

Sept. 20, 1960

M. ROLANDO

2,952,979

CIRCULAR ELASTIC MOVABLE FENDER HAVING SPRING EXPANSION

Filed July 18, 1955

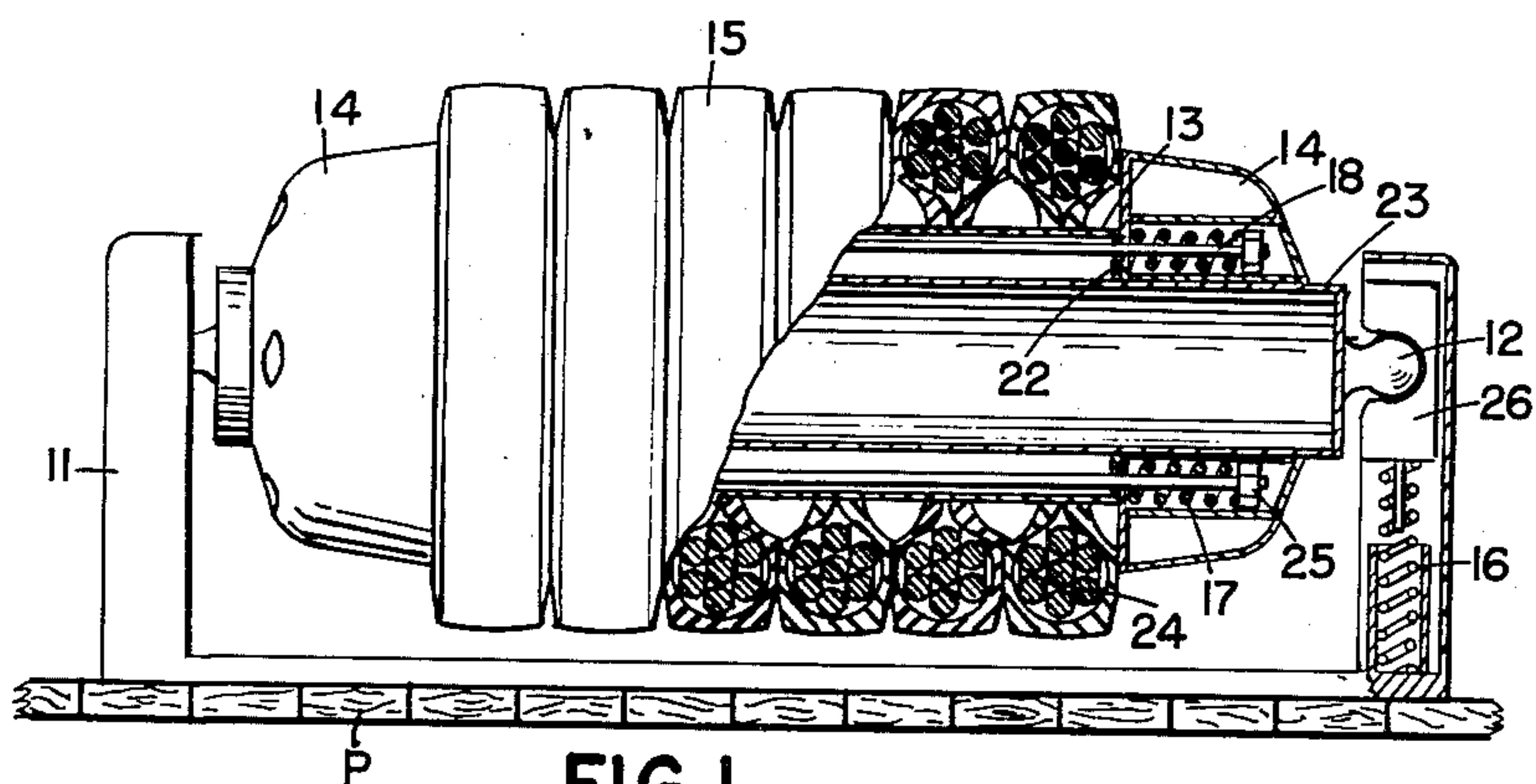


FIG. 1

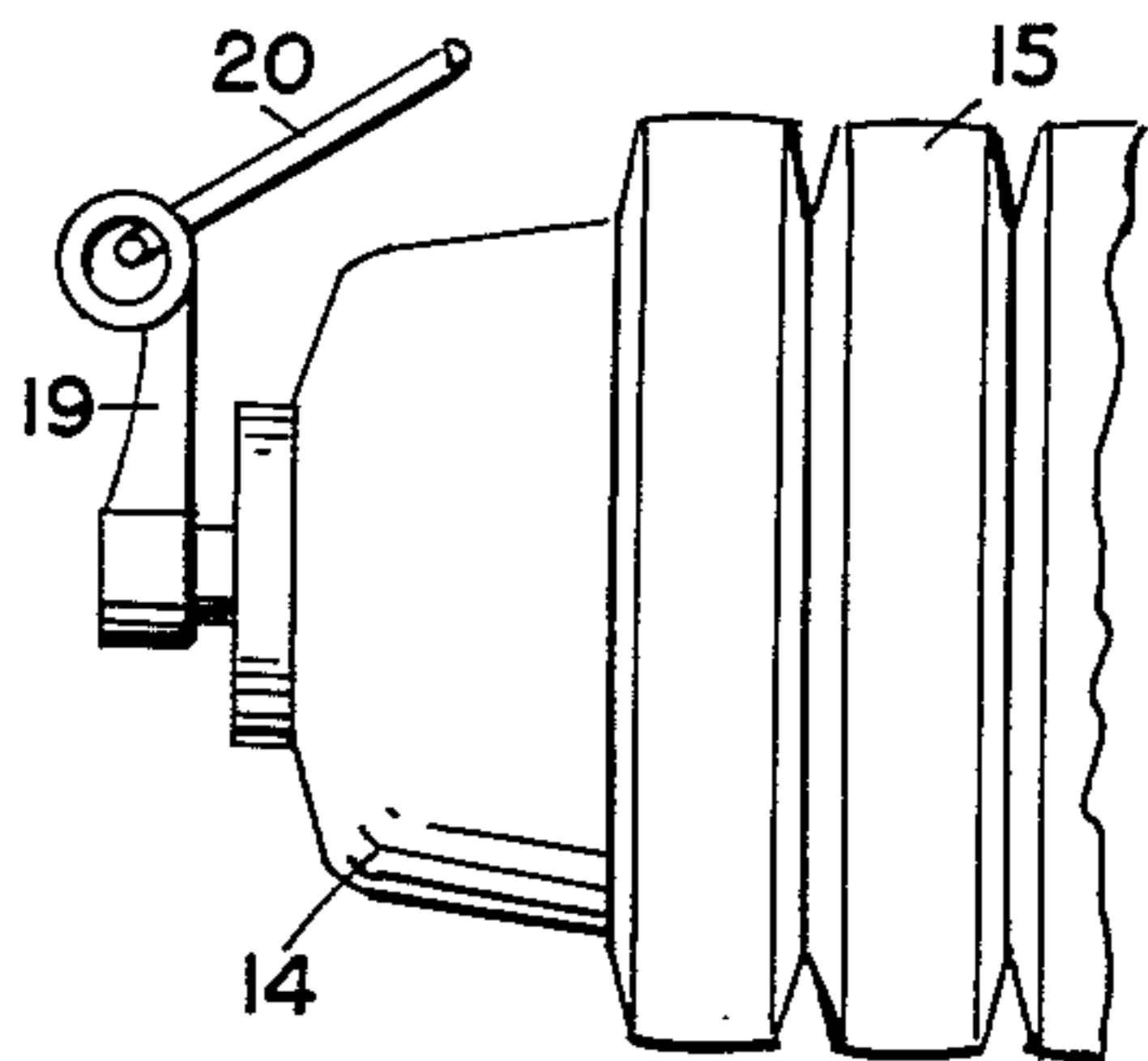


FIG. 2

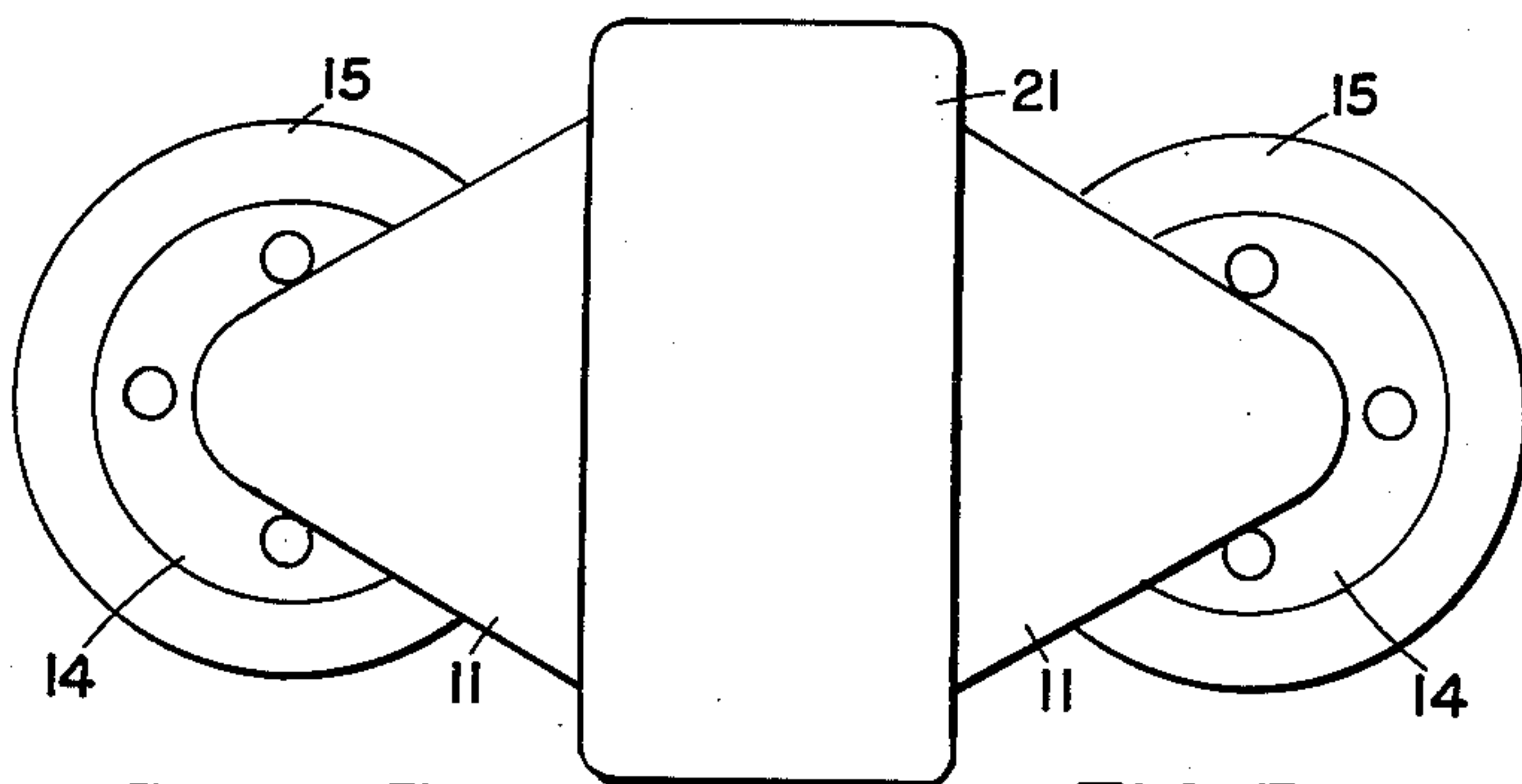


FIG. 3

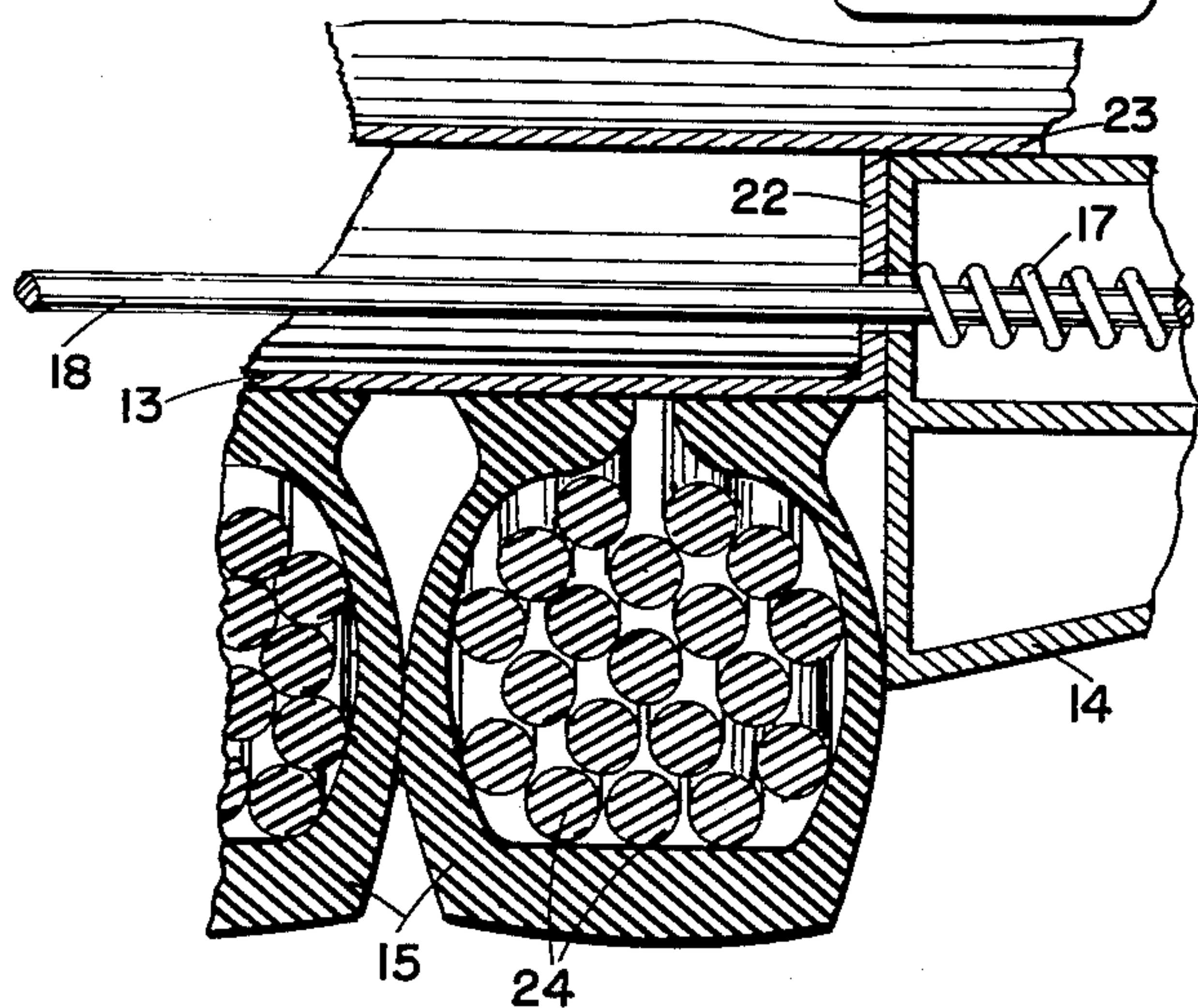


FIG. 4

INVENTOR.  
Mario Rolando  
BY Maxwell E. Sparrow  
ATTORNEY.



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## CIRCULAR ELASTIC MOVABLE FENDER HAVING SPRING EXPANSION

Mario Rolando, Via Curtatone 1/15, Genoa, Italy

Filed July 18, 1955, Ser. No. 522,567

Claims priority, application Italy Dec. 3, 1954

3 Claims. (Cl. 61—48)

This invention relates to maritime fenders, and more particularly to maritime fenders which are used on piers to prevent docking ships from being damaged, or between ships, and the like.

Maritime fenders have been known composed of rope, pieces of wood, used tires and the like; however, all these fenders had one or the other disadvantages, they wore out too fast, were too expensive, had not enough elasticity, were too hard and were prone to damage the hull of the ships, and the like.

This invention presents a new and improved type of maritime fender, by which the aforementioned disadvantages are avoided. Objects and advantages of the invention will be set forth in part hereafter and in part will be obvious herefrom or may be learned by practicing the invention, the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims. The invention consists in such novel features, arrangements and combinations of parts as may be shown and described in connection with the apparatus herein disclosed by way of example only and as illustrative of a preferred embodiment.

It is the main object of this invention to provide for new means to be placed between a rigid wall of a pier and a floating vessel for protecting both from being damaged by the movements of the latter.

Another object of the invention is to provide for fender means which can give way and move elastically in all three coordinate directions.

Yet another object of the present invention is to provide for fender means having a body composed of strong and shock resisting parts to resist the rough use in harbors, in open waters and the like.

Furthermore, it is an object of this invention to provide for fender means having elastic means on a rigid body for absorbing the shocks and impacts imparted upon them by the floating vessels under the influence of the surf.

It is a further object of the present invention to provide for fender means wherein said elastic shock absorbing means consist of used truck tires and the like.

Another object of the invention is to provide for fender means having contrivances for readily exchanging worn elastic, shock absorbing means.

A further object of the invention is to provide for fender means which are practical, economical, conveniently handled and uncomplicated.

Various further and more specific purposes, features and advantages will clearly appear from the detailed description given below taken in connection with the accompanying drawings which form part of this specification and illustrate merely by way of example one embodiment of the device of the invention. In the following description and in the claims, parts will be identified by specific names for convenience, but such names are intended to be as generic in their application to similar

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parts as the art will permit. Like reference characters denote like parts in the several figures of the drawings, wherein:

Fig. 1 is a plan view of a maritime fender mounted on its supports, partly broken away;

Fig. 2 shows another way of suspending the said maritime fender;

Fig. 3 shows a floating body with two fenders mounted thereon;

Fig. 4 shows a partial section of Fig. 1 in a large scale.

Referring now in more detail to the drawings illustrating a preferred embodiment by which the invention may be realized. There is in Fig. 1 a maritime fender, consisting of a supporting bracket 11 mounted on the vertical wall of a pier P. The fender has two ball-shaped ends 12 which are held in slidable bearing blocks 26. The ends 12 are part of an elongated cylindrical support 23. Concentrically circumposed about this cylindrical support 23 is a cylindrical central support portion 13, spaced apart from the elongated cylindrical support 23 by spacers 22. Abutting against the two ends of this cylindrical central support portion 13 are two annular heads 14 slidably mounted on said elongated cylindrical support 23, said annular heads 14 being held in contact with said central support portion 13 by a plurality of steel tie rods 18. Springs 17 on said tie rods 18, abutting against the inner wall of the annular heads 14 and secured in their position relative to the tie rods 14 by nuts 25, keep said tie rods 14 under tension and are holding said annular slidable heads 14 resiliently abutting against the ends of said central support portion 13.

Circumposed about the central support portion 13 and held between the two annular heads 14 are used truck tires 15 or the like resilient circular means which may be filled with ropes 24 or with smaller tires or any other resilient means for giving these fender means sufficient strength. The bearing blocks 26 for the ball-shaped ends 12, as mentioned before, are resiliently located in the arms of the supporting brackets 11 by means of springs 16, so that the entire fender may rotate about its axis in the bearings and may resiliently move to and from said pier wall P.

Obviously any maritime vessel leaning against the resilient means of the fender, can easily move up and down without losing positive contact with its mooring and without running the danger of being damaged. It can further be seen that any movement of the moored vessel in a longitudinal direction can be taken by this kind of construction without destruction, by virtue of the resiliently held, slidable annular heads.

Fig. 2 shows how the fender may be used without being permanently located on a pier in a harbor. It can be suspended on a rope 20 by means of hook members 19 which again are rotatably holding the ball-shaped ends 12.

Fig. 3 illustrates a double fender mounted on both sides of a float or buoy 21 which may be placed between two ships at a time when direct loading or unloading operations from ship to ship take place, or when ships are tied up side-by-side.

Fig. 4 shows in an enlarged scale how the annular heads 14 are slidably mounted on the elongated cylindrical support 23 and are being held resiliently under spring pressure against the ends of the cylindrical central support 13 having spacer means 22 thereon by means of tie rods 18 and springs 17. Also shown are the resilient fender means such as used tires 15 filled with other resilient means 24.

It can be understood that a worn set of said resilient means 15 can be replaced without major operation and without destroying any permanently welded or fixed parts. It also can be seen that the construction is rugged



and apt to withstand the wear and tear to which such maritime equipment is subjected.

While the invention has been described and illustrated with respect to certain particular preferred example which gives satisfactory results, it will be understood by those skilled in the art after understanding the principle of the invention, that various other changes and modifications may be made without departing from the spirit and scope of the invention and it is intended therefore in the appended claims to cover all such changes and modifications.

I claim:

1. In a marine fender comprising a base having supports mounted thereon spring-supported bearing means resiliently arranged in said supports, a first cylindrical member resiliently and rotatably located in said supports, a second cylindrical member having a substantially larger diameter than the said first cylindrical member and concentrically mounted thereon, the combination with a plurality of annular cushion members fabricated of yieldable material and arranged in contiguous side-by-side relation slidably surrounding and substantially covering said second cylindrical member, of a pair of annular heads slidably circumposed about said first cylindrical member on opposite sides thereof, and resiliently yieldable means arranged in the concentric space between said cylindrical members said means connecting said heads for rotation therewith and for maintaining said heads in resiliently abutting engagement with the said second cylindrical member.

2. In a marine fender, an elongated generally cylindrical support having a generally cylindrical concentric central support portion thereon having a larger diameter than that support, means mounting said cylindrical support at its opposite ends for axial rotation, said mounting means comprising a pair of spaced, outstanding members adapted to be fixed perpendicularly to a pier, a pair of bearing blocks slidably mounted in said members and each rotatably supporting a respective end of said cylindrical support and resilient means in said members abutting against each of said bearing blocks to yieldably urge the same outward away from said pier, a plurality of annular cushion members fabricated of yieldable material arranged in contiguous side-by-side relation slidably surrounding and substantially covering said central support portion, a pair of annular heads slidably circumposed about said elongated generally cylindrical support on opposite sides of said central support portion and of said cushion members, and resilient

means arranged in the concentric space between said cylindrical support and said central support portion and extending between said annular heads for rotation therewith, said resilient means urging said heads into abutting engagement with said central support portion.

3. In a marine fender, an elongated generally cylindrical support having a generally cylindrical concentric central support portion thereon having a larger diameter than that support, means mounting said cylindrical support at its opposite ends for axial rotation, said mounting means comprising a pair of spaced, outstanding members adapted to be fixed perpendicularly to a pier, a pair of bearing blocks slidably mounted in said members and each rotatably supporting a respective end of said elongated cylindrical support and resilient means in said members abutting against each of said bearing blocks to yieldably urge the same outward away from said pier, a plurality of annular cushion members fabricated of yieldable material arranged in contiguous side-by-side relation slidably surrounding and substantially covering said central support portion, a pair of annular heads slidably circumposed about said cylindrical support on opposite sides of said central support portion and of said cushion members, and resilient means arranged in the concentric space between said cylindrical support and said central support portion, and extending between said annular heads for rotation therewith, said resilient means comprising substantially rigid tie members each extending between said heads and through said concentric space between said two cylindrical supports, and spring means in each of said heads engaging the adjacent ends of respective tie members and heads to urge said heads toward each other into abutting engagement with said central support portion.

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