Sept. 15, 1959 H. G. G. BROWN 2,903,990

MARINE FENDER

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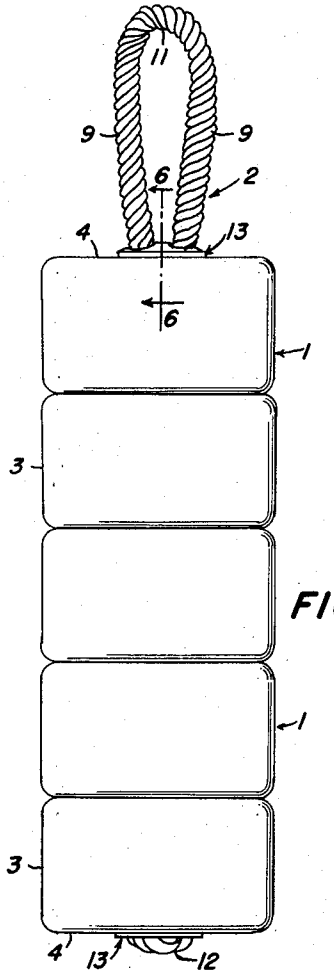


FIG. 1

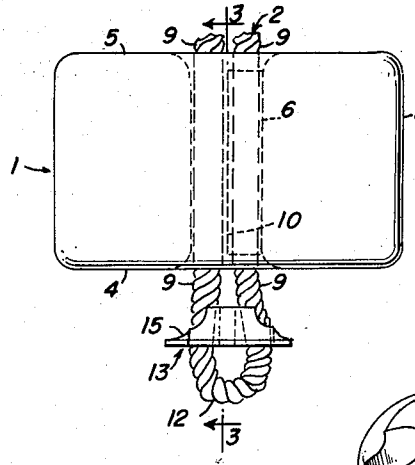


FIG. 2

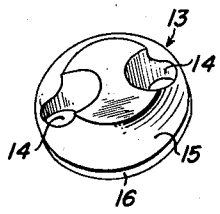


FIG. 5

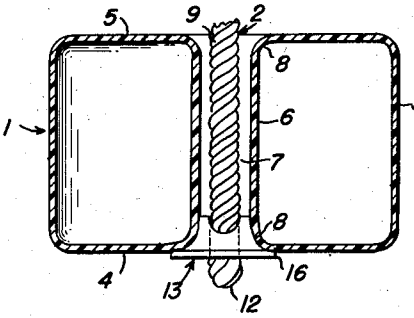


FIG. 3

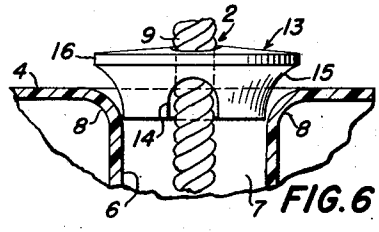


FIG. 6

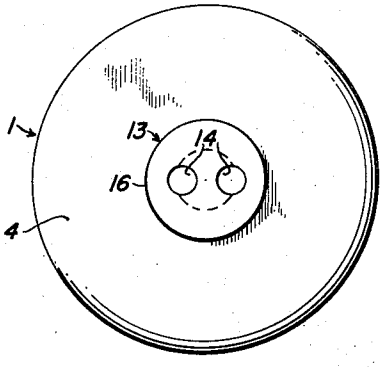


FIG. 4

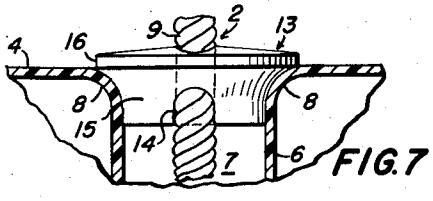


FIG. 7

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MARINE FENDER

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4 Claims. (Cl. 114—219)

This invention relates to marine fenders, and more particularly to fenders of the kind in which one or more bumper elements are strung on a rope or cable.

It previously has been proposed to provide fenders of this kind in which a plurality of bumper elements of toroidal, disk or like form have been strung on a rope or cable, and have been held in adjusted positions, to some degree, by retaining washers. In the prior constructions referred to it has not generally been possible to adjust the parts easily and also to secure them firmly in adjusted position while still permitting disabling of the securing means easily when it has been desired to disassemble the parts or to readjust them.

An object of the present invention is to provide a marine fender assembly of the general class referred to in which the parts are so constructed and cooperatively arranged as to provide for increased ease in adjustment, securing in adjusted arrangements, and freeing for disassembling or readjustment.

A further object of the invention is to provide a fender assembly of the character stated including resilient retaining members so shaped and so cooperable with bumper elements as to be compressible into gripping relation with a rope or other stringer member to hold the parts in adjusted positions.

Other objects of the invention will become apparent from a reading of the following description, the appended claims, and the accompanying drawings, in which:

Figure 1 is an elevational view showing a marine fender assembly embodying the invention;

Figure 2 is an enlarged scale fragmentary elevation showing the lower part of the assembly illustrated in Figure 1, with certain of the parts being shown in the relative positions they occupy at an intermediate phase of preparing the assembly for use;

Figure 3 is a fragmentary sectional view on the line 3—3 of Figure 2, a rope and retaining plug being shown in elevation and in completely assembled relation;

Figure 4 is a bottom plan view of the parts shown in Figure 3, but with the rope omitted;

Figure 5 is a perspective view of a retaining plug, drawn on an enlarged scale;

Figure 6 is a fragmentary sectional view on the line 6—6 of Figure 1, but showing a retaining button in a position for enabling relatively free sliding of the rope with respect to other parts of the assembly; and

Figure 7 is a view similar to Figure 6, but showing the parts in their completely assembled relative positions in which they are not freely slidable with respect to each other.

The illustrative embodyment of the invention includes a plurality, in the form shown, five, of bumper elements 1 which are strung on a rope 2 passed through the bumper elements 1. Each bumper element 1 is in the form of a hollow annulus including a peripheral outer wall 3, an outer end wall 4, an inner end wall 5, and a central wall 6 which defines an axial opening 7. The end portions of the central walls 6 and openings 7 are convexly tapered from the respectively adjacent end walls 4 and 5 inwardly toward the opposite end walls. The elements 1 preferably are formed of resilient or cushion material which may be one of the well known moldable plastics, for example a plastic of the vinyl class.

The bumper elements 1 are strung on the rope 2, two stretches 9, 9 of which pass through the openings 7 in the elements 1, the ends of the rope 2 being spliced at 10 within the assembly of elements 1. In the form shown, the splice 10 is located within the opening 7 in the lowermost bumper element 1. The rope 2 has an upper bight 11 which joins the upper portions of the rope stretches 9, 9 above the topmost element 1, and a lower bight 12 which joins the lower portions of the rope stretches 9, 9 below the bottom element 1.

For holding the bumper elements 1 and rope in the desired relative assembled positions, retainer or anchoring plugs generally designated 13 are positioned above the topmost element 1 and below the bottom element 1, and so circumferentially engage the rope 2 and the associated elements 1 as to resist sliding movement of the elements 1 with respect to the rope 2 when the parts are in their completely assembled relative positions. Each of the retainer plugs 13 is also preferably formed of resilient or cushion material, such as vinyl plastic, and is provided with two spaced apertures 14 which extend generally parallel to the rope stretches 9, 9 and the openings 7 through the bumper elements 1. Each plug 13 is peripherally concavely tapered at 15 conformingly to the tapering of the portions 8 of the walls defining the openings 7 in the elements 1, and the extreme outer peripheral part of each plug 13 is formed as a flange 16.

In assembling the parts, the rope 2 before being spliced is threaded through the openings 14 in the two retainer plugs 13 and through the openings 7 in the bumper elements 1, and the rope ends are then spliced. This is done while the retainer plugs 13 are displaced from the contiguous bumper elements 1 as shown in Figures 2 and 6. With the retainer plugs 13 so disposed and being out of contact with the adjacent bumper elements 1, the plugs are not subjected to inward radial compression and the resilient plug material is, therefore, relaxed and the plug apertures 14 are of sufficiently larger diameter than the rope stretches 9 to permit relatively free sliding movement of the plugs 13 and the rope stretches 9. The parts, having been assembled to the extent described above, the looped rope may be moved so as to position the splice 10 within one of the bumper elements, as shown in Figure 2. The parts are then in readiness for being finally positioned in relatively fixed adjusted relationship. This relative fixing of the parts is effected by forcing the retainer plugs 13 inwardly toward the respectively adjacent bumper elements 1 and coaxially into the openings 7 so as to bring the tapered plug surfaces 15 into pressing engagement with the tapered portions 8 of the openings 7 in the elements 1. The radially inward force thus exerted upon the plugs 13 squeezes the plug material inwardly so as, in effect, to reduce the diameter of the plug apertures 14, causing the plug material to bind against or grip the rope stretches 9, 9 and permit only relatively less free sliding of the plugs on the rope stretches. Figure 6 shows the top retainer 13 in its relatively relaxed position prior to being brought into forcible contact with the top bumper element 1 with the walls of the plug apertures 14 being slightly spaced from or only lightly contacting the rope stretches 9. With the parts so positioned the plug may relatively easily be slid along the rope. Figure 7 shows the parts after the plug 13 has been moved into forcible engagement with the tapered part 8 of the opening 7 with resultant radially inward compression of the plug ma-

terial and squeezing of the rope by the walls of the plug apertures 14. Figures 2 and 3 show the bottom retainer plug 13 respectively in its displaced position and in its securing position in which it grips the rope 2.

The plugs may be moved into their gripping positions either by being slid along the rope at a point somewhat removed from the adjacent rope bight and against the adjacent element 1, as indicated at the top of Figure 1, or the rope stretches 9 may be pulled partially through the openings 7 to cause the rope bight to extend across and contact the outer face of the retainer plug 13 and pull the latter into the tapered opening portion 8, as indicated in Figure 3.

When it is desired to disassemble the parts or to adjust the bumper elements 1 in new positions on the rope 2, the retainer plugs 13 are first dislodged from the opening tapered portions 8 so as to permit the plug material to relax and release the rope for relatively free sliding movement. To prevent the plugs 13 from being pulled into the opening tapered portions 8 so far as to make it difficult to dislodge the plugs 13, the latter are provided at their extreme peripheral portions with flanges 16 adapted to bear resiliently against the adjacent ends of the bumper elements 1 so as to limit the extent to which the plug tapered surfaces 15 may be forced into the opening tapered portions 8.

While Figure 1 shows a typical and perhaps the most commonly used arrangement of the parts, it will be understood that the bumper elements 1 may be placed in different relative positions for special uses. For example, the elements 1, or certain of them, may be arranged in mutually spaced relation, in which case a retainer plug 13 may be placed adjacent to each surface 4 or 5 of each element 1 so as to maintain the elements in predetermined relative positions deployed along the rope.

In very large assemblies, the anchoring plugs may be formed with four, instead of only two, apertures, and two rope loops or four rope stretches may be employed for stringing the elements 1. In such constructions, each rope stretch passes through one of the apertures in each plug and is relatively released or gripped according to the positioning of the plug with respect to the adjacent bumper element, as explained above.

Preferably, the material constituting the buttons or plugs 13 is somewhat softer or more yieldable than the material of which the bumper elements are formed. This is conducive to most effective cooperation of the parts for the gripping and releasing of the rope stretches 9 as required.

The bumper elements 1 being of yieldable material, the assembly is effective for minimizing shocks, but, being resilient, the elements 1 do not take on permanent deformation in service. Moreover, the hollow form of the bumper elements renders them buoyant so as to be recoverable if inadvertently dropped in the water, and so as to be usable as life preservers.

The construction disclosed embodies the invention in a preferred form, but it is intended that the disclosure be illustrative rather than definitive, the invention being defined in the appended claims.

I claim:

1. In a marine fender assembly, a bumper element having an inner end face and an outer end face and an opening extending axially through said element from the inner end face to the outer end face thereof, said opening having a portion tapered from said outer end face inwardly toward said inner end face; two rope stretches extending through said opening and being joined by a bight outwardly beyond said outer end face; and an anchoring plug of yieldable material tapered at its periphery conformingly to and fitting coaxially within the tapered portion of said opening and having two apertures extending through said plug on opposite sides of the plug and opening common axis and being spaced from each other transversely to said axis, said rope stretches respectively extending through said apertures with the aperture walls surrounding the respective rope stretches, and the diameters of said apertures being so related to the diameters of said rope stretches that said rope stretches are circumferentially engaged by said plug to resist sliding movement of said plug and said bumper element relative to said rope stretches, the rope bight extending across the outer face of said plug between said apertures.

2. In a marine fender assembly, a bumper element of yieldable material having an inner end face and an outer end face and an opening extending axially through said element from the inner end face to the outer end face thereof, said opening having a portion tapered from said outer end faces inwardly toward said inner end face; two rope stretches extending through said opening and being joined by a bight outwardly beyond said outer end face; and an anchoring plug of yieldable material tapered at its periphery conforming to and fitting coaxially within the tapered portion of said opening and having two apertures extending through said plug on opposite sides of the plug and opening common axis and being spaced from each other transversely to said axis, said rope stretches respectively extending through said apertures with the aperture walls surrounding the respective rope stretches, and the diameters of said apertures being so related to the diameters of said rope stretches that said rope stretches are circumferentially engaged by said plug to resist sliding movement of said plug and said bumper element relative to said rope stretches, the rope bight extending across the outer face of said plug between said apertures.

3. In a marine fender assembly, a bumper element of yieldable material having an inner end face and an outer end face and an opening extending axially through said element from the inner end face to the outer end face thereof, said opening having a portion tapered from said outer end face inwardly toward said inner end face; two rope stretches extending through said opening and being joined by a bight outwardly beyond said outer end face; and an anchoring plug of yieldable material tapered at its periphery conformingly to and fitting coaxially within the tapered portion of said opening and having two apertures extending through said plug on opposite sides of the plug and opening common axis and being spaced from each other transversely to said axis, said rope stretches respectively extending through said apertures with the aperture walls surrounding the respective rope stretches in gripping relation thereto, the rope bight extending across the outer face of said plug between said apertures, said plug apertures being sufficiently larger in cross section than said rope when said plug is displaced from said opening tapered portion and is not subjected to inward radial pressure to permit relatively free sliding of said plug on said rope stretches, said apertures being reduced in cross section when said plug is forced into said opening tapered portion and said plug is compressed radially inwardly and said plug is forced into binding contact with said rope stretches, whereby there can be only relatively less free sliding of said plug on said rope stretches.

4. In a marine fender assembly, a bumper element of yieldable material having an inner end face and an outer end face and an opening extending axially through said element from the inner end face to the outer end face thereof, said opening having a portion tapered from said outer end face inwardly toward said inner end face; two rope stretches extending through said opening and being jointed by a bight outwardly beyond said outer end face; and an anchoring plug of yieldable material tapered at its periphery conformingly to and fitting coaxially within the tapered portion of said opening and having two apertures extending through said plug on opposite sides of the plug and opening common axis and being spaced from each other transversely to said

axis, said rope stretches respectively extending through said apertures with the aperture walls surrounding the respective rope stretches in gripping relation thereto, the rope bight extending across the outer face of said plug between said apertures, said plug apertures being sufficiently larger in cross section than said rope when said plug is displaced from said opening tapered portion and is not subjected to inward radial pressure to permit relatively free sliding of said plug on said rope stretches, said apertures being reduced in cross section when said plug is forced into said opening tapered portion and said plug is compressed radially inwardly and said plug is forced into binding contact with said rope stretches, whereby there can be only relatively less free sliding of said plug on said rope stretches, said plug

having an outer peripheral flange engaging the outer face of said bumper element for limiting forcing of said plug into said opening tapered portion and thereby limiting the radial inward compressing of said plug and its binding upon said rope stretches.

References Cited in the file of this patent

UNITED STATES PATENTS

1,180,665	McElroy	Apr. 25, 1916
2,105,815	Mass	Jan. 18, 1938
2,197,839	Roberts	Apr. 23, 1940

FOREIGN PATENTS

55,883	Norway	Nov. 11, 1935