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**EUROPEAN PATENT SPECIFICATION**

45 Date of publication of patent specification: **21.11.84**

51 Int. Cl.<sup>3</sup>: **F 41 F 3/10**

21 Application number: **80304357.9**

22 Date of filing: **03.12.80**

54 **Underwater weapon systems.**

43 Date of publication of application:  
**09.06.82 Bulletin 82/23**

45 Publication of the grant of the patent:  
**21.11.84 Bulletin 84/47**

84 Designated Contracting States:  
**BE DE FR IT NL SE**

58 References cited:  
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**EP 0 053 210 B1**

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## Description

This invention relates to underwater weapon systems.

The use of moored mines is well-known. The laying of a minefield, for example to safeguard an area such as the approaches to a harbour, is an expensive operation. Particularly in wartime, the positioning of such mines may be haphazard.

It is known also to release a missile from an underwater container. For example, in U.S.—A—313 7203 there is described an underwater missile launching system comprising a self-propelled weapon, a water-tight container for the weapon and control means operative to open the container to permit release of the weapon. In the container is a pump for pumping sea water to change the buoyancy of the system.

According to the present invention, an underwater weapon system comprising a self-propelled weapon with target homing means, a watertight container for the weapon, pump means in the container having an inlet or inlets and an outlet or outlets and control means operative to open the container to permit release of the weapon is characterised in that the pump means are arranged for pumping sand or silt away from under the container to cause the container to become buried in sand or silt on the sea bed, said container having control means for operating said pump means and means arranged to stop said pump means when the container is buried to a predetermined depth.

The aforesaid pump means may be operatively reversible to pump sand or silt underneath the container for raising the container. Said control means for the pump means may be arranged in response to a command signal to operate the pump means to raise the container to a position for weapon release.

The weapon may typically be a torpedo and may be of conventional construction, for example with an acoustic sensor or other target-detecting device controlling guidance means for guiding the torpedo towards a target. Other forms of self-propelled weapons suitable for underwater release may be employed.

With the weapon system of the present invention, the container, with the weapon in it, is put on the sea-bed and the pump means are operated to pump silt or sand, which covers the majority of the sea bed, particularly in shallow water, from underneath the container and to eject it above the base of the container. Thus the container will bury itself in the sea-bed. Means may be provided to stop the pump means when the container is buried to a predetermined depth.

Most self-propelled underwater weapons are of generally elongate form. The container, in such a case, is also preferably of elongate form. It may be buried with its axis vertical or in a

generally horizontal position. If it is buried in a vertical position, the upper end may be left protruding above the sea bed. More generally however the container may be completely buried and, when the weapon is to be activated, the container has to be raised by reverse operation of the pump means.

Activation of the weapon system may be effected by an external command signal, for example transmitted by acoustic or electromagnetic signalling to a receiver within the container or it may be effected in response to an output of a target detection sensor within the container. The activation may be in one or more stages, for example the container may be raised to the surface of the sea bed initially and further operation may then be deferred until a sensor detects a target whereupon the container is opened for launching of the weapon.

If this weapon system is used defensively, for example for defence against surface vessels or underwater vessels approaching a harbour, control means operating by electromagnetic or acoustic radiation or by a communication cable may be provided for activating and de-activating the system as required. Particularly if a power supply can be fed to the system, it is readily possible then to bury and raise the container as often as required.

If the weapon system is to be used offensively, for example in the sea near enemy territory, the ability to have the system buried in the sand or silt in the sea bed significantly reduces the possibility of detection of the weapon.

If acoustic or electromagnetic radiation signals are to be received when the container is buried in the sea bed, receiving means may be provided which can be erected and retracted as required. A programmed intermittent listening with retraction of the receiving sensor, e.g. radio aerial, may be employed to reduce the possibility of detection.

By the use of a self-propelled weapon, this weapon system enables action to be taken, for example against surface or underwater craft, over a large area, far larger than is possible with conventional mines. If a number of weapon systems are deployed, they may be linked, for example to a central listening system so as to ensure that the weapon most advantageously sited is employed.

In the foregoing, the use of a weapon such as a torpedo has been referred to more particularly as a means of attack on surface or underwater craft. The weapon however may be any weapon suitable for underwater launching and may, for example, be a ballistic missile. A ballistic missile may be guided, in a known way, in accordance with preprogrammed or pre-received instructions, onto a selected static target defined by its geographical location, or it may have target-detecting sensor means.

Preferably the container or at least the part thereof housing the weapon is constructed to be

watertight and pressure-tight. The weapon thus may be stored in a predetermined atmosphere, for example with controlled humidity, and/or in an inert gaseous atmosphere.

Although, in the above, the container has been described in combination with a self-propelled weapon, this type of container may be used more generally for the storage of weapons or other equipment. For example it might be used for the storage of weapons, supplies or other equipment for use on submarines, particularly nuclear submarines having long-term underwater capability. This would enable such vessels to be resupplied without having to come to the surface.

The following is a description of one embodiment of the invention, reference being made to the accompanying drawings in which:—

Figure 1 is a diagrammatic side elevation of a weapon system; and

Figure 2 is an end elevation with the end plate removed.

Referring to Figure 1 there is shown diagrammatically a self-propelled weapon 10 which, in this case, is a conventional torpedo for underwater travel, the torpedo including a homing means (not shown) for sensing a target and for control of guidance means. This weapon 10 is housed within a pressure-tight chamber 11 which is closed at the forward end by a detachable bulkhead 12.

This particular weapon system is arranged to sit on the sea bed substantially horizontally and to be buried in the sea bed in a substantially horizontal position. Although the whole length of the bottom of the container is a suction chamber 15. Suction pumps 16, 17 are provided having inlets 18, 19 leading to this suction chamber 15. A plurality of such inlets may be provided if necessary opening into the suction chamber at spaced points along the length thereof. These pumps have outlets 20, 21 respectively on the upper surface of the container.

It will be seen that, if the container is put on its base on the sea bed and the pumps are operated, the sand and/or silt on the sea bed will be sucked upwardly from underneath the weapon system via the suction chamber 15 and the pumps 16, 17 and ejected upwardly through the outlets 20, 21. Such operation of the pumps therefore causes the container to bury itself within the sea-bed. Normally the pumps would be operated until the top of the container is approximately at the level of the sea-bed, in other words, the container is substantially completely buried in the sand or silt. Reversal of the pumps, by pumping sand or silt into the region underneath the container will raise the container. If the forward pump 17 is connected to the forward part of the suction chamber 15, operation of the forward pump only would cause the forward end of the container

only to be lifted. This may be preferred in some cases for launching a weapon.

In the particular embodiment illustrated, two retractable aerials 22 are shown for reception of communication signals for activating the system. Such activation can be arranged to operate the pumps 16, 17 to raise the container or at least the forward end thereof. A sensor (not shown) for detecting the presence of a surface craft or underwater craft is provided in the container. Such a sensor may for example be an acoustic sensor and the container may contain programme means containing the "voice prints" of known target so that any received signals may be analysed and identified and if necessary compared with such voice prints. The listening watch may be continuous or may be intermittent. When a target vessel is detected, the aforementioned forward bulkhead with the forward pumping compartment is removed and the weapon is launched. The weapon, as previously mentioned, is self-propelled and has homing means to guide to towards the target.

#### Claims

1. An underwater weapon system comprising a self-propelled weapon (10) with target homing means, a watertight container (11) for the weapon, pump means (16, 17) in the container having an inlet or inlets (18, 19) and an outlet or outlets (20, 21) and control means (22) operative to open the container to permit release of the weapon, characterised in that the pump means are arranged for pumping sand or silt away from under the container to cause the container to become buried in sand or silt on the sea bed, said container having control means for operating said pump means and means arranged to stop said pump means when the container is buried to a predetermined depth.

2. An underwater weapon system as claimed in claim 1 characterised in that said pump means is operatively reversible to pump sand or silt underneath the container for raising the container.

3. A weapon system as claimed in either claim 1 or claim 2 characterised in that said control means for the pump means are arranged in response to a command signal to operate the pump means to raise the container to a position for weapon release.

4. A weapon system as claimed in any of the preceding claims characterised in that means (22) responsive to an external command signal are provided for activation of the control means for the weapon system.

5. A weapon system as claimed in claim 4 and having a receiver for receiving an acoustic or electromagnetic command signal.

6. A weapon system as claimed in claim 5 and having a retractable receiving sensor (22) for receiving said command signal.

7. A weapon system as claimed in any of the

preceding claims wherein the weapon (10) is a torpedo.

8. A weapon system as claimed in any of claims 1 to 6 wherein the weapon is a ballistic missile.

### Patentansprüche

1. Unterwasserwaffensystem, das eine selbstfahrende Waffe (10) mit einer Zielenkeinnrichtung, einen wasserdichten Behälter (11) für die Waffe, eine Pumpeneinrichtung (16, 17) im Behälter mit einem Einlaß oder Einlässen (18, 19) und einem Auslaß oder Auslässen (20, 21) und eine Steuereinrichtung (22) umfaßt, die so arbeitet, daß sie den Behälter öffnet, um die Waffe freigegeben zu können, dadurch gekennzeichnet, daß die Pumpeneinrichtung zum Abpumpen von Sand oder Schlamm vom Bereich unter dem Behälter eingerichtet ist, damit der Behälter dazu gebracht wird, im Sand oder Schlamm am Meeresboden eingegraben zu werden, wobei der Behälter eine Steuereinrichtung zum Betreiben der Pumpeneinrichtung und eine Einrichtung aufweist, die eingerichtet ist, die Pumpeneinrichtung anzuhalten, wenn der Behälter auf eine vorbestimmte Tiefe eingegraben ist.

2. Unterwasserwaffensystem nach Anspruch 1, dadurch gekennzeichnet, daß die besagte Pumpeneinrichtung in ihrer Arbeitsweise umkehrbar ist, um Sand oder Schlamm unter dem Behälter zu pumpen, um den Behälter anzuheben.

3. Waffensystem entweder nach Anspruch 1 oder Anspruch 2, dadurch gekennzeichnet, daß die Steuereinrichtung für die Pumpeneinrichtung so eingerichtet ist, daß sie auf ein Befehlssignal ansprechend die Pumpeneinrichtung betreibt, um den Behälter in eine Lage zum Freigeben der Waffe anzuheben.

4. Waffensystem nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß eine auf ein äußeres Befehlssignal ansprechende Einrichtung (22) vorgesehen ist, um die Steuereinrichtung für das Waffensystem zu betätigen.

5. Waffensystem nach Anspruch 4, mit einem Empfänger zum Empfangen eines akustischen oder elektromagnetischen Befehlssignals.

6. Waffensystem nach Anspruch 5, mit einem einzeihbaren Empfangssensor (22) zum Empfangen von Befehlssignals.

7. Waffensystem nach einem der vorhergehenden Ansprüche, bei dem die Waffe (10) ein Torpedo ist.

8. Waffensystem nach einem der Ansprüche 1 bis 6, bei dem die Waffe eine ballistische Rakete ist.

### 5 Revendications

1. Un système d'arme sous-marine comprenant une arme auto-propulsée (10) avec des moyens de guidage, un conteneur étanche à l'eau (11) pour l'arme, des moyens de pompage (16, 17) dans le conteneur ayant une entrée ou des entrées (18, 19) et une sortie ou des sorties (20, 21) et des appareils de contrôle actif (22) pour ouvrir le conteneur afin de permettre le lancement de l'arme, caractérisé en ce que les moyens de pompage sont organisés pour pomper du sable ou de la vase de dessous le conteneur afin de conduire le conteneur à s'enterrer dans le sable ou la vase au fond de la mer, ledit conteneur ayant des moyens de commande pour mettre en service lesdits moyens de pompage et des moyens organisés pour arrêter lesdits moyens de pompage quand le conteneur est enterré à une profondeur prédéterminée.

2. Un système d'arme sous-marine selon la revendication 1, caractérisé en ce que ledit moyen de pompage est réversible de façon à injecter du sable ou de la vase sous le conteneur pour soulever le conteneur.

3. Un système d'arme selon la revendication 1 ou la revendication 2, caractérisé en ce que lesdits moyens de commande pour les moyens de pompage sont organisés pour obéir à un signal de commande mettant en service les moyens de pompage afin de soulever le conteneur jusqu'à une position de lancement de l'arme.

4. Un système d'arme selon une quelconque des revendications précédentes caractérisé en ce que des moyens (22) sensibles à un signal de commande externe sont disposés pour activer les moyens de commande du système d'arme.

5. Un système d'arme selon la revendication 4 et ayant un récepteur pour recevoir un signal de commande acoustique ou électromagnétique.

6. Un système d'arme selon la revendication 5 et ayant un capteur de réception rétractable (22) pour recevoir ledit signal de commande.

7. Un système d'arme selon une quelconque des revendications précédentes où l'arme (10) est une torpille.

8. Un système d'arme selon une quelconque des revendications 1 à 6 où l'arme est un missile balistique.

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