INTER-COMPARTMENT COUPLING DEVICE

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ABSTRACT

Inter-compartment coupling devices are described for improving on-board communications for large ships. The described devices permit efficient electrical coupling between compartments so that communications by hand-held transceivers is possible. The couplers described include a slot antenna, loop and monopole antennas which interconnect the various areas on either side of a partition or deck.

6 Claims, 4 Drawing Figures
1 INTER-COMPARTMENT COUPLING DEVICE

BACKGROUND OF THE INVENTION

In general this invention relates to inter-compartment coupling devices, and more particularly to inter-compartment coupling devices which improve onboard communications for large ships by introducing efficient electrical coupling between the compartments.

Communications from one part of a ship to another has been accomplished to a limited extent by means of hand-held transceivers, (i.e., walkie-talkies). There is an increasing interest in this type of communications among ship owners, and in particular among large tank fleet operators. At present there is under consideration a set of standards (frequency, power output, etc.) for this type of communication on ships. Thus far, random coupling is utilized by relying on inadvertent slots and cracks between compartments and in the ship's ventilating system. On large ships, each cabin, passageway, hold, or tank can be considered to be a cavity, in the radio or electrical sense of the word, and each such cavity is coupled haphazardly to the next and to the outside area on the deck of the ship through cracks, portholes, ventilation ducts, and the like. There is, therefore, a real need to improve on-board communications and to eliminate the haphazard coupling so that small power hand-held transceivers can be readily used.

SUMMARY OF THE INVENTION

It is therefore an object of this invention to provide an inter-compartment coupling device which greatly improves on-board communications by introducing efficient electrical coupling between two or more compartments.

Another object of this invention is to provide an inter-compartment coupling device which permit communications by small power transceivers between at least any two parts of a ship.

According to the broader aspects of this invention there is provided an inter-compartment coupling device comprising means located within the partition which separates the compartments, such that the means improve the communications by introducing efficient electrical coupling between the compartments.

BRIEF DESCRIPTION OF THE DRAWING

The description of the invention will more easily be understood when considered in connection with the following illustrative drawings in which:

FIG. 1 schematically represents a ship having inter-compartment coupling devices installed within its partitions;

FIG. 2 illustrates a type coupler which may be utilized as an inter-compartment coupling device;

FIG. 3 illustrates another inter-compartment coupling device which may be incorporated to affect the electrical coupling between various compartments; and

FIG. 4 illustrates still another inter-compartment coupling device which may be utilized to connect the areas on either side of a partition.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to FIG. 1, there is illustrated a typical tanker or cargo ship 11. Installed in the partitions 12 separating the various compartments or chambers 13, and the various cabins 14 and top areas 15 of the ship, coupling devices 16 which are more fully described in connection with FIGS. 2 through 3. The purpose of the arrangement as shown in FIG. 1 is to permit communications between transceivers of the type known as walkie-talkies having a small power. If, for example, there is a randomly located transceivers at points A, B, C in the chambers or cabins indicated, the coupling devices 16 provide an efficient path for electrical radio energy between one chamber or a number of chambers. Thereby, clear and inexpensive radio communications can be maintained at all times between any parts of the ship.

It should be pointed out at this point that although there is herein described a means for communicating from one compartment to another on shipboard, using conventional hand-held receivers to overcome the shielding effects of metallic construction of the ship, the coupling arrangements described herein can as easily be used in any place where communication is desired between any chambers which require overcoming shielding effects of the electrical interference partitions or walls which interconnect the various chambers through which communication is desired.

Referring now to FIG. 2, there is illustrated a coupler which is a simple slot antenna 21 cut in the partition 22 which separates two compartments. The width 23 of the slot antenna is equal to the width of the partition, and the length 24 of the antenna slot is equal to the one-half wave length at the frequency of operation of the transceiver. The height 75 of the slot antenna is not critical, but it should not be less than one-half inch. A range, for example, is ½ to 2¾ inches. In this the simple case, the coupler 21 which may be utilized and designed into the partitions 12 interconnecting the various compartments of the ship as shown in FIG. 1. However, it should be apparent that although this inexpensive slot antenna can be utilized in all portions of the ship, it could represent a hazardous condition in some cases or an undesirable condition in others where water tight or secure compartments are required. It is therefore proposed, as shown in FIGS. 3 and 4, the other embodiments of the invention whereby inter-compartment integrity can be maintained and efficient electrical coupling still provided.

Referring now to FIG. 3, there is shown a coupler which operates on a similar principle to that of the slot antenna except that the pickup and reradiation is accomplished by means of a directly connected mono-pole antenna 31. The length 32 of the radiator 33 as measured from the face of its support is one-quarter of a wave length at the frequency of operation. This measurement from the indicated face is when radiator is mounted in an insulation 34 which is contained in the threaded metallic support member 35 and fixed to the partition 36 by a threaded metallic nut 37. The insulation can be any solid type of insulation such as teflon, glass impregnated epoxys, etc., the type selected, as should be evident to one skilled in the art, shorten the physical length of the radiator which will require length adjustment so that the length of the radiator projection 32 is one-quarter of a wave length at the frequency of operation. In addition, it should be noted that if the support member 35 is completely non-metallic, then the measurement of the one-quarter wave length should be from the partition face as indicated by length 38. Inter-compartment integrity can be maintained in well known means by including between the surfaces 39 of the support member 35 and the partition 37 any sealing compound selected from a material which will seal against the various environments to which the compartments are exposed. The sealing, in a simple case, could be a washer or a silicon rubber type compound. The sealant, of course, will depend to a large extent on the general nature of the cargo to be carried by the ship.

Referring now to FIG. 4, there is shown a preferred type loop coupling device 41. The coupler comprises two loops 42, 42a, on each side of the partition 43 and conductively connected together. This device is also simple and inexpensive to install since it only requires drilling a hole 44 and then fastening by means of a single nut 45. Coupling is accomplished by the radio field on one side of the partition inducing currents in the loops which causes radiation on the other side of the partition. The loop may be, for instance, made of wire or rod of suitable strength. For optimum coupling the overall length 46 of the loop should be such that resonance occurs at the frequency of operation of the transceivers, and roughly half this length 47, should extend on either side of the partition as shown. Loops with smaller dimensions will operate with reduced efficiency. As indicated in FIG. 3 the support member 48 comprises a solid insulation 49 contained in a metallic threaded member 50. This configuration permits fix-
ing to the wall. Also included would be the required sealing in area 51 to maintain cargo integrity between the compartments on either side of the partition.

The loop antenna 41 as shown, combines a solid insulation and a metallic nut and thread configuration, wherein the ends 52 of the loop are electrically connected to the metallic member 50 of the support 48. This is extremely valuable for use in oil tankers because of its intrinsic safe character. This is due to the fact that it is almost impossible to produce a spark in a loop antenna because of the grounded feature at 52. Since safety is an important feature in all oil tank operations, the loop antenna, as shown in FIG. 4, does indeed contribute to increasing tanker fleet safety and still provide improved communications.

Although there is described three distinct couplers, it is possible to combine the couplers, for example, using the loop type in an explosive atmosphere and the slot or mono-pole type for interconnecting the cabins. The combination used, will be determined by the location and communication requirements of the various areas on the ship or other facility.

There has been described inter-compartment coupling devices for improving communications between chambers. The couplers described included a slot antenna, loop and mono-pole antennas which can easily be fit into partitions forming the chambers. These couplers interconnect the various areas on either side of a partition to facilitate communication between one or more areas by small power transceivers. The term partitions is intended to include decks and communication is of course possible from above deck to below.

Although I have described above specific embodiments in connection with specific apparatus, it should be clearly understood that this description is made only by way of example and not as a limitation to the scope of my invention as set forth in the objections thereof and in the accompanying claims.

I claim:

1. An inter-compartment coupling device for improving two-way on-board communications between compartments of a ship comprising a mono-pole antenna and means locating the antenna within a partition between compartments so as to provide efficient electrical coupling between the compartments, and the length of the antenna radiator projecting into each compartment is one-quarter of a wave length at the frequency of operation.

2. An inter-compartment coupling device for improving two-way on-board communications between compartments of a ship comprising a loop antenna, one loop on either side of a partition separating the compartments and conductively connected together, means locating and fixing the antenna to said partition, and said antenna having an overall length one-half of a wave length at the frequency of operation.

3. The coupler according to claim 2 wherein the means for locating and fixing said antenna in the partition includes a threaded support member and nut, the threaded support having a solid insulation portion and a metallic portion.

4. The coupler according to claim 3 wherein the ends of the loop antenna are electrically connected to the metallic portion of said support member whereby, when a radio field on one side of the partition introduces currents in the loop to cause radiation on the other side of the partition, the coupling is accomplished in a spark free manner.

5. Means for improving two-way on-board communications from one part of a ship to another comprising: transceiver means for communicating between compartments separated by at least one partition; and mono-pole antenna means positioned within the partition and extending on both sides of the partition for improving two-way communications of said transceiver means by introducing efficient electrical coupling between the compartments.

6. Means for improving two-way on-board communications from one part of a ship to another comprising: transceiver means for communicating between compartments separated by at least one partition; and loop antenna means positioned within the partition and extending on both sides of the partition for improving two-way communications of said transceiver means by introducing efficient electrical coupling between the compartments.

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