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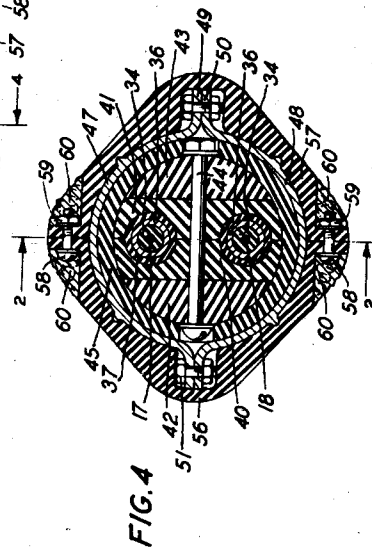
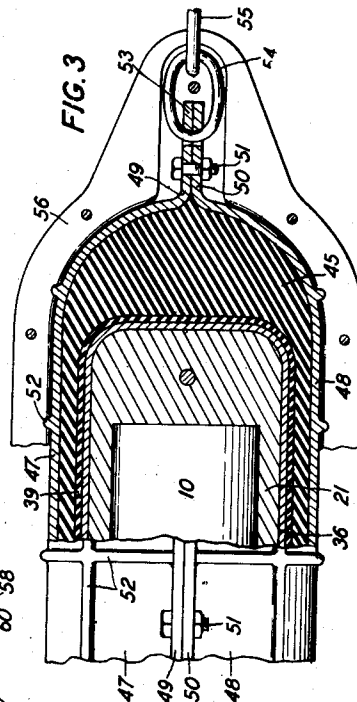
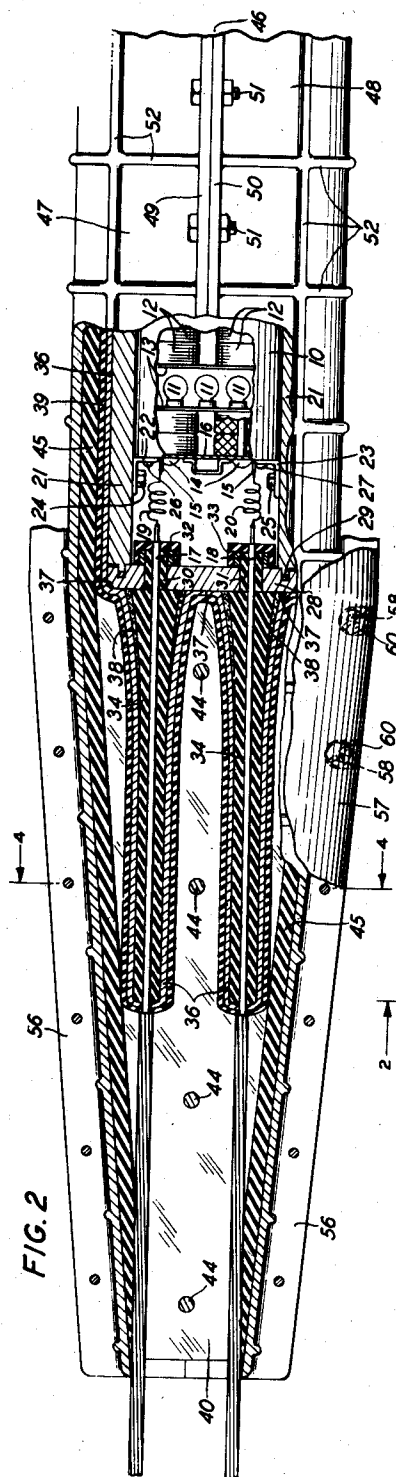
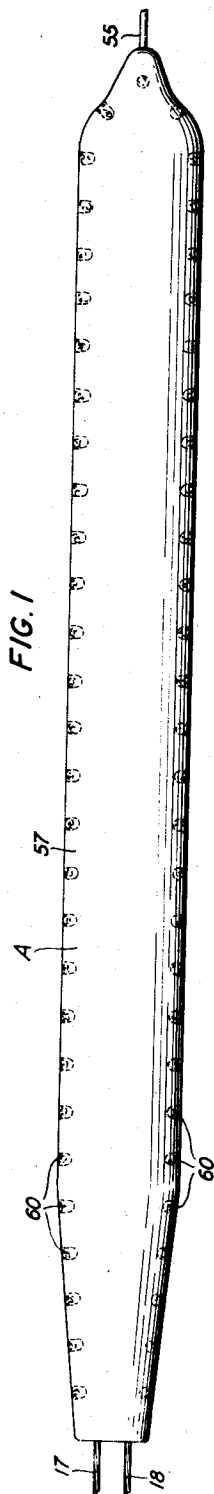
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2,155,650

HOUSING FOR REPEATER APPARATUS

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2 Sheets-Sheet 1



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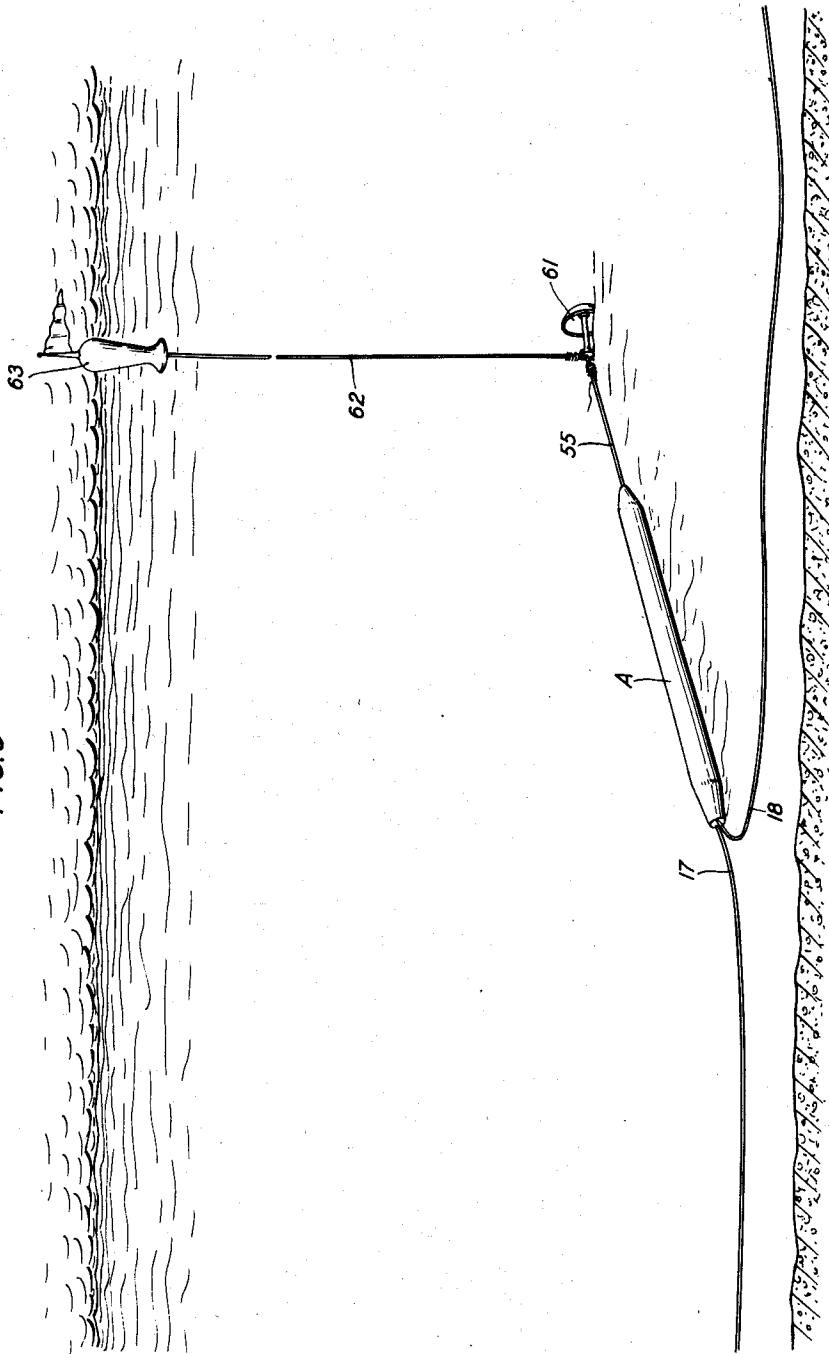
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FIG. 5



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HOUSING FOR REPEATER APPARATUS

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4 Claims. (Cl. 174—70)

This invention relates to repeater stations for submarine cables and more particularly to the containers for housing such repeater equipment on the ocean floor.

The object of the invention is to provide a container or housing for electrical apparatus which will withstand the tremendous pressures on the ocean floor.

Another object of the invention is the provision of a container or housing for sea bottom repeater equipment which will not permit the entrance of water around the cable entrance.

A further object of the invention is the provision of a housing for ocean bottom repeater equipment which will protect the equipment located in said container.

In accordance with this invention, commercial cables which cross the ocean are provided with repeater stations which are located on the ocean floor and which divide the cable into a number of sections. By the use of a number of repeater stations, economies in the cable construction and the terminal apparatus are effected. It has been proposed to provide repeater stations by anchoring a buoy repeater station to the ocean floor and also to provide repeater stations which are submerged some distance below the surface of the ocean, but not on the floor thereof. Such systems are open to the objection that long loops of cable must be provided, and that ocean currents cause the repeater stations to drift, thereby causing the cable attached thereto to be severely strained.

The present invention overcomes these objections by placing the repeater stations on the ocean bottom, a location which is almost entirely free from surface disturbances.

The repeater housing or container of this invention comprises a large cylindrical metal tube, the walls of which are sufficiently thick to withstand the severe pressures encountered at the bottom of the ocean. The tube is provided at one end with a closure which permits the entrance of cable stubs without permitting the entrance of water, and a series of protective sheaths or jackets enclose the metal tube to prevent injury from external objects with which it may come in contact.

The invention will be more clearly understood from the following description when read in connection with the following drawings in which:

Fig. 1 is a plan view of the repeater housing with the protective jacket therearound;

Fig. 2 is a fragmentary view, partly in section, illustrating the manner in which the cable stubs

are terminated and the various protective sheaths or jackets;

Fig. 3 is a fragmentary view, partly in section, illustrating the permanently closed end of the housing and the means of attaching the pulling or anchoring cable thereto;

Fig. 4 is a sectional view on line 4—4 of Fig. 2; and

Fig. 5 is a view showing the repeater housing in position on the ocean floor with an anchor secured to the anchoring cable and a marking buoy secured to the anchor.

In the drawings which illustrate applicant's repeater housing or container A for sea bottom repeater equipment, the numeral 10 designates a case or container preferably in the form of a continuous tube, heavy wrought iron pipe being suitable for the purpose. Within the case 10 are the vacuum tubes 11 and the other various repeater equipment such as the coils 12. Other repeater equipment is also contained in this tube or case 10 but, for the sake of clarity and the fact that this equipment forms no part of the invention, it is not shown.

As shown in Fig. 1, the apparatus contained in the case 10 is mounted on suitable shelves 13 which in turn are secured in position by means of the horizontal bolts 14. Connections to the apparatus in the case 10 are attained by means of the terminals 15 which extend through the end 16 of the case 10 and are connected inside of the case to the apparatus in the usual manner and on the outside of the case to the two cable stubs 17 and 18 by means of the flexible connections 19 and 20.

The case 10 is enclosed in a steel tube 21 and is secured therein by means of the angle brackets 22 and 23 and the bolts 24 and 25, the brackets being securely fastened to the end of the case 10 by means of the rivets 26 and 27. The tube 21 is provided with a cover 28, which, due to the gasket 29, makes a moisture-proof joint between the cover 28 and the tube 21. Secured in the cover 28 and insulated therefrom by means of the insulated bushings 30 and 31 and the fittings 32 and 33 are the cable stubs 17 and 18 (a construction similar to that shown in Patent 1,610,442 to W. S. Gorton). Surrounding the two cable stubs 17 and 18 and extending some distance out from the cover plate 28 are the two cones 34 and 35 of insulating material, preferably rubber. These cones are securely joined to the cable stubs 17 and 18 by a suitable adhesive or they may be molded thereon. Surrounding the cones 34 and 35 and extending over the entire surface of the

tube 21 is a lead jacket 36. This jacket is hermetically sealed and forms a complete covering for the cable stubs 17 and 18 and the tube 21. The lead jacket 36, where it comes in contact with the cover 28 is sweated thereto at 37 to prevent any loss of the impregnating fluid 38 which is introduced between the cones 34 and 35 and the lead jacket 36. Over the lead jacket 36 is cemented a jacket 39 of vulcanized rubber of a high quality. This jacket extends over the entire surface of the lead jacket 36, the cable stubs 17 and 18 and the cones 34 and 35 thus forming a water-tight seal over the lead jacket.

In order to form a single truncated cone out of the two cones 34 and 35 and the stubs 17 and 18, segments of rubber, as shown in the plan view Fig. 1 and in the cross-sectional view Fig. 4, are provided. These segments comprise two inner members 40 and 41 and two outer members 42 and 43 which, when secured together by means of the bolts 44, form a complete enclosure in the shape of a truncated cone for the stubs 17 and 18 and for their cones 34 and 35.

Completely enclosing the entire assembly, as described up to this point, is a resilient jacket 45. This jacket completely surrounds the assembly and spaces it away from an armored steel casing 46 which comprises two elongated semi-circular sections 47 and 48 which are provided with flanged portions 49 and 50 along their abutting edges so that the bolts 51 may be passed therethrough and fastened to secure the two halves together. These steel sections are provided with reinforcing ribs 52 which are provided to add strength to the housing. Means comprising a lug 53, integral with the two sections 47 and 48, and a coupling ring 54 are provided for securing an anchoring cable 55 thereto.

In order to protect the outer steel shell or casing 46 from abrasions, etc., such as are met with on the ocean floor, a heavy vulcanized rubber covering or jacket has been provided. This covering is arranged to completely enclose the entire repeater housing and comprises two members 56 and 57 having semicircular grooves therein and, when secured together by means of the bolts 58 and the nuts 59, forms a cavity which will snugly enclose and embrace the steel casing 46. In order to prevent the action of the sea water from affecting the bolts 58 and the nuts 59 they are covered over with a suitable cement 60.

As shown in Fig. 5, the repeater housing A is in position on the ocean floor with the cable stubs 17 and 18 extending therefrom and the anchoring cable 55 secured to the anchor 60. Secured to the anchoring cable 60 by means of a cable 62 is the marking buoy 63.

From the foregoing it will be observed that the applicant has provided a container for sea bottom

repeater equipment of high power output, in which certain mechanical features have been incorporated which will enable the container to house various pieces of electrical apparatus and yet be able to withstand the high pressure encountered at sea bottom depth.

It is to be understood that the invention is not limited to the precise construction shown as various modifications may be made without departing from the spirit of the invention, and it is only limited by the scope of the appended claims.

What is claimed is:

1. A container for housing undersea electrical apparatus comprising an elongated tubular member closed at each end, one of said ends being provided with a removable cap and having a conductor passing therethrough and secured therein by a water-tight fitting, a jacket of soft metal completely surrounding said member and said cap and a shell of hard metal enclosing said soft metal jacket but spaced away therefrom by a layer of resilient material.

2. A container for housing undersea electrical apparatus comprising an elongated tubular member closed at each end, one of said ends being provided with a removable cap and having a conductor passing therethrough and secured therein by a water-tight fitting, a jacket of soft metal completely surrounding said member and said cap, a shell of hard metal enclosing said soft metal jacket but spaced away therefrom by a layer of resilient material and a jacket of protective material completely surrounding said hard metal shell.

3. A container for housing undersea electrical apparatus comprising an elongated tubular member closed at each end, one of said ends being provided with a removable cap and having a conductor passing therethrough, a jacket of soft metal completely surrounding said member and said cap, a shell of hard metal enclosing said soft metal jacket but spaced away therefrom by a layer of resilient material, a jacket of protective material completely surrounding said hard metal shell and an apparatus chamber mounted inside of said first-mentioned tubular member.

4. A container for housing undersea electrical apparatus comprising an elongated tubular member closed at each end, one of said ends being provided with a removable cap and having a conductor passing therethrough, a jacket of soft metal completely surrounding said member and said cap, a shell of hard metal enclosing said soft metal but spaced away therefrom by a layer of resilient material, and a jacket of protective material completely surrounding said hard metal shell, said jacket comprising two similar sections bolted together.

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