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Daughenbaugh

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[54] **UNDERWATER DEMOLITION DEVICE**

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[52] **U.S. Cl.** ..... **102/1 R,** 102/10

[51] **Int. Cl.** **F42b 22/00**

[58] **Field of Search** 89/1.5; 102/1, 18, 2, 7, 102/10, 13, 16, 24

[56] **References Cited**

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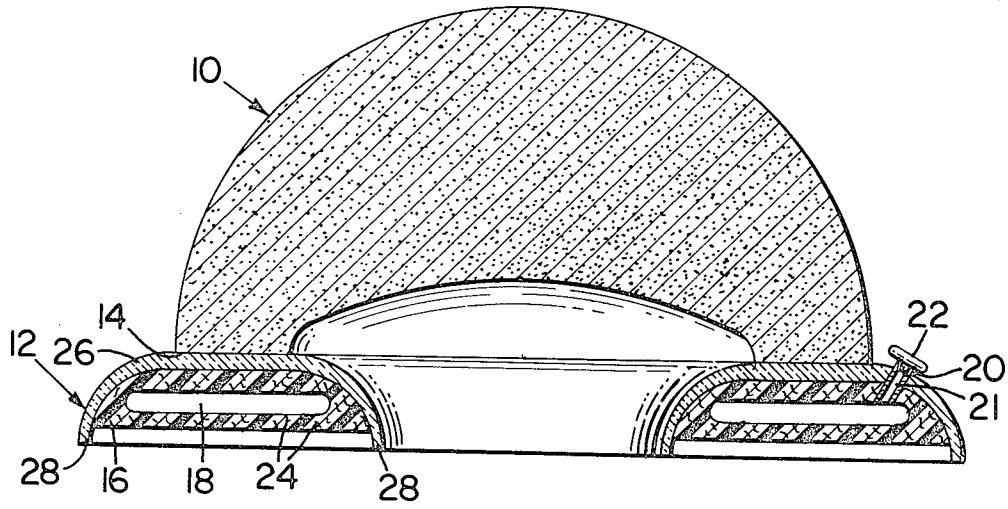
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[57] **ABSTRACT**

A device for attaching an explosive charge to an underwater portion of a sea-going vessel including an adhesive substance having a suitable chemical material therein adapted to react with sea water and initiate an exothermic reaction which melts the adhesive substance and bonds the device and any connected explosive charge to the hull of the vessel.

8 Claims, 3 Drawing Figures



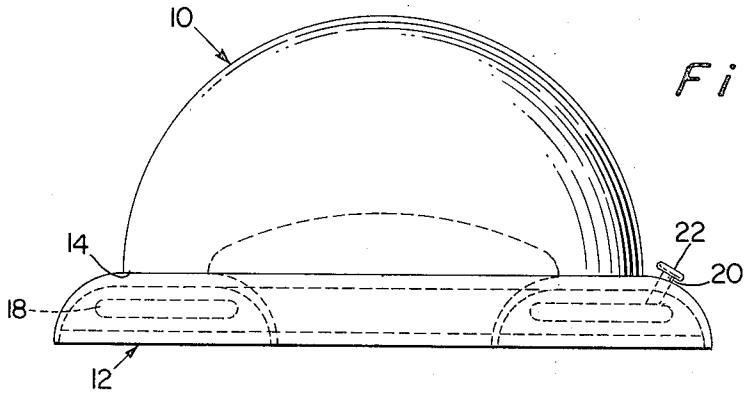


Fig. 1

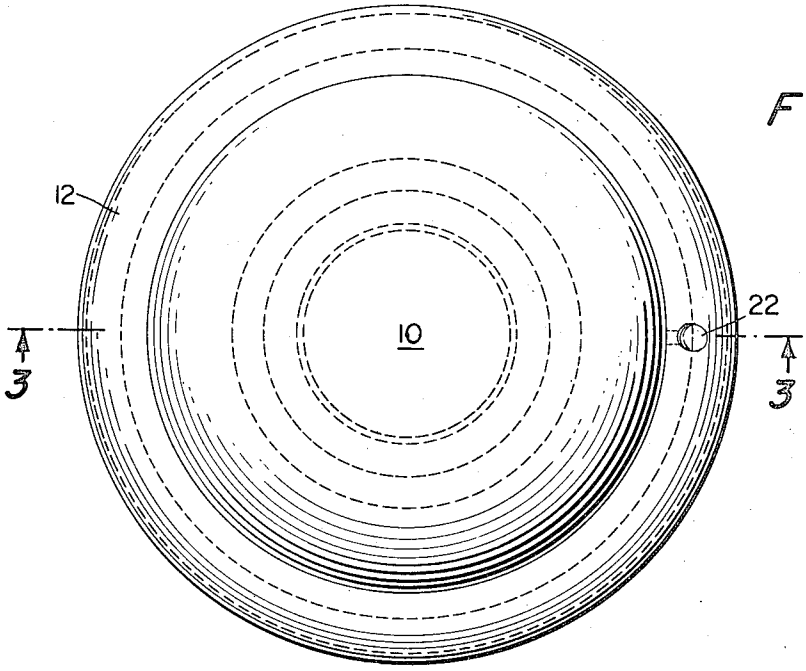


Fig. 2

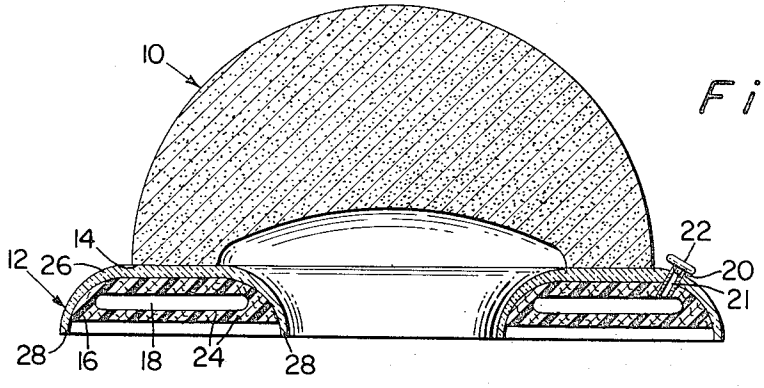


Fig. 3

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UNDERWATER DEMOLITION DEVICE

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to a heat responsive attachment mechanism and specifically to a metallized adhesive means responsive to heat which is adapted to bond an explosive charge to a sea going vessel's hull.

2. Description of the Prior Art

Devices for attaching various objects to underwater structures are faily commonplace. While such prior bonding devices are a definite improvement in the art, they have generally proved to be unreliable in operation and are thus completely unsatisfactory as a means to bond explosives to underwater surfaces. Many of the prior devices employ the principle of magnetism as the attachment means and accordingly would be inoperative on vessels having a wooden hull. Other devices are suitable only for use on dry structures and have little holding or bonding power when applied on wet objects.

SUMMARY OF THE INVENTION

The present invention involves generally an attachment means for bonding an explosive charge to an underwater surface in which an adhesive substance affixed to the charge is softened and partially melted by a controlled exothermic chemical reaction with the heat of reaction being transmitted evenly throughout the adhesive by a metallic material embedded therein. After termination of the reaction, the adhesive congeals and forms a strong bond between the explosive charge and the underwater surface.

A primary object of the present invention is to provide an improved means of attaching an explosive charge to a desired underwater surface.

Another object of the invention is to provide an adhesive means which is resistant to the effects of water and readily bonds to underwater surfaces.

Another object is to provide a simple and efficient means for bonding an explosive charge to a desirable underwater surface.

Other objects, advantages, and novel features of the invention will become apparent from the following detailed description of the invention when considered in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWING

FIG. **1** is an elevational view of an explosive charge with the bonding means of the present invention attached thereto.

FIG. **2** is a top plan view of the invention as shown in FIG. **1**.

FIG. **3** is a sectional view taken along the line **3—3** of FIG. **2**.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings wherein like reference characters designate like parts throughout the several views, reference numeral **10** denotes the explosive charge intended to be attached by means of the present

bonding device **12** to the surface of an underwater object. The charge is generally hemispherical or dome shaped in appearance and has the present bonding device affixed to the under portion **14** thereof substantially as shown in the drawings. Other charge configurations may be employed to obtain the maximum benefits depending upon the type of explosive used and the ultimate purpose thereof. However there is preferably a time delay, well known in the art, built within the charge **10** to allow a safe period of time to elapse prior to actual explosion thereof, which allows the person handling the device sufficient time to escape.

As shown best in FIG. **3**, the bonding device **12** is circular in overall configuration and has a central opening therein allowing the blast from the explosive charge **10** an unobstructed path to the object on which it is bonded. As illustrated, the device includes an adhesive substance **16** preferably an epoxy resin in which a hollow heat dissipation tank **18** having a central chamber is conveniently embedded. A hollow tube **20** forming the passageway **21** extends outwardly from the dissipation tank to project its outer end a suitable distance beyond the exterior of the adhesive substance **16** and a removable cover **22** seals the tube against the entrance of any ambient water. However, at the time the explosive device is to be utilized, the cover **22** is removed by a frogman or diver permitting water to be channeled through the passageway **21** of tube **20** and into tank **18.** Since a suitable chemical material has either previously been positioned in the tank **18** or placed therein at the time the cover **22** is removed, the addition of water to the tank causes an exothermic reaction which heats up the adhesive substance **16** to partially melt the same and form a strong bond with the submerged ship's hull or other surface against which it has been positioned.

Dispersed throughout the plastic adhesive substance **16** is a metal heat exchanger **24,** such as wire foil or the like which facilitates distribution of heat from exothermic chemical reaction rapidly and uniformly throughout the adhesive thus assuring that sufficient heat will be available to create the liquid bonding effect.

A flexible heat shield **26** is positioned on the upper surface of the adhesive **16** and serves both to hold the exothermic heat in and around the adhesive mass and to insulate the explosive charge **10** thereby preventing a possible premature firing thereof.

A thin sealing lip **28** positioned on both the inner and outer bottom edges of the adhesive substance **16** permits application of the device **12** on uneven surfaces and in general aids in contouring the adhesive **16** to the shape of the attaching surface.

Thus in summary it is believed readily apparent that the bonding device affixed to a charge **10** operates as follows: a frogman or diver removes the cover **22** and places a suitable chemical substance in the tank **18** via the channel **20.** Water may then be permitted to enter the tank and an exothermic reaction is initiated, the heat of which is distributed evenly through the plastic adhesive **16** by the metal foil **24** to partially melt the same and effectuate a strong underwater bond between the explosive charge **10** and the object to which it is to be attached. A heat shield **26** assures that the heat is retained in the adhesive and away from the charge.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within

the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. An underwater device for bonding an explosive charge to an object comprising:

a mass of material having adhesive characteristics when softened by the application of heat;

means for raising the temperature of the mass to thereby increase its adhesive characteristics during application to an object,

the mass being disposed between the explosive charge and the object to which it is to be attached, said mass having a central opening to permit the blast from the explosive charge an unobstructed path to the object on which it is bonded; and

a heat shield positioned between the explosive charge and the adhesive mass to insulate said charge from premature firing thereof.

2. The device of claim **1** wherein the mass of adhesive material is employed as the means for bonding the explosive charge to an underwater surface.

3. The device of claim **1** wherein the heat from a controlled exothermic chemical reaction is the means for raising the temperature of the adhesive mass.

4. The device of claim **1** wherein a metal foil heat exchanger is embedded in the adhesive mass for distributing the heat rapidly and evenly throughout said mass.

5. The device as defined in claim **3** wherein:

a tank is embedded in the adhesive material, said tank having a tube connected thereto and opening to the outside of the adhesive material; and

6. The method of bonding an underwater explosive charge to an object comprising:

attaching a mass of adhesive material to a suitable explosive charge, said mass having a central opening to permit the blast from the explosive charge an unobstructed path to the object on which it is bonded;

inserting in a suitable manner a flexible heat shield between the adhesive material and the explosive charge;

heating the adhesive material by a controlled exothermic chemical reaction within the adhesive to thereby increase its adhesive characteristics; and

adhering the adhesive material with the attached explosive charge against an object.

7. The method of claim **6** wherein is included the step of distributing the heat more rapidly throughout the adhesive material by incorporating a suitable heat exchanger therein.

8. The method of claim **6** wherein said controlled exothermic chemical reaction is initiated by the step of adding water to suitable chemicals positioned within the adhesive material.

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