Nov. 13, 1962 F. B. SCHUYLER 3,063,399

BOW BUMPER FOR TUGS AND SIMILAR BOATS

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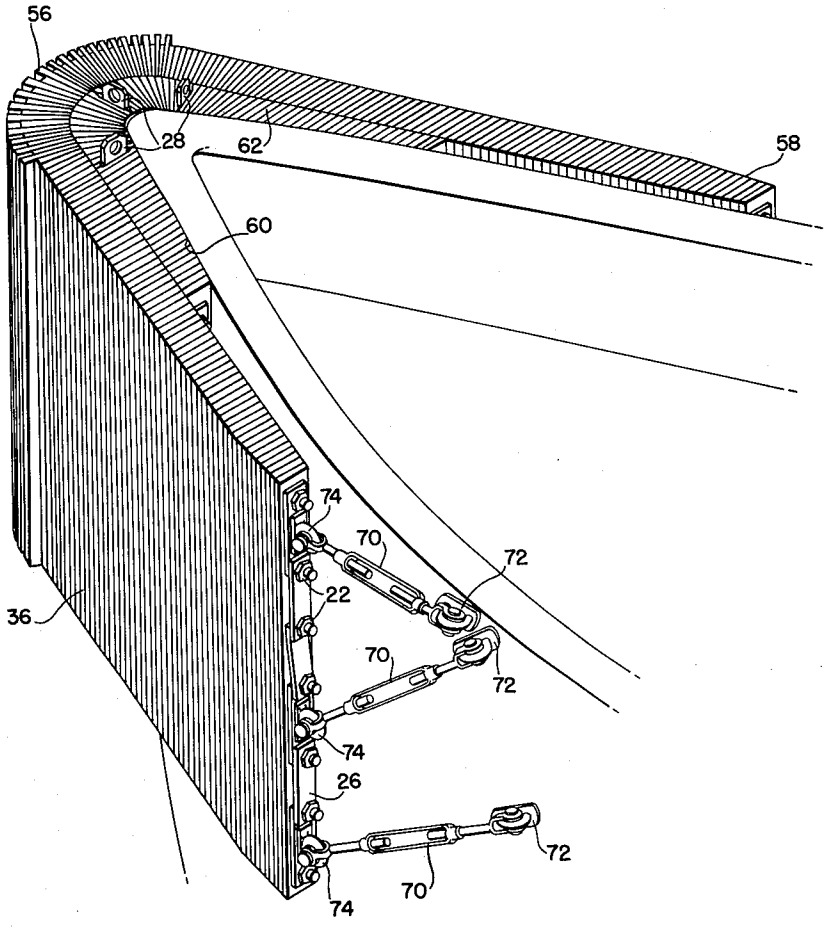


FIG. 1

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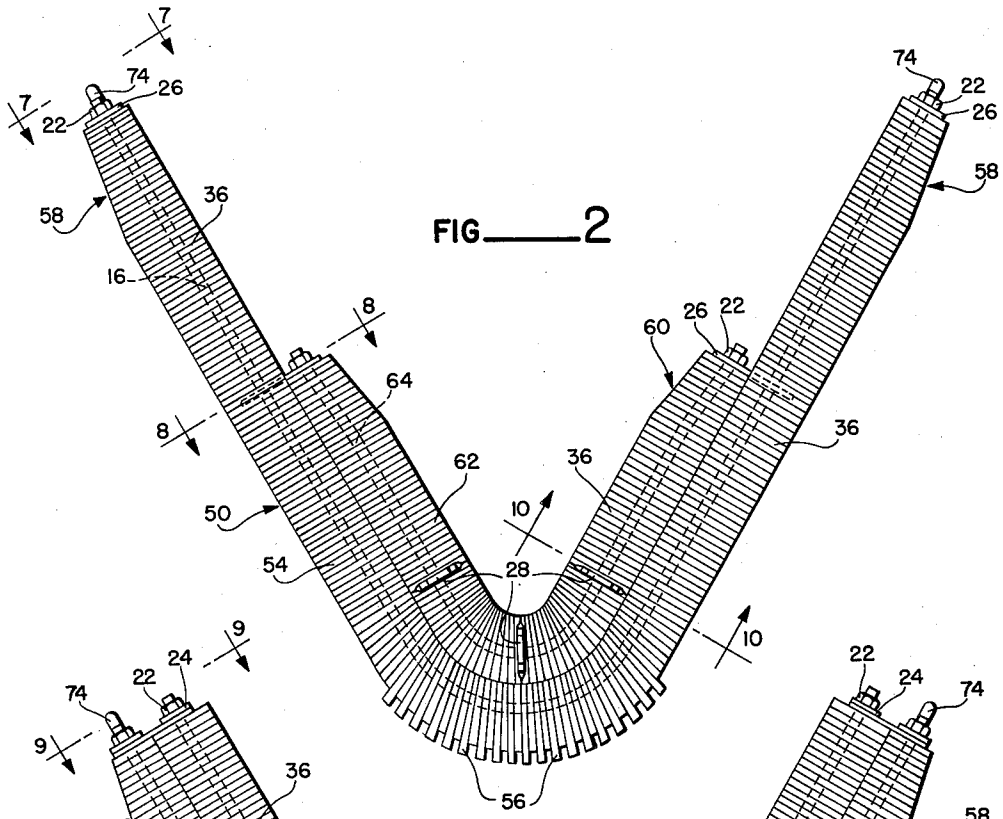


FIG. 2

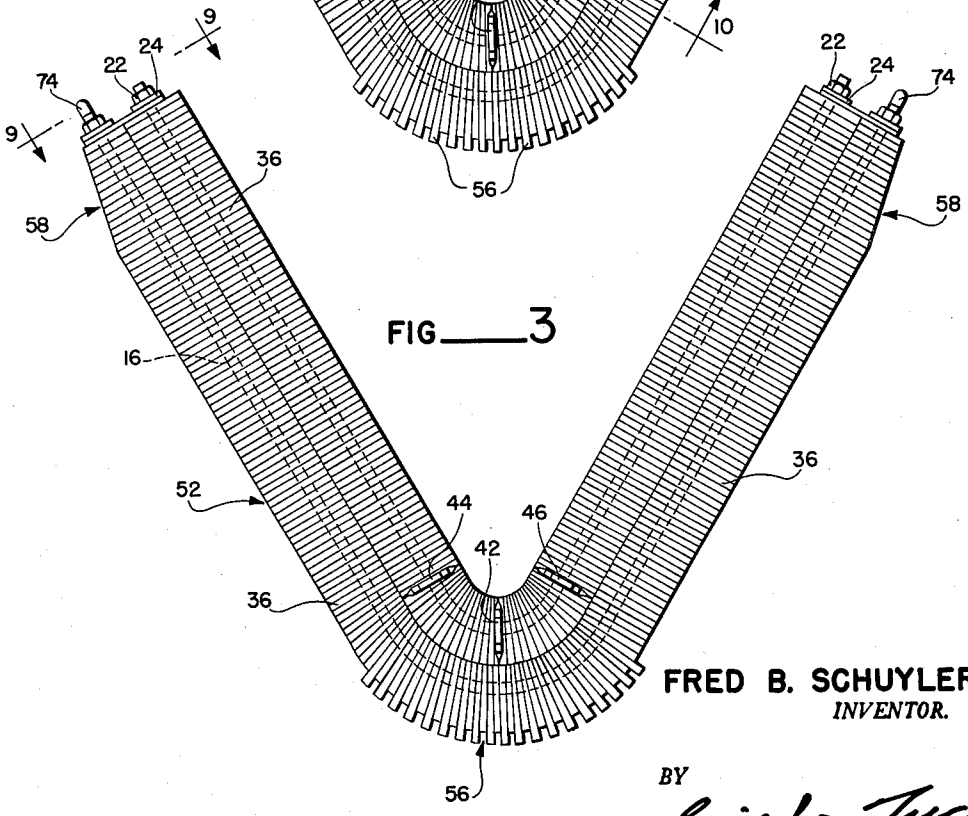


FIG. 3

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FIG. 4

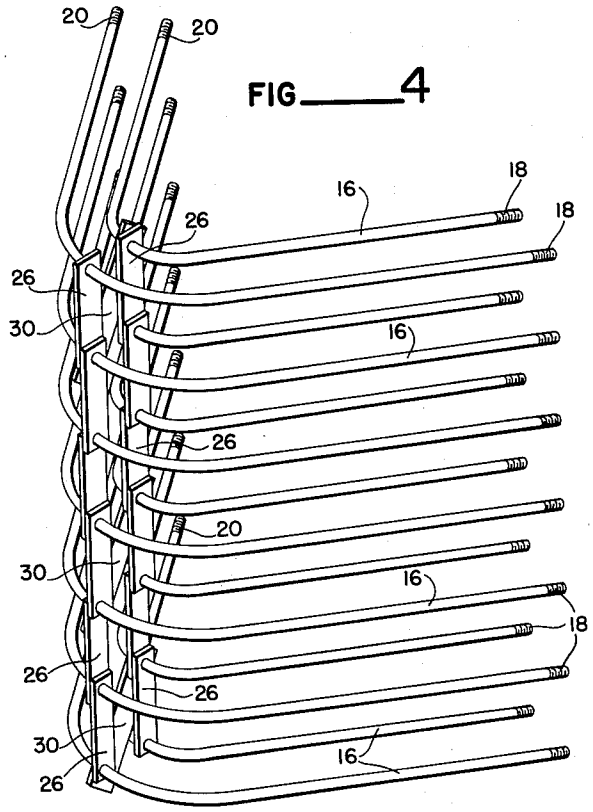


FIG. 5

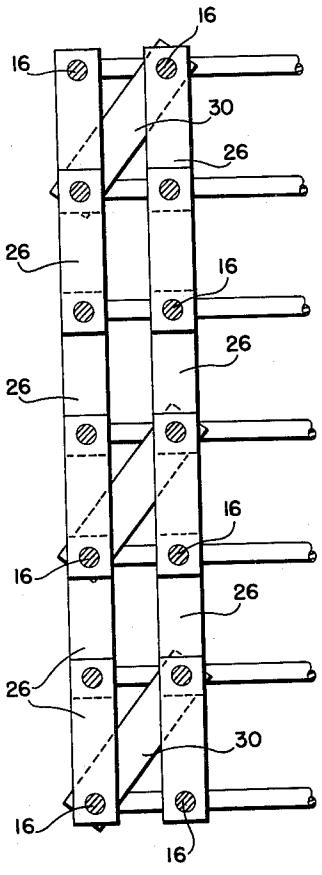
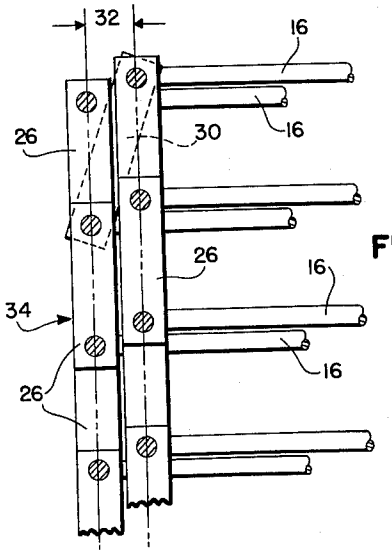


FIG. 6



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BOW BUMPER FOR TUGS AND SIMILAR BOATS

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FIG. 7

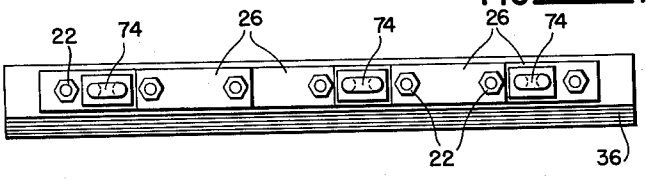


FIG. 8

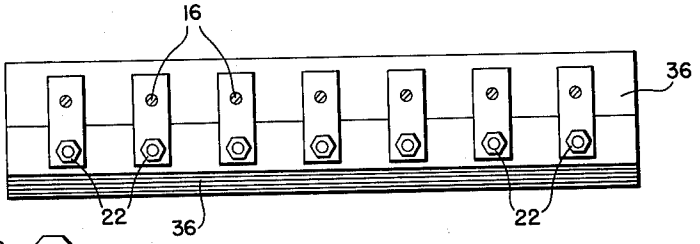


FIG. 10

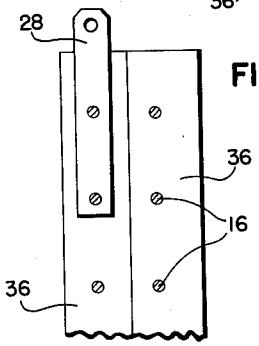
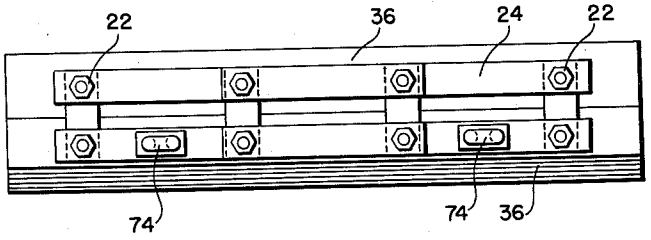


FIG. 9



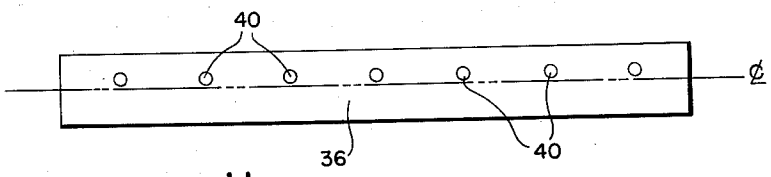


FIG. 11

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3,063,399

BOW BUMPER FOR TUGS AND SIMILAR BOATS

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6 Claims. (Cl. 114—219)

This present invention relates to a built-up bumper for the bow and stem portions of marine tugs and boats where a major part of their employment is in the maneuvering of other boats, scows and the like, this being accomplished by engaging the bow of the tug against the boat being maneuvered. More particularly, this invention comprises bumpers for boats made of reinforced rubber strips which are vertically disposed and joined together, in an adeqaute mass to serve their purpose, by rod and link conecting and positioning means.

In the maneuvering of ships, scows and the like in close quarters it has long been the practice to engage the bow of a tug or other boat against the side plating of the boats or scows to be maneuvered. In the case of scows especially, often the ends of the scows are so engaged. The orinary tug used for this purpose is usually a heavy boat of relatively deep draft and in order to save time in maneuvering and to save damage to the maneuvered boat as well as the tug, it has long been common to employ very substantial bumpers on the bow portion of the tug. These bumpers have been made of many different types of materials and in many different forms, the most common type made from rope with usually some filling to give bulk and thickness. This type of bumper has proven expensive in use because its usual life is relatively short. Further, as the bumpers habitually are wet while used they are inclined to slide easily on the shell plating or surfaces of the boats or scows being maneuvered. As a result it has been mandatory that the tug itself be in a position with its axis substantially at right angles to the surface contacted. This has oftentimes proved difficult to do because of the movement of the boat being maneuvered and the current, wave action, and the like affecting the tug. It is therefore desirable to provide means permitting a degree of angularity of engagement of the tug with the boat being maneuvered. In my present bumper I believe I have made a satisfactory solution of the various perplexing problems encountered in this rather unusual service.

The principal object of my present invention therefore is to provide a built-in bumper formed of reinforced rubber strips or of rubber impregnated strips of fabric or coated materials so that a bow bumper can be made up in sections which can be so inter-engaged as to provide a thickness and size to meet the conditions imposed by the size of the tug and its intended use.

A further object of this present invention is to provide a built-up bumper in which the strips are arranged vertically so that they have a squeegee action when engaging the side of a boat to be maneuvered.

A further object of this invention is to provide, especially in the bow section of a bumper, for projecting a portion of the strips outwardly from its surface and having them in spaced relation to each other so that a wiping and squeegee action is obtained.

A further object of this invention is to provide a yieldable flexible metal framing composed of metal rods and metal links which will insure a constant spacing of the rods but which still will permit of the bumper yielding to a high degree in use when under compression loading.

A further object of this invention is to provide a built-up bumper which may consist of several independently constructed sections hingedly joined together by metal links so as to geratly increase the resilience and restorative properties of this built-up bumper when it is of considerable thickness.

Further objects, advantages and capabilities will be apparent from the description and disclosure in the drawings or may be comprehended or are inherent in the device.

FIGURE 1 is a perspective view of a bumper illustrating its placement on the bow of a boat.

FIGURE 2 is a top plan view of one form of bumper employing a partial liner.

FIGURE 3 is a top plan view of a modified form of structure in which the bumper elements both extend the full length of the bumper.

FIGURE 4 is a perspective view illustrating the main metal framework of my bumper.

FIGURE 5 is an elevation of a portion of FIGURE 4 with certain parts broken away and illustrating the manner of connnecting two layers so that both layers can be compressed.

FIGURE 6 is a fragmentary view showing the upper portion of FIGURE 5 and illustrating the position of the framing and linkage when the fender is completely compressed.

FIGURE 7 is an end view of my bumper as though taken from the line 7—7 of FIGURE 2 and illustrating the eyed members to which the supporting means for the ends of the fenders are secured.

FIGURE 8 is a view taken along the line 8—8 of FIGURE 2, assuming that the outer layer of strip materils between planes 7X7 and 8X8 have been removed.

FIGURE 9 is an end view of a double bumper arrengement as taken along the line 9—9 of FIGURE 3.

FIGURE 10 is a fragmentary view illustrating one of the supporting means used to make provision for attaching the support for the central portion of the bumper. The same is taken as viewed along the plane 10—10 of FIGURE 2 with the plane passing between plies of the bumper material.

FIGURE 11 is a face view of one of the strips employed to build up my bumper.

Referring to the drawings, throughout which like reference characters indicate like parts, the numeral 16 designates one of the typical metal rods of which a plurality are used to form a yieldable positioning and compressing means for the strips employed employed in building up one of my bumper units. Rods 16 are to a degree fashioned for the boat with which it is to be used. They have a general V shape which should be substantially parallel to the bow form of the tug with which the equipment is to be used. Each end of the rod is threaded as at 18 and 20 so that when nuts 22 and plates 24 are in place on the opposite ends of the rod it is possible to compress the strips making up the bumper. In FIGURE 4 two sets of rods 16 are illustrated. The showing of FIGURE 4 is the type that would be employed in a bumper fashioned as in FIGURE 3.

It is to be understood that a single vertical row of rods 16 might be employed for a single unit of a bumper, or in order to gain increased thickness, any reasonable number of these bumper units might be used together and be supported generally after the showing of FIGURES 5 and 6. The vertically disposed rods 16 are joined together at the apex of the V by what is in effect a metal chain, composed of a plurality of link members 26, each of which has an opening in its opposite ends so that they may be threaded over rods 16 and variously placed. As illustrated in FIGURES 2 and 3, three such link arrangements are provided so that the center support straps 28 may be fixedly secured with respect to the upper link 26 of one of the vertical chain units.

It is to be noted that links 26 are made of flat metal plate and of substantial thickness so that they will be stiff against endwise compression. Links 26 of a plural-

ity of bumper units, combined to form a bumper, are preferably aligned from front to rear. By having the various links **26** of substantial construction they then provide tension to prevent the spreading of rods **16**, and the stiffness of the links prevents rods **16** being pressed together under heavy impact as was formerly quite often experienced when a tug first engaged a boat to be maneuvered. By having the connecting members **26** serve as links it is possible for rods **16** to have considerable movement fore and aft of the boat protected by the bumper. This makes it possible to employ these single bumper units in multiple thus building up a thick bumper that still permits use of the full resilience of all the various layers of the built-up units. It also follows that rods **16**, even though they are generously proportioned to support the heavy weights encountered, should be capable of considerable bending and yet be self-restorative when the impact loading or pressure has been relieved. It is to be considered that bumpers of this order may weigh four or five tons or even more, depending upon the size of the boats, and it is necessary therefore that all the components must be ruggedly made of material with a degree of resilience so that it will be restorative and not take permanent sets.

The manner of securing the various single units together is best illustrated in FIGURES 5 and 6 in which a plurality of individual links **30** are employed. These links, of which there may be any desired number, must be disposed in parallel relationship after the showing of FIGURE 5 and be threaded upon appropriate bars **16**. When enough load is imposed upon the bumper to tend to crush it, the spacing between the two adjacent single units can be reduced to the extent shown in FIGURES 5 and 6. In FIGURE 6, hinge links **30**, links **26** aligned from front to rear, and rods **16** finally come to a point of near contact; but it will be noted that there is a minimum spacing between rods **16** as is illustrated at **32**. Such spacing is required in order that the strips which form the bumper still will not be stretched or crushed to the extent of destroying them.

The restoring of the forward vertical row of plate links **26**, indicated generally by the reference character **34**, is provided by the resilience of the strips **36** which should be made of material having the capacity for distortion under load without destroying its ability to recover its original form. A material that has been found to be very appropriate for this use are strips cut from the carcass of automotive tires, it being desirable to use the carcasses of truck tires for the large heavy bumpers. Tires of this order are provided with layers of fabric or cords which are thoroughly impregnated, and the interstices between the threads or yarns fully filled, with rubber or some of the rubber substitutes which have the property of being actually non-compressible so that under compressive loading the material tends to flow into other adjacent space. When the loading has been released, materials of this order will reassume their original form. This property makes these tire carcasses an excellent material for this purpose and in addition they are a very cheap source of this material.

In building up a bumper after the teachings of this present invention it is first desirable to set up the framework after the showing of FIGURE 4. This particular arrangement is the form of frame that is used in the bumper shown in FIGURE 3. The strips **36**, which have been previously cut to size, are perforated to correspond with the spacing of rods **16** of a single unit. In the instant example there is an opening **40** for each rod **16** and the strips **36** are successively threaded onto the rods from each end and forced over to the central row of links **26**. When an adequate number of strips have been put in place it may then be desirable to set in another row of link plates **26**, one on each side of the central row to provide the three rows indicated at **42**, **44** and **46** in FIGURE 3. The threading of the perforated strips is continued until near the ends of rods **16** and at this point in the operation another line of links **26** are disposed on each of rods **16**. Plates **24** and nuts **22** are applied to portions **18** and **20** and the nuts tightened so as to initially compress the strips **36**. The degree of compression will be a function of the material employed in the strips. If the strips were especially manufactured for the purpose and were substantially flat very little compression would be required. However, when tire carcass material is employed it is then desirable to flatten, to a substantial degree, the normal cupping of the strips. The cupping of the strips of course results from the fact that they are cut from carcasses that are actually round; consequently the strips are arcuate both throughout their length and transversely thereof.

Referring to FIGURE 11, it will be noted that a center line passing through the various openings **40** is appreciably off-set from the center line of strip **36**. This off-setting is responsible for the showing in FIGURES 2 and 3, referring now to the outside units, as **50** and **52**. Here it will be noted that the center line of rod **16** is off-set towards the boat bow. This arrangement moves all the metal parts inwardly from the outer face of members **50** and **52** and therefore a very much greater wearing time is provided before metal becomes exposed and the bumper must be replaced. There is a secondary effect of this placement of the supporting and positioning rods **16** in that the portions of strip **36** that are outwardly disposed are more easily doubled back slightly so that we have the effect as though there were many squeegees in operation, the first one making a movement over the ship's hull tending to remove surface moisture and the succeeding plies of strips **36** having a dry surface to engage. This factor adds appreciably to the ability of the bumper to hold the bow of a tug against the side of a ship even though the axis of the tug is displaced appreciably from the right angle position which formerly was a prerequisite of this form of maneuvering operation.

To carry the squeegee effect further and to use it to the maximum I have provided at **56** an arrangement where certain of the strips are shaped wider than the others and, in spaced relationship extend out beyond the normal face of the bumper. This gives a very much improved cushioning effect and, as previously noted, a very pronounced holding effect.

In FIGURES 1, 2 and 3 is shown a tapering of one face of the ends of certain of the bumper units. This tapering is shown generally at **58**. The tapering of the outer unit has the effect of reducing any unprotected corner of the strip material and thus tends to protect the bumper structure, particularly when the tug contacts other boats obliquely. A secondary effect of tapering the outer units is the finish or dress that it gives the installed bumper. Tapering of the inner units as indicated at **60** in FIGURES 1 and 2 makes it possible to bring the bumper in smoothly toward the hull as will be noted in FIGURE 1, and this has of course the effect of reducing the thickness of the bumper at the areas where the excess of thickness is not required. The use of the shortened inner unit **62** reduces the amount of material employed thus reducing the weight of the bumper and therefore the cost of the same. In all cases it is desirable to have the exit point of rods **16** substantially in the center of the end face. In the case of the tapering members **50** and **52** the off-setting of the rod itself achieves this purpose. In the inner tapered portions as in FIGURE 2, it has been found desirable to bend the rods as is indicated at **64** to achieve the same purpose. In all cases this normally provides that equal pressure is applied entirely across the end face of the bumper giving equal compression to the component strips **36**, thus negating any tendency of the bumper to curl or to become bowed.

The center of the bumper is variously supported from a tug by means of the hanger members **28** that extend

upwardly in the locations indicated at **42**, **44** and **46** of FIGURE 3. The end supports for the bumper are best accomplished by the use of a plurality of turnbuckles **70**. These turnbuckles are normally secured to the ship and the outer line of links **26** by pad eyes **72** and **74** which are normally welded in place, both to the bumper and to the shell of the tug. As shown in FIGURE 1 it is desirable that the turnbuckles be angularly disposed so that as impact occurs at the bow and there is a tendency to drive the whole unit back, the turnbuckle should be able to hinge to a degree that will prevent them from being overstressed and being buckled or bent by the applied impact or stress.

It is believed that it will be clearly apparent from the above description and the disclosure in the drawings that the invention comprehends a novel construction of bow bumpers for tugs and similar boats.

Having thus disclosed my invention, I claim:

1. A built-up bumper for the bow and stem portions of marine tugs and boats, comprising: a plurality of bumper units each having a plurality of automotive rubber tire casing strips disposed vertically and with the plane of the strips substantially at right angles to the boat surfaces to be protected; openings in said strips disposed in aligned relationship; a plurality of metal resilient rods each substantially horizontally disposed and bent to the general shape of the bow of the boat to be protected and adapted to pass through said aligned openings; said rods joined together by substantial perforated metal plate links at each end and intermediate said ends with said links in alignment from front to rear of said bumper; said rods being threaded at each end and after passing through said end disposed links having nuts bearing on said end links and adapted to compress said rubber strips; link means joining said plurality of bumper units and permitting relative vertical movement under pressure therebetween; link means secured to the uppermost of said rods to provide supporting means for the center of said bumper and eyed means secured to each end of said bumper to provide attaching means for adjustable supporting means adapted to position the ends of said bumper.

2. The subject matter of claim 1 in which said plate links are hingedly mounted upon and join the adjacent rods so all the rods of a single bumper unit are yieldably secured together in a manner permitting each rod to yield individually under impact.

3. The subject matter of claim 1 in which the said bumper units are hingedly secured together, face to face, by downwardly directed parallel disposed hinge links which join the rods of the adjacent coacting bumper units together and permit limited vertical movement of the bumper units with respect to each other, when they are under pressure during use.

4. A built-up bumper for the bow and stem portions of marine tugs and similar boats, comprising: a plurality of resilient non-metallic strips disposed vertically and with the plane of the strips substantially at right angles to the boat surfaces to be protected; openings in said strips disposed in aligned relationship; a plurality of metal rods each substantially horizontally disposed and bent to the general shape of the bow of the boat to be protected and adapted to pass through said aligned openings; said rods joined together by substantial perforated metal plate links at each end and intermediate said ends to provide a plurality of flexible link chain support units for said rods; said rods being threaded at each end and after passing through said links, having nuts bearing on the links disposed at the ends of said rods and adapted to compress said resilient strips; link means secured to the uppermost of said rods to provide supporting means for the center of said bumper; eyed means secured to each end of said bumper to provide attaching and supporting means for the ends of said bumper; the said strips forming a bumper unit are reduced in width near each end of said unit to provide tapering end portions for said bumper unit and are alternately increased in width at the central portion of said bumper unit.

5. A built-up bumper for the bow and stem portions of marine tugs and similar boats, comprising: a plurality of resilient non-metallic strips disposed vertically and with the plane of the strips substantially at right angles to the boat surfaces to be protected; openings in said strips disposed in aligned relationship; a plurality of metal rods each substantially horizontally disposed and bent to the general shape of the bow of the boat to be protected and adapted to pass through said aligned openings; said rods joined together by substantial perforated metal plate links at each end and intermediate said ends to provide a plurality of flexible link chain support units for said rods; said rods being threaded at each end and after passing through said links, having nuts bearing on the links disposed at the ends of said rods and adapted to compress said resilient strips; link means secured to the uppermost of said rods to provide supporting means for the center of said bumper; eyed means secured to each end of said bumper to provide attaching and supporting means for the ends of said bumper; said metal rods adapted to position said tapered strips are bent horizontally to conform to said tapering ends and be centrally positioned, in the horizontal plane, at their ends.

6. A built-up bumper for the bow and stem portions of marine tugs and similar boats, comprising: a plurality of resilient non-metallic strips disposed vertically and with the plane of the strips substantially at right angles to the boat surfaces to be protected; openings in said strips disposed in aligned relationship; a plurality of metal rods each substantially horizontally disposed and bent to the general shape of the bow of the boat to be protected and adapted to pass through said aligned openings; said rods joined together by substantial perforated metal plate links at each end and intermediate said ends to provide a plurality of flexible link chain support units for said rods; said rods being threaded at each end and after passing through said links, having nuts bearing on the links disposed at the ends of said rods and adapted to compress said resilient strips; link means secured to the uppermost of said rods to provide supporting means for the center of said bumper; eyed means secured to each end of said bumper to provide attaching and supporting means for the ends of said bumper; a portion of said strips disposed in spaced relationship extend outwardly from the normal face of said bumper and in the central portion thereof to give a squeegee effect when said strips contact a surface under operational conditions.

References Cited in the file of this patent

UNITED STATES PATENTS

1,781,403	Lyons	Nov. 11, 1930
1,852,240	Hill	Apr. 5, 1932
1,981,182	Lyons	Nov. 20, 1934