Jan. 2, 1968 J. P. GLASS 3,361,104

BOAT HULL AND RAIL

Filed Feb. 28, 1966 2 Sheets-Sheet 1

Fig. 1.

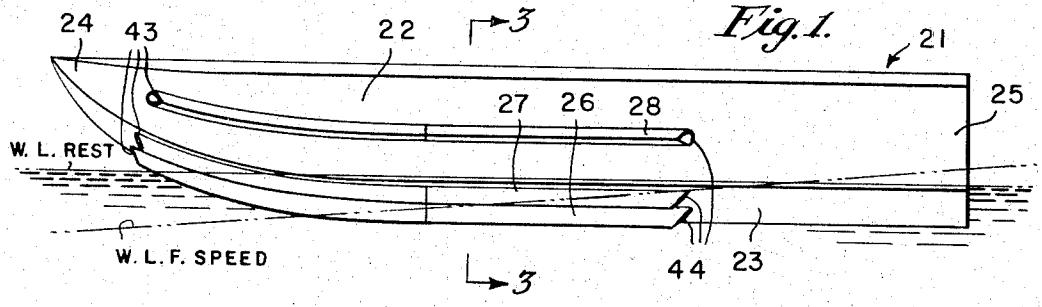


Fig. 2.

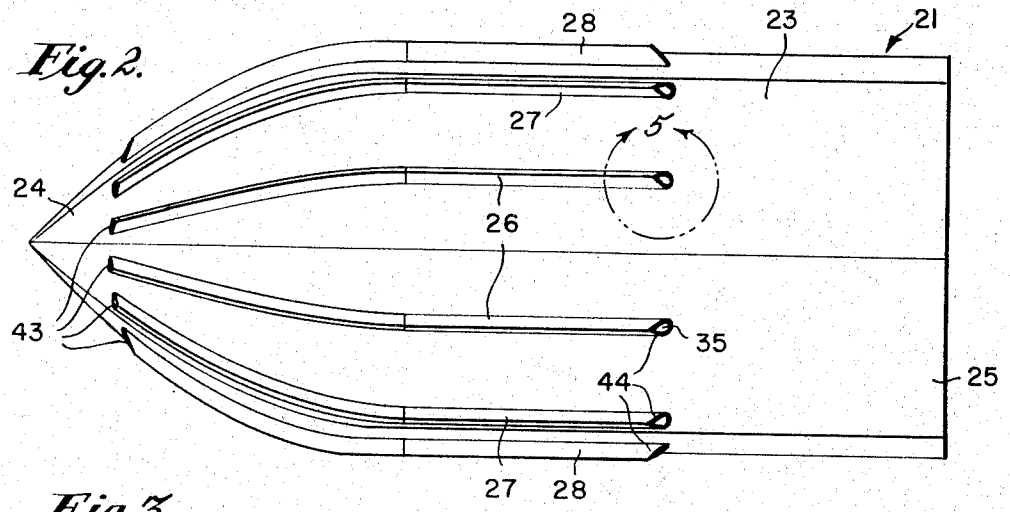


Fig. 3.

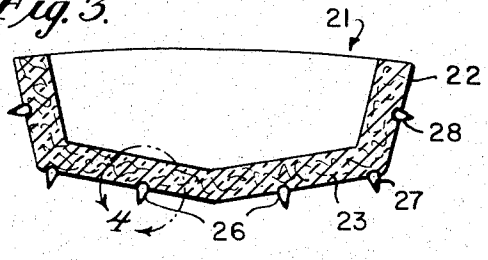
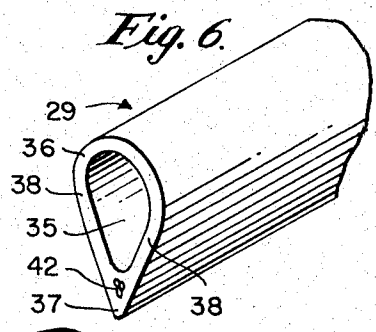


Fig. 6.



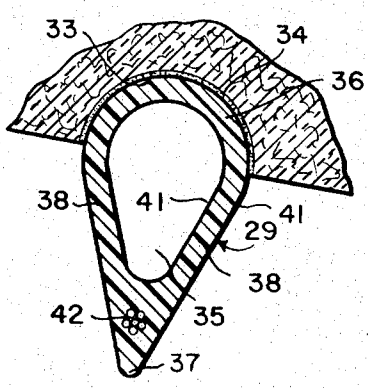


Fig. 4.

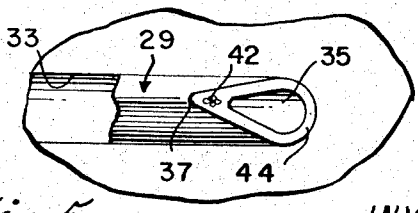


Fig. 5.

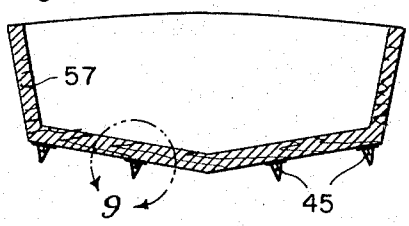
INVENTOR.
JOHN P. GLASS
BY Busser Smith & Harding
John P. A. Earley
ATTORNEY.

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BOAT HULL AND RAIL

Filed Feb. 28, 1966 2 Sheets-Sheet 2

Fig. 8.



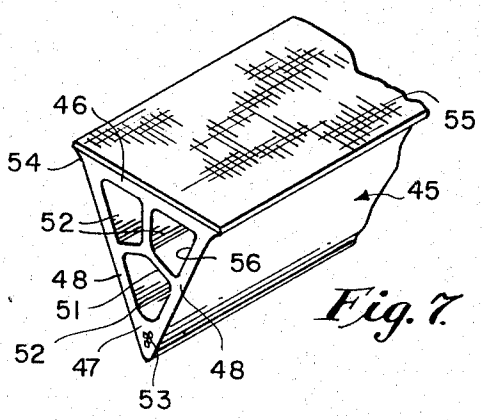


Fig. 7.

Fig. 9.

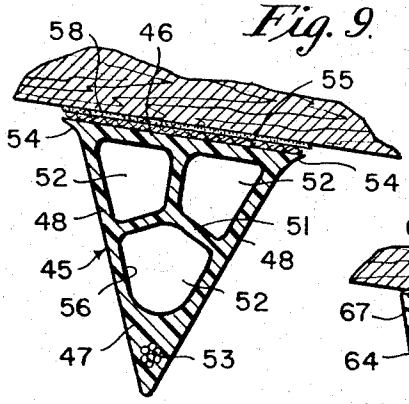
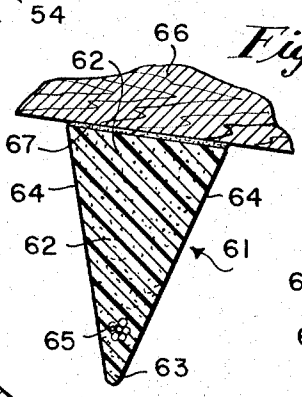


Fig. 11.



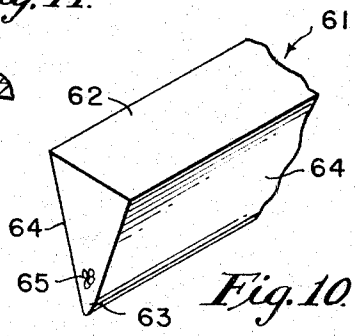
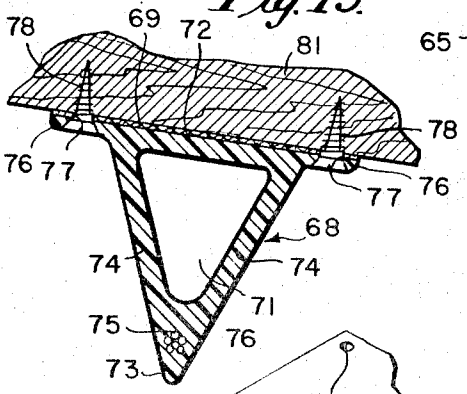


Fig. 10.

Fig. 13.



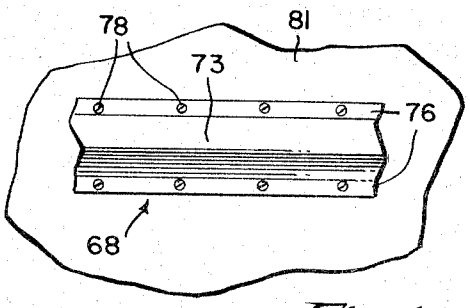


Fig. 14.

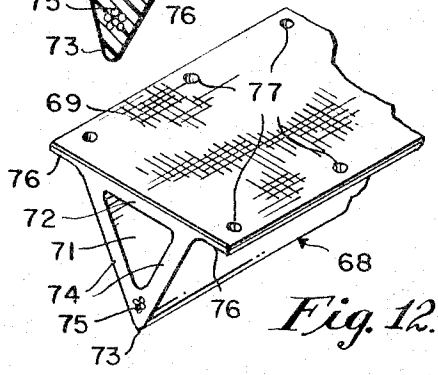


Fig. 12.

INVENTOR.
JOHN P. GLASS
BY Bussey Smith & Harding
John F. A. Earley
ATTORNEY.

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3,361,104

BOAT HULL AND RAIL

John P. Glass, 718 Lorraine Ave., Ardmore, Pa. 19003

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13 Claims. (Cl. 114—66.5)

ABSTRACT OF THE DISCLOSURE

A rail adapted to be attached to a boat hull, and a combination of boat hull and rails. The rail is made of a resilient material.

The rail comprises a tube of resilient material which is hollow in transverse cross section with a head portion connected to a bottom edge by sloping side walls, said tube having a skin layer which is impervious to water, the bottom edge of the rail being thicker than the side walls for better wear, and a reinforcing cable positioned in the bottom edge. The rail tube is open at front and rear ends and those ends are bevelled.

The boat hull may be molded of fiberglass and the like and have a plurality of parallel longitudinal channels formed therein in which the rails are mounted. On the other hand, the boat hull may be of wood, and the rails attached thereto by adhesive or by screws.

Disclosure

This invention relates to improvements in a boat hull and a rail therefor, and more particularly concerns a boat hull of the type which is adapted to plane at high speeds.

Fast boats which plane at high speeds encounter a number of problems. For example, because a good portion of the boat hull is out of the water, the boat has a tendency to slide sideways when turning or when struck by a quartering wave. Also, during rough weather, the boat has a tendency to porpoise or slam down hard on waves. This slamming action is hard on the boat and is dangerous to the crew. It is not unusual in ocean races of such boats to have most of the boats arrive at the end of the race in sinking condition because of the pounding received, and with many of the men of the crew having sustained injuries because of the bouncing around that they had endured during the course of the race.

Accordingly, it is an object of this invention to provide a boat hull and rail which overcomes the problems and disadvantages of the prior art.

It is another object of the invention to provide a boat hull which is adapted to plane at high speed and is cushioned against the shock of the slamming and pounding which such boats receive in turbulent seas.

It is another object of the invention to provide a planing boat hull which resists any tendency of the boat hull to slide sideways, as when turning, for example.

Other objects and advantages of this invention, including its simplicity and economy, as well as the ease with which it may be adapted to existing equipment, will further become apparent hereinafter, and in the drawings, in which:

FIG. 1 is a view in side elevation of a boat hull constructed in accordance with this invention;

FIG. 2 is a view in bottom plan of the boat hull of FIG. 1;

FIG. 3 is a view in section taken as indicated by the lines and arrows 3—3 which appear in FIG. 1;

FIG. 4 is a fragmentary view on an enlarged scale of of the area 4 indicated on FIG. 3;

FIG. 5 is a fragmentary view on an enlarged scale of the area 5 indicated on FIG. 2;

FIG. 6 is a fragmentary view in perspective of a tube which forms the rail element of the embodiment of the invention illustrated in FIGS. 1–6;

FIG. 7 illustrates another embodiment of the invention and is a fragmentary view in perspective of a tube which forms a rail that is attached to a boat hull as illustrated in FIG. 8 and FIG. 9;

FIG. 8 is a view in section similar to FIG. 3 and shows the tube of FIG. 7 attached to the hull of a wooden boat;

FIG. 9 is a fragmentary view on an enlarged scale of the area 9 which is indicated in FIG. 8;

FIG. 10 is a fragmentary view in perspective of another embodiment of tube which is adapted to form a rail of a boat hull;

FIG. 11 is a fragmentary view in section and illustrates the tube of FIG. 10 attached to a boat hull;

FIG. 12 is a fragmentary view in perspective of another embodiment and shows a tube which is adapted to be attached to a boat hull to form a rail;

FIG. 13 is a view in section which shows the tube of FIG. 12 attached to a boat hull by screws; and

FIG. 14 is a fragmentary view in bottom plan of a boat hull showing the rail of FIG. 13 screwed in place.

Although specific terms are used in the following description for clarity, these terms are intended to refer only to the structure shown in the drawings and are not intended to define or limit the scope of the invention.

Turning now to the specific embodiments of the invention selected for illustration in the drawings, there is shown a boat hull 21 having a generally vertical upper hull portion 22, a generally V-shaped lower hull portion 23 connected to the upper hull portion, a bow 24, and a stern 25. A plurality of longitudinal rails 26–28 extend from the lower hull portion 23 and define air chambers therein.

Rails 26–28 are made of a resilient material and are formed of a series of tube sections so as to provide for easy repair, in case of damage, by replacing a tube section instead of replacing the entire rail. In FIGS. 1 and 2, the outer rails 28 are positioned above the water line and act as spray rails to protect the occupants of the boat from spray and splash. It will be realized that the tube sections may be shorter in length, and a greater number may be used in each rail, if so desired.

The boat hull 21 illustrated in FIGS. 1–5 may be molded of fiber glass and the like, and may be provided with a plurality of parallel longitudinal channels 33 which are formed in the hull. The rails 26–28 are mounted in channels 33, as by an adhesive layer 34 of an epoxy resin, and extend outwardly from the hull. Channels 33 provide a seat for the rails and prevent them from moving sidewise.

Referring to FIGS. 4 and 6, tube 29 which forms the rails 26–28 of FIGS. 1–5, is made of a resilient material that is hollow and has a passage 35 extending the length of the tube. Tube 29 is wedge-shaped in transverse cross-section and includes a head portion 36 which is connected to a bottom edge 37 by inwardly sloping side walls 38. Head portion 36 is adapted to be seated in channel 33 and adhesively fastened thereto, and the tubes are provided with a skin layer 41 that is impervious to water. Bottom edge 37 of the rails is thicker than the side walls 38 in order to insure better wear, and a cable 42, which may be nylon or steel, is positioned in bottom edge 37 and extends therealong in a longitudinal fashion. Cable 42 resists penetration of the tube 29 by anything sharp and prevents any tearing off of large sections of tube 29 when the rails strike objects in the water.

The front ends 43 of rails 26–28 are open, as are rear ends 44. Accordingly, front ends 43 may admit some

water into passageway 35 when the boat hull is at rest or is traveling at slow speeds, but they admit air when the boat hull is traveling at high speeds since front ends 43 are out of the water. Accordingly, any water admitted at slow speeds is pumped out at high speeds by the air.

It is to be noted that front end 43 and rear end 44 of rails 26 are beveled for streamlining.

Referring now to FIGS. 7–9, there is shown another embodiment of the invention which is more easily adapted for use with any boat hull, whether it be new or old. The rails comprise a tube 45 of resilient material which is wedge-shaped in transverse cross section and has a flat head portion 46, rather than the rounded head portion 36 of the embodiment of the invention illustrated in FIGS. 1–6. Tube 45 is hollow, and head portion 46 is connected to bottom edge 47 by inwardly sloping side walls 48. An integral web 51 extends between side walls 48 and head portion 46 and forms passages 52 which extend along the length of tube 45. Web 51 adds strength and stiffness to tube 45 and enables the use of thinner walls 48, and yet the tube is resilient to provide the desired air cushion. FIG. 7 shows three passages 52 but there may be a greater or lesser number to give the desired strength and resilience.

Bottom edge 47 is thicker than side walls 48 for better wear, and a nylon cable 53 is molded into bottom edge 47 and extends along the length of the tube.

The top of head portion 46 is provided with feathered edges 54 which extend outwardly of the top of side walls 48, and resist any forces tending to peel or pull tube 45 away from the boat hull. The top of head portion 46 is provided with a backing 55 of fabric or rubber which is added in the extrusion process of manufacturing the tube 45. This is especially important when the tube is made of a material to which adhesives do not adhere without difficulty. For example, it is well known that polyethylene and polypropylene are materials to which it is very difficult to attach other materials by adhesives. Yet, because of their resiliency, cushioning and other properties, these materials are preferred for tube 45. But attaching tubes made of such materials to a boat hull presents a problem. This is solved by wedding a backing 55 to the tube during the extrusion process of making it, the backing becoming part of the tube while the tube material is still liquid.

Accordingly, backing 55 provides a surface which accepts adhesives readily and thereby provides for easily attaching tube 45 to a boat hull.

Tube 45 is provided with a skin layer 56 which is impervious to water, and the tube 45 is open at the front and rear ends in order to permit the passage of air and water through the passages 52. Tube 45 may be attached to a boat hull 57, which may be made of wood or other boat hull material, by a layer 58 of adhesive such as epoxy resin or other suitable adhesive.

Referring to FIGS. 10 and 11 there is shown another embodiment of the invention wherein the rail is made of a tube 61 which is wedge shape in cross section and includes a head portion 62 connected to a bottom edge 63 by side walls 64. A nylon cord 65 is molded into bottom edge 63 and extends along the length of the tube 61. Tube 61 may be attached to a boat hull 66 by an adhesive layer 67. Tube 61 is not hollow and there are no passages therein for passing air or water the length of the tube but tube 1 is resilient and provides a cushion.

FIGS. 12–14 illustrate another embodiment of the invention, and disclose a rail which is especially adapted for attachment to wooden hulls of old boats. A tube 68 of resilient material is provided with a fabric backing 69 as the tube is being formed by extrusion, the backing 69 being bonded to the material while it is still in a liquid state. Tube 68 is hollow and wedge-shaped in transverse cross section with a passage 71 extending longitudinally, and a head portion 72 is connected to a bottom edge 73 by inwardly sloping side walls 74. The bottom edge of tube 68 is thicker than side walls 74 for better wear, and

a nylon cable 75 is molded in the bottom edge 73 and extends the length of tube 68. Extending outwardly from head portion 72 are the flanges 76 which have a series of holes 78 formed therein that are adapted to receive screws 78 which fasten tube 68 to a boat hull 81. Backing 69 reinforces head portion 72 and flanges 76.

In operation of the boat hull of the present invention, it is cushioned against the shock of the hull bottom slamming and pounding against the water by a cushion of resilient rails. Additional cushioning is obtained, in the embodiments wherein the rails are hollow, from the air contained within the rail passages. The rail passages contain air at high speed because the boat hull is planing and the front ends 43 of the rails are out of the water. Any water contained within the rail passages before the boat hull starts planing is forced rearwardly by the air and empties from the rail through the open rear ends 44.

The shock of the boat hull slamming against the water is also reduced by the V-shape of lower hull portion 23 and by the rails which cut into the water to break up any waves.

At slow speed, front ends 43 may admit water and the rails may fill with water and thereby add water ballast to the boat hull to provide greater stability at slow speeds.

At both slow and high speeds, the longitudinal rails reduce any tendency of the boat hull to slide laterally, as when turning or when struck with a quartering wave.

The resiliency of the rails also cushions the boat hull against shock when it slams against floating logs, pilings, and the like.

In several of the embodiments of the invention, the rails are removable so that they may be positioned for trial purposes at specific locations on an old boat hull, and then removed and re-positioned if desired.

The rails may be made of rubber, or closed-cell water-impervious foam rubber or urethane covered by water-impervious water-resistant skin, or may be made of a nonpermeable foam plastic.

It is to be understood that the form of the invention herewith shown and described is to be taken as a presently preferred embodiment. Various changes may be made in the shape, size and arrangement of parts. For example, equivalent elements may be substituted for those illustrated and described herein, parts may be reversed, and certain features of the invention may be utilized independently of the use of other features, all without departing from the spirit or scope of the invention as defined in the subjoined claims.

The claimed invention:

1. A boat comprising a hull, a plurality of generally longitudinal rails protruding from a lower hull portion and defining air chambers therein when the boat hull is planing at high speed, said rails being made of a resilient material, whereby the boat hull is cushioned by an air cushion in said air chambers and by the lateral resiliency of the rails against the shock of the hull bottom slamming against the water.

2. The boat of claim 1, wherein said rails are formed of a series of tube sections so as to provide for easy repair, in case of damage, by replacing a tube section instead of the entire rail.

3. A boat comprising a hull, a plurality of generally longitudinal rails protruding from a lower hull portion and defining air chambers therein when the boat hull is planing at high speed, said rails being made of a resilient material, whereby the boat hull is cushioned by an air cushion in said air chambers and by the resiliency of the rails against the shock of the hull bottom slamming against the water, including an upper hull portion, a generally V-shaped lower hull portion connected to the upper hull portion, said hull portions being molded of fiberglass and the like, a plurality of parallel longitudinal channels formed in the lower hull portion, said rails being mounted in said channels and extending from the

lower hull portion, said channels preventing sidewise movement of the rails, said rails being in the form of a tube of resilient material which is hollow in transverse cross section with a head portion connected to a bottom edge by sloping side walls, said head portion being positioned in said channel, said tubes having a skin layer which is impervious to water, the bottom edge of the rails being thicker than the side walls for better wear, and a reinforcing cable positioned in the bottom edge.

4. A boat comprising a hull, a plurality of generally longitudinal rails protruding from a lower hull portion and defining air chambers therein when the boat hull is planing at high speed, said rails being made of a resilient material, whereby the boat hull is cushioned by an air cushion in said air chambers and by the resiliency of the rails against the shock of the hull bottom slamming against the water, including a generally vertical upper hull portion and a shaped lower hull portion, said rails being made of a tube of resilient material, said tube being hollow in transverse cross section and open at front and rear ends so that any water admitted a slow speeds is pumped out at high speeds, and said front and rear ends are beveled.

5. The boat of claim 4, wherein said tube has a head portion connected to a bottom edge by inwardly sloping side walls, said tube has a skin layer which is impervious to water, the bottom edge being thicker than the side walls for better wear, and a cable is positioned in the bottom edge.

6. A rail for use with a boat hull, and adapted to be attached to a boat hull bottom, comprising a longitudinal strip of resilient material having sides which are adapted to flex laterally to form a resilient cushion to the shock of waves when said rail is attached to a boat hull.

7. A rail for use with a boat hull, and adapted to be attached to a boat hull bottom, comprising a longitudinal strip of resilient material which forms a resilient cushion to the shock of waves when said rail is attached to a boat hull, wherein said strip is hollow and open at front and rear ends, and said open front end is adapted to admit air to said tube.

8. The rail defined in claim 7, wherein the front and rear ends of the strip are beveled.

9. A rail for use with a boat hull, and adapted to be attached to a boat hull bottom, comprising a longitudinal strip of resilient material which forms a resilient cushion to the shock of waves when said rail is attached to a boat hull, wherein said strip is a hollow tube which is wedge-shaped in transverse cross section and has a head portion connected to a bottom edge by inwardly sloping side walls, the bottom edge of the rail being thicker than the side walls for better wear, a cable is positioned in the bottom edge, said tube has a skin layer which is impervious to water, and means is provided for attaching said tube to a boat hull.

10. The rail of claim 9, including an integral web connecting together the side walls and the head portion, and a feathered edge extending outwardly from each side of the top of the head portion, said top of the head portion being provided with a backing of fabric.

11. A rail for use with a boat hull, and adapted to be attached to a boat hull bottom, comprising a longitudinal strip of resilient material which forms a resilient cushion to the shock of waves when said rail is attached to a boat hull, wherein said strip is a hollow tube which is wedge-shaped in transverse cross section and has a head portion connected to a bottom edge by inwardly sloping side walls, the bottom edge of the tube being thicker than the side walls for better wear, a nylon cable is positioned in the bottom edge and extends longitudinally, a flange extends outwardly from each side of the top of the head portion, and a series of holes are formed in said flanges and adapted to receive screws which fasten the tube to a boat hull.

12. The rail of claim 6 including a backing on said strip which accepts adhesive readily and provides for easy attachment to a boat hull by an adhesive.

13. A rail for use with a boat hull, and adapted to be attached to a boat hull bottom, comprising a longitudinal strip of resilient material which forms a resilient cushion to the shock of waves when said rail is attached to a boat hull, wherein said strip is made of polyethylene and is adapted to be attached to a boat hull by an adhesive, said strip being hollow so as to contain an air chamber, and including a reinforced backing material bonded to said strip, said backing material accepting adhesive readily to provide for easy attachment to a boat hull by an adhesive, and a cable is molded into the strip and extends longitudinally thereof.

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ANDREW H. FARRELL, *Primary Examiner.*