Feb. 13, 1973 W. G. WILSON ET AL 3,716,010

SNAP ACTING BALLAST RELEASE DEVICE

Filed Oct. 21, 1970 2 Sheets-Sheet 1

FIG. 1.

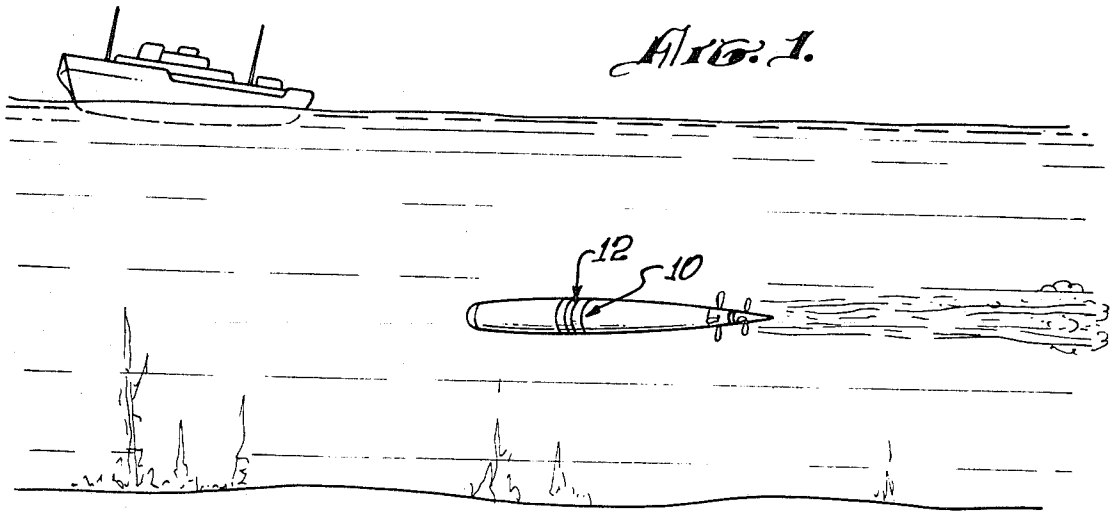


FIG. 4.

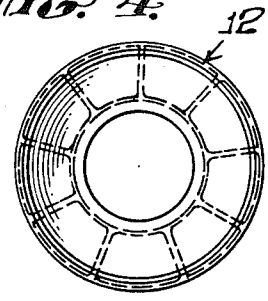


FIG. 5.

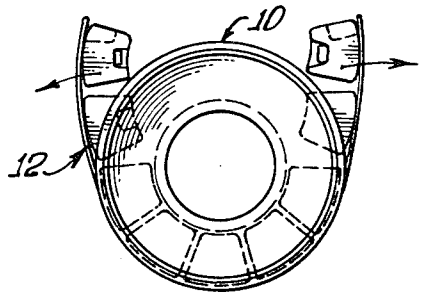


FIG. 6.

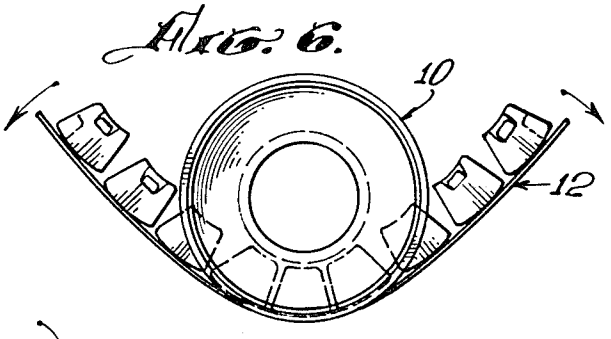
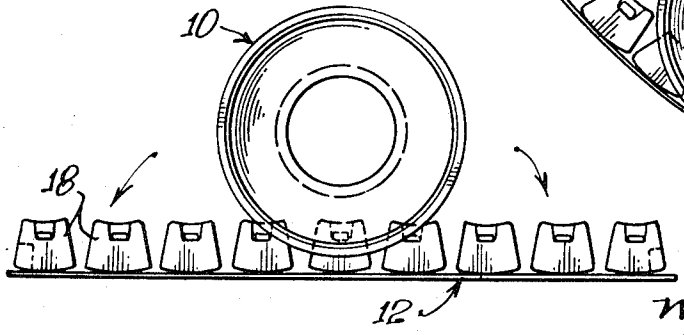


FIG. 7.



INVENTORS.
WILLIAM G. WILSON,
JAMES H. GREEN,
WILLIAM D. WHITE,

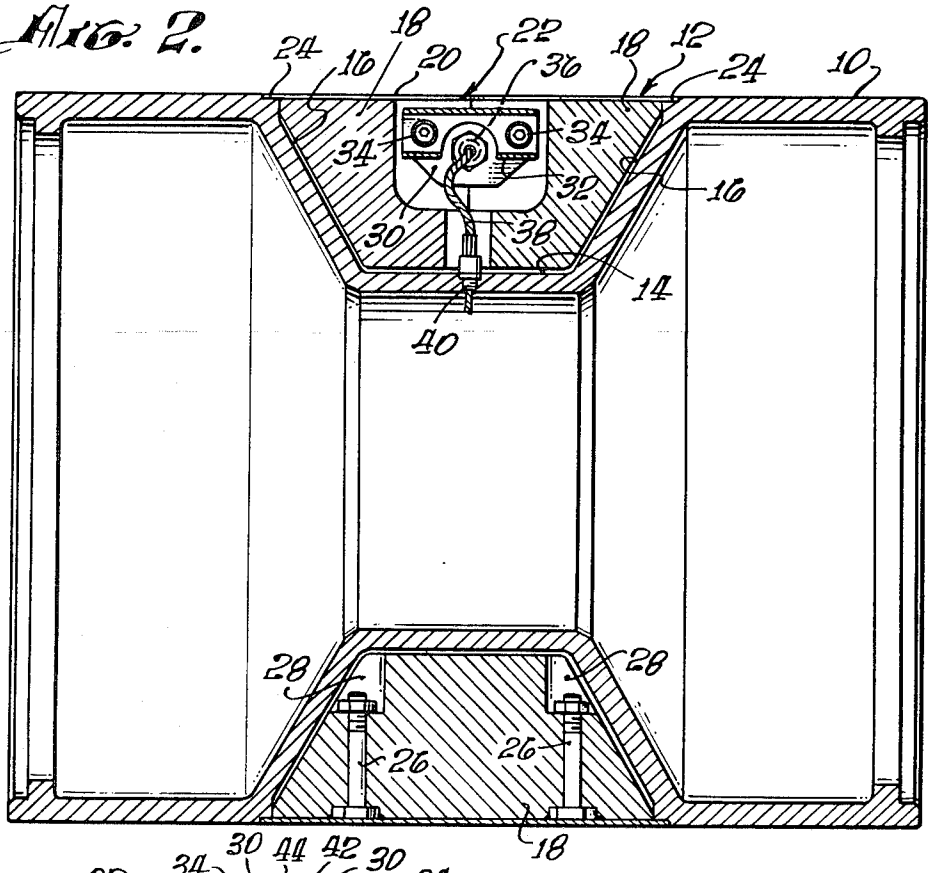
By ERVIN F. JOHNSTON
ATTORNEY

Feb. 13, 1973 W. G. WILSON ET AL 3,716,010

SNAP ACTING BALLAST RELEASE DEVICE

Filed Oct. 21, 1970 2 Sheets-Sheet 2

FIG. 2.



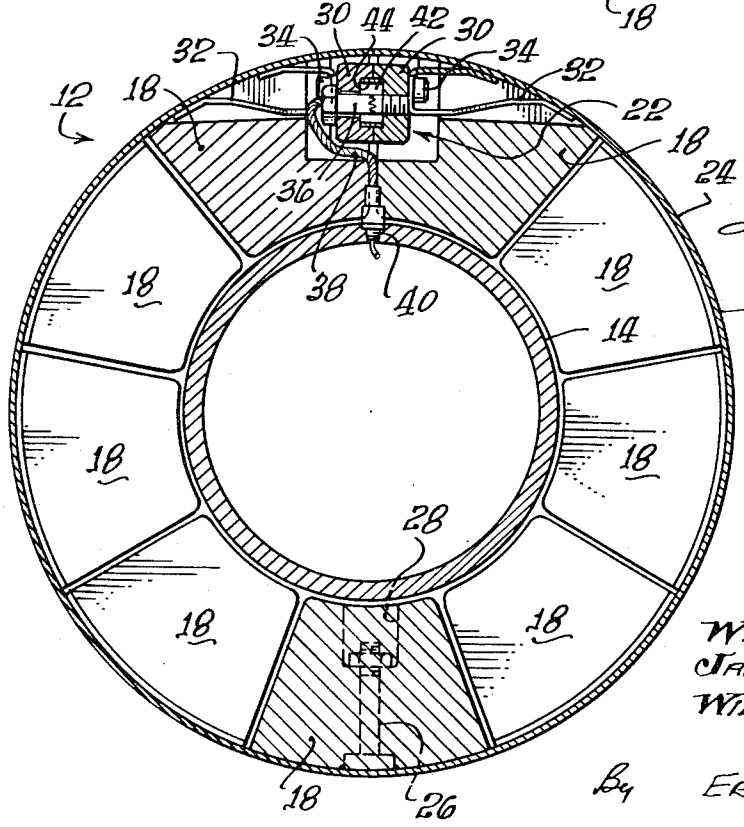


FIG. 3.

INVENTORS.
WILLIAM G. WILSON,
JAMES H. GREEN,
WILLIAM D. WHITE,

By ERVIN F. JOHNSTON,
ATTORNEY.

United States Patent Office 3,716,010 Patented Feb. 13, 1973

3,716,010

SNAP ACTING BALLAST RELEASE DEVICE

William G. Wilson, Livermore, James H. Green, Sierra Madre, and William D. White, Pasadena, Calif., assignors to the United States of America as represented by the Secretary of the Navy

Filed Oct. 21, 1970, Ser. No. 82,661
Int. Cl. F42b 15/10, 19/00
U.S. Cl. 114—22 3 Claims

ABSTRACT OF THE DISCLOSURE

A snap acting ballast release device for a water vehicle, such as a torpedo, including: the hull of the torpedo having an annular recess; a plurality of weights disposed within the recess; a resilient band extending around the weights and secured thereto in a closed biased position; means releasably connecting the ends of the band in the closed biased position; the band being adapted, because of its resiliency, to assume a relaxed open position away from the torpedo hull, so that upon release of the ends of the band the band and its attached weights snap free of the torpedo.

STATEMENT OF GOVERNMENT INTEREST

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

A torpedo is typically operated in two configurations, exercise and warshot. In the exercise version, a special exercise section is substituted for the warhead section of the warshot configuration. To assure equivalent performance, it is important that the exercise section duplicate the same overall trim and weight characteristics of the warhead section. Since special instrumentation in the exercise section accounts for only a portion of the warhead explosive weight, it is typical to use ballast weights to make up the difference.

The warshot torpedo is designed to be negatively buoyant so that it will sink to the ocean bottom at the end of a run. It is desirable, however, that the exercise torpedo be rendered buoyant at the end of its run so that it can be recovered and reused for subsequent exercises. In U.S. Pat. No. 3,404,649 there is illustrated a ballast release device which renders an exercise torpedo buoyant after its run. The present invention is directed toward improving the ballast release device in this patent by providing quick and positive release of the ballast weights from the torpedo.

SUMMARY OF THE INVENTION

The present invention is similar to the ballast release device in the aforementioned patent in the respect that the torpedo hull has an annular recess, and a plurality of weights are disposed within this recess. The present invention attains its improvements by providing a resilient band which extends around the weights and is secured thereto in a closed biased position. Means, such as explosive bolt, releasably connects the ends of the band in this closed position. The band, because of its resiliency, is adapted to assume a relaxed open position away from the torpedo hull so that upon release of the ends of the band the band and its attached weights will snap free from the torpedo.

STATEMENT OF THE OBJECTS OF THE INVENTION

An object of the present invention is to provide a snap acting ballast release device for a water vehicle.

Other objects and many of the attendant advantages of this invention will be readily appreciated as it becomes better understood by reference to the description and accompanying drawings which follow.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an ocean elevation view of a torpedo employing the ballast release device;

FIG. 2 is a longitudinal cross sectional view of the exercise section employing the ballast release device for an exercise torpedo;

FIG. 3 is a transverse section of the exercise torpedo showing the top pair of weights, retention means, and bottom weight in cross-section; and

FIGS. 4 through 7 illustrate the ballast release device in operation.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings wherein like reference numerals designate like or similar parts throughout the several views there is shown in FIG. 1 a water vehicle, such as a torpedo, which has a ballast release device for releasing weights from the vehicle when it is desired to render it buoyant for retrieval purposes. In an exercise torpedo, there is a special exercise section **10** which is joined to forward and after portions of the torpedo by any conventional joiner, such as that disclosed in Patent 3,100,121 to Hillmer. The section **10** of the torpedo is a hull portion which is substantially cylindrical and which includes the present ballast release device **12**.

As best illustrated in FIG. 2, the exercise hull section **10** is provided with an annular recess **14** which circumscribes the torpedo and which may have opposed inwardly tapered walls **16**. A plurality of weights **18**, which may be constructed of lead, are disposed within the recess **14**. The weights **18** may be a plurality of wedge shaped blocks which are adapted to fit and substantially fill the annular recess **14** in consecutive fashion, as illustrated in FIG. 3.

In order to provide a snap away release of the weights **18** from the torpedo a resilient band **20**, which may be constructed from spring steel, may extend around the weights **18** and may be secured thereto in a closed biased position, as illustrated in FIG. 3. A means **22**, which will be described in more detail hereinafter, releasably connects the ends of the bands in this closed biased position. The band **20**, because of its resiliency, is adapted to assume a relaxed open position away from the cylindrical hull section **10**. In the preferred embodiment the relaxed position is substantially flat, as illustrated in FIG. 3. With such an arrangement, a release of the ends of the band **20** will cause the band and its attached weights **18** to snap free of the torpedo and render the torpedo buoyant for recovery purposes.

It is desirable that the band **20** in its closed connected position assume an outer shape which forms a substantially smooth continuation with the hull section **10**. As illustrated in FIG. 2, the continuation with the hull may be accomplished by providing the hull with annular depressions **24** of substantially the same thickness as the band **20** at the top opposing edges of the recess **14**. In order that the attachment of the weights **18** to the band **20** not interrupt the smooth configuration of the exterior surface of the band, the heads of mounting bolts **26** may be attached to the interior surface of the band by any suitable means, such as welding. A pair of the bolts **26** extend radially inwardly through each weight **18** and are secured to the weights by nuts threaded on their opposite ends. Each weight **18** is provided with a pair of

notches **28** which provide clearances for the nuts so that they do not interfere with the bottom of the recess **14**.

As illustrated in FIG. 3, the releasable means **22** for the band **20** may include a retainer block **30** which is split into two portions. The end weights **18** on the band **20** may be provided with opposing recesses for receiving this retainer block. One block portion may be attached to the inner surface of the band **20** adjacent one end thereof and the other block portion may be attached to the inner surface of the band adjacent the other end thereof. Specially configured brackets **32** may be provided for making these attachments. The end portions of each bracket **32** may be welded to the interior surface of the band **20** and the block portions may be mounted thereto by bolts **34**.

In order to join and subsequently separate the block portions **30** an explosive bolt **36** may be provided which extends through both block portions and is threaded into at least one of the block portions for retention purposes. The bolt **36** contains an internal explosive which separates the bolt, and this explosive is detonated by an electrical lead **38**. The lead **38** extends into a center portion of the torpedo through a fitting **40** and is actuated by instrumentation (not shown) which is set for a predetermined release time. In order to prevent explosive bolt fragmentation of the block **30** the block may be provided with an internal substantially cylindrical cavity **42**, and within this cavity there may be provided a ring collar **44** which bridges the joint of the retainer block portions.

OPERATION OF THE INVENTION

In the operation of the present invention the ballast release device **12** is mounted to the torpedo **10** prior to the exercise run. After the run is completed instrumentation within the torpedo sends a signal to the explosive bolt **36** which causes the bolt to separate within the retainer block **30**. Upon this occurrence the retainer block portions are separated and the resiliency of the band **20** causes the band and the attached weights **18** to quickly snap away from the torpedo. This renders the torpedo buoyant so that it can be recovered at the surface by a surface ship.

Obviously many modifications and variations of the 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.

We claim:

1. In a vehicle having a cylindrical hull, a snap-acting ballast release device comprising;

said hull having an annular recess;

a plurality of weights disposed within said recess;

a resilient band extending around the weights and secured thereto in a closed biased position;

means releasably connecting the ends of said band in the closed biased position;

said band being adapted, because of its resiliency, to assume a relaxed open position away from the cylindrical hull;

said band having in its closed connected position an outer shape which forms a smooth continuation of the hull shape;

said weights being wedge shaped and secured directly to the inner service of the resilient band in a substantially continuous fashion therealong when the band is in a closed biased position;

and said weights being secured to the resilient band by bolts which are welded to the inner surface of the band, whereby upon release of the ends of the band, the band and its attached weights snap free of the vehicle.

2. A combination as claimed in claim **1** including:

the relaxed open position of the band being substantially flat.

3. A combination as claimed in claim **2** including:

the recess having annular opposed inwardly tapered walls; and

each weight being configured to substantially fit and fill an annular segment of said recess.

References Cited

UNITED STATES PATENTS

3,404,649	10/1968	Valihora	114—20 R
3,115,836	12/1963	Brashears	102—49.5
2,890,670	6/1959	Le Francois	114—22
3,513,512	5/1970	Phillips	24—279
3,109,216	11/1963	Brown	24—279
2,712,326	7/1955	Yurdin	24—279 X

BENJAMIN A. BORCHELT, Primary Examiner

J. M. HANLEY, Assistant Examiner

U.S. Cl. X.R.

102—49.5