

A Method And System for Delivering A Floatation Device

FIELD OF INVENTION

- 5 The present invention relates broadly to a method and system for delivering a deployable floatation device and, in particular, to a projectile for delivering a deployable floatation device.

BACKGROUND

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Typically, a person facing difficulties in the open waters of the sea or the like without a life jacket or floatation device has about 20 – 60 seconds before there is a serious threat of drowning. In such emergencies, it is crucial to rescue the victim in as short a time as possible.

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For example, on a beach that is patrolled by lifeguards, if a swimmer swims far out into the sea and starts to face difficulties in the open waters, the most direct way used by the lifeguards to rescue this victim is to swim towards the victim to pass him or her a floatation device to cling on. Alternatively, depending on the availability of such resources, the lifeguards may paddle a canoe or ride a jet-ski to pick up the victim. Another way of rescuing the victim is to contact the nearest motor-launch that is patrolling the outer perimeter of the water boundary of the beach to pick-up the victim.

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- 25 Unfortunately, using the above conventional methods, often the victim is not reach in time to be saved. This problem is made worse if the beach is crowded or if the victim is washed out further into the sea by strong currents.

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To solve the above problem, one method is to rescue the distressed victim utilising a hand-held pneumatic line thrower. This method uses an inflatable rescue buoy with a line connected to the line thrower, which is launched towards the victim. The rescue buoy is compact for launching or throwing. Once the victim manages to cling on to the buoy, he or she is pulled towards the shore using the line. However, the effectiveness of such a device depends on the accuracy of the launch. There is a high chance that the launched buoy misses

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its target and the struggling victim has to attempt to swim towards the buoy. Furthermore, being hand-held, it is difficult to have control over the accuracy. Also, typically the line thrower only has a limited range of 250-300 feet or less.

- 5 Japanese patent number JP6171584 discloses a rescue kit comprising a water-bound propulsion device controlled through remote control for maneuvering the rescue kit in water towards the victim. However, if the waters are rough with strong currents, waves, crowded with swimmers or strong winds are blowing, steering the rescue kit across the distance from the point of deployment (e.g., the water edge) to
10 the victim may be difficult and time consuming.

At least embodiments of the present invention seek to address one or more of the above-mentioned problems.

15 SUMMARY

- In accordance with an aspect of the present invention, there is provided a method for delivering a deployable floatation device, the method comprising: providing a launcher having a recoil absorbing base and a launch tube coupled to the base;
20 providing a projectile for launching by the launcher, the projectile comprising the deployable floatation device; adjusting an orientation of the launch tube relative to the base for launching the projectile to a first targeted point; launching the projectile to the first targeted point; and remotely controlling a movement of the deployed floatation device to a second targeted point after the projectile has landed on or
25 about the first targeted point.

The recoil absorbing base may comprise a swivel base for adjusting the direction of the launch tube.

- 30 The launcher may comprise a pivoting mechanism for adjusting the angle of the launch tube.

- The pivoting mechanism may comprise a template marked with a range/elevation table to indicate angular settings in relation to firing range for elevation adjustments
35 of the launch tube.

The projectile may comprise a main body and a detachable cap for deploying the deployable floatation device.

- 5 The main body may be substantially cylindrical in shape.

The detachable cap may be shaped as a pointed structure.

- 10 The deployed floatation device may comprise an antenna attached with coloured streamers to aid spotting the deployed floatation device from a distance.

The projectile may comprise one or more propellers corresponding to one or more channels for providing fluid communication with surrounding water after the projectile has landed on or about the first targeted point.

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- In accordance with another aspect of the present invention, there is provided a system for delivering a deployable floatation device, the system comprising: a launcher having a recoil absorbing base and a launch tube coupled to the base; a projectile for launching by the launcher, the projectile comprising the deployable floatation device; the launcher comprising an adjustment means for adjusting an orientation of the launch tube relative to the base for launching the projectile to a first targeted point; and a remote control unit for remotely controlling a movement of the deployed floatation device to a second targeted point after the projectile has landed on or about the first targeted point.

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The recoil absorbing base may comprise a swivel base for adjusting the direction of the launch tube.

- 30 The launcher may comprise a pivoting mechanism for adjusting the angle of the launch tube.

The pivoting mechanism may comprise a template marked with a range/elevation table to indicate angular settings in relation to firing range for elevation adjustments of the launch tube.

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The projectile may comprise a main body and a detachable cap for deploying the deployable floatation device.

The main body may be substantially cylindrical in shape.

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The detachable cap may be shaped as a pointed structure.

The deployed floatation device may comprise an antenna attached with coloured streamers to aid spotting the deployed floatation device from a distance.

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The projectile may comprise one or more propellers corresponding to one or more channels for providing fluid communication with surrounding water after the projectile has landed on or about the first targeted point.

15 The projectile may be arranged to have a center-of-gravity bias such that the projectile assumes a pre-determined orientation when in the water.

In accordance with a yet another aspect of the present invention, there is provided a projectile for delivering a deployable floatation device, the projectile comprising: the
20 deployable floatation device; and a remote control unit for remotely controlling a movement of the deployed floatation device after the projectile has landed on or about a first targeted point.

The projectile may further comprise a main body and a detachable cap for deploying
25 the deployable floatation device.

The main body may be cylindrical in shape.

The detachable cap may be shaped as a pointed structure.

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The deployed floatation device may comprise an antenna attached with coloured streamers to aid spotting the deployed floatation device from a distance.

The projectile may further comprise one or more propellers corresponding to one or more channels for providing fluid communication with surrounding water after the projectile has landed on or about the first targeted point.

- 5 The projectile may be arranged to have a center-of-gravity bias such that the projectile assumes a pre-determined orientation when in the water.

In accordance with a further aspect of the present invention, there is provided a method for delivering a deployable floatation device, the method comprising:
10 providing a projectile comprising the deployable floatation device; and remotely controlling a movement of the deployed floatation device after the projectile has landed on or about a first targeted point.

The projectile may comprise a main body and a detachable cap for deploying the
15 deployable floatation device.

The main body may be substantially cylindrical in shape.

The detachable cap may be shaped as a pointed structure.
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The deployed floatation device may comprise an antenna attached with coloured streamers to aid spotting the deployed floatation device from a distance.

The projectile may comprise one or more propellers corresponding to one or more
25 channels for providing fluid communication with surrounding water after the projectile has landed on or about the first targeted point.

BRIEF DESCRIPTION OF THE DRAWINGS

30 Embodiments of the invention will be better understood and readily apparent to one of ordinary skill in the art from the following written description, by way of example only and in conjunction with the drawings, in which:

Figure 1 is an illustration of a method of delivery of a floatation device according
35 to an example embodiment of the present invention.

Figure 2 is a diagram showing the components of a projectile comprising a floatation device according to an example embodiment of the present invention.

5 Figure 3 is a diagram showing the rear view of the projectile of Figure 2.

Figure 4 is a schematic diagram showing the side view of a launcher for launching the projectile according to an example embodiment of the present invention.

10 Figure 5 is a schematic diagram showing the cross sectional side view of the launcher of Figure 4.

Figure 6 is a schematic diagram showing a rear view of the launcher of Figure 4.

15 DETAILED DESCRIPTION

Example embodiments of the present invention are capable of delivering a floatation device across a distance to a person in distress in the waters of a sea, lake, river, pool, swamp or the like.

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In an example embodiment of the present invention, there are three major parts, a projectile sub-system, a launch tube sub-system and a remote control sub-system. With reference to Figure 1, the projectile sub-system comprises a projectile 100, which consists of a floatation device 108. The launch tube sub-system comprises a
25 launcher 102. Part of the remote control sub-system is mounted on the projectile 100 and the other part is a separate device acting as a remote control centre. The operation of the three sub-systems will now be described.

When a person 104 in distress at sea is detected, for example, from a lifeguard post
30 on the shores of a beach, the projectile 100 consisting of a floatation device 108 is launched from the launcher 102 placed at a predetermined fixed position on shore towards the person 104. It will be appreciated that the launcher 102 may alternatively be mounted at a predetermined fixed position on a vehicle, ship, building or the like. To prevent the projectile 100 from hitting the person 104, the
35 spot targeted for the landing of the projectile 100 is situated close to the person 104.

After the projectile 100 lands in the water close to the person 104, the floatation device 108, which is part of the projectile 100, is inflated with gas and deployed. The movement of the floatation device 108 is controlled through a remote control device 106 on shore to steer the floatation device 108 towards the person 104. The person 104 is safe once he or she holds on to the floatation device 108 and stays afloat. Subsequently, means such as, for example, using a canoe, a jet-ski, deployment of a motor launch or the like, may be employed to pick up the person 104 who is now holding on to the floatation device 108.

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With reference to Figure 2, in the example embodiment, the projectile sub-system consists of a projectile 100 designed to be launched by the launcher 102 across a distance towards the person in distress. To aid launching, the projectile 100 has a bullet-shaped housing 200, which is aerodynamically suitable for launching. The housing 200 contains a deflated floatation device 108 compact within the projectile 100. When the projectile 100 is launched and reaches the waters, the floatation device 108 is inflated with gas and expands. The deflated expandable parts 204 of the floatation device 108 are packed adjacent to the front tip of the housing 200. A detachable cap 202 is pushed out when the floatation device 108 is inflated so as to allow the inflated floatation device 100 to expand. The shape of the housing 200 may be spherical, cylindrical or the like so long that it is suitable for launching from the launcher 102.

In the example embodiment, the floatation device 108 has two electric motors 206, 208 each mounted to propellers 210, 212 respectively for propelling the floatation device 108 in the desired direction when the floatation device 108 is in the water. The floatation device 108 further consists of a remote control receiver 214, which receives control signals (via e.g. radio waves) wirelessly from a remote control device 106. A spring loaded antenna 226 is mounted on the remote control receiver 214 to enable the remote control receiver 214 to receive the control signals transmitted by the remote control device 106. The floatation device 108 also consists of an associated speed control and servo unit 220, which provides speed and steering to the electric motors 206, 208. The speed and steering of the floatation device 108 are controllable by control signals received by the remote control receiver 214.

In the example embodiment, a switch 230 topped by a bobbin 216 or similar device is used to activate a battery 218. There is an opening 234 at the base of the housing 200, which allows water to reach the bobbin 216 when the projectile 100 lands in the water after the projectile 100 is launched. After the bobbin 216 is dissolved or softened when the bobbin 216 comes into contact with water, the bobbin 216 releases the switch 230 to close an electrical circuit in order to activate the battery 218. The battery 218 provides power to the electric motors 206, 208, the remote control receiver 214, the associated servo unit 220 and a circuit board 222.

In the example embodiment, the circuit board 222 controls two functions. The first function is the release of an antenna retaining catch 224 that is used to release the spring loaded antenna 226. The second function is the release of compressed gas in a gas canister 228 for inflating the deflated expandable parts 204 of the floatation device 108 through the use of a release valve 232. When the deflated expandable parts 204 are fully expanded upon inflation, the floatation device 108 automatically assumes an orientation such that the antenna 226 is outside of the water and the propellers 210, 212 are in the water. Proper orientation can be achieved by providing suitable center-of-gravity bias on the projectile. For example, by positioning the heavier components of the projectile 100 to form a base or to stabilize the projectile with ballast such that the heavier portion of the projectile will have a natural tendency to rest below the lighter portion when in water. The circuit board 222 performs these functions upon power-up. In another example embodiment, the circuit board 222 may perform these functions after activation after receiving signals from the remote control receiver 214.

In the example embodiment, to prevent the spring loaded antenna 226 from sticking upright when the projectile 100 is in the launcher 102 or when the projectile 100 is in flight after being launched from the launcher 102, the antenna 226 is held down by the antenna retaining catch 224. The antenna retaining catch 224 is an electromechanical catch, which is released upon activation by the circuit board 222. Attached to the antenna 226 are coloured streamers 240, which aid in spotting the floatation device 108 from a distance.

Figure 3 shows the rear view of the projectile 100 of the example embodiment. The two electric motors 206, 208 and the propellers 210, 212 are paired on the left and right sides of the floatation device 100. The remote control receiver 214 and the associated servo unit 220 are situated above the electric motors 206, 208. Channels 236, 238 are provided in the housing 200 of the projectile 100 such that the propellers 210, 212 are in fluid communication with the water surrounding once the projectile 100 has landed in the water. In the example embodiment, the channels 236, 238 do not extend the entire length of the projectile 100 but rather project only to a distance which allows sufficient space for the propellers to provide propulsion effectively. The bobbin 216 is positioned above the opening 234, at the base of the housing 200.

With reference to Figure 4, in the example embodiment, the launcher 102 of the launch tube sub-system consists of a launch tube 400 into which the projectile 100 would be placed for launching. There is a replaceable compressed gas canister 402 attached to the base of the launch tube 400. The gas canister 402 provides the necessary force to launch the projectile 100. A swivel base 404 is coupled to the launch tube 400 to allow the direction of the launch tube 400 to be rotated such that the barrel 410 of the launch tube 400 points to the desired direction of launch. The swivel base 404 also acts as a recoil absorbing base to absorb the recoil from the launch of the projectile 100. A pivoting device 406 allows the elevation and angle of launch of the launch tube 400 to be adjusted to vary the firing range of the projectile 100. In addition, there is a template 408 marked with a range/elevation table on the pivoting device 406 to indicate the angular settings in relation to the firing range for elevation adjustments of the launch tube 400 in the example embodiment.

With reference to Figure 5, the gas canister 402 is attached to a pressure regulator 504 that has a quick release mechanism. When triggered, the quick release mechanism of the pressure regulator 504 causes the release of high pressure gas from the gas canister 402 into an empty void 514 in the launch tube 400. The pressure regulator 504 has another function of controlling the pressure of the gas released into the void 514 during the launch. The projectile 100 is placed within the barrel 410 of the launch tube 400 with minimal or no clearance on its sides in contact with the walls of the barrel 410 with the rear facing the empty void 514.

- During launch, gas in the gas canister 402 is released into the void 514 through the released pressure regulator 504. As such, there is a sudden release of gas behind the rear of the projectile 100 facing the void 514. The sudden difference in pressure between the air at the front of the projectile 100 facing the target, which is at normal atmospheric pressure, and the gas in the void 514 behind the projectile 100, which is under high pressure, causes the high pressure gas to exert a force on the floatation device 100 thereby pushing the floatation device 100 forward towards the targeted spot as the gas expands outward through the barrel 410 of launch tube 400.
- 10 A triggering device 506 consisting of a shaft 512 and a knob 510 is utilised to activate the release of compressed gas in the gas canister 402 to launch the projectile 100. A safety catch 508 is built round the shaft 512 of the triggering device 506 to prevent the accidental release of compressed air.
- 15 Figure 6 shows that the swivel base 404 is connected to two legs 600, 602, holding the launch tube 400 in between. The pivoting device 406 comprises two circular pieces 604, 606 mounted on the two outer ends of the two legs 600, 602. On one of the circular pieces 606, there is a knob 608 fixed onto the circular piece 606 for rotating the pivoting device 406 for making elevation adjustments. Two rods 610, 612 are each connected or fixed to the centre of the two circular pieces 604, 606. The rods extend through the tips of the two legs and is connected or fixed to the launch tube 400. When the knob 608 is pushed sideways, the circular piece 606 rotates and brings along the rotation of the launch tube 608 about the central axis 614 of the rods thus allowing elevation adjustments.
- 25 In the example embodiment, referring back to Figure 2, the remote control sub-system consists of the remote control receiver 214 mounted on the floatation device 108 and a separate grip-type remote controller 215 (corresponding to the remote control device 106 in Figure 1) suitable for single-hand or two-hands operation. The grip-type remote controller 215 may be a handheld device containing a joystick for controlling the direction and speed of the floatation device 108. For different speeds and directions of the floatation device 108, there are corresponding control signals being transmitted from the grip-type remote controller 215 to the remote control receiver 214 on the floatation device 108.

A signal amplifier 244 and a complementary antenna 242 are built in the grip-type remote controller 215. During operation, the signal amplifier 244 and complementary antenna 242 enables the grip-type remote controller 215 to amplify and transmit control signals to anywhere within the range of 500m. It is appreciated that the distance can be beyond 500m by utilising a suitable signal amplifier and antenna 242.

In the example embodiment, the projectile 100 is designed to weigh about 4 kg and is aerodynamically shaped like a bullet with a length of 18 inches and diameter of 4 inches. In addition, the length of the launch tube 400 is 24 inches and the nominal angle of launch may be set at 45° which in theory provides a maximum launch range if the launch velocity is kept constant. The launch velocity required is set at approximately 45 m/sec and the air pressure required to achieve this launch velocity is approximately 120 psi. To provide this pressure, the gas canister 402 in the example embodiment requires a sufficient volume of gas at an approximate pressure of 200 psi with the release pressure regulator 504 rated at 120 psi (i.e., corresponding to the required release pressure).

Example embodiments of the present invention may have the following features and advantages.

In the instance of a crowded beach, example embodiments of the present invention provide a deployable floatation device incorporated within a projectile for launching over a crowd towards a distressed swimmer struggling at a distance. Therefore, when compared with conventional methods, example embodiments of the present invention are capable of delivering a floatation device to the victim in a shorter time.

Furthermore, the projectile in the example embodiments of the present invention is launched from a tube that is mounted on a recoil base. This provides greater stability in handling recoil of the launch by compressed air and allows for mechanisms for adjusting precise launch direction and angles. As such, example embodiments of the present invention are capable of handling greater launch pressure, achieve a longer firing range and more accurate shots.

Moreover, example embodiments of the present invention contain a remotely controlled propulsion system, which allows the deployed floatation device to be moved and steered after it lands on the water. A lifeguard or any passer-by on land may easily steer the floatation device towards the victim once the projectile lands in water in the vicinity of the victim and the floatation device is deployed. This compensates the effect of inaccurate launches and at the same time reduces the difficulty in steering a floatation device over a long distance when the waters are rough with conditions such as strong currents, waves, crowded with swimmers or when the wind is strong.

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Many modifications and other embodiments can be made to the system and its method by those skilled in the art having the understanding of the above described disclosure together with the drawings. Therefore, it is to be understood that the device and its utility is not to be limited to the above description contained herein only, and that possible modifications are to be included in the claims of the disclosure.

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CLAIMS

1. A method for delivering a deployable floatation device, the method
5 comprising:
 providing a launcher having a recoil absorbing base and a launch tube
 coupled to the base;
 providing a projectile for launching by the launcher, the projectile comprising
 the deployable floatation device;
10 adjusting an orientation of the launch tube relative to the base for launching
 the projectile to a first targeted point;
 launching the projectile to the first targeted point; and
 remotely controlling a movement of the deployed floatation device to a
 second targeted point after the projectile has landed on or about the first targeted
15 point.
2. A method as claimed in claim 1, wherein the recoil absorbing base
comprises a swivel base for adjusting the direction of the launch tube.
- 20 3. A method as claimed in any one of the preceding claims, wherein the
launcher comprises a pivoting mechanism for adjusting the angle of the launch tube.
4. A method as claimed in claim 3, wherein the pivoting mechanism
comprises a template marked with a range/elevation table to indicate angular
25 settings in relation to firing range for elevation adjustments of the launch tube.
5. A method as claimed in any one of the preceding claims, wherein the
projectile comprises a main body and a detachable cap for deploying the deployable
floatation device.
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6. A method as claimed in claim 5, wherein the main body is
substantially cylindrical in shape.
7. A method as claimed in claims 5 or 6, wherein the detachable cap is
35 shaped as a pointed structure.

8. A method as claimed in any one of the preceding claims, wherein the deployed floatation device comprises an antenna attached with coloured streamers to aid spotting the deployed floatation device from a distance.

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9. A method as claimed in any one of the preceding claims, wherein the projectile comprises one or more propellers corresponding to one or more channels for providing fluid communication with surrounding water after the projectile has landed on or about the first targeted point.

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10. A system for delivering a deployable floatation device, the system comprising:

a launcher having a recoil absorbing base and a launch tube coupled to the base;

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a projectile for launching by the launcher, the projectile comprising the deployable floatation device;

the launcher comprising an adjustment means for adjusting an orientation of the launch tube relative to the base for launching the projectile to a first targeted point; and

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a remote control unit for remotely controlling a movement of the deployed floatation device to a second targeted point after the projectile has landed on or about the first targeted point.

11. A system as claimed in claim 10, wherein the recoil absorbing base comprises a swivel base for adjusting the direction of the launch tube.

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12. A system as claimed in claims 10 or 11, wherein the launcher comprises a pivoting mechanism for adjusting the angle of the launch tube.

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13. A system as claimed in claim 12, wherein the pivoting mechanism comprises a template marked with a range/elevation table to indicate angular settings in relation to firing range for elevation adjustments of the launch tube.

14. A system as claimed in any one of claims 10 to 13, wherein the projectile comprises a main body and a detachable cap for deploying the deployable floatation device.

5 15. A system as claimed in claim 14, wherein the main body is substantially cylindrical in shape.

16. A system as claimed in claims 14 or 15, wherein the detachable cap is shaped as a pointed structure.

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17. A system as claimed in any one of claims 10 to 16, wherein the deployed floatation device comprises an antenna attached with coloured streamers to aid spotting the deployed floatation device from a distance.

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18. A system as claimed in any one of claims 10 to 17, wherein the projectile comprises one or more propellers corresponding to one or more channels for providing fluid communication with surrounding water after the projectile has landed on or about the first targeted point.

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19. A system as claimed in any one of claims 10 to 18, wherein the projectile is arranged to have a center-of-gravity bias such that the projectile assumes a pre-determined orientation when in the water.

20. A projectile for delivering a deployable floatation device, the projectile comprising:

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the deployable floatation device; and

a remote control unit for remotely controlling a movement of the deployed floatation device after the projectile has landed on or about a first targeted point.

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21. A projectile as claimed in claim 20, the projectile further comprising a main body and a detachable cap for deploying the deployable floatation device.

22. A projectile as claimed in claim 21, wherein the main body is cylindrical in shape.

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23. A projectile as claimed in claims 21 or 22, wherein the detachable cap is shaped as a pointed structure.

24. A projectile as claimed in any one of claims 20 to 23, wherein the
5 deployed floatation device comprises an antenna attached with coloured streamers to aid spotting the deployed floatation device from a distance.

25. A projectile as claimed in any one of claims 20 to 24, the projectile
further comprising one or more propellers corresponding to one or more channels
10 for providing fluid communication with surrounding water after the projectile has landed on or about the first targeted point.

26. A projectile as claimed in any one of claims 20 to 25, wherein the
projectile is arranged to have a center-of-gravity bias such that the projectile
15 assumes a pre-determined orientation when in the water.

27. A method for delivering a deployable floatation device, the method
comprising:
providing a projectile comprising the deployable floatation device; and
20 remotely controlling a movement of the deployed floatation device after the
projectile has landed on or about a first targeted point.

28. A method as claimed in claim 27, wherein the projectile comprises a
main body and a detachable cap for deploying the deployable floatation device.
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29. A method as claimed in claim 28, wherein the main body is
substantially cylindrical in shape.

30. A method as claimed in claims 28 or 29, wherein the detachable cap
30 is shaped as a pointed structure.

31. A method as claimed in any one of claims 27 to 30, wherein the
deployed floatation device comprises an antenna attached with coloured streamers
to aid spotting the deployed floatation device from a distance.
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32. A method as claimed in any one of claims 27 to 31, wherein the projectile comprises one or more propellers corresponding to one or more channels for providing fluid communication with surrounding water after the projectile has landed on or about the first targeted point.