

DESCRIPTION

Device and method for warding off objects approaching a
ship under or on water

5

The invention relates to an apparatus and a method for defense against objects which are approaching a marine vessel under or on the water, by means of munition bodies or a munition which can be detonated under the
10 water surface, having a fuze device, which makes it possible to program the water depth at which firing can take place automatically.

Apparatuses for defense against underwater objects
15 approaching a marine vessel, such as submarines, torpedoes or attacking swimmers, have been known for a long time. For this purpose, when it is considered that there is a threat, depth charges or underwater grenades are fired in the direction of the supposed underwater
20 object, for example by means of a depth-charge launcher.

For example, even in the Second World War, anti-submarine weapons referred to as Squid were used, for
25 which the launcher was initiated directly by means of a sonar rangefinder. In this case, after detection of an underwater object, three mutually independently acting depth charges were fired at a distance of about 250 m in front of the marine vessel. The three depth charges
30 then formed a triangle with a side length of about 37 m. The explosion depth had to be set in advance, to be the same in each case.

This known apparatus had the disadvantage inter alia,
35 that a plurality of depth charges had to be fired in each case. Although it was possible to continue to observe the underwater object using the sonar after firing, accurate location of the underwater object

simply on the basis of the distance information obtained by the sonar was impossible. Therefore, if the sonar echo obtained from the underwater object remained constant, an immediate attack was required without any turning maneuvers with launchers launching to the side and to the rear. Considerable amounts of explosive therefore had to be used for the defensive measures, as a result of which the risk of inadvertent damage was very high.

DE 10 2007 048 072.7, which was not published prior to this, pursued the idea of using an artillery or mortar projectile, or explosive projectile, and of firing this into the target region by means of a large-caliber gun, for example a Howitzer. A measure such as this makes it possible to provide defense against a submarine or the like (for example an underwater mine) from a marine vessel or, possibly, from the land as well, over a distance of ≥ 30 km away from the target region. The projectile strikes the water surface and sinks deeper until the depth selected via a special fuze is reached. The projectile fuze may be a hydrostatic pressure fuze, which is triggered when the selected water depth is reached. However, depending on the application, different fuzes can also be used, (for example proximity fuzes which act on the basis of the magnetic, acoustic or hydrodynamic field of the target, or delayed-action fuzes, which respond once a selected time after immersion of the depth charge has elapsed).

The invention is based on the object of specifying an apparatus and a method by means of which, when it is believed that there is a threat, underwater objects approaching a marine vessel or objects approaching on the water can be attacked specifically from the marine vessel.

According to the invention, this object is achieved by the features of claim 1. Further, particularly

advantageous refinements of the invention are disclosed in the dependent claims.

The invention is essentially based on the idea of using
5 an underwater location installation to determine both the range and the direction, and therefore also the depth of an object approaching the marine vessel, and of transmitting this data to a fire control computer for a firing device, which can be aimed about two axes,
10 for a munition launcher. The fire control computer then uses the position data of the object and the munition ballistics of the munition body (underwater grenade)/munition used to attack the object and its launch velocity to determine the data required to aim
15 the firing device such that, after an appropriate munition body has been fired, this strikes the water surface in an accurately predefined area above the object or, in the case of an object approaching on the water, at a predetermined distance from this object. In
20 addition, before the munition body is fired, the fire control computer programs the fuze device in the munition body such that the munition body is detonated at a predetermined depth after striking the water surface in order to destroy the underwater object, or
25 to stop an object approaching on the water surface (for example a boat loaded with explosives) and to force it to reverse as a result of the rising pressure wave.

By specifically attacking objects approaching the
30 marine vessel in this way, considerably smaller amounts of explosive are required than is the case with known comparable apparatuses. In this case, the amount of explosive can also be chosen such that it does not, for example, kill an approaching attacking swimmer, but
35 merely makes him incapable of combat. This avoids the risk of unintended death and other collateral damage.

The underwater location installation may, for example, consist of an active system, which determines both the distance to the approaching object and, by rotation of the location sonde, the direction of the object.

5 However, a plurality of passive location sondes arranged at a distance from one another can also be provided for accurately determining the direction of the approaching object, with the distance between the location sondes being chosen such that the direction of
10 the object can be determined by the different distances between the location sondes and the approaching object.

In order to optimally attack the approaching object, it has been found to be expedient for at least one of the
15 location sondes of the underwater location device to be used to determine the approaching object type, (submarine, attacking swimmer, torpedo), thus allowing the munition to be fired to be chosen appropriately.

20 Further details and advantages of the invention will become evident from the following exemplary embodiment, which will be explained with reference to a figure.

The figure schematically shows the bow of a marine
25 vessel 1 which is being approached by an attacking swimmer 2 under the water, in order, for example, to attach a limpet charge, which can be fired remotely, to the marine vessel 1.

30 Location sondes 4 of an underwater location installation 5 are located under the water surface 3 on the hull wall of the marine vessel, and can be used to determine not only the distance to the attacking swimmer 2, but also the direction in which the
35 attacking swimmer 2 is approaching the marine vessel 1 (and therefore also the depth at which the attacking swimmer 2 is located under the water surface 3).

The underwater location installation 5 is connected by means of appropriate lines via a fire control computer 6 to the actuating drives (not illustrated) of a firing device (in this case a firing barrel) 7 of a munitions launcher 8 which is located on the marine vessel 1 and can be aimed about two axes.

As soon as the underwater location installation 5 has detected the attacking swimmer 2, the signals received with the aid of the location sondes 4 are supplied to a computer 9, which evaluates the signals and their propagation time differences, in a manner known per se.

The position data obtained in this way is supplied to the fire control computer 6, which then uses the position data of the attacking swimmer 2 and the munition ballistics of the munition body/munition 10 used to attack the attacking swimmer 2, as well as its launch velocity to determine the data required for aiming the firing device 7, for the actuating drives of the firing device 7.

The firing device 7 is then aimed automatically in azimuth and elevation in accordance with the data determined by the fire control computer 6. In addition, a fuze device (for example a programmable pressure fuze) of the munition body 10, which is still located in the firing device, is programmed by the fire control computer via an electrical connection in respect of the water depth and detonation time and/or detonation depth at which the munition body 10 will be initiated. The electrical connection may be of an inductive nature. Alternatively, known fuze-setting units can also be included.

After the munition body 10 has been fired, it strikes the water surface 3 in a predefined area 11 above the attacking swimmer 2 and then falls to the preset depth,

at which it is detonated and the attacking swimmer 2 is rendered ineffective for combat. For this purpose, the munition or the munition body 10 may have a delayed-action fuze which triggers the munition on reaching the
5 selected water depth after immersion, after a selected time has elapsed or a selected depth has been reached, for example by means of a hydrostatic pressure fuze.

List of reference symbols

	1	Marine vessel
	2	Attacking swimmer, underwater object, object
5	3	Water surface
	4	Location sonde
	5	Underwater location installation
	6	Fire control computer
	7	Firing device
10	8	Munition launcher
	9	Computer
	10	Munition body/munition
	11	Area

PATENT CLAIMS

1. A method for defense against objects (2) which are approaching a marine vessel (1) under or on the water, by means of munition bodies or a munition (10) which can be detonated under the water surface (3), having a fuze device, which makes it possible to program the water depth at which firing can take place automatically, having the following steps:

10

a) determination of the distance and the direction of the approaching object (2) with respect to the marine vessel (1),

15

b) determination of actuating signals for the actuating drives of a firing device (7) for the munition (10) with the aid of the determined position signals of the approaching object (2) and from the munition ballistics of the munition (10) used to attack the object (2), and its launch velocity, as well as

20

c) programming of the munition (10) in respect of the detonation time and/or detonation depth at which the munition (10) will be initiated.

25

2. The method as claimed in claim 1, characterized in that the direction of the approaching object (2) can be determined with respect to the marine vessel (1) by the different distances between the location sondes (4) and the approaching object (2).

30

3. The method as claimed in claim 1 or 2, characterized in that the firing device (7) is directed by the actuating signals for the actuating drives such that, after firing, the munition (10) strikes the water surface (3) in a predefined area (11) above the object (2) or at a predetermined distance from the object (2).

35

4. An apparatus for defense against objects (2) which are approaching a marine vessel (1) under or on the water, by means of munition bodies or a munition (10) which can be detonated under the water surface (3),
5 having a fuze device, which makes it possible to program the water depth at which firing can take place automatically, having the following features:

- 10 a) the apparatus comprises an underwater location installation (5),
- b) the underwater location installation (5) is connected via a computer (6) to the actuating drives of a firing device (7) of a munition launcher (8) which can be arranged on the marine
15 vessel (1) and can be aimed about two axes,
- c) the munition (10) which is located in the firing device (7) in the munition launcher (8), is connected via an electrical connection to the computer (6) in order to program the detonation
20 time and/or detonation depth.

5. The apparatus as claimed in claim 4, characterized in that the underwater location installation (5) comprises a plurality of location sondes (4) at a
25 distance from one another.

6. The apparatus as claimed in claim 4 or 5, characterized in that the approaching object type can be determined at least with the aid of one of the
30 location sondes (4) of the underwater location installation (5).

7. A munition (10) for use in an apparatus as claimed in one of claims 1 to 3, characterized in that the
35 amount of explosive is chosen such that an underwater noise is produced for defense against an attacking swimmer, and in the case of approaching boats etc.,

they are caused to stop and/or to reverse by the rising pressure wave.

8. The munition as claimed in claim 4, characterized
5 in that a delayed-action fuze is included, which is triggered once a selected time after immersion has elapsed.

9. The munition as claimed in claim 4 or 5,
10 characterized in that a hydrostatic pressure fuze is included, which is triggered on reaching the selected water depth after immersion.