the present invention.

Fig. 2 is a somewhat enlarged rear elevation of the propeller illustrated in Fig. 1 and of the shroud attached to the propeller.

Fig. 3 is a transverse section taken on line 3—3 of Fig. 2.

Fig. 4 is a still further enlarged forward elevation of the shroud.

Fig. 5 is a transverse section taken on line 5—5 of Fig. 4.

Fig. 6 is a view similar to Fig. 2 but showing a modification of the shroud for use with a two-bladed propeller.

Fig. 7 is a transverse section taken on line 7—7 in Fig. 6.

Referring more particularly to the drawings, the stern 10 of a motorboat, generally indicated by the numeral 11, is illustrated in Fig. 1. A motor support fixture 12 is rigidly connected to the stern and rearwardly extended therefrom. A motor 14, exemplifying the type of motor with which the present invention is usable, includes a hinge bracket 15 releasably pivotally connected to the support fixture by means of a pin 16. The pin is extended transversely of the boat so that the motor can pivot about a horizontal axis between the substantially erect operating position, illustrated in Fig. 1, and a substantially horizontal position, not shown, rearwardly extended from the stern when the motor is not in use.

The motor 14 provides an elongated propeller shaft 20 and a three-bladed propeller 21 providing a hub 22 releasably mounted on the shaft and held in position thereon by means of a conically shaped nut 23. The propeller has blades 25 radiating outwardly from the hub and providing outer end portions or tips 26 and inner end portions or roots 27 secured to the hub. Further, each blade has a forward surface 29 and an aft surface 30. It is to be noted that each blade has curved leading and trailing edges 31 and 32, respectively.

The shroud of the subject invention provides an annular tri-radiate envelope or cover 35 of elastic, resiliently flexible material, such as sheet rubber. The envelope includes opposed, congruent, tri-radiate forward and aft walls 36 and 37. The forward wall has a circular central forward opening 39 of predetermined diameter and concentric to an axis for the envelope. Also, a plurality of circular concentric ribs 40 extend forwardly outwardly from the forward wall in concentric relation to the axis of the envelope and of successively increased diameters. The aft wall also has a circular central opening 41 which is concentric to the axis of the forward opening but of somewhat smaller diameter than the forward opening.

Each wall 36 and 37 includes three portions or pockets 45 radiating outwardly from the described axis of the envelope 35 and an outer circumferential edge 46. This outer edge of each wall includes curved leading and trailing sections 47 and 48 interconnected by relatively straight tip sections 49 all of which generally define the radiating portions. The leading and trailing sections are respectively of substantially the same curvature as the leading and trailing edges 31 and 32 of the blades 25. Further, the envelope edge includes intermediate sections 50 radially outwardly spaced from the outermost rib 40 and which interconnect adjacent leading and trailing sections of the edge. It is to be understood that the designations "leading" and "trailing" are not intended to restrict the direction of rotation of the propeller 21 alone or with the envelope applied but are employed for descriptive convenience to indicate the usual direction of movement of the blades when propelling the boat 11 forwardly.

The forward and aft walls 36 and 37 are joined in back-to-back congruent relation by a web 55 interconnecting opposed leading and trailing sections 47 and 48 and opposed intermediate sections 50. The web does not

connect opposed tip sections **49**, however. Thus, it will be evident that the envelope includes three blade receiving sleeves **56** formed by the opposed radiating portions **45** of the walls and the web. These sleeves have outer tip openings **57**. Further, the sleeves preferably have outlet ports **58** in the trailing sections thereof for purposes soon described.

Operation

The operation of the described embodiment of the subject invention is briefly summarized at this point. The shroud is normally used to adapt the motor **14** and thus the boat **11** for use in trolling, or other slow speed travel.

In order to apply the shroud to the propeller **21**, the motor **14** preferably is pivoted on the pin **16** from its upright operating position into a substantially horizontal position. The shroud can be applied when the propeller is in the water but obviously application is easier when the motor is in the described horizontal position.

The forward wall **36** of the envelope **35** is stretched outwardly by manually grasping the wall within the forward opening **39**. The envelope is then fitted over the blades **25** of the propeller **21**. The blades are individually received by the sleeves **56** so that the tips **26** of the blades extend slightly outwardly through the tip openings **57** of the sleeves. The web **55** at the leading and trailing sections **47** and **48**, of course, fits against the leading and trailing edges **31** and **32**, respectively, of the blades.

Because of the size of the aft opening **41** relative to the nut **23**, the aft wall **37** is rearwardly yieldably tensioned about the nut in generally rearwardly conical shape, as best illustrated in Fig. 3. This holds the aft wall outwardly away from the aft surfaces **30** of the blades **25** to avoid conformance to the blades and further to reduce blade efficiency. The inner rib **40** or edge describing the forward opening **39** of the forward wall **36** circumscribes the propeller shaft **20** so that the forward opening exposes the roots **27** of the blades.

For ease of attachment and depending on the size of the propeller **21**, it may be desirable to increase the size, that is, diameter, of the forward opening **39**. This is done by cutting the forward wall **36** along one of the ribs **40**. After an annular segment has been removed it will be evident that a rib remains as reinforcement of the edge circumscribing the now enlarged forward opening. With the three ribs as described, it will be evident that, in addition to the forward opening as illustrated, two other openings of larger diameter may be provided. Obviously, the number and radial spacing between the ribs may be varied as appears desirable. It is also to be noted that a larger forward opening may be desired for exposing more of the blades.

After the envelope **35** is attached, the motor **14** is returned to upright operable position with the covered propeller **21** in the water. When the motor **14** is started and the propeller rotated in the water, the envelope **35**, by covering the blades **25**, reduces their propelling efficiency. The effect is to reduce the speed of the boat **11** normally resultant from any speed of propeller rotation.

As the covered propeller **21** rotates in the water, and particularly during movement of the boat **11**, water enters between the blades **25** through the forward opening **39** and is thrown centrifugally outwardly within the sleeves **56**. This water is permitted to pass out of the sleeves through the tip openings **57** and outlet ports **58** so as to avoid expansion of the envelope or tendency to throw the shroud from its position on the propeller. When the propeller is rotated at normal speeds, the resultant centrifugal force is directed generally radially outwardly of the blades so as to throw most of the water outwardly through the tip openings. However, it has been discovered that if the propeller rotates at very high speeds, the stress resultant from the centrifugal force lags somewhat behind the described radial position and is directed rearwardly against the trailing sections **48** of the sleeves. In this latter instance, the ports **58** permit escape of water and minimize expansion of the envelope. The tips of the blades exposed through the openings **57** and the shape of the shroud mounted on the propeller are adequate to propel the boat but because of the imparted propeller inefficiency very slow speeds of boat movement are readily attained.

Modification

A modification of the shroud of the subject invention is illustrated in Figs. 6 and 7. A propeller shaft **60** is provided having a two-bladed propeller **61** mounted thereon. As before, the propeller has a hub **62** on the shaft, and a propeller nut **63** is applied to the shaft for holding the propeller in position. Two blades **65** extend radially outwardly from the hub in diametric relation and include outer tips **66**, inner roots **67**, forward surfaces **68**, and aft surfaces **69**.

An envelope **75** includes congruent forward and aft walls **76** and **77** connected in opposed relation by means of a web **79** extended between adjacent marginal edges of the walls.

The forward wall **76** has a forward central opening **85** concentric to an axis for the envelope **75**, and a plurality of circular ribs **86** project forwardly outwardly from the wall in concentric relation to the forward opening, as before. The rear wall **77** has an aft opening **87** coaxial with and diametrically smaller than the forward opening.

The envelope **75** has oppositely extended blade receiving sleeves **90** having outer tip openings **91** and curved, opposite leading and trailing edges **92** and **93**, respectively. The sleeves also preferably have rearwardly directed ports **94** in the trailing edges thereof. Essentially, the only difference between the modification and the form of the invention first described above is that the modification is adapted for use on a two-bladed propeller of the type shown at **61**.

In use of the envelope **75**, it is fitted over the propeller **61** so that the blades **65** are received by the sleeves **90** and the tips **66** extend through the tip openings **91**. The aft wall is rearwardly convergently tensioned about the propeller nut **63** to prevent the sleeve from snugly fitting against the aft surfaces **69** of the blades. Again, as the propeller rotates in the water, its propelling efficiency is reduced by the envelope. Water is allowed to pass into the envelope through the forward opening **85** and out of the envelope through the tip openings **91** and ports **94** incident to centrifugal action of the propeller. Therefore, the envelope remains dependably in place on the propeller and is not appreciably diametrically expanded by the centrifuging water.

From the foregoing it will be evident that a propeller shroud has been provided which quickly and simply enables the adaptation of a motorboat, normally used for high speed boating, for use in trolling, or for other slow speed uses. With the shroud of the present invention, the necessity of maintaining two boats for each of the described purposes is no longer necessary. The principles of the subject invention can be applied to shrouds for propellers having various numbers of blades as the described first and second forms herein indicated. The shroud is dependably retained in propeller covering position particularly because of the openings adjacent to the blade tips which allow water to be thrown out of the envelope incident to rotation and centrifugal action of the propeller.

Although the invention has been herein shown and described in what is conceived to be the most practical and preferred embodiments, it is recognized that departures may be made therefrom within the scope of the invention, which is not to be limited to the details disclosed herein but is to be accorded the full scope of the claims

so as to embrace any and all equivalent devices and apparatus.

Having described my invention, what I claim as new and desire to secure by Letters Patent:

1. In combination with a propeller having a plurality of blades, a shroud for reducing the propelling efficiency of the blades when moving through a fluid comprising an annular envelope concentric to a predetermined axis and having blade receiving sleeves radiating outwardly from the axis, the sleeves having openings therein providing communication outwardly from interiorly of the envelope, the envelope being fitted over the propeller with the sleeves receiving the blades, said openings allowing escape of fluid in the envelope which fluid is centrifugally thrown outwardly incident to rotation of the propeller.

2. The combination of a motor having a propeller adapted for use in propelling a boat through water, which propeller provides a plurality of blades having outwardly extended tips; and an annular envelope concentrically circumscribing the propeller and having a plurality of circumferentially spaced, radially outwardly extended sleeves individually receiving the blades of the propeller therein and providing openings through which water entering the envelope and thrown outwardly by the blades of the propeller during rotation thereof is allowed to escape.

3. The combination of claim 2 wherein the motor has a shaft on which the propeller is mounted and including a nut connected to the shaft against the propeller, the envelope including an aft wall having an opening concentric to the shaft and circumscribed by an edge in circumferential engagement with the nut to hold the aft wall in rearwardly convergent, generally conical shape thereby to prevent the aft wall from fitting closely against the blades.

4. The combination of claim 3 wherein the nut is rearwardly convergently conical whereby engagement of the edge of the opening of the aft wall with the nut tensions the aft wall in said conical shape.

5. The combination of claim 2 wherein the blades have leading and trailing edges; wherein the sleeves have leading and trailing edges respectively adjacent to the leading and trailing edges of the blades over which they are fitted, and wherein the openings in the sleeves are located in the trailing edges of the sleeves.

6. The combination of claim 2 wherein the sleeves have outer ends fitted over the tips of the blades, and wherein the openings in the sleeves are in the outer ends thereof and expose the tips of the blades.

7. The combination of claim 2 wherein the blades have leading and trailing edges of different curvatures; and wherein the sleeves of the envelope provide leading and trailing edges respectively having substantially the same curvatures as the leading and trailing edges of the blades and respectively extended along said leading and trailing edges of the blades.

8. An envelope for reducing the efficiency of the propeller of a motor boat which propeller has a plurality of radially extended blades providing outer tips, comprising opposed congruent forward and aft walls, each of the walls having a central opening substantially concentric to an axis for the envelope and through which water is adapted to pass, each wall also having an outer edge circumscribing the axis and a plurality of circumferentially spaced portions radiating outwardly from said axis and corresponding in number to the number of blades on the propeller, means interconnecting the outer edges of the walls whereby opposed radiating portions of the walls provide sleeves individually adapted to receive the blades of the propeller, the sleeves having open ends adapted to fit over the tips of the blades and to permit centrifuging of water radially outwardly therethrough by the propeller during rotation thereof in the water.

9. The envelope of claim 8 wherein the forward wall has a plurality of annular ribs concentric to each other and to said axis for the envelope, the ribs being of progressively increased diameter radially outwardly from the opening in the forward wall whereby an annular portion can be cut out of the forward wall inwardly of a selected rib for increasing the diameter of the opening in the forward wall.

10. A shroud for a propeller having a hub and a plurality of blades outwardly extended from the hub comprising an envelope of elastic material adapted releasably to fit over a propeller in stretched substantially fitted relation about the blades and providing an external surface when so mounted on a propeller of a shape of substantially less propelling efficiency than said propeller, the envelope having water admitting openings adjacent to the hub of the propeller and water emitting openings at the ends of the propeller blades and through which the tips of the blades extend.

11. A shroud for a propeller having a hub mounted on a rotatable drive shaft providing an endwardly tapered aft end and blades outwardly extended from the shaft comprising an envelope of elastic material having forward and rearward sides and a central portion adapted to fit about the hub of such a propeller and having pockets radially extended from the central portion adapted to fit over the propeller blades, said pockets having water emitting openings in their radially extended end portions, the central portion of the envelope having a forward opening for receiving the shaft and a restricted aft opening aligned with the forward opening for constriction about the tapered aft end of the shaft with the rearward side of the envelope tensioned in rearwardly spaced relation to the propeller.

References Cited in the file of this patent

UNITED STATES PATENTS

1,719,860 Wendt ---------- July 9, 1929