

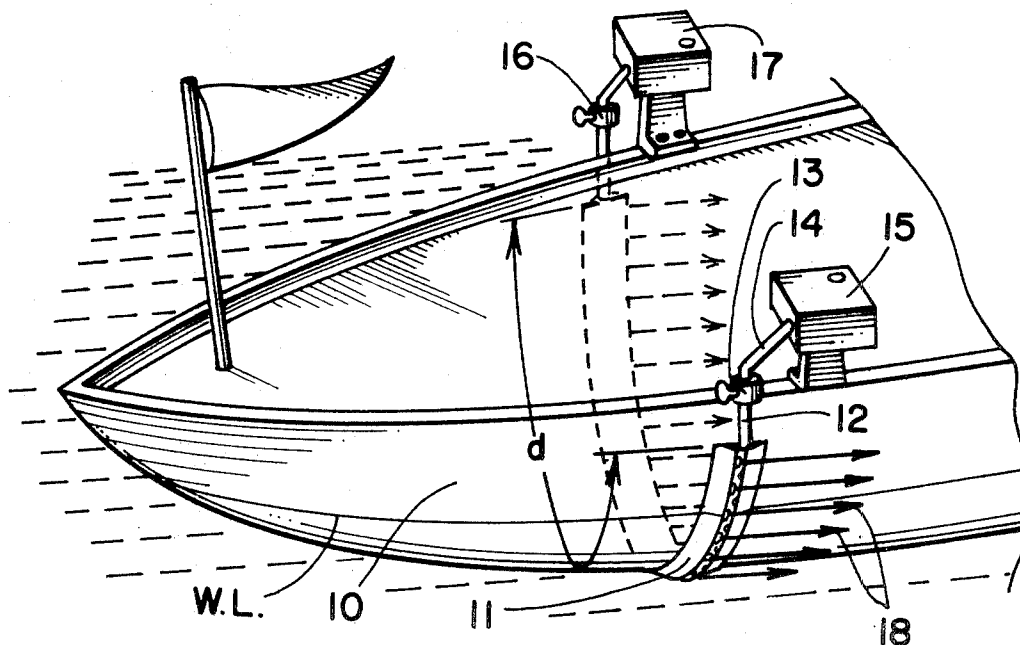
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Continuation-in-part of application Ser. No.
807,881, Mar. 17, 1971, now abandoned.
This application Mar. 23, 1970, Ser. No.
21,585

[56] **References Cited**
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3,084,651 4/1963 Parmenter 114/67 X
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[54] **DILUTED SOLUTION DISPENSING APPARATUS
FOR BOATS**
4 Claims, 5 Drawing Figs.

[52] U.S. Cl. 114/67 A
[51] Int. Cl. B63b 1/38
[50] Field of Search 114/67

ABSTRACT: An elongated flexible strip incorporating a longitudinally extending central tube provided with egress openings is arranged to be wrapped about the hull portion of a boat adjacent its bow. A chemical is fed into the central tube and passes out in controlled quantities from the egress openings to thereby form with water passing by the hull a diluted solution which then passes down the length of the hull and thereby reduces the friction of the boat hull when passing through water.



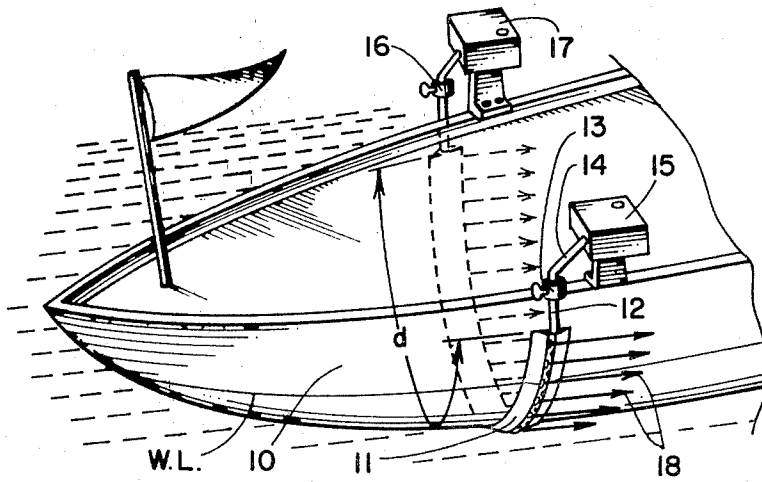


FIG. 1

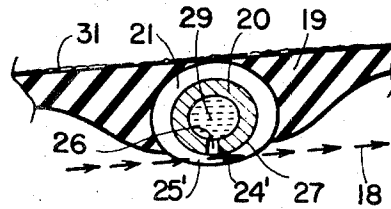
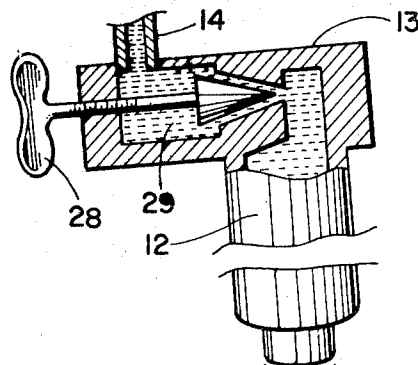


FIG. 3

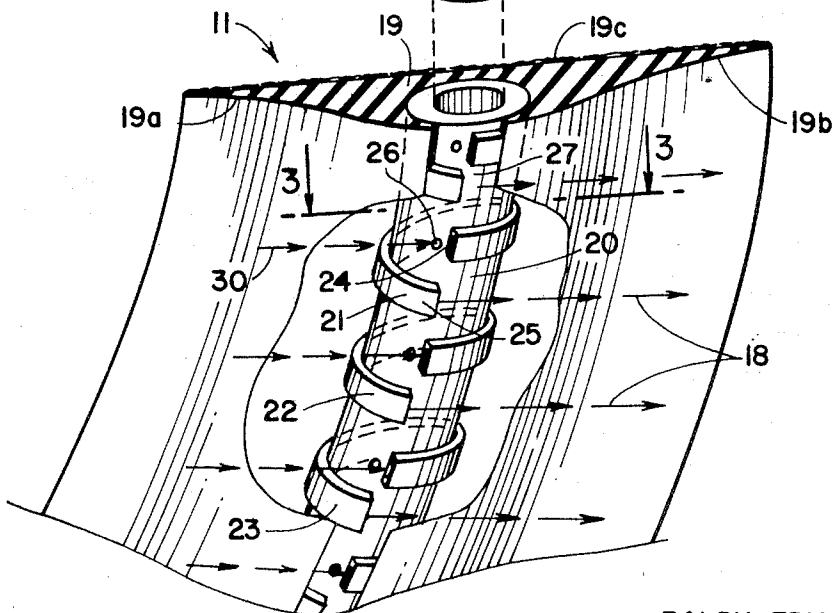


FIG. 2

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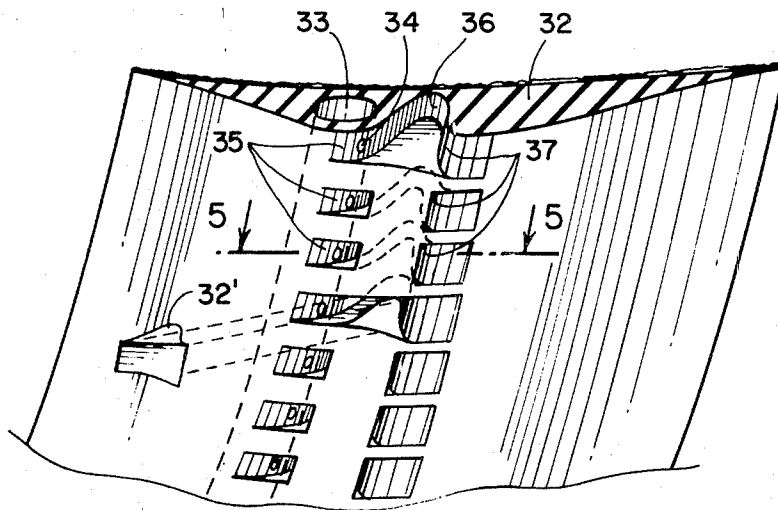


FIG. 4

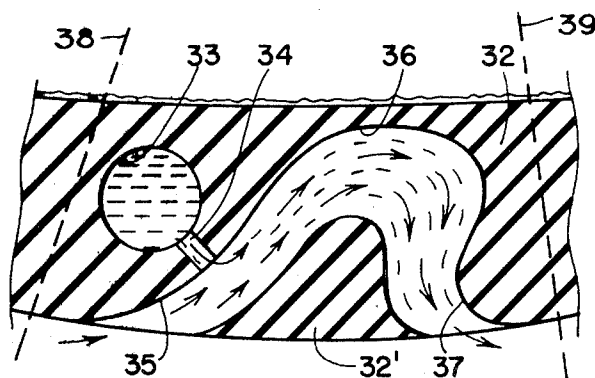


FIG. 5

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DILUTED SOLUTION DISPENSING APPARATUS FOR BOATS

This application is a continuation in part of my copending U.S. Pat. application Ser. No. 807,881 filed Mar. 17, 1969, now abandoned.

This invention relates to an improved apparatus for dispensing a diluted solution of water and chemical adjacent to the bow of a boat to thereby reduce the friction of the boat hull when passing through water.

BACKGROUND OF THE INVENTION

It has been well established in the prior art that by dispensing a chemical such as an oil at the forward portion of the boat hull, the friction of movement of the hull through water is substantially reduced.

Conventionally, the dispensing of a chemical is accomplished by forming small holes or slots in the forward portion of the hull of the boat. An interior apparatus dispenses a measured amount of chemical through these openings to mix with water passing along the hull.

While the foregoing arrangement is effective in carrying out the intended purpose, it is necessary to structurally modify the particular boat involved. More particularly, holes or passages must be formed in the hull of the ship to provide egress for the chemical involved. This operation must normally be carried out in a dry dock unless the holes are formed during the manufacture of the boat in question. More importantly the puncturing of the hull itself below the water line can impair the structural integrity of the hull. This latter problem is particularly acute in the case of submarines wherein very high water pressure is exerted on the hulls.

For smaller type boats, such as private pleasure craft, rupturing of the hull in order to provide a suitable egress openings can become very difficult and expensive, particularly in the case of multilayered wooden hulls and reinforced fiber glass type plastic hulls.

BRIEF DESCRIPTION OF THE PRESENT INVENTION

With the foregoing in mind, the present invention contemplates the provision of an apparatus enabling the dispensing of a diluted solution of water and chemical along the forward bow portion of a boat to realize the advantages of reduced friction without the necessity of puncturing or otherwise impairing the hull below the waterline in any manner.

More particularly, the invention contemplates the provision of an elongated flexible tube means adapted to be wrapped about the underside of a forward portion of the hull of a boat. This tube means includes a plurality of egress openings. One or more chemical storage tanks are carried on the boat at a level above the ends of the tube means and each connected by a conduit to the tube means. This conduit preferably includes a control valve so that a controlled amount of chemical such as oil may be passed to the tube means and dispensed from the egress openings in a manner to provide a proper diluted solution passing along the hull.

In a preferred embodiment of the invention, the tube means includes a flexible strip material having a thickened central portion tapering to thinner dimensions towards its longitudinal edges, the back surface of the strip being substantially flat for engaging the hull. The chemical passes through a tube imbedded in the thickened central portion of the strip or alternatively through a hole formed directly in the thickened central portion. With this arrangement there is provided a stream line configuration when the strip is secured about the hull portion. Further, a desired length of strip material may be cut to adjust to the particular size of the boat to which the strip is to be affixed.

An improved mixing of the chemical and water to provide the desired diluted solution is accomplished by providing curved passage means. These passage means include entrance and exit openings, the entrance openings being adjacent to the egress holes for the chemical. Water passing along the hull enters the entrance openings of the passage means and picks up

the chemical flowing from the tube egress holes and effects a desired mixing, the resulting solution thereafter being dispensed from the exit opening of the passage means to flow along the hull of the ship.

BRIEF DESCRIPTION OF THE DRAWINGS

A better understanding of the invention will be had by now referring to the accompanying drawings, in which:

FIG. 1 is a fragmentary perspective view of the bow portion of a boat wherein the apparatus for dispensing a diluted solution of water and chemical has been attached in accord with the invention;

FIG. 2 is an enlarged fragmentary exploded perspective view of a portion of the apparatus of FIG. 1;

FIG. 3 is a fragmentary cross section taken in the direction of the arrows 3—3 of FIG. 2;

FIG. 4 is a fragmentary perspective view of an alternative form of a portion of the apparatus; and

FIG. 5 is a fragmentary cross section taken in the direction of the arrows 5—5 of FIG. 4.

DETAILED DESCRIPTION OF THE INVENTION

Referring to FIG. 1 there is shown the bow of a boat about which there has been wrapped an elongated flexible strip 11. As will become clearer as the description proceeds, the strip 11 includes a central tube means passing longitudinally through the strip. A first end of the central tube connects through conduit 12 to a control valve 13 and a further conduit 14 to a chemical storage tank 15. The other end of the central tube similarly connects through a control valve 16 to a storage chemical tank 17 on the opposite side of the boat. The storage tanks 15 and 17 and associated valves 13 and 16 may all be located inboard in concealed compartments if desired. In this case the connecting conduit such as 12 would pass through an upper opening in the boat side well above the waterline, or alternatively simply pass over the top edge of the hull.

The central tube means includes egress holes such as that chemicals passed into the central tube will exit through the egress holes and mix with water flowing along the hull of the ship to provide a diluted solution which in turn flows along the hull as indicated by the arrows 18. This diluted solution of water and chemical serves to reduce the friction of the hull passing through the water.

Referring now to FIG. 2, details of a first type of the flexible strip and central tubular structure will be evident. As shown, the flexible strip means itself constitutes an elongated strip of flexible material 19 which may constitute neoprene or similar flexible rubberlike material or even flexible plastic and fiberglass combinations. This strip has a thickened longitudinal central portion tapering to thinner dimensions towards the longitudinal edges thereof as indicated at 19a and 19b. The back of the strip is substantially flat as shown at 19c and it is this flat surface which is designed to engage directly the forward portion of the hull of the boat of FIG. 1.

In the embodiment of FIG. 2, the heretofore referred to tube means takes the form of a central tube 20 of flexible material which may constitute a plastic type tube or even a flexible metal tube imbedded within and passing longitudinally through the thickened central portion of the strip. The structure also includes a plurality of spiral passage means such as indicated at 21, 22, and 23, encircling the tube, each of the passage means circumferentially extending substantially 360° about the central tube. As shown particularly for the spiral passage means 21, the passage terminates in entrance and exit openings 24 and 25. These openings lie substantially in a plane normal to the back surface 19c of the strip and including the axis of the central tube. The openings themselves are longitudinally spaced by an amount defined by the pitch of the spiral passage means.

The various egress holes or openings from the central tube in the strip are disposed adjacent the entrance openings for

the various spiral passage means such as indicated at 26 for the entrance opening 24 of the spiral passage means 21. It should be noted that the imbedding of the central tube in the strip is such that a longitudinal wall portion of the tube is exposed along a front surface of the strip as indicated at 27. The purpose of the flexible strip material itself surrounding a major portion of the central tube is simply to provide a streamlined housing and secure support for wrapping the structure about the hull of the boat.

In the exploded portion of the drawing above the strip 19, there is illustrated one type of control valve which may be connected between the conduits 12 and 14 for controlling the rate of flow of chemical from the tank 15 of FIG. 1 into the central tube. As shown, this valve takes the form of a needle valve having an adjusting screw 28. The chemical from the tank 15 of FIG. 1 completely fills the inner chamber of the valve as indicated at 29. This chemical, as mentioned, may take the form of a nonpollutant oil and will flow through the adjusted valve opening into the central tube to completely fill the tube and pass from the various egress holes such as 26 at a controlled flow rate.

FIG. 3 shows in fragmentary cross section the manner in which the entrance and exit openings are substantially aligned in a longitudinal direction; that is, one above the other. In the preferred embodiment, the end portions of the spiral passage means are flattened slightly as indicated at 24' and 25' to improve the overall streamlining provided by the flexible strip 19 to water flow over the structure. In addition, this slight flattening changes the cross-sectional area of the spiral passage means and results in a more thorough mixing of chemical flowing from the egress hole 26 and received in the entrance opening 24 with water moving in the direction of the arrow 30 simultaneously received in this opening. The mixed water and chemicals swirl around the spiral passage means in the larger cross-sectional areas and become thoroughly intermingled before exiting from the exit opening in the general direction of the arrows 18. The back of the strip 19 may be provided with an epoxy bonding agent 31 for securing the strip to the hull.

FIG. 4 illustrates an alternative flexible strip structure 32 for providing a proper mixing of chemical and water. In this embodiment the exterior shape of the strip is substantially the same as that of the strip 19 of FIG. 2 but rather than a central tube imbedded in the strip, there is simply defined a tubular passage means by forming a bore 33 through the thickened portion.

A plurality of small lateral holes 34 from the bore 33 terminate in entrance openings 35 of curved passage means 36 formed in the strip material. Rather than spiral about the main bore as in FIG. 2, these passage means cause the water chemical solution to circulate about an arc defined by the inner wall of at least 180°. The top passage in FIG. 4 is broken away to expose the interior. The ends of each of the passages terminate in exit openings 37.

In the enlarged view of FIG. 5, it will be noted that the sidewalls diverge towards the central portion of the passage and then converge to define a narrower exit opening thereby assuring thorough mixing of the solution. In addition the bottom wall slopes downwardly slightly as seen in FIG. 4 to provide a divergence between the top and bottom walls in the last half portion of the passages such that the cross-sectional areas of the entrance and exit openings are in the ratio of approximately 1 to 2.

Each of the passages 36 may be formed by defining the top, bottom and inner sidewalls of the passage during molding of the strip 32. Thereafter, plugs of strip material 32' such as shown in exploded view in FIG. 4 for one of the passages, may be cemented between the top and bottom walls, the plug being such as to leave a gap with the inner passage sidewall and thus define the passage.

OPERATION

In operation, the elongated flexible strip with the central tube or bore and passage means may be manufactured in any desired length. The strip may be stored on a drum or similar convenient storage means and sold in boat shops, boat supply outlets, and other similar establishments handling boating equipment. The control valve and storage chemical tanks would also be sold to a customer when he purchases a given length of the strip material.

Thus, assuming a private boat owner wishes to improve the operation of his boat, he will purchase a given length of the flexible strip, the same readily being cut to the desired length such that the strip will fit about the forward hull portion of the person's boat. In this respect, the strip should be at least of a length *d* to terminate near the water line W.L. on the particular boat involved as indicated in FIG. 1.

The cut strip portion may then be wrapped about the forward hull portion of the boat and secured thereto by any suitable means. For example, the pressure-type epoxy adhesive such as indicated at 31 in FIG. 3 may be provided on the back of the strip so that the same may simply be pressed onto the hull portion of the boat.

Thereafter, it is a simple matter for the boat owner to position the chemical storage tanks such as indicated at 15 and 17 in FIG. 1 adjacent opposite sides of the boat levels above the ends of the flexible strip. The conduits and control valves are then connected by any conventional means so that when the control valves are opened slightly, chemicals such as oil will flow into the central tube or bore and fill the same completely.

As the boat cruises through the water, the operator may adjust the control valves 13 and 16 to cause a minute flow of oil from the various openings in the central tube, this oil being picked up by water entering the entrance openings of the passage means and mixing with the oil all as described heretofore. The dispensed diluted solution from the exit openings is such that the friction of the hull passing through the water is substantially reduced. Normally 1 part of oil to 10,000 to 100,000 parts of water constitutes a workable diluted solution. The storage tanks, accordingly, need not be large.

From the foregoing description, it will be evident that the present invention has provided a unique apparatus enabling the dispensing of a properly diluted solution of chemical and water along the hull of a boat to reduce friction. There is no necessity whatsoever for puncturing the hull of the boat or otherwise effecting any structural modification of the boat itself. The apparatus thus is ideally suited for private boat owners and is readily adaptable to any sized boat. In new hull constructions, however, the hull wall may be designed with a reinforced groove within which a modified strip would fit to provide a flush exterior surface with the hull. Towards this end, the strip itself would have straight sides such as would result from cutting along the lines 38 and 39 in FIG. 5.

While the invention has been described with reference to a boat, the term "boat" as used here and in the claims is meant to include any type of a water vehicle such as large ships, pontoons for aircraft, flying boats, and even submarines. In addition the term "boat" is meant to include barges wherein the present invention would be particularly useful for facilitating the movement of towed barges across expanses of water. For very large boats more than one strip may be used positioned at longitudinally spaced intervals along the hull.

Further, the term "tube" as used herein is meant to include, in addition to a conventional circular type of tubular passage, any other cross-sectional variation, and for convenience is deemed to cover equivalent passages such as rectangularly shaped passages or other types of conduit providing fluid communication. Finally, while the control valves have been shown as manually operable, they may be electrically operated.

What is claimed is:

1. An apparatus for dispensing a diluted solution of water and chemical adjacent to the bow of a boat to thereby reduce the friction of the boat hull when passing through water, comprising, in combination:

a. an elongated strip of flexible material having a thickened longitudinal central portion tapering to thinner dimensions towards the longitudinal edges thereof, the back surface of said strip being substantially flat;
b. a bore passing longitudinally through said strip, a longitudinal wall portion of said bore including lateral egress openings exposed along the front surface of said strip;
c. a plurality of curved passage means, each of said means terminating in entrance and exit openings along the front surface of said strip said lateral egress openings being adjacent to the entrance openings of said plurality of curved passage means respectively,
whereby a desired length of said strip may be cut and wrapped about the underside of the bow portion of a boat hull with the back surface of said strip engaging said hull and said entrance openings facing forwardly so that a chemical fed into said bore at each end will flow from said egress openings and mix with water passing into said entrance openings of said passage means to form said diluted solution, said solution exiting from said exit openings to flow along the major portions of the hull of said boat.

2. An apparatus according to claim 1, including chemical storage tanks for securement on either side of said boat above the ends of said strip; conduit means for connecting said tanks to the ends of said bore; and control valves in said conduit means for controlling the rate of chemical flow into said bore whereby the rate of flow of said chemical from said egress holes may be controlled.

3. An apparatus according to claim 1, in which said bore is defined by a tube imbedded within said strip, each of said curved passage means being in the form of a spiral circumferentially extending substantially 360° about said tube, said entrance and exit openings lying in a plane normal to the back surface of said strip and spaced longitudinally by an amount defined by the pitch of said spiral.

4. An apparatus according to claim 1, in which each of said curved passage means extends over an arc greater than 180°, the sidewalls initially diverging towards the central portions of the passage and then converging to define a narrower exit opening.

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