April 5, 1932. M. HILL 1,852,240

SHIP'S FENDER

Filed Dec. 20, 1930 2 Sheets-Sheet 1

Fig. 1.

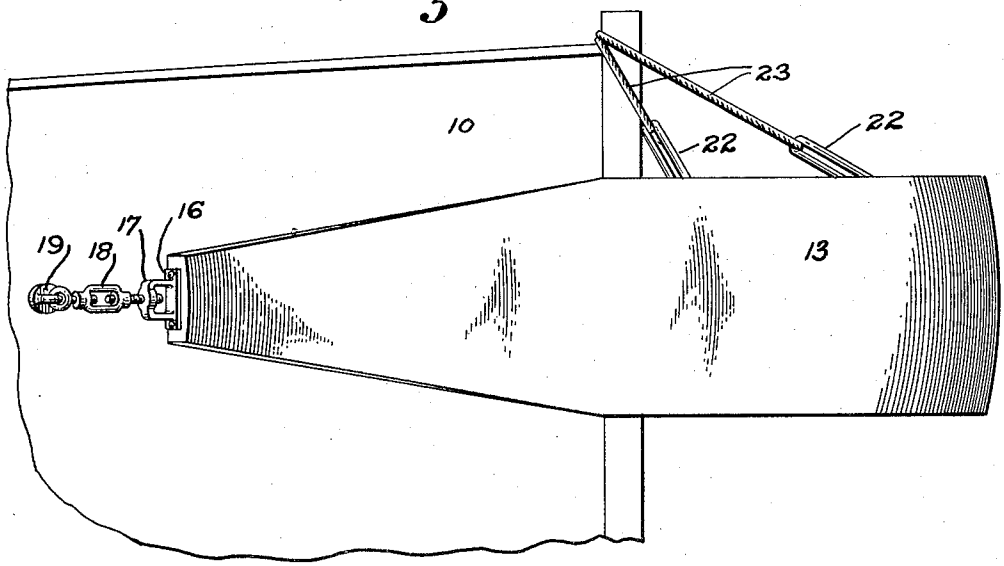
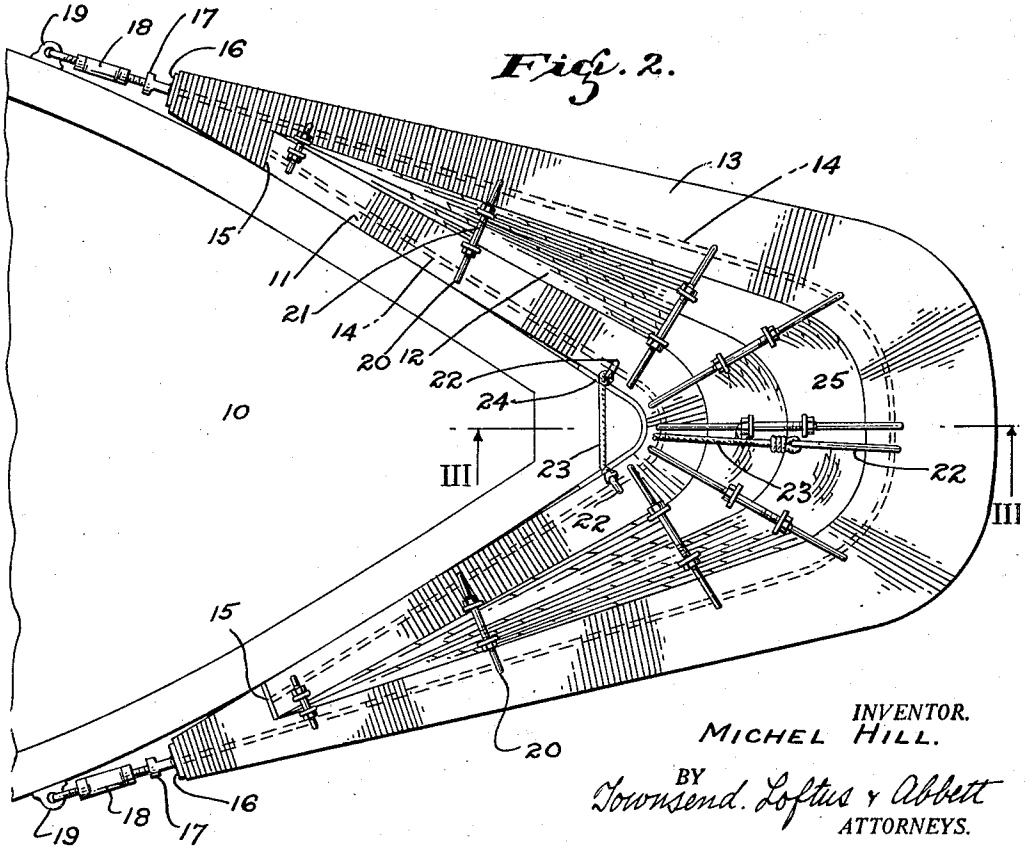


Fig. 2.



INVENTOR.
MICHEL HILL.

BY Townsend, Loftus & Abbett
ATTORNEYS.

April 5, 1932. M. HILL 1,852,240

SHIP'S FENDER

Filed Dec. 20, 1930 2 Sheets-Sheet 2

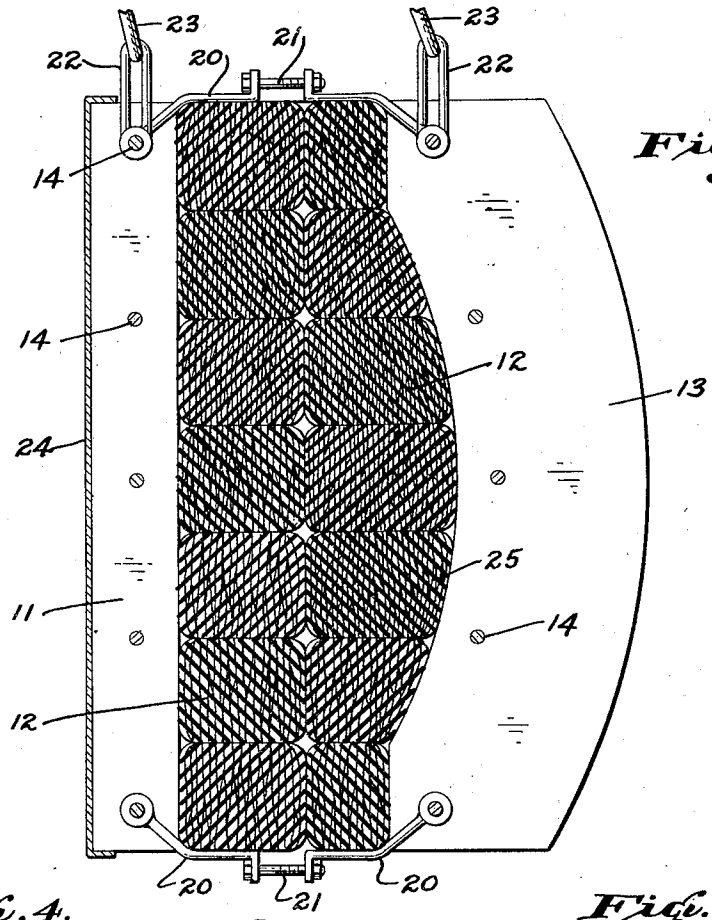


Fig. 3.

Fig. 4.

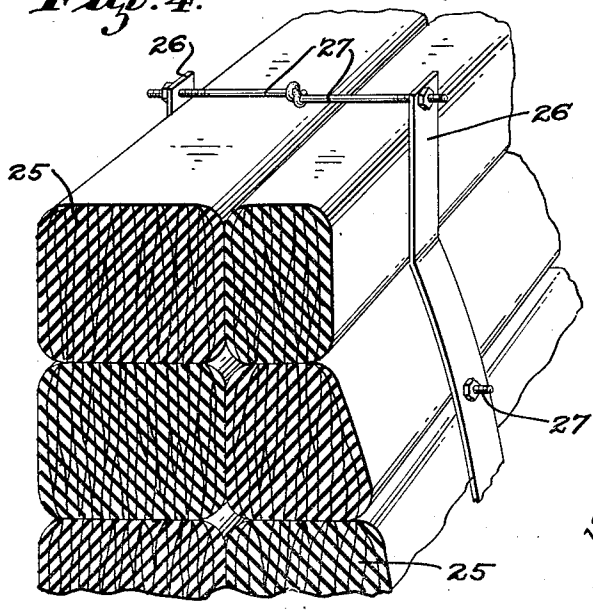


Fig. 5.

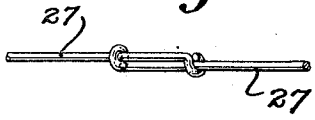
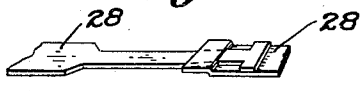


Fig. 6.



INVENTOR.
MICHEL HILL.

BY Townsend, Loftus & Abbett
ATTORNEYS.

Patented Apr. 5, 1932 1,852,240

UNITED STATES PATENT OFFICE

MICHEL HILL, OF SAN FRANCISCO, CALIFORNIA

SHIP'S FENDER

Application filed December 20, 1930. Serial No. 503,748.

This invention pertains to ships' fenders and more particularly to improvements in fenders that serve the purpose of absorbing the shock due to the impact of moving objects one against the other.

It is the object of the present invention to provide a fender that will afford the required resiliency and at the same time be more durable and lasting than ordinary fenders. It is also an object of the invention to provide a fender that will be inexpensive to manufacture and that will be composed of several separable sections whereby upon deterioration of any one section it may be removed and replaced at considerably less than the cost of an entire new fender.

The object of the invention is accomplished through the provision of a fender which is composed of three sections, namely, a lining adapted to fit against the surface to be protected, a cushion section formed of numerous bundles of resilient material, and a wearing section of rugged construction secured with relation to the lining and adapted to support the cushion section thereagainst.

Fenders manufactured in accordance with my invention may be applied to any part of a ship where a fender is necessary, or may be suitably used on wharves and piers and, in fact, they are not limited to marine use, but will be found capable of application in many instances where it is desirable to cushion the shock of large objects striking together.

One form of my invention is shown by way of illustration in the accompanying drawings and described in greater detail in the following specification.

In the drawings—

Fig. 1 is a side elevation of a portion of a ship's bow equipped with a fender embodying the present invention.

Fig. 2 is a plan view of the same.

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

Fig. 4 is a perspective view of a portion of the cushion section employed in the fender shown.

Fig. 5 is a perspective view showing a collapsible link employed in the binding of the cushion element.

Fig. 6 is a modification of the same.

Referring more particularly to the drawings, in Figs. 1 and 2 I show a portion of a ship's bow 10 having a fender attached thereto. The fender is composed of a lining 11 conforming to and contacting with the bow of the ship, a cushion section indicated at 12 positioned next thereto, and a wearing section 13. The lining section 11 and the wearing section 13 are composed of flat pieces of durable resilient material, the shapes of which may be best seen in Fig. 3.

The material of which these sections are formed is preferably rubber, such as may be salvaged from old automobile tires, rubber hose, belting or other articles that have outworn their useful life. The strips are cut to any desired size and may be graduated in size to form tapered ends on the fender, as shown in Fig. 1, if desired. The strips are held together by means of tie rods 14 which pass through holes formed in the strips at intervals, as shown. The tie rods may be in the form of steel rods or may, if desired, be composed of chain or cable. The tie rods 14 of the lining section are secured at their termini to steel plates 15 in any suitable manner and the tie rods of the wearing section are similarly secured to steel plates 16, as shown in Fig. 1. The steel plates 16 may be provided with a bracket 17 to which a turn buckle 18 is attached, and by means of which the fender may be firmly secured to a ring bolt 19 provided in the side of the ship.

Suitable links 20, as best shown in Fig. 3, are carried by the uppermost and lowermost rods 14 in each of the sections 11 and 13 and spaced thereon at suitable intervals. The links 20 are secured together at their ends by means of bolts 21, so that tightening of these bolts will cause the links to be drawn toward each other, thus causing the outer or wearing section 13 to be drawn inwardly toward the lining section, with the result that the cushion section 12 will be slightly compressed and firmly held therebetween. Suitable links 22 may also be provided for engagement with the uppermost tie rods 14

to afford means to attach a rope or cable 23 depending from the bow stem of the ship to support the forward end of the fender. A steel stem plate 24 may be interposed, when necessary, between the fender and the ship to reduce wear caused by friction.

The cushion element referred to above is formed of a plurality of elongated bundles 25 of waste rubber. The rubber used in these cushions may be in pieces of any size or shape, as the cushions are bound by means of rope, wire, metal bands or clips, not shown. The cushions may be maintained in the form of a resilient unit by means of metal strips 26 placed at intervals on two sides of them and interconnected by means of collapsible links 27, as shown in Fig. 4. The links 27 are horizontally disposed and may also be employed at intervals throughout the lengths of the strips 26. As the cushion is subjected to shock, it will be seen that the links 27 will be collapsed as shown in Fig. 5.

A modification of this structure may be seen in Fig. 6, in which the ends of bands 28 are cut so as to interlock one with the other, and yet permit freedom of movement toward each other. While the above structure has been found desirable, it will be understood that the cushion members need not necessarily be bound together by such means, but may be wholly supported by the lining and wearing sections and the links 20 and the bolts 21, as shown in Figs. 1 and 3.

In applying the fender to a ship, the lining section would first be suspended in position against the bow of the ship. The wearing section 13 would then be supported in front of the lining section and the bolts 21 connecting the lower ends of the sections together would be loosely inserted. The cushion elements 25 would then be placed in position between the lining and wearing sections, after which the bolts 21 connecting the upper ends of the sections could be inserted. At this time all of the bolts 21 would be tightened until the fender was given suitable compactness and rigidity. It is also possible to completely assemble the fender and then suspend it from the ship in a single unit. Repairs and replacements may, of course, be made in either manner.

It will be seen from the foregoing that I have provided a fender which is composed of three individual sections, each serving a separate purpose and readily removable for repairs or renewal. The fender is chiefly composed of waste material, as has been described, and the use of the material is particularly economical, as not only will the major portion of it be used to make the large strips forming the wearing and lining sections, but the scraps may be bound into the bundles 25 of the cushion sections. As rubber tires, belts, hose, and the like are interwoven with fibrous material, it will be seen that the wearing and lining sections will have the ends of this material exposed, thus providing a surface that is exceptionally rugged and durable. It will also be noticed that the holes through which the tie rods 14 pass in the wearing section are formed as near as is practical to the inner edge of the strips forming this section, thus presenting as large an area as possible for wear before it will be necessary to replace this section.

While I have shown the preferred form of my invention, it should be understood that various changes may be resorted to in the arrangement and construction of its several parts within the spirit and scope of the appended claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—

1. A fender of the character described comprising a resilient section, and a second resilient but relatively durable lining section detachably secured with relation thereto and positioned between the resilient section and the object to which the fender is attached.

2. A fender of the character described comprising a resilient lining section, a resilient wearing section, and a cushion section interposed between the lining and wearing sections and having greater resiliency than said lining and wearing sections.

3. A fender of the character described comprising a lining section, a wearing section, and a cushion section interposed between the lining and wearing sections, and detachable means connecting the lining and wearing sections and adapted to embrace and support the cushion section therebetween.

4. A fender of the character described comprising a lining section, a wearing section and a cushion section interposed between the lining and wearing sections, and adjustable, detachable means connecting the lining and wearing sections and adapted to embrace and support the cushion section therebetween.

5. A fender of the character described comprising a lining section, a wearing section and a cushion section interposed between the lining and wearing sections, and adjustable, detachable means connecting the lining and wearing sections and adapted to support the cushion section therebetween, said means permitting movement of the wearing section toward and away from the lining section and being spaced from the wearing surface of said wearing section.

6. A fender of the character described comprising a lining section, a wearing section, said sections being composed of flat pieces of durable material having holes formed therein and having means passing through said holes for binding them together, and a cushion section interposed between said lining section and wearing section.

7. A fender of the character described comprising exterior sections of durable material and a cushion section interposed between the exterior sections, said cushion section comprising bundles of resilient material and binding means securing said bundles together.

8. A fender of the character described comprising exterior sections of durable material and a cushion section interposed between the exterior sections, said cushion section comprising bundles of resilient material, and means for securing said bundles together, said means permitting the bundles to be compressed when a shock is received by the fender.

9. A fender of the character described comprising exterior sections of durable material and a cushion section interposed between the exterior sections, said cushion section comprising bundles of resilient material, metal strips on two sides of the bundles, and collapsible links connecting said strips whereby said bundles will be maintained in a single compressible unit.

10. A fender of the character described comprising a lining section, a wearing section and a cushion section interposed between the lining section and the wearing section, said lining and wearing sections being composed of flat members having holes formed therein, binding members passing through said holes, links carried by said binding members, and bolts connecting the links carried by the lining section and the links carried by the wearing section to hold said sections against the interposed cushion section.

11. A fender of the character described comprising a lining section, a wearing section and a cushion section interposed between the lining section and the wearing section, said lining and wearing sections being composed of flat members having holes formed therein, binding members passing through said holes, links carried by said binding members, and means slidably engaging the links carried by the binding members and the links carried by the wearing section to hold said sections against the interposed cushion section and permit movement of the wearing section toward the other sections.

12. A fender of the character described comprising a lining section, a wearing section, each of said sections being composed of a plurality of relatively flat members joined by tie rods extending through perforations therein, and a cushion section interposed between the lining and wearing sections.

13. A fender of the character described comprising a lining section, a wearing section, said sections being composed of relatively flat members joined by tie rods extending through perforations therein, a cushion section interposed between the lining and wearing section and collapsible links connecting tie rods in the lining section with tie rods in the wearing section.

14. A fender of the character described comprising a lining section, a wearing section, a cushion section interposed between the lining and wearing sections, rods extending lengthwise through said lining and wearing sections and collapsible links connecting said rods.

15. A fender of the character described comprising a lining section, a wearing section, a cushion section interposed between the lining and wearing sections and means for clamping said cushion section between the other sections, one of said other sections having a concave inner surface to retain said cushion section against displacement.

MICHEL HILL.