

July 19, 1949.

C. S. HARPER
STOPPING HOLES IN HULL BOTTOMS
BELOW THE WATER LINE

2,476,601

Filed May 4, 1945

3 Sheets-Sheet 1

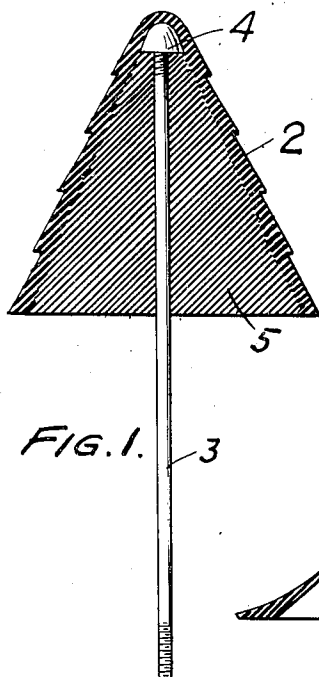


FIG. 1.

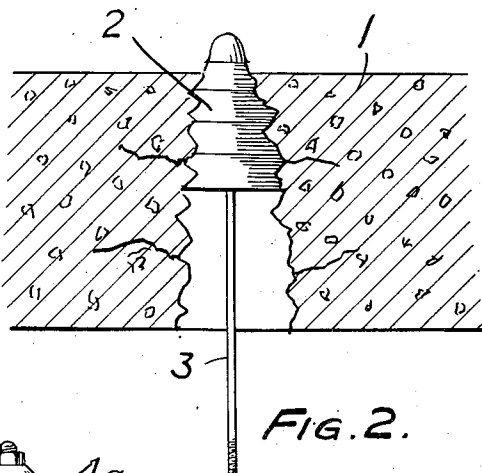


FIG. 2.

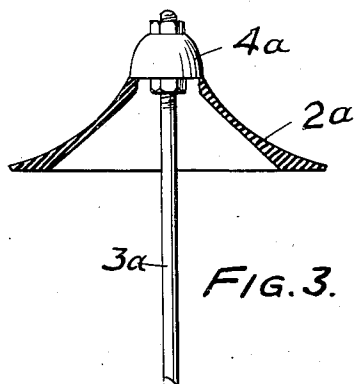


FIG. 3.

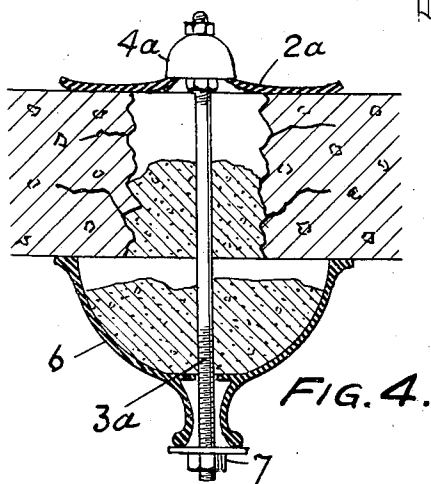


FIG. 4.

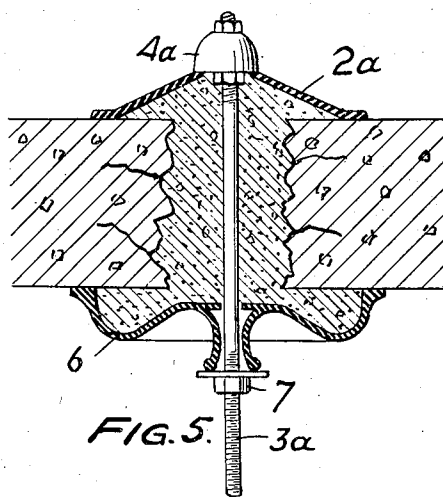


FIG. 5.

WITNESS:

Robt. W. Kitchel

INVENTOR

Charles S. Harper

BY

Augustus B. Stroughton

ATTORNEY

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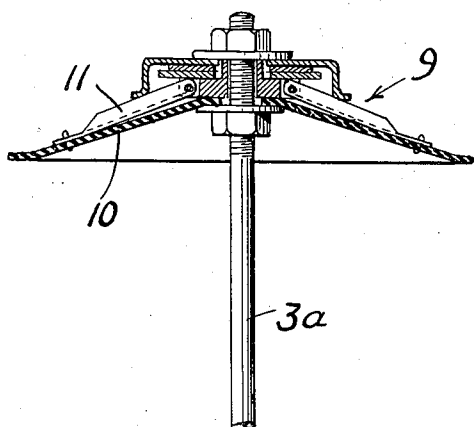


FIG. 6.

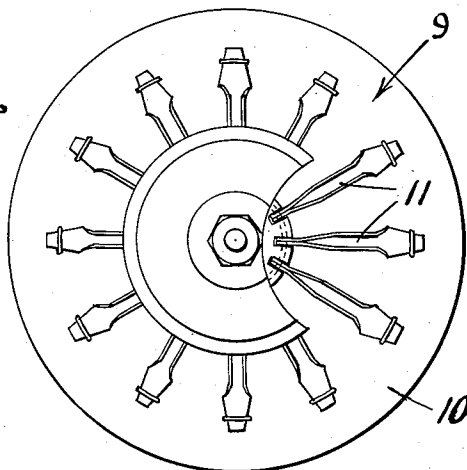


FIG. 7.

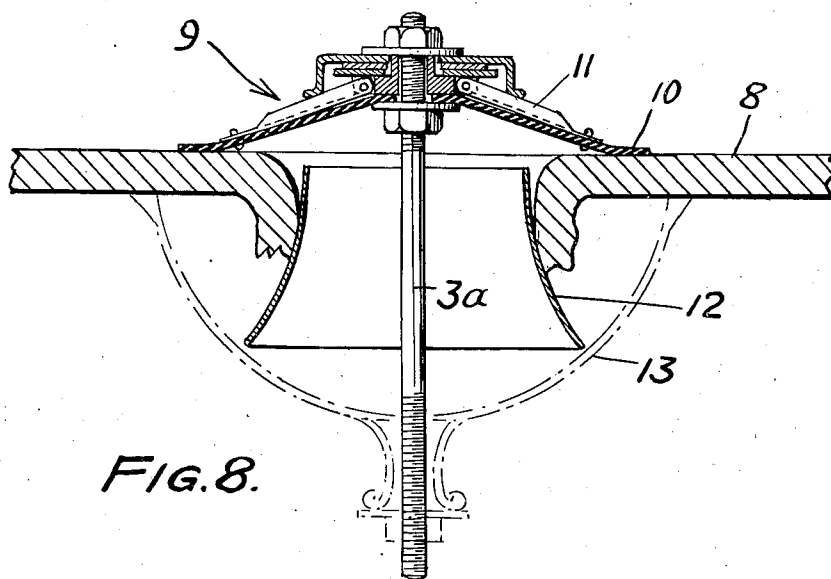


FIG. 8.

WITNESS:

Robt. R. Kitchin

INVENTOR

Charles S. Harper
BY

Augustus B. Stoughton

ATTORNEY.

July 19, 1949.

C. S. HARPER
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3 Sheets-Sheet 3

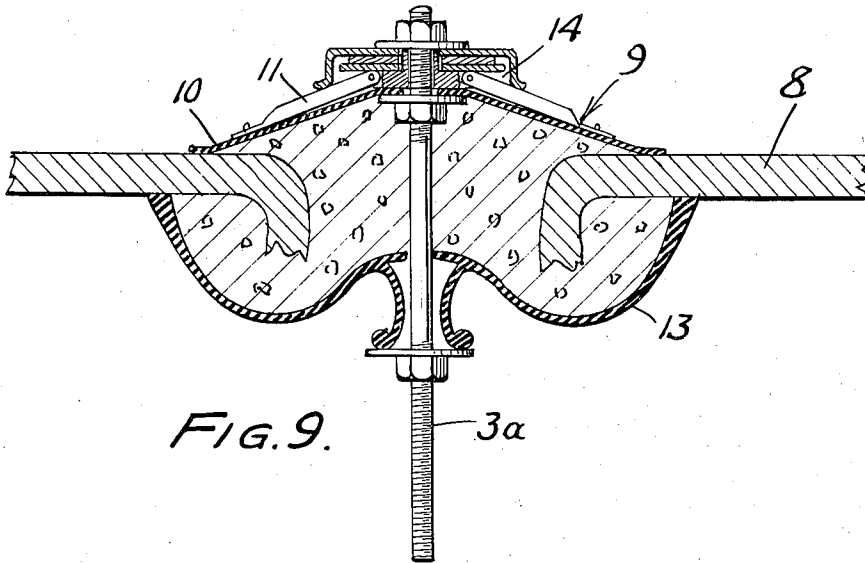


FIG. 9.

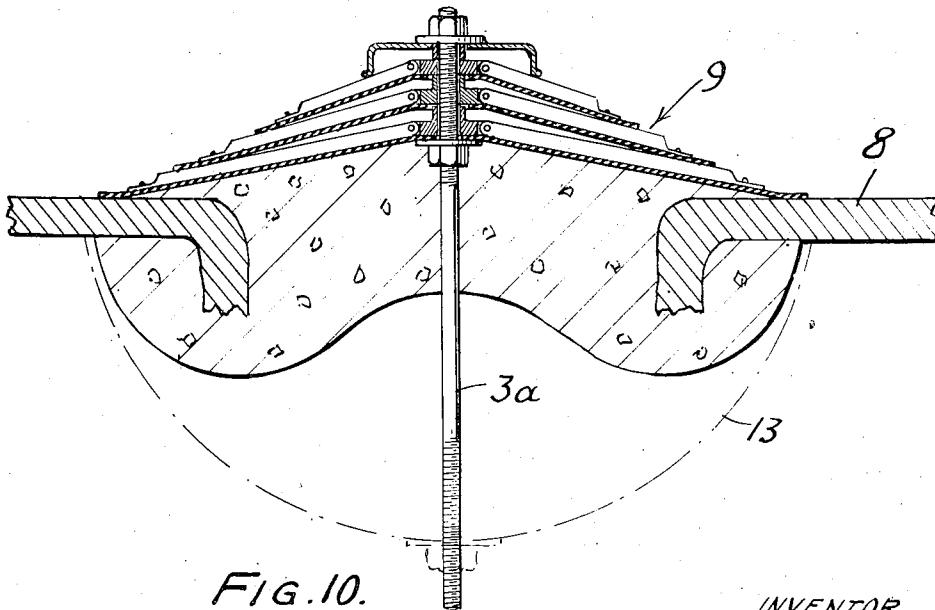


FIG. 10.

WITNESS:

Robert R. Mitchell

INVENTOR

Charles S. Harper

BY

Augustus B. Stroughton

ATTORNEY.

UNITED STATES PATENT OFFICE

2,476,601

STOPPING HOLES IN HULL BOTTOMS
BELOW THE WATER LINE

Charles S. Harper, Philadelphia, Pa.

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2 Claims. (Cl. 114-227)

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It frequently happens that shots produce holes or ruptures in the hulls of iron or concrete ships below the water line thereof and it is one of the present objects to provide for stopping or repairing such holes or ruptures below the water line thereof; another object is to provide simple, reliable and efficient apparatus for the accomplishment of that object; another object is to prevent and oppose ingress of water from the inside of the hull and, at the same time, preventing or opposing such ingress of water from means or methods located inside of the hull of the vessel; another object is to prevent leakage from shot holes below the water line by repairing such leakage from the inside of the hull of the vessel; and another object is to effect the necessary repairs without having the use of a dry dock.

Other objects of the invention will appear from the following description at the end of which the invention will be claimed.

In the following description, reference will be made to the accompanying drawings forming part hereof and in which:

Fig. 1 is a sectional view illustrating a plug device for application to a hole in the hull of a concrete ship;

Fig. 2 is a transverse sectional view illustrating the application of the plug device for stopping ingress of sea water through a hole in a concrete ship;

Fig. 3 is a sectional view illustrating a modification of the plug device;

Fig. 4 is a transverse sectional view illustrating the application of the device shown in Fig. 3 in partially completed state;

Fig. 5 is a view similar to Fig. 4 showing the completion of the plug device in its assembled form;

Fig. 6 is a transverse sectional view illustrating a plug device for application to a metal ship;

Fig. 7 is a top or plan view illustrating a detailed construction of the device shown in Fig. 6;

Fig. 8 is a transverse sectional view illustrating the partial construction of the plug device;

Fig. 9 is a sectional view illustrating the completion of the plug device of Fig. 8; and

Fig. 10 is a similar view of a progression of devices of the character arranged in Fig. 9 for the completion of larger holes.

Referring to Figs. 1 and 2, the hull 1 of a concrete or like ship has been punctured below the water line and from the outside to the inside of the hull. In consequence, sea water tends to flow into the hull. The plug 2 shown as of con-

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ical form, and generally umbrella-shape, is attached to a rod 3 by means of a threaded connection 4 and the plug consists of rubber or rubber-like material having a roughened or irregular surface and containing a filling 5 as of sponge rubber.

In use, the rod 3, in association with the plug, is pushed from the inside of the hull through the opening therein, and the opening serves to compress the plug as indicated in Fig. 2 so that the plug is peripherally deformed and fills irregularities in the opening provided by the passage of a projectile through the concrete. The plug may be backed up with cement (not shown).

Referring to Figs. 3, 4 and 5, the plug 2a is generally of umbrella-shape and of flexible material as of rubber and is attached to the fastening 4a. To stop an opening for the inlet of sea water through the projectile of the hull and referring to Fig. 4, the device is plugged through the opening and toward the sea water which holds it in place to cover the opening. A comparatively limited supply of cement, which may be of quick-setting character, is applied to the opening and a cap 6 contains a portion of the cement. Thereupon, referring to Fig. 5, the nut or fastening 7 is used to shorten up the length of the rod so that the plug and cap assume the positions shown and, when the cement has been set, the work is completed.

Referring to Figs. 6, 7 and 8, 8 indicates the hull of a metal vessel or ship and there is indicated through an opening in the hull such as provided or produced by the passage of a projectile through the outside to the inside and under the water-line. 9 is an umbrella-like structure provided with a disk 10 as of rubber or like material attached to the rod 3a and with ribs 11 of spring metal or the like connected toward the center of the rod.

Referring to Fig. 8, 12 indicates a funnel-like structure for temporary use. This funnel-like structure permits of the passage of the plug and protects the latter from injury which might otherwise be caused by jagged or pointed edges projecting from the hole in the hull of the ship. Thereafter, the funnel can be disregarded if desired. The dotted line in Fig. 8 shows a cap 13 and Fig. 9 shows cement contained in the cap and provided through the opening in the hull and in position for stopping the opening. The fastening 14 shows the cap properly positioned on the rod 3a. Thus the hole or opening through the hull is stopped and the work is done from the inside of the hull and below the water-line.

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Referring to Fig. 10, the projectile passed through the iron hull produces, of course, or is likely to produce, jagged or rough edges and the projectile may be of larger size. In this event, use is made of a series of caps or covers differing in size and located inside of each other and the largest is sufficient to cover the entire opening. Otherwise, the construction and arrangement is as has been described in connection with Fig. 9.

I claim:

1. A device for plugging with water-proof concrete shot-holes and other such irregular openings formed in the hull of a vessel below the water-line thereof comprising, in combination, an umbrella-like structure having a stem and a collapsible hood secured to one end of said stem, said hood being expansible radially of said stem to a diameter exceeding the overall dimension of the opening to be plugged, a smoothly-bored funnel insertable axially into said opening and operative as a guideway for axial insertion therethrough of said umbrella-like structure, with the hood thereof in collapsed condition whereby to so position said hood on the outer or water side of the hull that upon radial expansion of the hood it serves as an external closure for the opening, a compressible cup-shaped member shiftable axially upon said stem into position to close said opening from the inner side of the hull, a mass of quick-setting water-proof concrete carried within said cup-shaped member, and means for shifting said cup-shaped member with its mass of concrete axially of said stem, said means being operative to so compress said member as to cause said concrete to completely fill the space contained between the expanded hood overlying the outer side of the opening and the compressible member overlying the inner side of said opening.

2. A method of plugging with water-proof concrete shot-holes and other such irregular openings formed in the hull of a vessel below the water-line thereof, which consists in initially fit-

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ting said opening with a smooth-bored funnel-shaped member, in then projecting through the smooth bore of said member an umbrella-like structure having a stem and a flexible head expansible radially of the stem to a diameter exceeding the maximum dimension of the opening to be plugged, said structure being projected head-first through said smooth bore whereby the expanded head serves as an external closure for the opening, in thereafter shifting axially of the stem and into engagement with the inside of the hull a compressible member filled with a mass of concrete in plastic state, and in finally compressing said member axially of the stem to force the concrete through said opening and into all of the space confined between the expanded head closing the outer side of said hull opening and the compressible member closing the inner side of said opening, said compressible member being maintained compressed until said concrete has fully set and hardened.

CHARLES S. HARPER.

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