July 29, 1958 W. T. KENNEDY 2,844,943

PIER BUMPER

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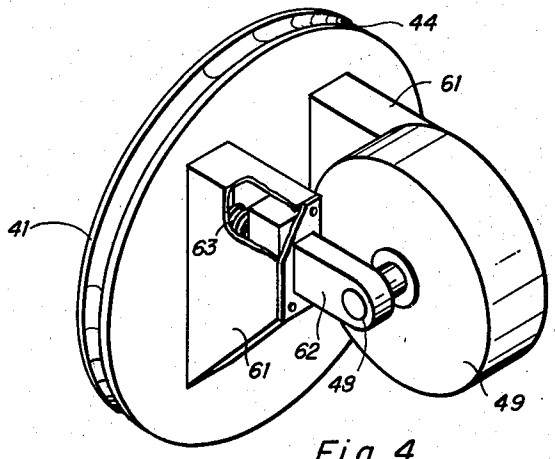


Fig. 4

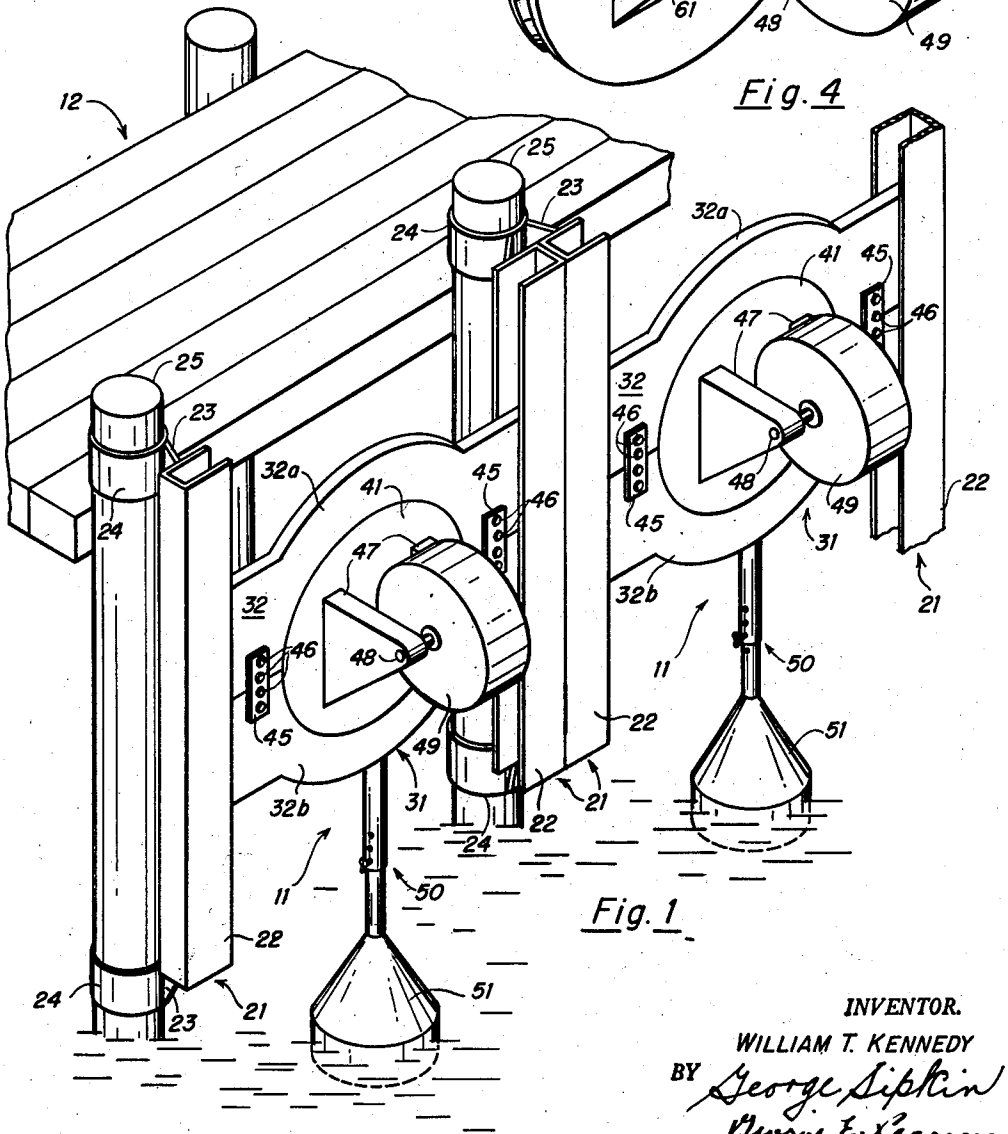


Fig. 1

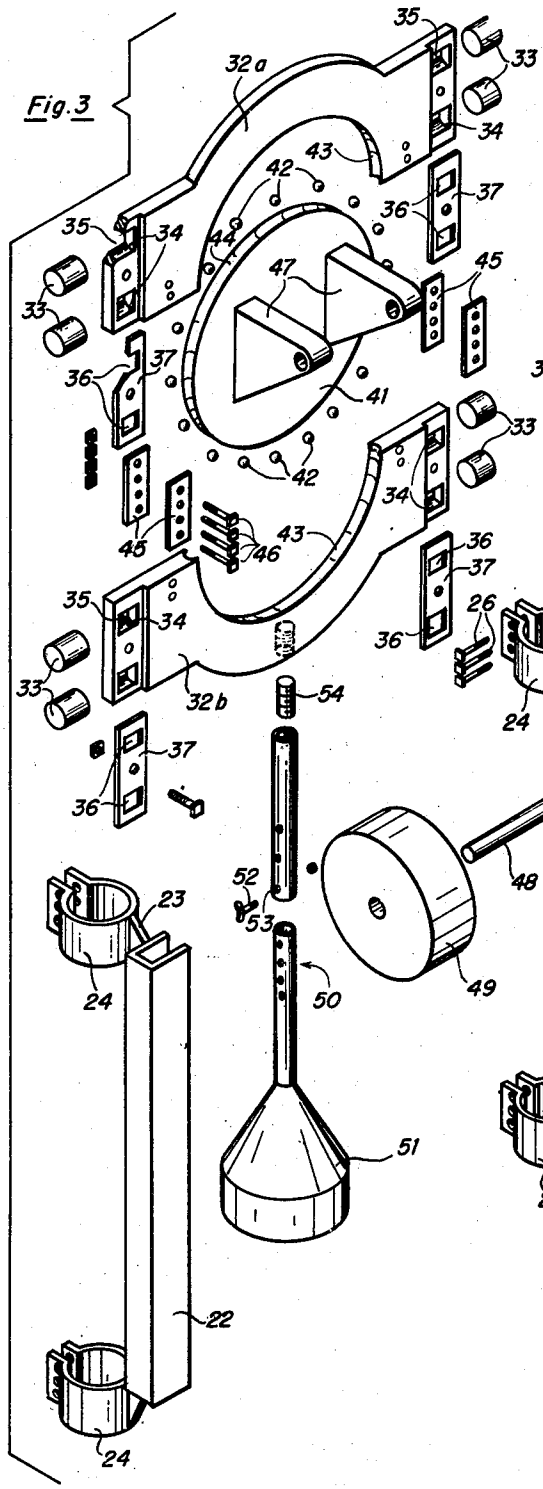
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Fig. 3



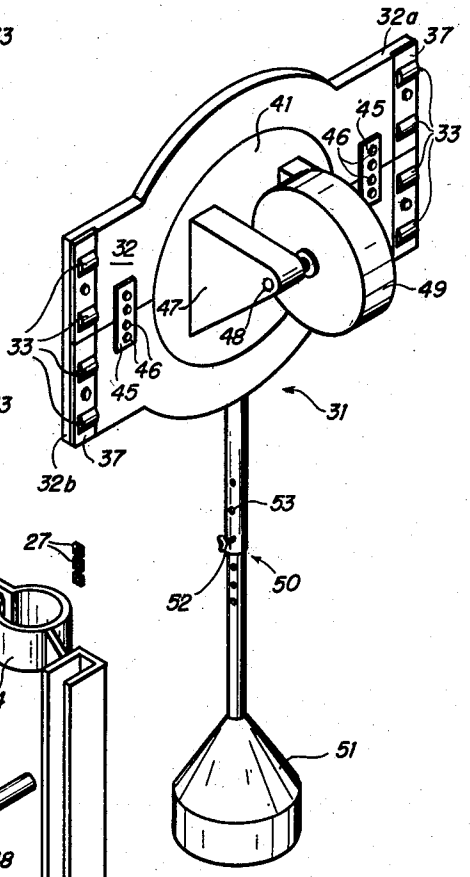


Fig. 2



Fig. 5.

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PIER BUMPER

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4 Claims. (Cl. 61—48)

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The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

This invention relates to an improved pier bumper.

It is an object of the invention to provide a pier bumper which provides protection to a pier, wharf, slip, or other analogous object to which it may be attached and to a ship which may be tied or come alongside the pier.

A further object is to provide a pier bumper which remains at a predetermined level above the surface of the water notwithstanding relative changes in the distance from the water surface to the pier platform surface.

Still a further object is the provision of a pier bumper which readily aligns itself for friction reducing coupling between the pier and the movement of a ship alongside.

Another object of the invention is the provision of a pier bumper that will maintain itself in friction reducing relation with a ship alongside thereof irrespective of the tide level or the lateral direction of movement of the ship relative to the pier.

It is still another object to provide a friction reducing pier bumper which is simple in construction and operation, yet durable and sturdy.

Still a further object is the provision of a pier bumper which is easily mounted by securing to the pilings of a pier.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

Fig. 1 is a partial view in perspective of a pier on which a plurality of pier bumpers constructed in accordance with the present invention are mounted;

Fig. 2 is a perspective view of the float and ship contact assembly;

Fig. 3 is an exploded view of the float and ship contact assembly;

Fig. 4 is a perspective view partially in fragmentary section of a modification; and

Fig. 5 is a view in side elevation of the rotatable disc.

Referring to the drawings, as shown in Fig. 1, a plurality of pier bumpers, generally designated **11**, may be mounted on a pier **12** to provide for friction reducing contact with a ship which may come alongside the pier. These bumpers **11** may be mounted closely adjacent each other, as shown, or may be mounted in spaced apart relation or singly as may be desired.

In the embodiment disclosed each individual pier bumper **11** is comprised of guide supports **21**, a ship contact assembly **31**, and a float **51**.

The guide support assemblies **21** consist of a U-shaped guide **22**, which may be constructed of U-shaped angle beam, secured, as by welding, to a spacer **23**. The spacers **23** each have a pair of spaced apart split collars **24** which

are secured about the pier pilings **25** as with nuts and bolts **26**, **27**. The vertical guides **21** thus formed grooved runways for laterally supporting and guiding the movement of the vertically slidable contact assembly **31**.

The contact assembly **31** consists of a split panel **32** the ends of which have rollers **33** mounted in grooved-out seats **34** therein. These rollers **33** are of greater diameter than the thickness of the panel and extend outwardly through slots **35** at the bottom of the seats **34** and slots **36** in the cover plates **37** which hold the rollers in place in seats **35**. The rollers thus extend outwardly beyond the lateral front and back surfaces of the panel **32** for rolling contact with the inner surfaces of the guides **22**.

Rotatably mounted for rotation about a horizontal axis normal to the plane of movement of the panel **32** is a disc **41**. The two halves **32***a*, **32***b* of the split panel **32** each have a semi-circular recess formed on the adjacent sides thereof of a diameter slightly larger than the diameter of the disc **41**. The mounting for the disc **41** is comprised of ball bearings **42** seated in annular grooves **43** arranged in the inner surfaces of the circular opening formed by the joining together of the two panel halves **32***a*, **32***b*. A concave arcuate groove **44** is formed in the circumferential surface of the disc **41** for engagement with the ball bearings **42**. The two halves **32***a* and **32***b* of the panel **32** are secured together by connecting plates **45** which are bolted, as indicated at **46**, to the two halves **32***a* and **32***b*. The disc **41** is thus held between the two halves of the panel in such a manner that it is free to rotate about its axis but is securely held against lateral movement.

Secured to the outer face of the disc **41** are a pair of caster roller supports **47**. These supports **47** have secured, as by a press fit, in their outer ends a shaft **48** upon which is rotatably mounted a contact caster roller **49**. The shaft **48** and contact roller **49** are positioned with their axis to the side of the axis of rotation of the disc **41** and normal to the disc axis. It will thus be apparent that for any impact force applied to the roller in a direction either directly toward the pier or at an acute angle thereto will, due to the off center positioning of the contact roller's axis relative to the axis line of disc **41**, be applied in its greatest strength at a point offset from the center of disc **41**. This will cause a torsion action on disc **41** tending to rotate it in a direction toward the pier and transfer the shock of the impact force to panel **32** in a manner causing a rotative torque on panel **32**. This torsional effect in transmitting an impact force from the contact roller **49** to the panel **32** allows a greater impact force to be absorbed by the contact assembly **31** and transferred to the pier, without deformation of the contact assembly **31**, than would be possible if the force was applied with its greatest intensity along the axis of the disc. Further, if the impact force applied to the contact roller is at an acute angle with the pier, it will have a glancing effect on the contact roller causing it to spin on its axis. Should the contact roller's axis not be aligned normal to the direction of the impact force, the force striking the roller at an angle coupled with the off-center position of the contact roller's axis will cause a torque to be applied to disc **41** radial to its axis. This torque action turns the disc **41** to the point where the torque is reduced to zero, which is the point of correct orientation of the contact roller **49** relative to the applied force. In the correctly oriented position the applied force is tangential to the roller **49** and the roller rotates in response to the force, thereby greatly reducing the friction caused by lateral movement of a ship or other object alongside the pier.

Secured to and depending from the bottom of the panel **32**, as with a double-ended threaded male coupling **54**, is a connecting tube assembly **50** which has a float **51** on the

end thereof. This float provides a buoyant support for the contact assembly **31**. The float **51** may be hollow, or made of some buoyant material such as wood or cork as desired. The float serves to maintain the contact assembly **31** at a constant distance above the water surface, regardless of the level of the water relative to the pier platform. The connecting tube assembly **50** is made extensible, as by telescopic construction with bolt and slot or other suitable securing means **52, 53** for securing it at a desired length, although such construction may not be necessary or desirable in all instances.

In operation it will be seen that the contact assembly **31** is maintained at a constant pre-set distance above the surface of the water to insure proper contact of the roller **49** with the side of a ship when it comes alongside the pier **12**. The roller will "follow" the lateral movement of the ship through its torque arm effect on the disc **41** and will thus allow free movement of the ship up, down, and sideways along the pier **12**.

In some instances it may be highly desirable to provide for resilient movement of the roller **49** toward the pier to absorb the shock of any abrupt movement of the ship against the roller. In such case the caster supports may be modified as shown in Fig. 4. In this modification the supports may each be made in two telescoping parts **61, 62** with a buffer spring **63** arranged between the two parts to provide for resilient movement of the outer part **62** toward the pier **12**.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. A pier bumper for attachment to the pilings of a pier comprising a pair of grooved guides, means for securing said guides to said pier piling in vertical spaced apart relation, a panel mounted in said guides for vertical movement therein, a disc rotatably mounted on said panel with its axis horizontal and normal to the side of said pier, a pair of spaced apart normally extending roller support members secured to the face of said disc, a shaft secured near the end of said support members, a roller rotatably mounted on said shaft, the axis of said shaft and roller being parallel to the side of said pier and spaced laterally from the axis of said disc.

2. A pier bumper for attachment to the pilings of a pier comprising a pair of grooved guides, means for securing said guides to said pier piling in vertical spaced apart relation, a panel mounted in said guides for vertical movement therein, a disc rotatably mounted on said panel with its axis horizontal and normal to the side of said pier, a pair of spaced apart normally extending roller support members secured to the face of said disc, a shaft secured near the end of said support members, a roller rotatably mounted on said shaft, the axis of said shaft and roller being parallel to the side of said pier and spaced laterally from the axis of said disc, and a float connected to said panel in depending relation therefrom.

3. A device for protecting a pier and a vessel secured thereo, comprising float supported means mounted on the side of the pier for sliding movement vertically thereof, a float depending from said supported means for moving the same vertically with the rise and fall of the tide, wheel supported means mounted on said float supporting means for rotation about a horizontal axis disposed laterally of the pier, and a wheel journalled in said wheel supporting means for rotation about an axis in spaced parallel relation to the side of the pier, said last named axis being spaced laterally of said horizontal axis whereby the wheel in contact with the vessel is rotatively positioned thereby about the horizontal axis for rotation in a vertical plane as the vessel moves vertically with the tide or selectively is rotatively positioned by the vessel about the horizontal axis for rotation in a horizontal plane in response to horizontal movement of the vessel along the pier.

4. A pier bumper comprising contact means for engaging the side of a ship, means secured to a pier for slidably supporting said contact means, and float means connected to said contact means for positioning said contact means a predetermined distance above the water, said contact means including a ship engaging roller and means for rotatably supporting said roller on said supporting means for rotation about an axis perpendicular to the roller's axis in response to movement of the ship to a position where the roller's axis of rotation is normal to the direction of the ship's movement as the ship moves horizontally or vertically relative to the pier.

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