

[54] **FENDER FOR MOORING POSTS OR THE LIKE**

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[58] Field of Search 114/219, 230; 61/48; 14/76; 267/139; 293/1, 60, 66, 73

[56]

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[57]

ABSTRACT

A fender of a mooring post is held thereon by a ball and socket mount permitting pivoting on a vertical and on a horizontal axis. The fender is secured against rotation on an axis transverse to the surface of the fender provided for engaging a ship.

2 Claims, 4 Drawing Figures

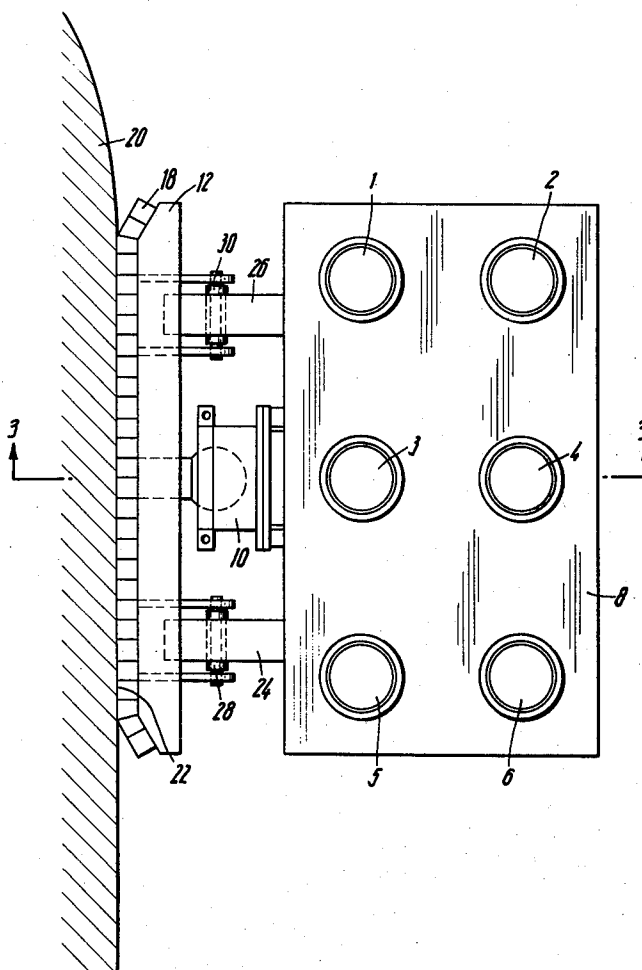


Fig. 1

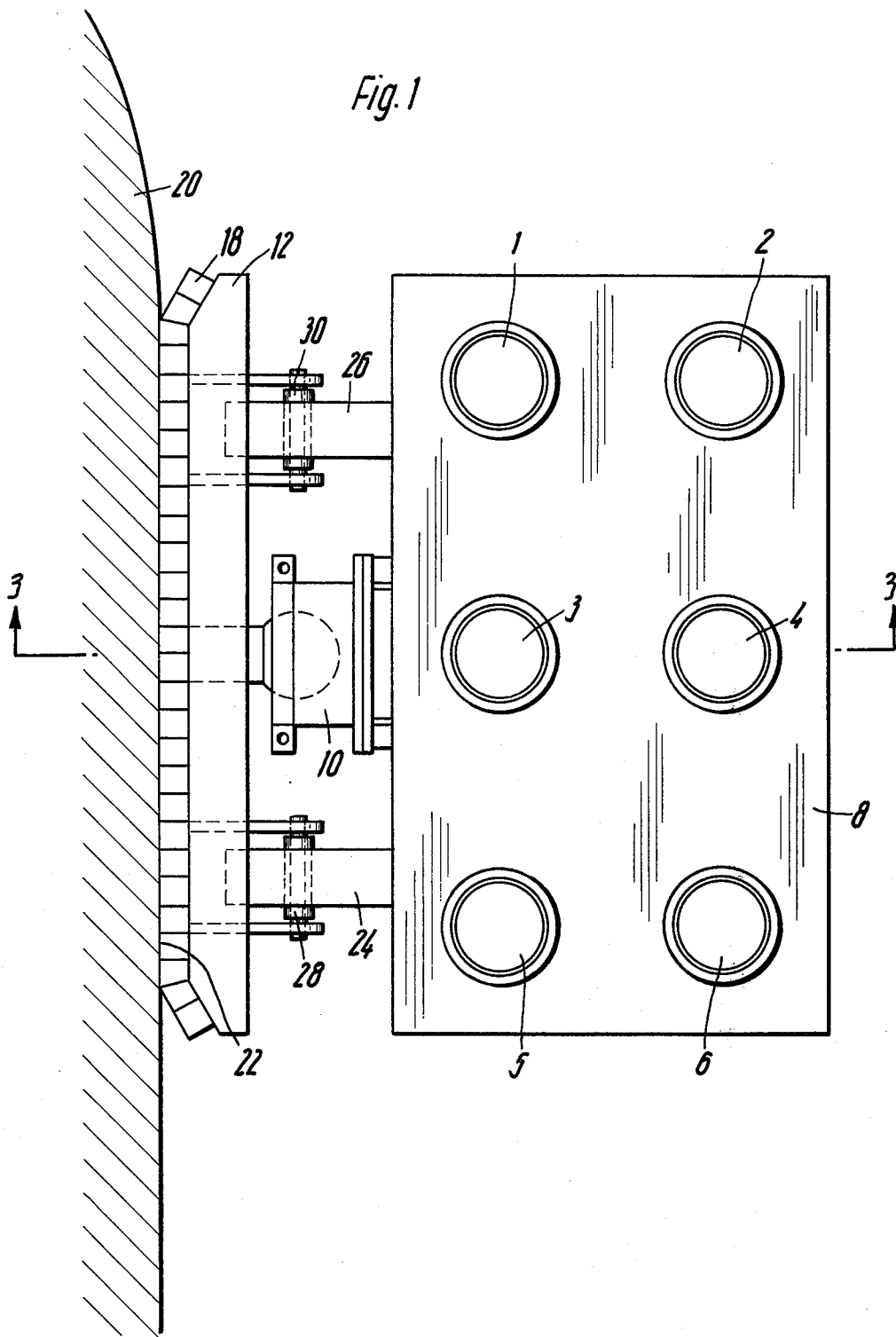


Fig.2

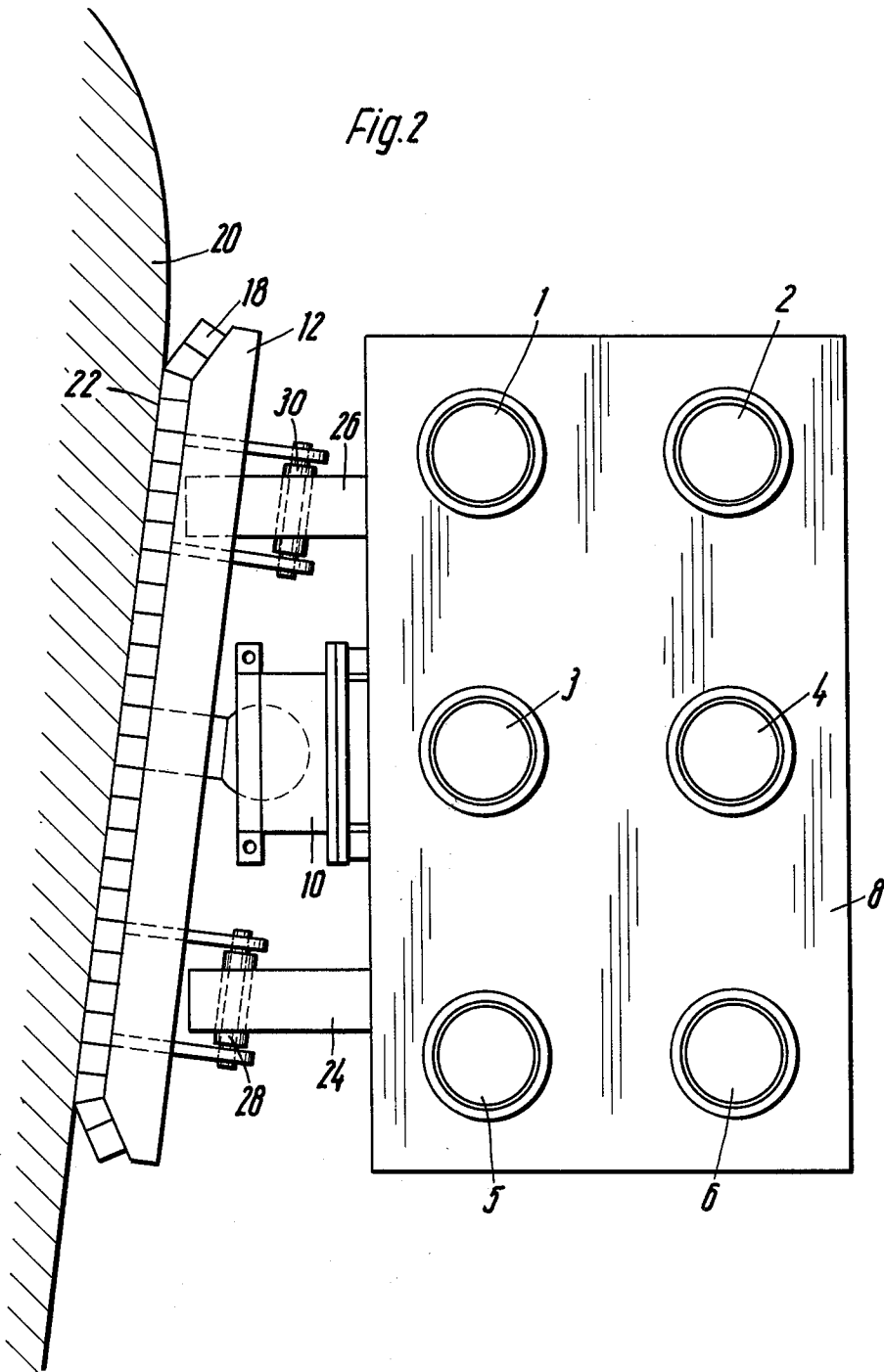


Fig. 3

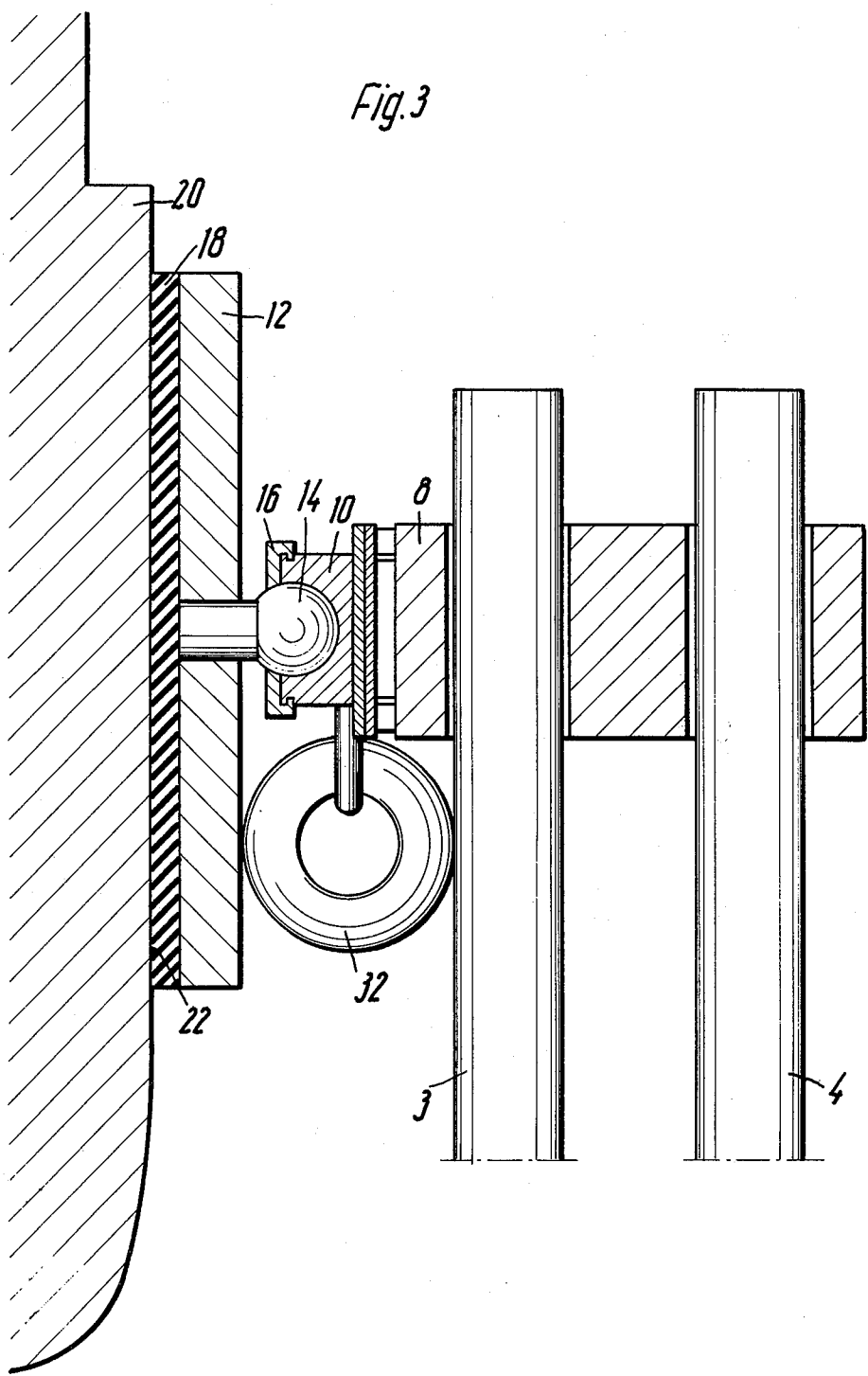
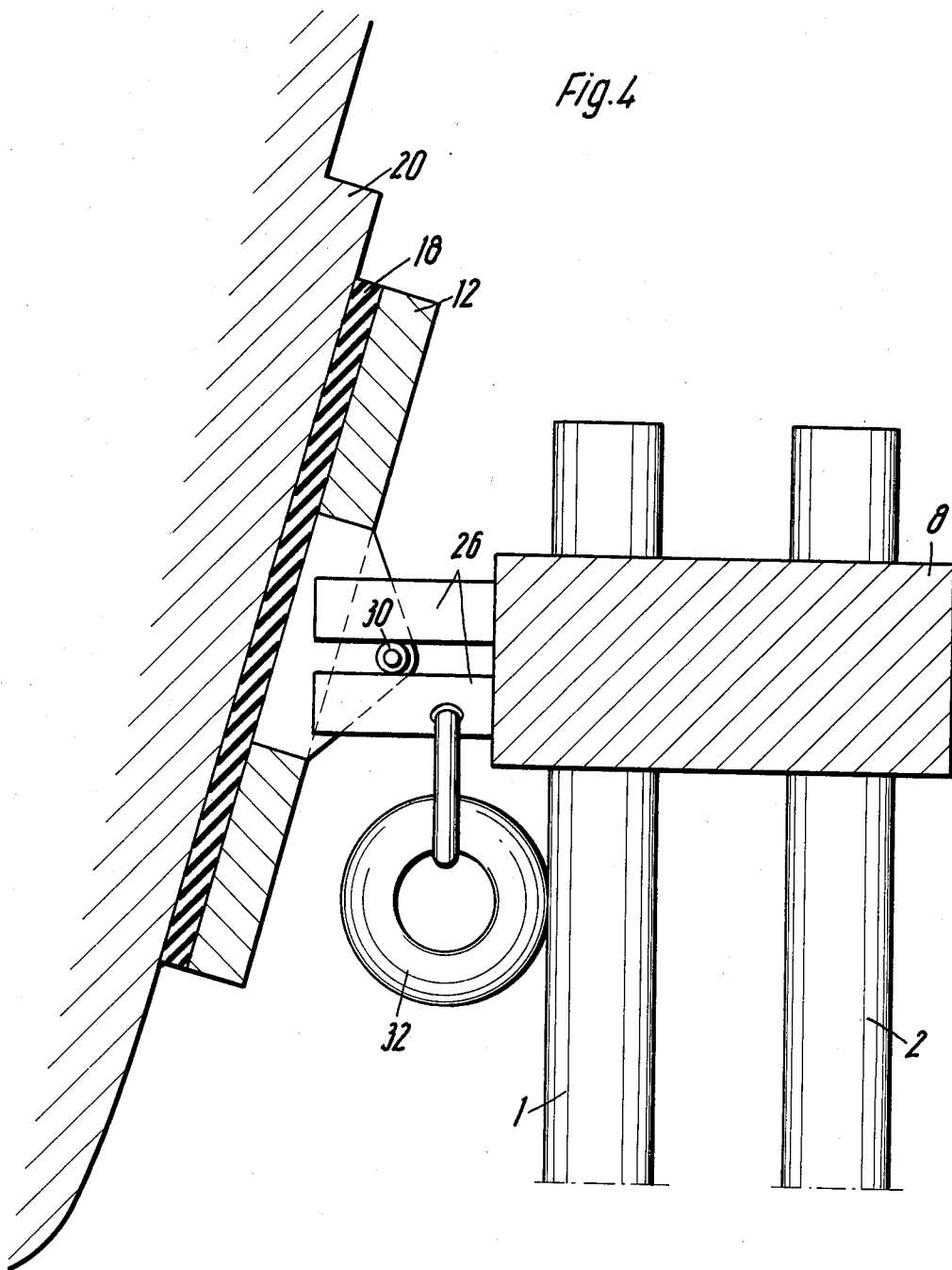


Fig. 4



FENDER FOR MOORING POSTS OR THE LIKE

BACKGROUND OF THE INVENTION

The present invention relates to a fender for a pier, quay, mooring post or the like upon which impacts are transmitted by a mooring vessel. Also, some attenuation of the impact forces is to be provided for.

It is known to resiliently support a fender, or several interconnected fenders on a stationary pier, mooring post or the like. The fender is moved parallelly when impacted upon or the fender is pivoted on an arbitrary, i.e., undefined, axis. Such fenders have usually quite large surfaces for engagement, but the area of actual contact is really limited to almost point or line contact with the outer hull of a vessel, which amounts to production of highly localized, high impact forces per unit area as acting on the hull. This, of course, may directly endanger the vessel.

SUMMARY OF THE INVENTION

It is an object of the present invention to construct a fender which, upon interaction with the hull of a vessel will not set up significant and excessive local pressure forces, but there will be a relatively large area of contact, even in the case of an oblique approach of the vessel. Moreover, the shape of the hull and local maneuvering and towing must be considered, to ensure broad surface-to-surface contact between fender and hull.

In accordance with the preferred embodiment of the invention, it is suggested to support the fender body in cardanic fashion so that it can pivot and readily assume parallel disposition in relation to the outer surface of the hull and to permit the fender body to follow, within a limited range of course, changes in attitude and disposition of the vessel during mooring. The fender body is not to be yieldingly supported but is to follow changes in the position of the ship's hull independently from the force exerted by the ship upon the pier. The fender body is to follow such changes over a larger range than is possible with fenders of the resiliently yielding variety.

The fender body is to turn and pivot on a vertical axis whenever the vessel engages the fender only partially and moves parallelly to the pier. The fender body is to turn and pivot on a horizontal axis which runs about parallel to the longitudinal extension of the pier so that the fender body engaging surface can match the disposition and extension of the hull's surface of a vessel when docking. The fender body itself will be held normally in a normal medium disposition by means of interposed resiliently yielding means (e.g. tires) which maintain normal position of the fender when a vessel is not moored.

The cardan mount is preferably provided by a ball and socket joint providing for intersecting horizontal and vertical pivot axes in between the fender's surface engaging a vessel and the mooring post facility. Additionally, the fender body is prevented from turning on an axis normal to the said surface. For this, guide forks extend from the mooring post and receive rollers journalled on bearings which extend from the rear of the fender.

The fender body is constructed from wooden planks or boards or from resiliently yielding fenders on the fender body. The ball or socket or both could be resili-

ently mounted to the fender body and the mooring post.

DESCRIPTION OF THE DRAWINGS

While the specification concludes with claims particularly pointing out and distinctly claiming the subject matter which is regarded as the invention, it is believed that the invention, the objects and features of the invention and further objects, features and advantages thereof will be better understood from the following description taken in connection with the accompanying drawings in which:

FIG. 1 is a top elevation of a mooring post with fender improved in accordance with the preferred embodiment of the invention, a moored vessel is shown in regular position;

FIG. 2 is a similar view but showing the vessel obliquely with corresponding tilting or pivoting of the fender on a vertical axis;

FIG. 3 is a side elevation of the construction with engagement of the fender with the vertical hull surface; and

FIG. 4 is a similar view but with a hull surface tilted on a horizontal axis.

Proceeding now to the detailed description of the drawings, the pier or mooring facility shown therein has a plurality of posts 1 to 6 which are interconnected by a box-like frame 8 to establish a mooring post. A vessel 20 is to be moored (or has been moored) to that post structure. A spherical segment-like socket 10 is secured to frame 8 and on that side thereof, which is provided for mooring of vessels. A ball 14 is received by socket 10, which ball is secured to a fender 12.

The ball and socket arrangement provides for a cardanic mount of the fender permitting pivot motions on two axes which intersect in the ball and socket center and which are located between the fender (and particularly outer surface 22 thereof) and the mooring post.

Ball 14 is prevented from lifting off the socket 10 by means of a calotta ring 16 (see FIG. 3), i.e., a ring with an internal spherical surface to adapt to the contour of ball 14. Fender body 12 has a soft cover 18 for providing for a soft surface 22 for engagement with the hull 20 of a vessel. Accordingly, one could term cover 18 as being the fender proper, while 12 is the fender body or fender support body.

Fender 12 is additionally secured against rotation on a (normally) horizontal axis extending transversely to surface 22. For this, fork-shaped horizontal guides 24 and 26 are provided for engaging horizontally journalled rollers 28, 30 in between. These rollers are journalled in bearings which, in turn, are secured to fender body 12. Guides 24, 26, carry rings (tires) 32 made of elastic material, which hold fender body 12 in a near vertical disposition when a ship's hull does not engage the fender. FIGS. 3 and 4 show particularly such an annulus or tire 32 as hanging from guide fork 26. Fender 24 can be equipped analogously.

FIG. 1 shows the hull 20 of a vessel in parallel disposition to the long side of the mooring post. Upon mooring, however, one cannot count on an assumption that the hull approaches the post in that parallel disposition. Rather, a situation of docking as depicted in FIG. 2 is more likely to occur. The fender body is made to pivot here on the center of the ball and socket arrangement 10-14, with a vertical pivot axis.

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FIG. 3 shows the hull of the ship in vertical parallel disposition to fender surface 22, but again, a possibly occurring disposition is shown in FIG. 4, illustrating that the fender pivots on the ball and socket as well as on the rolls 30 on a horizontal axis. Thus, it can be seen that the forks 24, 26, must have disposition so that the axes of the rollers are in a plane that runs through the horizontal pivot axis through ball and socket mount 10-14. More precisely, the axes of the rollers 28, 30, should coincide and run through the center of the ball.

The invention is not limited to the embodiments described above but all changes and modifications thereof not constituting departures from the spirit and scope of the invention are intended to be included.

We claim:

1. Fender for mooring facilities for ships comprising a fender body having a surface for engaging mooring ships:

a single ball and socket arrangement for cardanically mounting the fender to the mooring facility on the other side from the surface at a single point and

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centrally located pivot mount to undergo a pivot motion about a horizontal axis and a vertical axis, both axes running through the pivot mount, so that upon engagement of the fender by a ship, the fender pivots on these axes into surface-to-surface engagement with the ship and independently from any force as exerted by the ship upon the fender; and

resilient means displaced from the cardanic mounting for centering the fender in a normal position, when not engaging a ship and wherein the engaging surface is vertically oriented; and

means laterally displaced from the ball and socket mount for preventing the fender from turning on an axis transverse to the engaging surface thereof.

2. Fender as in claim 1, wherein the means for preventing are first and second fork-like guides engaging journaled rollers, the first guides and rollers being mounted to the fender, the second guide being mounted to the mooring facility.

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