Sept. 27, 1932. G. L. WANAMAKER 1,880,060

DEEP SEA TELEPHONE, LIFE LINE, AND DIVING CABLE

Filed Dec. 11, 1928

FIG.1.

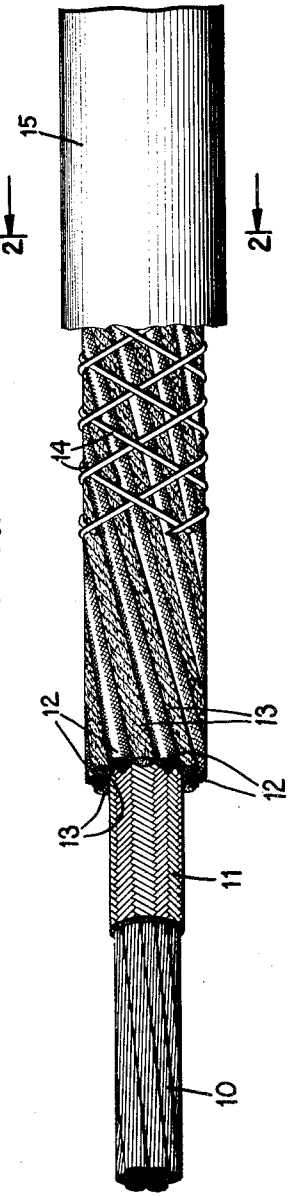
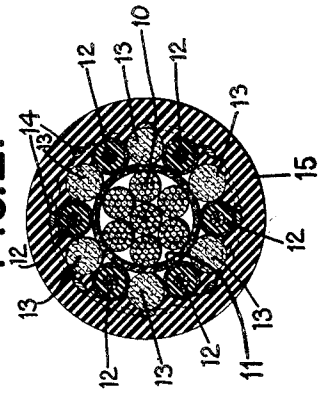


FIG.2.



George L. Wanamaker
Inventor

By his Attorneys
Cooper, Kerr & Dunham

Patented Sept. 27, 1932 1,880,060

UNITED STATES PATENT OFFICE

GEORGE L. WANAMAKER, OF AMBRIDGE, PENNSYLVANIA, ASSIGNOR TO NATIONAL ELECTRIC PRODUCTS CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE

DEEP SEA TELEPHONE, LIFE LINE, AND DIVING CABLE

Application filed December 11, 1928. Serial No. 325,238.

This invention relates to certain new and useful improvements in safety life lines and telephone cables for divers.

In deep sea diving, each diver is, of course, provided with a rugged and strong life line and in addition telephone communication must be established with the diver and accordingly telephone cable conductors must be provided to reach the diver. Such telephone conductors are comparatively fragile and are liable to breakage. In diving work it is also advantageous to make the cables and lines which extend to the diver as flexible as possible so as to permit free movement of the diver.

This invention has for its objects the provision of an improved unitary structure which comprises not only a rugged and strong life line, but also comprises a set of telephone conductors all associated in one cable.

It is accordingly another object of the present invention to provide an improved cable which is particularly adapted for divers' use. The life line and telephone conductors are all disposed in one complete cable and the various parts are so related to one another that while strength is secured for the elements which constitute the life line, flexibility of the cable as a whole is retained and the telephone wires or conductors are well protected against accident, breakage and against abrasion.

It is a further object of the present invention to provide a unitary structure in which the telephone conductors are contained within a common housing which also encases the life line.

It is a further object of the present invention to provide an improved arrangement of the component elements which go to make up the cable to the general end that combined life line and telephone cable may be provided which will meet the rigid service requirements which such devices are subject to.

In the drawing:

Figure 1 is a fragmentary view of the life line and telephone cable broken away to show the interior construction.

Fig. 2 is a transverse cross-section taken on line 2—2 of Fig. 1.

In more detail in the drawing, the life line proper which is centrally disposed in the cable, comprises a number of fine copper strands which are "rope laid" as shown in Fig. 1 at 10. This disposition of these strands with a rope lay with the individual strands being formed of relatively fine copper wire affords a construction giving extreme strength and at the same time affording maximum flexibility.

Disposed outside of the central life line portion of the cable is a sheath 11 which may be in the form of a braided cover or a tape covering. This braid or tape serves to reduce the friction between the life line and outer parts including the telephone conductors and also forms a cushion or bed for such telephone conductors. The telephone conductors designated 12, Fig. 2, are the usual insulated telephone conductors used in telephone practice and such telephone conductors are spirally disposed outside of the braid or wrapping 11 as shown in Fig. 1. Such telephone conductors are individually separated from each other by intermediate spacing filler cords 13. Such filler cords serve to keep the telephone cables or conductors apart and prevent their rubbing against one another when the cable as a whole flexes or bends. As shown in Fig. 2, there are six telephone conductors or three separate pairs. This provision of a multiplicity of conductors provides available spares in case one set of conductors becomes damaged or ineffective in any way.

Outside of the telephone conductors 12 and filler cords 13 there is disposed somewhat open soft fibrous net work or mesh 14. In lieu of such mesh work a tape-like covering can be provided. This mesh work, netting or tape-like covering serves to keep the telephone conductors and filler cords in place and acts as a supplementary outer cushion therefor.

Over the whole assemblage thus far described, there is placed a vulcanized flexible rubber tubular sheath 15 which is impervious to sea water and which acts as an outer pro-

tection for the telephone conductors and their interior parts.

The construction of a deep sea telephone and life line cable as thus described affords a cable which is rugged and yet which retains a high degree of flexibility permitting a diver to freely move about when at work. The disposition of the rope laid life line at the center affords backing or support for the telephone conductors and prevents an excessive kinking or sharp bending of such conductors. The conductors are also additionally supported from without by the relatively thick but flexible rubber sheath 15. The parts which are disposed outside of the life line also cooperate and afford a protection to the life line itself. They guard the life line against damage. The spiral disposition of the telephone conductors about the life line with their disposition between cushion bed 11 and the net work 14, also contributes to provide for maximum flexibility.

What I claim is:

1. A life line for divers' use comprising a plurality of fine flexible copper strands having a rope laid disposition to each other and disposed centrally of the life line, a flexible jacket and cushioning housing for said flexible copper strands, and flexible stranded individually insulated telephone conductors upon said jacket and surrounding said life line, and a flexible tubular rubber outer housing disposed exteriorly of the stranded telephone conductors and providing a flexible housing therefor and for said life line.

2. A life line and telephone cable for deep sea divers' use comprising a life line of metallic strands with a rope lay at the center of the cable, a plurality of flexible stranded individually insulated telephone conductors disposed therearound and being relatively smaller than the life line strands to afford greater flexibility to the interior life line and an outer flexible rubber housing without said conductors, which housing retains the conductors in position with respect to the center life line elements.

3. A life line and telephone cable for divers, comprising a centrally disposed rope laid structure of flexible strands to comprise a life line, a yielding wrapping therearound, telephone conductors supported thereupon and spaced from the life line by said wrapping, yielding spacer elements between the adjacent telephone conductors, another wrapping around said conductors and spacer elements, and flexible rubber housing encasing the whole.

4. A combined life line and telephone cable, comprising a unitary structure including an outer rubber flexible housing, a centrally disposed life line structure and intermediate exteriorly insulated telephone cables which are spaced apart from each other to prevent the insulation of one telephone cable rubbing against the insulation of an adjacent telephone cable upon bending of the whole, said telephone cables being disposed between the life line structure and the flexible housing so as to be backed up and supported against excessive bending by both the housing and life line structure.

5. A combined telephone cable and life line for divers' use comprising a centrally disposed life line structure, a plurality of telephone conductors spirally disposed about the life line structure, a fibrous cushion element between said conductors and the life line and directly engaging the life line, another cushion element around the assemblage of conductors and a flexible rubber housing encasing all of said parts and protecting the same from ingress of sea water.

6. A combined telephone cable and life line for divers' use comprising a life line structure and a plurality of telephone conductors spirally disposed about the central life line and spaced therefrom only by a fibrous cushion element and a flexible rubber outer housing which encases the telephone conductors and holds the same in a position where they are adapted to receive support from the life line.

7. A combined life line and telephone cable comprising a flexible tubular rubber outer housing, telephone conductors and a life metallic line therein, said life line being within and affording a support for the telephone conductors, and the telephone conductors being spirally disposed therearound, and cushioning means for separating the respective conductors and for maintaining the same out of direct abutting contact with the life line, said cushioning means which maintains the telephone conductors out of direct abutting contact with the life line comprising a fibrous cushion element which itself directly abuts the metallic life line, said tubular housing encasing all the aforesaid parts.

8. A combined life line and telephone cable which is flexible enough for divers' use comprising telephone conductors with associated protecting and insulating material, a life line disposed within said conductors and material and a tubular rubber outer housing encasing all of said parts, said life line affording a backing and support for the telephone conductors, and said conductors, protecting and insulating material and the outer housing, all serving to protect the life line against damage said telephone conductors being relatively smaller and accordingly more flexible than the inner life line and said protecting and insulating material being of very flexible character and being so disposed with respect to the life line and telephone conductors as not to materially impede the bending of the life line.

9. A combined flexible life line and telephone cable, which line and cable are flexible enough for divers' use, comprising a life line

with flexible metallic strands having a rope lay configuration and disposed centrally of the cable, telephone conductors spiralled therearound and relatively smaller than the life line to afford high flexibility and so as not to restrict bending of the life line and a common outer rubber housing without the telephone conducts for houisng both said conductors of the life line.

In testimony whereof I hereto affix my signature.

GEORGE L. WANAMAKER.