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COUPLING FOR PREVENTING ELECTROLYTIC CORROSION

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Fig. 2.

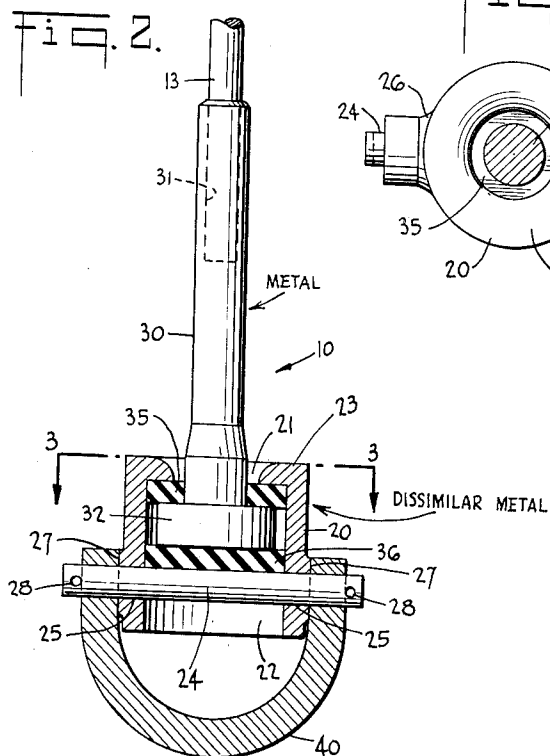


Fig. 3.

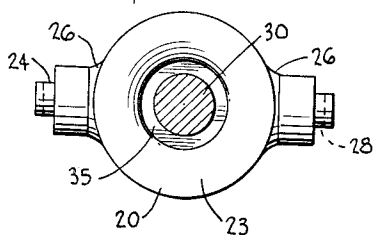


Fig. 1.

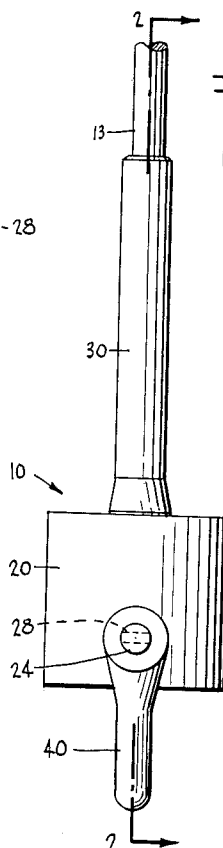
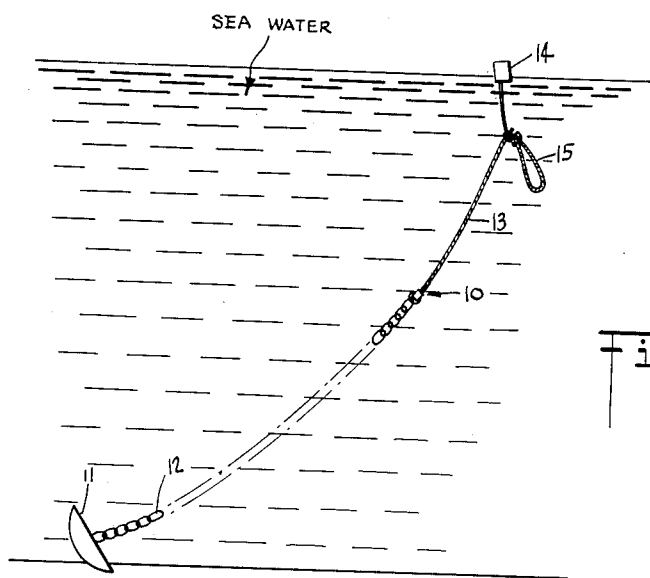


Fig. 4.

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COUPLING FOR PREVENTING ELECTROLYTIC CORROSION

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4 Claims. (Cl. 174—138)

My present invention relates generally to couplings for connecting elements composed of dissimilar metals, and has particular reference to a coupling provided with electric insulating properties and useful for preventing electrolytic corrosion.

An example of the type of use for which the present improved coupling is intended resides in the connection between an iron anchor chain and a mooring pennant composed of stainless steel or the like. For illustrative purposes, the invention will be described and depicted as it applies to such a purpose.

Mooring pennants of manila rope are commonly used in spite of their disadvantages, which include a susceptibility to abrasion, chemical and bacterial attack; large size and weight (particularly when wet) for required tensile strength; and uncleanness due to accumulation and shedding of gurry. Stainless steel and other non-corrosive metals and alloys have been suggested and used as a substitute for manila fiber, in rope pennants secured to metallic anchor chains which are usually of iron. Such metals and alloys are admirably resistant to mechanical abrasion as well as to chemical and bacterial attack. For example, for a given breaking strength a stainless steel rope can be used which is approximately one-third the diameter and seven-tenths the weight of new, dry manila, and only four-tenths the weight of a corresponding length of manila rope which has soaked up water.

The use of such non-corrosive pennants is subject to a very great disadvantage, however, in that the non-corrosive material, when in contact with a dissimilar metal under water, will in almost all cases protect itself at the expanse of the other metal. The contact of the two dissimilar metals produces an electromotive force or potential at the joint which causes a flow of current through the metals, the circuit being completed by a path through the water. Thus by electrolysis the other metal which stands higher in the electromotive series is dissolved in the water leaving the non-corrosive metal virtually unharmed. This electrolytic effect is of course exceedingly active if the water happens to be sea water and the other metal happens to be ordinary ferrous material, whether or not galvanized. Thus, it has been found that when a stainless steel pennant is shackled to an iron mooring by an iron shackle, the shackle is destined literally to dissolve in a surprisingly short time, and this effect also obtains down along the entire anchor chain at a diminishing rate with increased distance from the shackle. Therefore it is necessary very carefully to observe the links and shackle and to replace them when the damage approaches a critical point, otherwise the boat may be swept away by reason of the weakening of the anchor chain and shackle to a breaking point due to this electrolytic dissolution.

A general object of this invention lies in the provision of an insulator coupling which can be used for linking an anchor chain and pennant and which will prevent the electrolytic effect described above and permit the use

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of a stainless steel or other non-corrosive pennant with safety.

A more particular object of my invention is to provide a coupling between dissimilar metallic elements, such as an anchor chain and a pennant, which incorporates a medium to electrically insulate the dissimilar metals and thereby prevent the completion of an electrolytic circuit which would otherwise result from their contact.

A further object of my invention lies in the provision of such a coupling in which the insulator is in the form of an element that is held under compression between the coupling parts by the tensile forces tending to separate these parts while the coupling is in use, e. g., while mooring a boat.

Another object of the invention lies in the provision of a coupling of the character described which is constructed to permit universal swivel action of the coupled elements.

For the attainment of these objectives and such other objects and advantages as may hereinafter appear or be pointed out, I can employ the preferred embodiment of the invention which is illustratively exemplified in the accompanying drawings, wherein:

Figure 1 is an elevational view of an insulator coupling constructed in accordance with the present invention;

Figure 2 is a cross-sectional view taken substantially along line 2—2 of Figure 1;

Figure 3 is a cross-section taken substantially along line 3—3 of Figure 2; and

Figure 4 is a diagrammatic elevation showing the coupling as it may be used to connect an anchor chain to a pennant.

Referring first to Fig. 4, I have shown how a coupling 10 of the present kind can be used to link ordinary ground tackle to a mooring pennant of a boat. The ground tackle I have shown comprises a mushroom anchor 11, and an anchor chain 12 which is normally composed of ferrous metal partly or wholly protected by galvanizing. The pennant 13 is preferably a preformed, kink-proof, stranded wire rope of a stainless steel or other non-corrosive alloy. To the pennant is secured a pick-up can or buoy 14 adjacent the loop 15 which normally may be dropped over a Samson post, bitt or cleat (not shown) to secure a boat to the anchorage.

The coupling 10, as shown in Figs. 1—3, includes a preferably cylindrical socket or shell-like member 20 which is inwardly flanged at one end to form a restricted aperture 21 communicating with bore 22. The restricted mouth of the socket is defined by the shoulders or flanges 23, the other end of the socket being fully open.

A rod-like terminal 30 is provided as a mating coupling member. The terminal 30 is formed of the same material as that of the wire rope pennant 13, and is securely fastened thereto by any desired method as by swaging the end of the pennant into a bore 31 at one end of terminal 30. The end of the terminal is provided with an enlarged head 32 whose diameter is less than the bore 22 of shell 20 and received therein spaced from the walls of the shell. The diameter of the terminal 30 is less than the diameter of the restricted opening 21 so that it also is circumferentially spaced from the socket member at the level of its mouth 21.

Snugly fitting within the socket bore 22 is an annulus 35 whose inner diameter is substantially equal to that of terminal 30 and fits rather closely thereover. The annulus is formed of an electrically insulative material which has low water absorption properties, which is inert to chemical influence and bacteria, and which is tough, non-brittle and capable of withstanding high compression. One such material is the plastic currently available under the name "Formica YN-25," which is a plastic material embodying a nylon cloth base molded in a

phenolic resin, but the invention is not restricted to the use of this or any other particular substance having the enumerated properties, since other such materials are known. The insulating annulus when assembled is held in compression between the socket flange 23 and the terminal head 32, and serves to retain the terminal out of contact with and electrically insulated from the socket. The annulus also acts as a bearing for the terminal in its swivel action in the socket, the terminal being capable of turning full 360° about its own axis with respect to the shell 20.

The bore 22 of socket 20 is closed at its wider end by a snugly fitting, insulative disc 36 which is preferably formed of the same material as annulus 35. The disc closure is held in place abutting the terminal head 32 by a bail pin 24 which traverses the socket member 20 preferably along a diameter. The pin 24 is journaled in bearing apertures 25 formed in two bosses 26 on the socket. Bosses 26 are provided with flat outer bearing surfaces 27.

A bail 40, which preferably is formed approximately equal in size to the anchor chain links, is pivotally journaled to the socket 20 by means of the opposite ends of removable pin 24, which pass through openings in the bail ends. The pin, socket and bail are securely fastened together by means of rivets, cotters or other suitable means extending through the apertures 28 in the ends of the pin. The inner sides of the bail ends are flattened for bearing against the flattened surfaces 27 of the socket bosses, so that the bail freely turns about pin 24 as an axis.

In assembling the coupling with the pennant and anchor chain, the terminal 30 with insulator 35 slipped over it is first passed outwardly through the bore 22 of shell 20 to engage the insulator 35 between the terminal head 32 and the flange 23. The free end of the terminal may then be secured to the pennant 13 by swaging or otherwise. Insulator 36 is then inserted into the open end of the shell. The bail 40 is then passed through the opening in one of the links at the uppermost end of the anchor chain and then fastened to the socket 20 by insertion of the pin 24 which also serves to hold the disc 36 in place. Finally, the cotter pins 28 are inserted.

The bail 40, pin 24 and shell 20 are formed of substantially the same metal as that of which the anchor chain 12 is composed. By the term "same metal," as used herein and in the appended claims, I intend to refer to any metals which are electrolytically neutral to each other, i. e., of the same status in the electromotive series. Therefore the dissimilar metals of the anchor chain and the pennant are repeated in the coupling by the respective parts to which they are fastened but are electrically separated therein by means of annulus 35. Since the dissimilar metals are thus held out of contact, no electrolytic circuit is completed and hence no electrolytic dissolution of the iron can take place.

It will be observed that insulator 35 is placed under compression by the tensile forces engendered by the interconnected elements. Consequently it is well able to withstand severe strains. It will further be noted that terminal 30 rotates about its own axis which is at right angles to the pivot pin axis of bail 40. The coupling therefore provides a universal joint between the coupled elements.

While I have described and illustrated a coupling in use between an anchor chain and a pennant, the invention has utility in other fields as well. The coupling is, in fact, of utility wherever it is desirable to separate dissimilar metals in the presence of an electrolyte to prevent the dissolution or corrosion of one of them. One example of such use is in the testing of various metals and alloys to determine resistance to salt water corrosion or resistance to chemical and bacterial attack. In such testing it is desirable to suspend the test specimens in a salt water bath (or other electrolyte) by means of an

insulator such as herein disclosed, in order to prevent electrolytic action between the support and the specimen which, if not prevented, would impair the test data obtained.

Modifications of the invention as to form and detail may obviously occur to those skilled in the art without necessarily departing from the spirit and scope of the invention as expressed in the appended claims.

Having thus described my invention and illustrated its use, what I claim as new and desire to secure by Letters Patent is:

1. A corrosion preventive coupling for linking an anchor chain to a pennant of dissimilar metal, comprising a substantially cylindrical socket inwardly flanged to restrict the bore thereof, a rod-like member of smaller diameter than the restriction in said bore and received therethrough and capped by a head of diameter larger than said restriction but smaller than that of the bore, an annulus of electrically insulative material held between said head and socket restricting flange, said insulative annulus having an outer diameter substantially equaling the diameter of the socket bore and an inner diameter substantially equaling the diameter of said rod-like member, whereby the rod-like member, including its enlarged head, is retained out of contact with the socket by said annulus, said annulus being composed of a material which is tough, non-brittle, capable of withstanding high compression, and having low water absorption properties, and a bail pivotally secured to said socket, said socket and bail being formed of one metal corresponding to that of the anchor chain and said rod-like member being formed of a dissimilar metal corresponding to that of the pennant, said bail being pivotally secured to the socket by a removable pin extending diametrically therethrough whereby upon securement of the bail to an anchor chain and securement of the rod-like member to a pennant the chain and pennant are linked together by a universal joint formed by the coupling.

2. A corrosion preventive coupling for linking an anchor chain to a pennant of dissimilar metal, comprising a substantially cylindrical socket inwardly flanged to provide a restricted opening to its bore at one end, a rod of smaller diameter than said restricted opening and received therethrough and having an enlarged head of diameter smaller than that of the socket bore and positioned within the bore, an annulus of electrically insulative material compressed between said head and said flange, said annulus having an outer diameter substantially equal to the diameter of the socket bore and an inner diameter substantially equal to the diameter of the rod for holding all parts of the rod spaced from the socket, a disc of electrically insulative material overlying the enlarged head of the rod, a bail pivotally secured to the socket by a removable pin extending diametrically therethrough said pin retaining the insulating disc in the socket, said socket and bail being formed of one metal corresponding to that of the anchor chain and said rod being formed of a dissimilar metal corresponding to that of the pennant, said annulus being composed of a material which is tough, non-brittle, capable of withstanding high compression, and having low water absorption properties.

3. A corrosion preventive coupling for linking an anchor chain to a pennant of dissimilar metal, comprising a substantially cylindrical socket inwardly flanged to provide a restricted opening to its bore at one end, a rod of smaller diameter than said restricted opening and received therethrough and having an enlarged head of diameter smaller than that of the socket bore and positioned within the bore, a removable annulus of electrically insulative material compressed between said head and said flange, said annulus having an outer diameter substantially equal to the diameter of the socket bore and an inner diameter substantially equal to the diameter of the rod for holding all parts of the rod spaced from the socket, a disc of electrically insulative material over-

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lying the enlarged head of the rod, a bail pivotally secured to the socket by a removable pin extending diametrically therethrough, said pin retaining the insulating disc in the socket, said socket and bail being formed of one metal corresponding to that of the anchor chain and said rod being formed of a dissimilar metal corresponding to that of the pennant, said annulus being composed of a material which is tough, non-brittle, capable of withstanding high compression, and having low water absorption properties.

4. A corrosion preventive coupling for linking a first metallic element to a second metallic element of dissimilar metal, comprising a substantially cylindrical socket inwardly flanged to restrict the bore thereof, a rod-like member of smaller diameter than the restriction in said bore and received therethrough and capped by a head of diameter larger than said restriction but smaller than that of the bore, an annulus of electrically insulative material held between said head and socket restricting flange, said insulative annulus having an outer diameter substantially equaling the diameter of the socket bore and an inner diameter substantially equaling the diameter of said rod-like member, whereby the rod-like member, including its enlarged head, is retained out of contact with the socket by said annulus, said annulus being composed of a material which is tough, non-brittle, capable of withstanding high compression, and having low water absorption properties, and a bail pivotally secured to said

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socket, said socket and bail being formed of one metal corresponding to that of the first metallic element and said rod-like member being formed of a dissimilar metal corresponding to that of the second metallic element, said bail being pivotally secured to the socket by a removable pin extending diametrically therethrough whereby upon securement of the bail to said first metallic element and securement of the rod-like member to said second metallic element the dissimilar metallic elements are linked together by a universal joint formed by the coupling.

References Cited in the file of this patent

UNITED STATES PATENTS

438,495	Short	Oct. 14, 1890
468,053	Englund	Feb. 2, 1892
476,193	Elliott	May 31, 1892
645,057	Ayers	Mar. 13, 1900
710,216	Schmidt	Sept. 30, 1902
726,912	Hebendahl et al.	May 5, 1903
949,604	Steinberger	Feb. 15, 1910
1,078,368	Meusebach	Nov. 11, 1913
1,200,984	Reeves	Oct. 10, 1916
1,594,197	Hofmann	July 27, 1926
2,148,036	Pfefferle	Feb. 21, 1939
2,329,961	Walker	Sept. 21, 1943
2,347,631	Hotchkiss	Apr. 25, 1944
2,384,941	Lyons	Sept. 18, 1945