

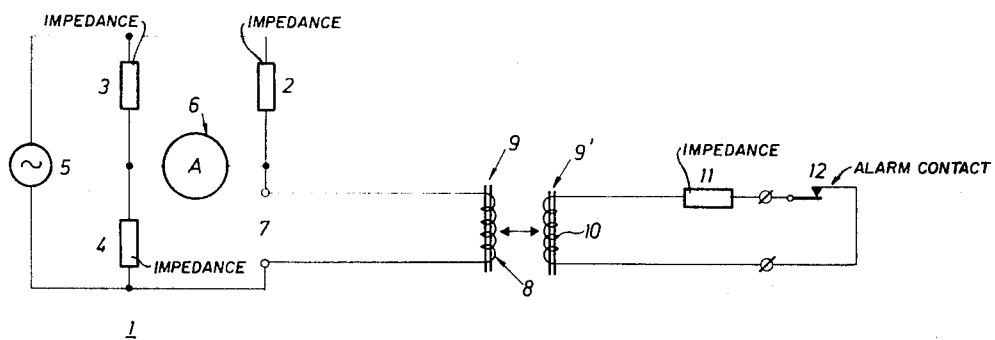
[54] **ELECTRIC ALARM DEVICE**
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340/280, 340/285, 336/115
[51] Int. Cl. **G08b 19/00, G08b 13/24**
[58] Field of Search 340/285, 195, 189,
340/29, 63, 280
[56] **References Cited**
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[57] **ABSTRACT**

An electric alarm system, particularly for boats, having an alarm sensing circuit connected to an alarm contact circuit which is adapted to be mounted on the boat. The connection between the alarm sensing circuit and the alarm contact circuit comprises an inductive coupling link in the form of a transformer having primary and secondary windings which are mechanically detachable from each other.

9 Claims, 8 Drawing Figures



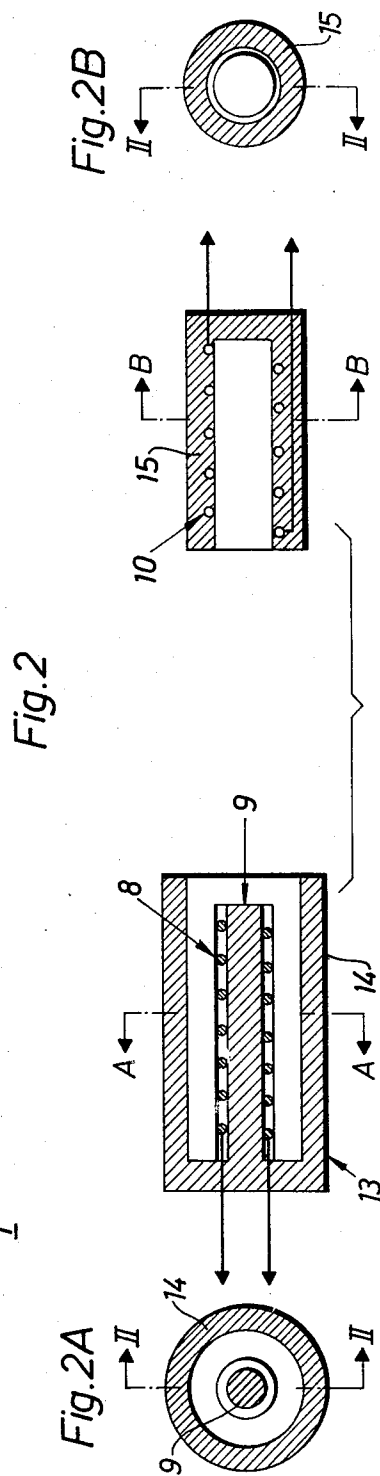
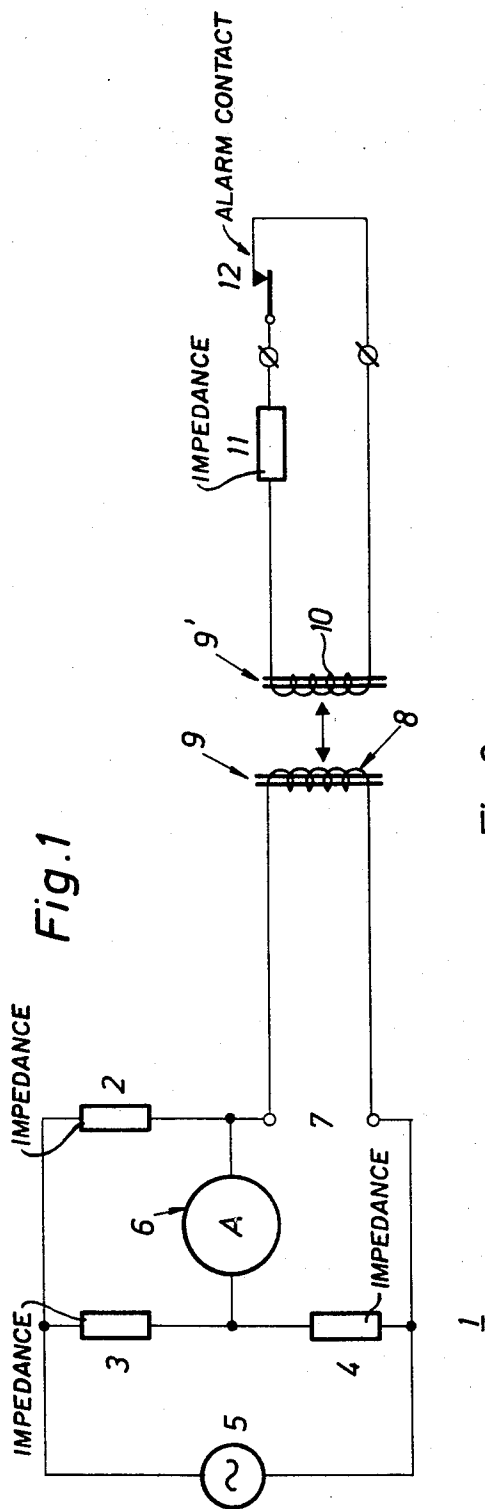


Fig. 4B

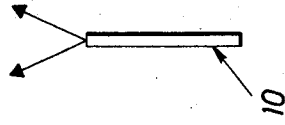


Fig. 4A

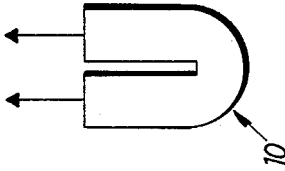


Fig. 3B

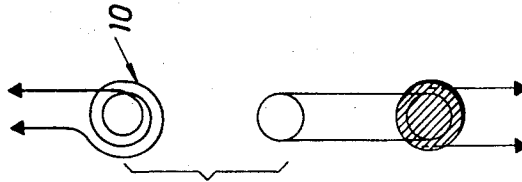
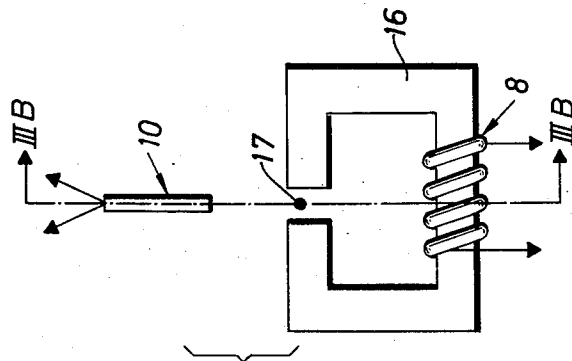


Fig. 3A



ELECTRIC ALARM DEVICE

The present invention refers to an electric alarm device.

In alarm systems, especially burglary alarm systems for water craft, such as boats, the contact elements incorporated in such systems and the contact devices used for transmitting alarm information from a boat to a shore-based alarm station often give rise to serious problems. Because the contact elements in the transmission lines quickly become corroded, disturbances occur in the electrical connections which can result in a false alarm at the shore-based alarm station.

This problem is solved by means of the system of the present invention, which relates to an electric alarm system of the type which includes an alarm state sensing circuit, preferably in the form of a balance coupling or the like, in connection with an alarm contact circuit or the like mounted on the device to be protected, and which is mainly characterized in that the connection between the alarm state sensing circuit and the alarm contact circuit comprises an inductive coupling link in the form of a transformer having primary and secondary windings which are mechanically detachable from each other, said transformer in the connected condition being such that it can transform the impedance value of circuit supplementary elements included in the alarm contact circuit for electrical cooperation with the alarm state sensing circuit.

This invention will now be described with reference to the accompanying drawings, in which:

FIG. 1 illustrates diagrammatically an alarm system according to the present invention.

FIG. 2 illustrates in cross section an inductive coupling linkage forming part of the system illustrated in FIG. 1, same being taken substantially along the lines II—II of FIGS. 2A and 2B. FIGS. 2A and 2B are cross sectional views taken along the lines A—A and B—B, respectively, in FIG. 2.

FIGS. 3A and 3B illustrate another embodiment of the inductive coupling link constructed according to the present invention.

FIGS. 4A and 4B illustrate an element of the inductive coupling link illustrated in FIG. 3.

The system illustrated in FIG. 1 consists of an alarm state sensing circuit in the form of a bridge balance coupling, which is indicated generally by the reference numeral 1. The bridge balance coupling includes three impedances 2, 3 and 4, the bridge coupling being supplied with a.c. voltage from a voltage source 5. Connected in the balance diagonal of the bridge coupling is an alarm device 6 of known type. A branch of the bridge, here indicated by the reference numeral 7, is connected with a primary winding 8 mounted on a transformer core 9. In the inductive coupling to the primary winding 8 is arranged a secondary winding 10 arranged on a second transformer core 9' which is magnetically coupled to the transformer core 9 but mechanically separable from the same. The secondary winding 10 is connected to a circuit consisting of an impedance 11 and an alarm contact 12 coupled in series therewith. The circuits 11 and 12 form a so called rest current circuit. The rest current circuit is such that together with the primary and secondary windings 8, 9, 10 it forms an impedance which balances the bridge 1. Thus, while the contact 12 is closed, the bridge is held in balance and the alarm device 6 is inoperative. How-

ever, as soon as the alarm contact 12, which may be incorporated in a burglary alarm system on board the vessel for example, is opened, the bridge coupling is unbalanced and the alarm device 6 is actuated.

The primary winding 8 and the secondary winding 10 thus form an inductive coupling link in the form of a dividable transformer preferably located adjacent the jetty or landing dock along which the boat is tied up, or on the boat itself. If the boat is moved from the landing dock, either the coupling device must be dismantled or the line broken, wherewith the bridge 1 becomes unbalanced and the alarm triggered.

FIG. 2 illustrates a practical embodiment of the inductive coupling link, which in this case has the form of a plug-and-socket device. In the embodiment illustrated in FIG. 2, the primary winding 8 is mounted on a core 9 which forms part of a plug portion 13 provided with a surrounding cylindrical casing 14. Arranged to cooperate with the plug portion 13 is a socket portion 15, in which the secondary winding 10 is placed. As will be seen from FIG. 2, the windings are suitably embedded in a protective material to shield them against mechanical damage. In practice it is expedient to attach to the landing dock a pin plug member and to attach a socket member 15 to the end of an electric cable leading from the boat. Naturally, the two members to be connected together can be provided with known snap-in devices for mechanically holding the parts together in relation to each other.

There may also be such an embodiment in which the coupling link is constituted by two mechanically separable transformer core halves on which the primary and the secondary winding respectively are arranged.

FIGS. 3A and 3B illustrate another inductive coupling link according to the invention. In this embodiment, the primary winding 8 is mounted on a core 16 having an air gap 17. The secondary winding 10 is designed for mechanical cooperation with the air gap 17. FIGS. 4A and 4B illustrate a simple embodiment of a secondary winding 10 constructed in the form of a U-shaped conducting portion, i.e., it consists of only one turn.

It will be understood that the invention is not restricted to the described and illustrated embodiments, but can be modified in a number of ways. Thus, it is not necessary for the alarm state sensing circuit to consist of a balance bridge coupling, but can be in the form of an impedance measuring circuit or the like. Moreover, in certain embodiments, the impedance 11 may be omitted, provided that the alarm contact circuit together with the inductive coupling link together form a balanced or neutral condition in the alarm state sensing circuit.

What is claimed is:

1. An electric burglary alarm system for watercraft for transmitting alarm information from a watercraft to a shore-based alarm, comprising in combination:

a shore-based alarm state sensing circuit means including an alarm;

an alarm contact circuit means adapted to be mounted on the watercraft to be protected;

connection means between the alarm state sensing circuit means and the alarm contact circuit means and separable for actuating said alarm upon theft of said watercraft;

said connection means transforming the impedance value of the alarm contact circuit means for electri-

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cal operation with the alarm state sensing circuit means, said connection means comprising an inductive coupling link defining a transformer having primary and secondary windings which are mechanically detachable from each other, said alarm contact circuit means comprising means defining a normally closed contact openable for operating said alarm in response to burglary on said watercraft and connected in closed circuit loop with said secondary winding, said alarm state sensing circuit means being connected to said primary winding; whereby said alarm is responsive to both opening of said contact and separation of said connection means.

2. An electric alarm system according to claim 1, wherein the alarm state sensing circuit means includes a balance bridge circuit having a potential source connected thereacross, said alarm being connected to the bridge circuit and means connecting said primary winding of said transformer in a leg of said bridge for unbalancing said bridge in response to either separation of secondary winding from said primary winding or opening of said contact.

3. An electric alarm system according to claim 2, including an impedance member connected in series with said contact in said closed circuit loop and selected so as to define with the coupled primary and secondary windings an impedance value which balances said bridge circuit with said contact closed and maintains said alarm unenergized.

4. An electric alarm system according to claim 8, wherein the transformer includes a core on which said primary winding is wound, said core having a pair of opposed, spaced portions defining an air gap, said secondary winding being removably receivable in said air gap between said spaced portions of said core.

5. An electric alarm system according to claim 4,

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wherein the core on which the primary winding is mounted is made of a magnetically conductive material.

6. An electric alarm system according to claim 4, wherein one said core portion is a substantially cup-shaped casing and the other core portion extends plug-like from the bottom of said cup-shaped portion axially toward the open end of said cup-shaped portion and is spaced by said air gap from the peripheral wall of said cup-shaped portion, said air gap being annular, said primary winding being wound on the radially inner of said core portions facing outwardly toward said air gap, said transformer further including a socket member of cup-like configuration having a peripheral wall, said secondary winding being on the inside of said peripheral wall, said socket member and secondary winding being receivable axially within said air gap of said core with said secondary winding in radially opposed surrounding relation to said primary winding for rendering said transformer operative.

7. An electric alarm system according to claim 6 in which said windings are embedded in a protective material to shield same against mechanical damage.

8. An electric alarm system according to claim 4 in which said core is substantially U-shaped, having a bight portion on which said primary winding is wound and spaced opposed legs extending therefrom and defining said air gap between the opposed free ends thereof, said secondary winding comprising a relatively flat coil oriented transverse of the plane of said core and receivable between said free leg ends for rendering said transformer operative.

9. An electric alarm system according to claim 8, in which said secondary winding coil is of only a single turn; consisting of a U-shaped conductor receivable in said gap.

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