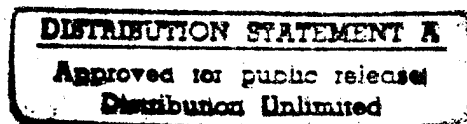


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Inventor Christopher F. Hillenbrand
Donald T. Gomez

NOTICE

The above identified patent application is available for licensing. Requests for information should be addressed to:



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DEPARTMENT OF THE NAVY
CODE OCCC3
ARLINGTON VA 22217-5660

19960405 073

DTIC QUALITY INSPECTED 1

1
2 Navy Case No. 75536
3

4 SYSTEM FOR DEPLOYING WEAPONS CARRIED IN AN
5 ANNULAR CONFIGURATION IN A UUV
6

7 STATEMENT OF GOVERNMENT INTEREST

8 The invention described herein may be manufactured by or for
9 the Government of the United States of America for Governmental
10 purposes without the payment of any royalties thereon or
11 therefor.
12

13 CROSS-REFERENCE TO RELATED APPLICATIONS

14 "Unmanned Undersea Vehicle With Keel-Mounted Payload
15 Deployment System" (Navy Case No. 75532) filed of even date
16 herewith in the name of Christopher F. Hillenbrand.

17 "Unmanned Undersea Weapon Deployment Structure With
18 Cylindrical Payload Deployment System" (Navy Case No. 75533)
19 filed of even date herewith in the name of Christopher F.
20 Hillenbrand.

21 "Unmanned Undersea Vehicle With Erectable Sensor Mast For
22 Obtaining Position and Environmental Vehicle Status" (Navy Case
23 No. 75534) filed of even date herewith in the names of
24 Christopher F. Hillenbrand and Donald T. Gomez.

1 "Unmanned Undersea Vehicle System for Weapon Deployment
2 System" (Navy Case No. 75535) filed of even date herewith in the
3 names of Christopher F. Hillenbrand and Donald T. Gomez.

4 "Unmanned Undersea Weapon Deployment Structure With
5 Cylindrical Payload Configuration" (Navy Case No. 76115) filed of
6 even date herewith in the name of Christopher F. Hillenbrand.

7 "Unmanned Undersea Vehicle Including Keel-Mounted Payload
8 Deployment Arrangement With Payload Compartment Flooding
9 Arrangement To Maintain Axi-Symmetrical Mass Distribution" (Navy
10 Case No. 76117) filed of even date herewith in the name of
11 Christopher F. Hillenbrand.

12
13 BACKGROUND OF THE INVENTION

14 (1) Field of the Invention

15 The invention relates generally to the field of undersea
16 weapon delivery systems and more particularly to such systems for
17 covertly deploying multiple weapons while eliminating the
18 necessity of having manned ships or submarines present at the
19 deployment site.

20 (2) Description of the Prior Art

21 Underwater missiles and torpedoes are currently launched
22 from either the offside of a manned ship or from the torpedo tube
23 of a manned submarine. This current method of deploying
24 underwater weapons requires the actual presence of the ship
25 and/or submarine at the deployment site, thereby posing a number
26 of dangers, including (1) the lives of the people on the ship or

1 submarine, including the equipment itself, are exposed to enemy
2 fire in a danger zone, and (2) ships, as well as submarines in
3 shallow water, are exposed and thereby easily detected by an
4 enemy.

5 Conventional wire-guided torpedoes are available as
6 generally unmanned vehicles, but there are a number of problems
7 in using them as a weapon system platform. A torpedo does not
8 have an arrangement for compensating for buoyancy when a weapon
9 is released from a torpedo shell. Also, the torpedo carrier does
10 not provide a desired observation station which would enable the
11 fire control personnel to have environmental information of the
12 above-the-surface domain at the site of a target. Thus, the
13 shock to the torpedo carrier when a weapon is launched will
14 result in an unstable carrier. Also, the torpedo carrier itself
15 is not recoverable, and hence can only be used once.

16 17 SUMMARY OF THE INVENTION

18 It is therefore an object of the invention to provide a new
19 and improved undersea weapon deployment, and fire control
20 information system in which above-the-surface environmental
21 information at a remote target site is available to fire control
22 personnel at the operational center of the system.

23 In brief summary, the invention provides an unmanned
24 undersea vehicle system comprising a remote-controlled, unmanned
25 undersea vehicle and a mother vehicle interconnected by a
26 communication link. The unmanned undersea vehicle includes a

1 weapon compartment, an erectable observation mast and a control
2 means. Within the weapon compartment are a plurality of weapon
3 deployment devices symmetrically disposed about a central core,
4 each weapon deployment device having a weapon canister for
5 carrying a weapon, the weapon deployment devices being pivotable
6 between a retracted, non-deployed position and an extended,
7 deployed position, and configured so that, when in their
8 extended, deployed positions the respective weapon canisters are
9 positioned beyond the vehicle's diameter. Each weapon canister
10 includes end caps at opposing ends which are discharged when the
11 weapon contained therein is fired to allow seawater to enter.
12 This compensates and countervails destabilization of vehicle
13 motion which would otherwise occur as a result of the potential
14 redistribution of mass of a vehicle when a weapon is expelled.
15 The observation mast obtains environmental information. The
16 control means controls the deployment of the weapon by expelling
17 the weapon from the weapon compartment and thereafter controls
18 the firing of the weapon. The mother vehicle generates command
19 information for controlling the control means and receives
20 unmanned undersea vehicle status information from the unmanned
21 undersea vehicle and processes it for use in generating the
22 command information. The communication link interconnects the
23 unmanned undersea vehicle and the mother vehicle to facilitate
24 transfer of command information from the mother vehicle to the

1 unmanned undersea vehicle and to further facilitate transfer of
2 unmanned undersea vehicle status information from the unmanned
3 undersea vehicle to the mother vehicle.
4

5 BRIEF DESCRIPTION OF THE DRAWINGS

6 This invention is pointed out with particularity in the
7 appended claims. The above and further advantages of this
8 invention may be better understood by referring to the following
9 description taken in conjunction with the accompanying drawings,
10 in which:

11 FIG. 1 depicts an unmanned undersea weapon deployment system
12 constructed in accordance with the invention;

13 FIG. 2 depicts, in schematic form, the side elevational view
14 of an unmanned undersea vehicle useful in the system depicted in
15 FIG. 1.;

16 FIG. 3 depicts, in schematic form, the side perspective view
17 of a weapon compartment useful in one embodiment of the unmanned
18 undersea vehicle depicted in FIG. 2;

19 FIG. 4 depicts, in schematic form, the sectional view of the
20 weapon compartment depicted in FIG. 3, taken along the line A-A
21 in FIGS. 2 and 3, with the weapons being situated in a non-
22 deployment condition;

23 FIG. 5 depicts, in schematic form, the sectional view of the
24 weapon compartment as depicted in FIG. 4, with the weapons being
25 situated in a deployment condition;
26

1 FIG. 6 depicts, in schematic form, a detail of a portion of
2 the weapon compartment depicted in FIGS. 3 through 5, which is
3 useful in understanding the weapon deployment operation;

4 FIG. 7 depicts, also in schematic form, the detail of a
5 weapon canister used in the weapon compartment depicted in FIGS.
6 3 through 6, which is useful in understanding the weapon
7 deployment operation;

8 FIG. 8 depicts, in schematic form, the side perspective view
9 of a weapon compartment useful in a second embodiment of the
10 unmanned undersea vehicle depicted in FIG. 2;

11 FIG. 9 depicts, also in schematic form, the sectional view
12 of the weapon compartment depicted in FIG. 8, taken along the
13 line B-B in FIG. 8, with the weapons being situated in a non-
14 deployment condition; and

15 FIG. 10 depicts, also in schematic form, the sectional view
16 of the weapon compartment depicted in FIG. 8, taken along the
17 line B-B in FIG. 8, with the weapons being situated in a
18 deployment condition.

19 20 DESCRIPTION OF THE PREFERRED EMBODIMENT

21 FIG. 1 depicts an unmanned undersea weapon deployment system
22 10 in accordance with the invention. With reference to FIG. 1,
23 the system 10 includes a "mother vehicle" 11 and a unmanned
24 undersea vehicle 12 constructed in accordance with the invention,
25 which are interconnected by a communication link 13 such as an
26 optical fiber. The mother vehicle 11 may be a conventional

1 manned nautical ship (either a surface ship or a submarine), to
2 which may be added (if necessary) mounting means (not separately
3 shown) for holding and releasing the unmanned undersea vehicle
4 into the ocean and for retrieving it from the ocean as described
5 below, and means (also not separately shown) for communicating
6 with the unmanned undersea vehicle to facilitate control of the
7 unmanned undersea vehicle by the mother vehicle as described
8 below.

9 FIG. 2 depicts, in schematic form, the side elevational view
10 of the unmanned undersea vehicle 12 which is useful in the system
11 10 depicted in FIG. 1. With reference to FIG. 2, the unmanned
12 undersea vehicle 12 includes an axi-symmetrical torpedo-shaped
13 outer hull 20 which houses a forward control system compartment
14 21, a weapon system compartment 22 and an aft "control effectors"
15 compartment 23. The central portion of the outer hull 20 is
16 generally cylindrical, with a forward rounded nose (to the left
17 in FIG. 2) and a tapered tail (to the right in FIG. 2).
18 Extending rearwardly of the tail portion is a propeller 30 used
19 to drive the unmanned undersea vehicle 12 selectively in a
20 forward or rearward direction. Extending vertically and
21 horizontally from the tail portion are four fins 31-33. Two of
22 the fins, one identified by reference numerals 30 (shown in FIG.
23 1) on opposing sides of the tail portion extend horizontally
24 therefrom (the second horizontally-extending fin is not shown),
25 and two fins, identified by reference numerals 32 and 33, on
26 opposing sides extend vertically therefrom. The angular

1 orientation of the fins relative to the longitudinal axis of the
2 unmanned undersea vehicle 12 is adjustable to permit steering of
3 the unmanned undersea vehicle horizontally and vertically.

4 The control system compartment 21 includes a number of
5 elements, including local control circuitry 24 for controlling
6 the various elements of the unmanned undersea vehicle 12 in
7 response to commands provided by the mother vehicle 11 (FIG. 1),
8 as well as in response to information as to the unmanned undersea
9 vehicle's external environment as provided by an external sensor
10 25. The local control circuit 24 may include, for example, a
11 conventional auto-pilot and a suitably-programmed digital
12 computer, as well as electrical circuitry for providing control
13 signals to control other components of the unmanned undersea
14 vehicle 12 as described below. The external sensor 25 may
15 comprise, for example, a conventional Doppler sonar device.

16 The aft "control effectors" compartment 23 includes several
17 elements for propelling and steering the unmanned undersea
18 vehicle 12 and, in one embodiment, for connecting the unmanned
19 undersea vehicle to the communication link 13 and for reeling the
20 communication link 13 out as the unmanned undersea vehicle moves
21 away from the mother vehicle 12 and reeling it in as the unmanned
22 undersea vehicle 12 returns towards the mother vehicle 12. In
23 particular, the control effectors compartment 23 includes a motor
24 40 for powering the propeller 30. The motor, in turn, is powered
25 by a battery and motor control circuit 41, which receives motor
26 control information from the local control circuit 24 in the

1 control system compartment 21 over a control link represented by
2 a dashed line 42. The control effectors compartment 23 also
3 includes motors (not shown) for controlling the orientation of
4 the fins 31-33, which are also powered by and under control of
5 the battery and motor control circuit 41. The battery and motor
6 control circuit 41 also provides status information to the local
7 control circuit over the control link 42.

8 In one embodiment, the control effectors compartment 23 also
9 includes a mother vehicle control link 43, which performs the
10 functions of connecting the unmanned undersea vehicle 12 to the
11 communication link and reeling the communication link 13 out and
12 in as the unmanned undersea vehicle 12 moves away from and toward
13 the mother vehicle 11. The mother vehicle control link 43, in
14 turn, provides the command information it receives from the
15 communication link 13 to the local control circuit 24 over an
16 internal communication link represented by dashed line 44. In
17 addition, the local control circuit 24 provides unmanned undersea
18 vehicle status information, including information as to the
19 unmanned undersea vehicle's position and its environment, to the
20 mother vehicle control link 43 over the internal communication
21 link 44, and the mother vehicle control link 44 will transmit
22 that information over the communication link 13 to the mother
23 vehicle 11.

24 In one embodiment, the unmanned undersea vehicle 12 also
25 includes an erectable mast 50, which may be extended in a
26 telescoping manner from the control effectors compartment. The

1 far (upper) end of the mast 50 includes sensor equipment which
2 permits acquisition of certain positioning and environmental
3 information. In particular, the mast 50 includes an optical
4 and/or video camera 51, which may be a CCD device, for obtaining
5 image information as to the vehicle's environment. The camera 51
6 provides the video information to the local control circuit 24,
7 which can process the information and use it locally, and in
8 addition can provide the processed and/or raw video information
9 to the mother vehicle 11. The mother vehicle 11, in turn, can
10 use the information received from the unmanned undersea vehicle
11 12 in determining the commands to be provided to the unmanned
12 undersea vehicle 12.

13 In addition, the mast 50 includes a Geodetic Position System
14 ("GPS") antenna 52. The GPS antenna 52 receives signals from the
15 Geodetic Positioning System maintained by the Federal Government
16 of the United States of America, and provides them to the local
17 control circuit 24 to facilitate determination of the vehicle's
18 location. The Geodetic Positioning System, as is well known,
19 includes a plurality of satellites which revolve around the Earth
20 and transmit signals which a conventional publicly-available GPS
21 receiver can use to identify the location of the receiver in any
22 relevant location on Earth. It will be appreciated that other
23 embodiments may utilize other location positioning systems, such
24 as may be provided by the Federal Government's Loran-C system.
25 In either case, the local control circuit 24 can use the
26 positioning information locally and it can provide the can

1 provide the information to the mother vehicle 11. The mother
2 vehicle 11, in turn, can use the information received from the
3 unmanned undersea vehicle 12 in determining the commands to be
4 provided to the unmanned undersea vehicle 12.

5 As noted above, the unmanned undersea vehicle 12 further
6 includes a weapon compartment 22. The weapon compartment 22
7 stores and deploys weapons, in the form of missiles, under
8 control of the local control circuit 24 operating, in turn, under
9 control of the mother vehicle 11. In one embodiment, which will
10 be described below in connection with FIGS. 3 through 7, the
11 weapon compartment 22 deploys a plurality of weapons axially
12 symmetrically about the unmanned undersea vehicle 12. In a
13 second embodiment, which will be described below in connection
14 with FIGS. 8 through 10, the weapon compartment, identified in
15 those figures by reference numeral 22' deploys the weapons
16 downwardly. In both cases, the weapon compartment can carry a
17 number of missiles and deploy them individually in a plurality of
18 locations. As it deploys the individual weapons, the weapon
19 compartment 22 and 22' maintains axial mass symmetry, which
20 simplifies steering of the vehicle as it is propelled through the
21 ocean, as well as simplifying weapon deployment from multiple
22 positions.

23 FIG. 3 depicts, in schematic form, the side perspective view
24 of weapon compartment 22, and FIG. 4 depicts, in schematic form,
25 the sectional view of the weapon compartment depicted in FIG. 3,
26 taken along the line A-A in FIGS. 2 and 3. In FIGS. 2 and 3, the

1 weapons are shown in retracted, non-deployed condition. FIG.
2 FIG. 5 depicts, in schematic form, the sectional view of the
3 weapon compartment as depicted in FIG. 4, with the weapons being
4 situated in an extended, deployment condition. With reference to
5 those figures, the weapon compartment 22 includes a central core
6 60, preferably comprising a buoyant material, having a central
7 aperture 61 which extends therethrough from the forward control
8 system compartment 23 to the rear control effectors compartment
9 24. The central aperture 61 is co-axial with the weapon
10 compartment 22 and provides a passageway through which the
11 connections extend between the forward control system compartment
12 23 and the rear control effectors compartment 24.

13 In addition, around the exterior surface of the central core
14 60 is formed a plurality of recesses 63(1) through 63(6)
15 (specifically shown in FIG. 5, and generally identified by
16 reference numeral 63(i)). In each recess 63(i) is mounted a
17 pivotable weapon deployment device 62(1) through 62(6) (generally
18 identified by reference numeral 62(i)). FIGS. 3 and 4 show the
19 weapon deployment devices 62(i) in a retracted, non-deployed
20 position, FIG. 5 shows the weapon deployment devices 62(i) in an
21 extended, deployed position, and FIG. 6 shows a detail of a
22 weapon deployment device 62(1) useful in understanding deployment
23 thereof. Each weapon deployment device 62(i) comprises a weapon
24 canister 64(i) mounted on a pivotable arm 65(i). When retracted,
25 as shown in FIGS. 3 and 4, the weapon deployment canister 64(i)
26 and arm 65(i) fits into the respective recess 63(i). The outer

1 surfaces of the arms 65(i) are contoured to conform to and form
2 the cylindrical outer surface of portion of the hull 20
3 comprising the weapon compartment 22.

4 As noted above, FIG. 5 shows the weapon deployment devices
5 62(i) in their respective deployed positions. As shown in FIG.
6 5, in the deployed positions, the weapon deployment devices 62(i)
7 are pivoted about respective pivot points 66(i) so that the
8 weapon canisters 64(i) are positioned beyond the surface of the
9 hull 20. As shown in FIG. 6, the weapon deployment devices 62(i)
10 are pivoted between the retracted, non-deployed position and the
11 extended, deployed position by respective electrical motors 67(i)
12 through a gear train 68(i). The motors 67(i), in turn, are
13 controlled by the local control circuit 24 (FIG. 1). It will be
14 appreciated that a plurality of motors and associated gear trains
15 may be situated along the length of the weapon compartment 22 to
16 provide for more rapid pivoting of the associated weapon
17 deployment device 62(i) than may be provided by a single
18 motor/gear train.

19 The procedure used in deploying and firing missiles from the
20 weapon compartment 22 will be described in connection with FIG.
21 7, as well as FIGS. 3 through 6. Initially, the local control
22 circuit 24, under control of the mother vehicle 11, has guided
23 the unmanned undersea vehicle 12 to a position in which a missile
24 is to be deployed and fired. While the unmanned undersea vehicle
25 12 is being propelled to the deployment and firing position, the
26 weapon deployment devices 62(i) will be in the retracted, non-

1 deployed position. After the unmanned undersea vehicle 12
2 arrives at the deployment and firing position, the local control
3 circuit 24, if commanded by the mother vehicle 11 to actually
4 deploy and fire one or more of the weapons, will actuate the
5 motors 67(i) that are associated with all of the weapon
6 deployment devices 62(i) and enable them to pivot the weapon
7 deployment devices 62(i) to the deployed condition. By deploying
8 all of the weapon deployment devices 62(i) symmetrically about
9 the axis of the unmanned undersea vehicle 12, the unmanned
10 undersea vehicle 12 is assured that it will not be forced from
11 the deployment position.

12 After all of the weapon deployment devices 62(i) have been
13 pivoted to the extended, deployed position, missiles contained in
14 one or more of the weapon canisters 64(i) may be fired. The
15 firing process will be described in connection with FIG. 7. With
16 reference to FIG. 7, the weapon canister 64(i) comprises a
17 cylindrical canister body 80(i), a forward end cap 81(i) and a
18 rear end cap 82(i). Prior to firing, the end caps 81(i) and
19 82(i) are affixed to the canister body 80(i) to form a housing
20 for a missile 83(i). When affixed to the canister body 80(i),
21 the end caps 81(i) and 82(i) seal the interior of the canister
22 64(i) from seawater surrounding the canister.

23 When the missile 83(i) inside of the weapon canister 64(i)
24 is fired, air pressure from the combusted gases generated during
25 the firing process builds up inside the canister 64(i), which
26 enables the end caps 81(i) and 82(i) to be blown off the canister

1 body 80(i). When the end caps 81(i) and 82(i) are off the
2 canister 64(i), the missile will thereafter propel itself
3 forward. In addition, seawater from outside of the canister will
4 enter the interior of the canister.

5 After the missile 83(i) has been fired, the local control
6 circuit 24 can actuate the motors 67(i) to enable the weapon
7 deployment devices 62(i) to be pivoted between the extended,
8 deployed position and the retracted, non-deployed position. In
9 that operation, the seawater which entered the canisters 64(i) of
10 the weapon deployment devices 62(i) when the respective missiles
11 therein were fired will remain therein. The seawater in the
12 canisters 64(i) for the fired missiles will help to maintain the
13 symmetry of mass around the longitudinal axis of the unmanned
14 undersea vehicle 12, which, in turn, will simplify controlling
15 the unmanned undersea vehicle 12 as it thereafter propels itself
16 beyond the weapon deployment and firing position.

17 While the unmanned undersea vehicle 12 including weapon
18 compartment 22 has been depicted in FIGS. 3 through 7 as
19 providing six weapon deployment devices 62(i), it will be
20 appreciated that any number of weapon deployment devices 62(i)
21 may be provided in the unmanned undersea vehicle 12.

22 FIG. 8 depicts, in schematic form, the side perspective view
23 of the second embodiment weapon compartment 22'. Insofar as the
24 invention is presently understood, weapon compartment 22'
25 embodies the preferred mode of invention with respect to the
26 instant, above-entitled invention. In the weapon compartment

1 22', two weapons 90(F) and 90(A) are positioned fore and aft
2 toward the bottom of the weapon compartment 22'. In addition,
3 forward and aft buoyancy tanks 91(F) and 91(A) are provide
4 proximate to and above the correspondingly-indexed weapons 90(F)
5 and 90(A). Positioned between the buoyancy tanks 91(F) and 91(A)
6 is a mother vehicle control link 92, which performs the same
7 function as mother vehicle control link 43 (FIG. 2); in a
8 unmanned undersea vehicle 12 which incorporates weapon
9 compartment 22', the mother vehicle control link 43 is not
10 present in the aft control effectors compartment 23. Each
11 buoyancy tank 91(F) and 91(A) is provided with a plurality of
12 actuatable valves 93(F) and 93(A) which provide a controllable path
13 to enable seawater exterior of the weapon compartment to flow
14 into the respective buoyancy tank 91(F) and 91(A) during
15 deployment and firing of the respective weapon 90(F) and 90(A) as
16 described below.

17 The operations performed by the unmanned undersea vehicle
18 12, in particular by the weapon compartment 22', in connection
19 with deployment and firing of the weapons 90(F) and 90(A) will be
20 described in connection with FIGS. 9 and 10. FIG. 9 depicts,
21 also in schematic form, the sectional view of the weapon
22 compartment depicted in FIG. 8, taken along the line B-B in FIG.
23 8, with the weapon 90(F) being situated in a non-deployment
24 condition; and FIG. 10 depicts, also in schematic form, the

1 sectional view of the weapon compartment depicted in FIG. 8,
2 taken along the line B-B in FIG. 8, with the weapon 90(A) being
3 situated in a deployment condition.

4 With reference to FIG. 9, weapon compartment 22' is provided
5 with a trap door 94 proximate the weapon 90(F), to facilitate
6 deployment and firing of the weapon. The trap door 94 is curved
7 to provide an arc that, when closed (FIG.9), the trap door 94
8 forms part of the cylindrical hull 20. Initially, the unmanned
9 undersea vehicle 12, in response to commands from the mother
10 vehicle 11 as described above, moves to a position at which it is
11 to deploy and fire a weapon. Thereafter, the local control
12 circuit 24, also in response to commands from the mother vehicle
13 11, enables the trap door 94 to open and the weapon compartment
14 to expel the weapon 90(F) downwardly. (It will be appreciated
15 that weapon 90(A) can also be expelled if both weapons are to be
16 fired contemporaneously.) After the weapon(s) has (have) been
17 expelled to a position completely exterior of the weapon
18 compartment 22', the weapon(s) can be fired. It will be
19 appreciated that, to facilitate complete expulsion of the
20 weapon(s) from the weapon compartment 22', the opening provided
21 by the open trap door 94 will be at least as large as the
22 diameter of the respective weapon. After deployment and firing
23 of the weapon(s) the local control circuit 24 may enable the trap
24 door 94 to close. Similar operations may be performed if only
25 weapon 90(A) is to be deployed and fired.

1 During the deployment and firing operation, as a weapon
2 90(F) or 90(A) is expelled, seawater enters the cavity from which
3 the weapon was expelled. Contemporaneously, to maintain an
4 axially-symmetrical distribution of mass and buoyancy in the
5 weapon compartment 22', the valves 93(F) or 93(A) connected to
6 the respective buoyancy tank 91(F) or 91(A) are also actuated to
7 enable seawater to enter the buoyancy tank. Accordingly, when
8 forward weapon 90(F) is deployed and fired, the forward buoyancy
9 tank 91(F) is filled, and when aft weapon 90(A) is deployed and
10 fired, the aft buoyancy tank 91(A) is filled. The seawater in
11 the buoyancy tanks 91(F) and 91(A) for the fired weapons will
12 help to maintain the symmetry of mass around the longitudinal
13 axis of the unmanned undersea vehicle 12, which, in turn, will
14 simplify controlling the unmanned undersea vehicle 12 as it
15 thereafter propels itself beyond the weapon deployment and firing
16 position.

17 While the unmanned undersea vehicle 12 including weapon
18 compartment 22' has been described as providing two weapons 90(F)
19 and 90(A) and an associated number of buoyancy tanks 91(F) and
20 91(A), it will be appreciated that any number of weapons and
21 associated buoyancy tanks may be provided in the unmanned
22 undersea vehicle 12.

23 The unmanned undersea vehicle 12 provides a number of
24 advantages. In particular, it provides a covert means for
25 deploying multiple underwater missiles and/or torpedoes from a
26 remotely operated and submerged platform. The unmanned undersea

1 vehicle eliminates the necessity of having ships or submarines
2 and their personnel at the deployment site. In addition, it
3 provides a covert means for detecting enemy targets. The
4 unmanned undersea vehicle is particularly useful in mapping and
5 eliminating undersea mine fields. In addition, the unmanned
6 undersea vehicle is relatively economical, since it is easily
7 recoverable; the mother vehicle 11 can, through suitable commands
8 provided to the local control circuit 24, enable the unmanned
9 undersea vehicle to, after the weapons are deployed and fired,
10 propel itself back to the mother vehicle 11 for retrieval. The
11 flooding of the weapon canisters 64(i) in weapon compartment 22,
12 and of the weapon cavity in weapon compartment 22', maintains the
13 stability of the submerged unmanned undersea vehicle during the
14 weapon deployment and launching process.

15 The preceding description has been limited to a specific
16 embodiment of this invention. It will be apparent, however, that
17 variations and modifications may be made to the invention, with
18 the attainment of some or all of the advantages of the invention.
19
20
21

1 Navy Case No. 75536

2
3 SYSTEM FOR DEPLOYING WEAPONS CARRIED IN AN
4 ANNULAR CONFIGURATION IN A UUV

5
6 ABSTRACT OF THE DISCLOSURE

7 An unmanned undersea vehicle system includes a remote-
8 controlled, unmanned undersea vehicle and a mother vehicle
9 interconnected by a communication link. The unmanned undersea
10 vehicle includes a weapon compartment, an erectable observation
11 mast and a control means. Within the weapon compartment are a
12 plurality of weapon deployment devices situated about a central
13 core, each weapon deployment device having a weapon canister for
14 carrying a weapon. The weapon deployment devices are pivotable
15 between a retracted position and an extended position. Each
16 weapon canister includes end caps at opposing ends which are
17 discharged when the weapon contained therein is fired to allow
18 seawater to enter. The observation mast obtains environmental
19 information. The control means controls the deployment of the
20 weapon by expelling the weapon from the weapon compartment and
21 thereafter controls the firing of the weapon. The mother vehicle
22 generates command information for controlling the control means
23 and receives unmanned undersea vehicle status information from
24 the unmanned undersea vehicle and processes it for use in
25 generating the command information. The communication link
26 interconnects the unmanned undersea vehicle and the mother

1 vehicle to facilitate transfer of command information from the
2 mother vehicle to the unmanned undersea vehicle and to further
3 facilitate transfer of unmanned undersea vehicle status
4 information from the unmanned undersea vehicle to the mother
5 vehicle.

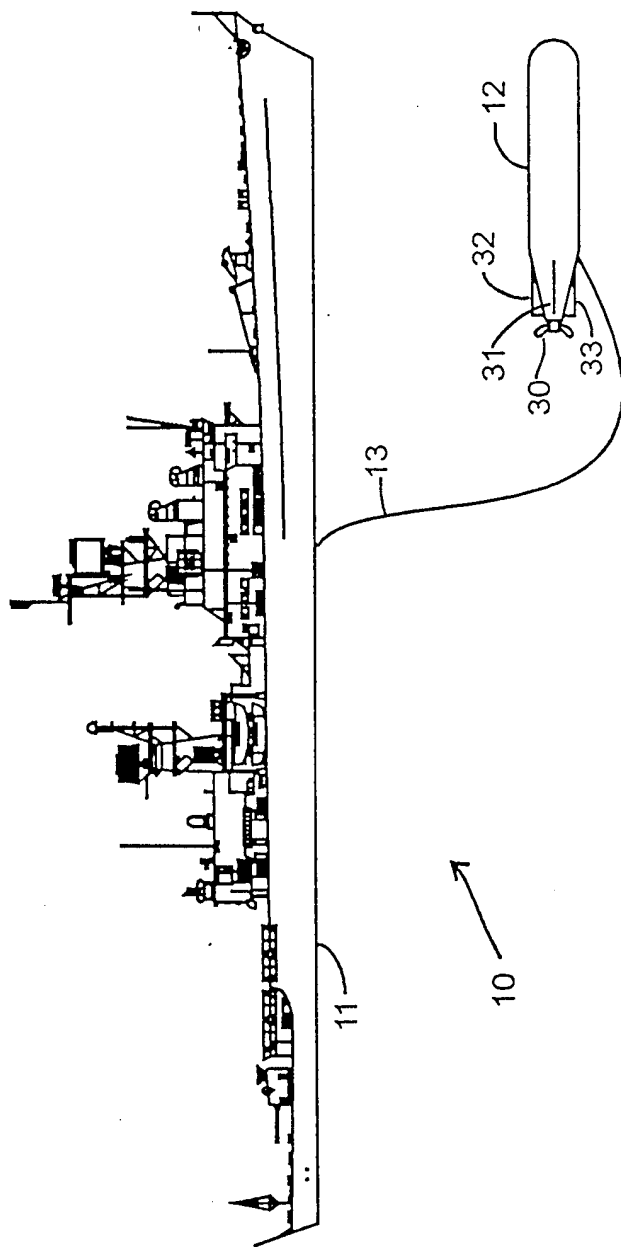
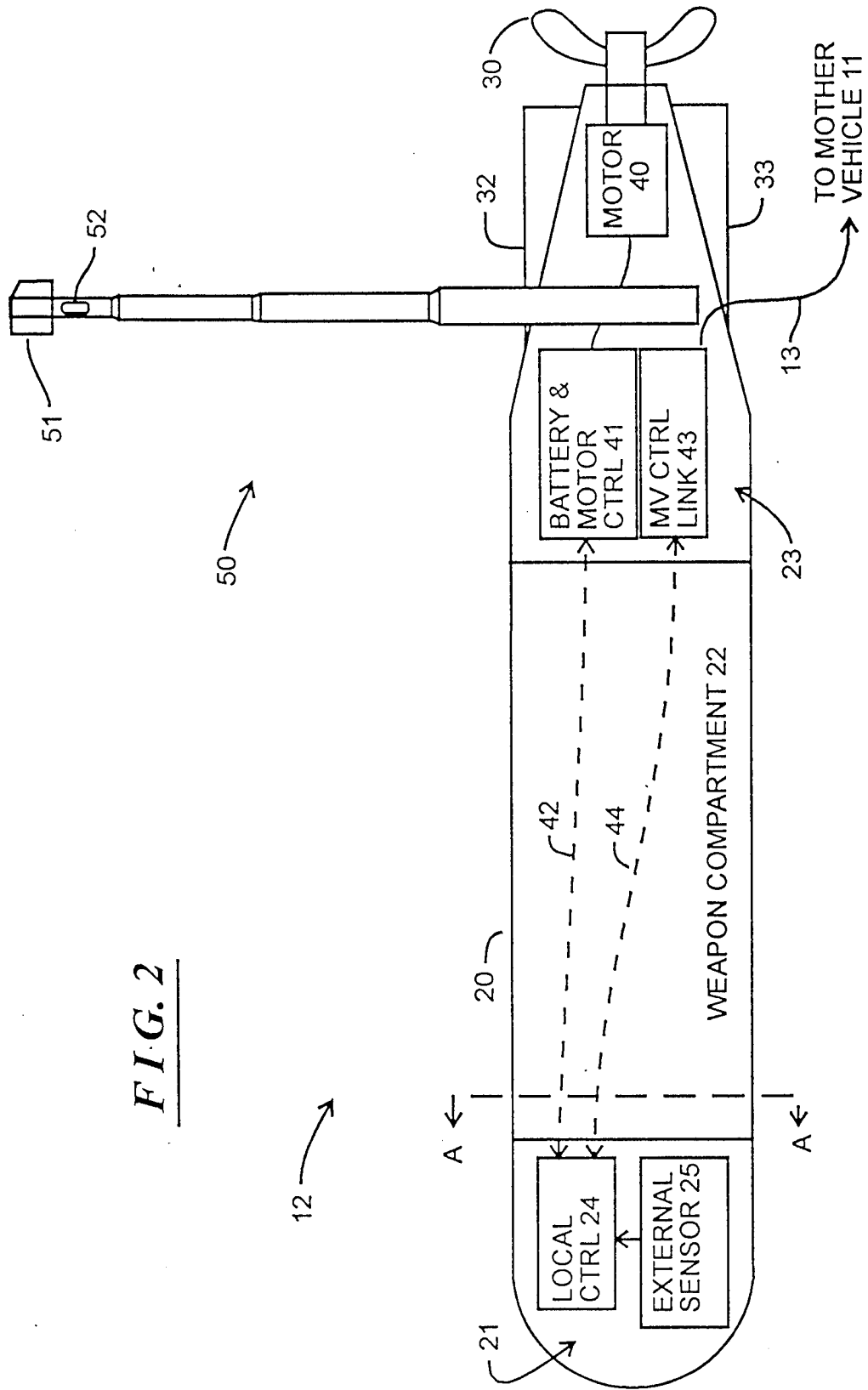


FIG. 1

FIG. 2



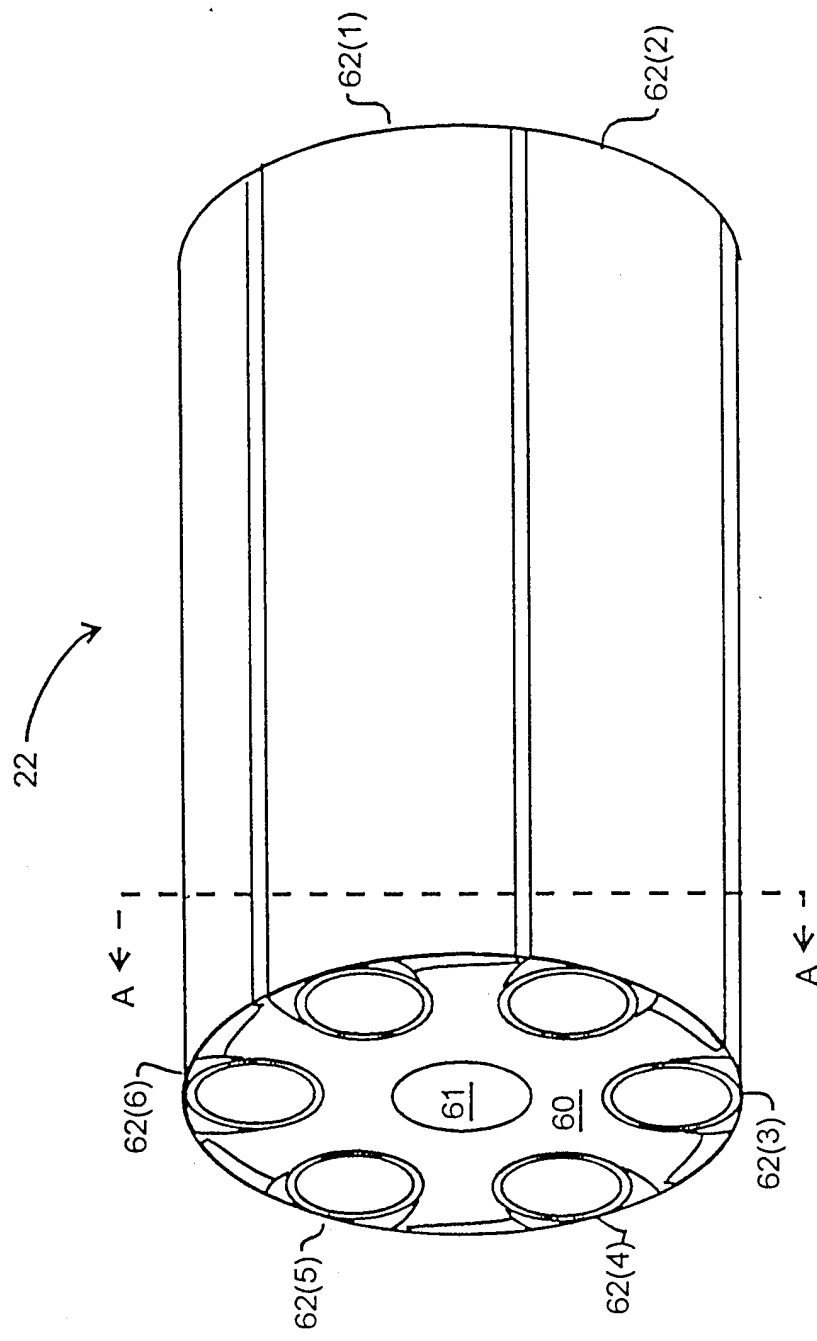


FIG. 3

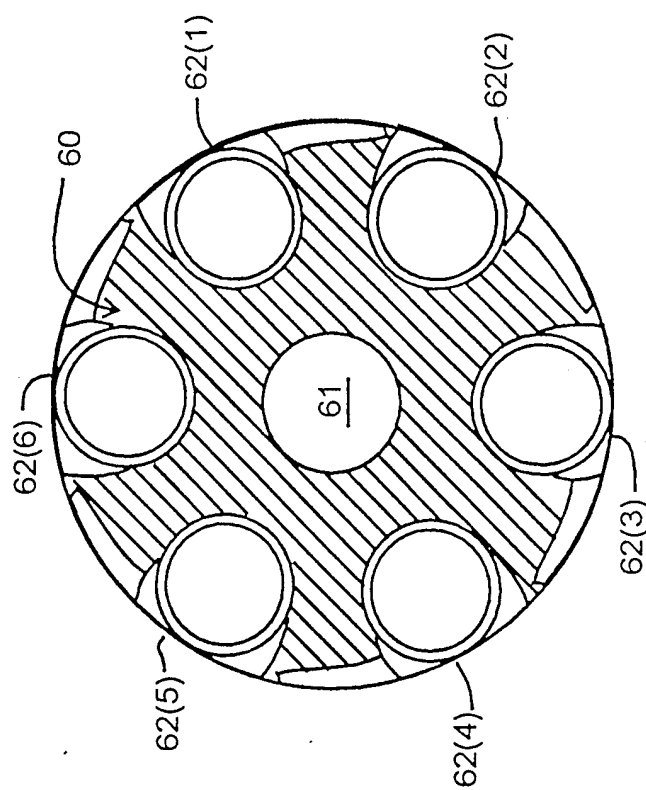


FIG. 4

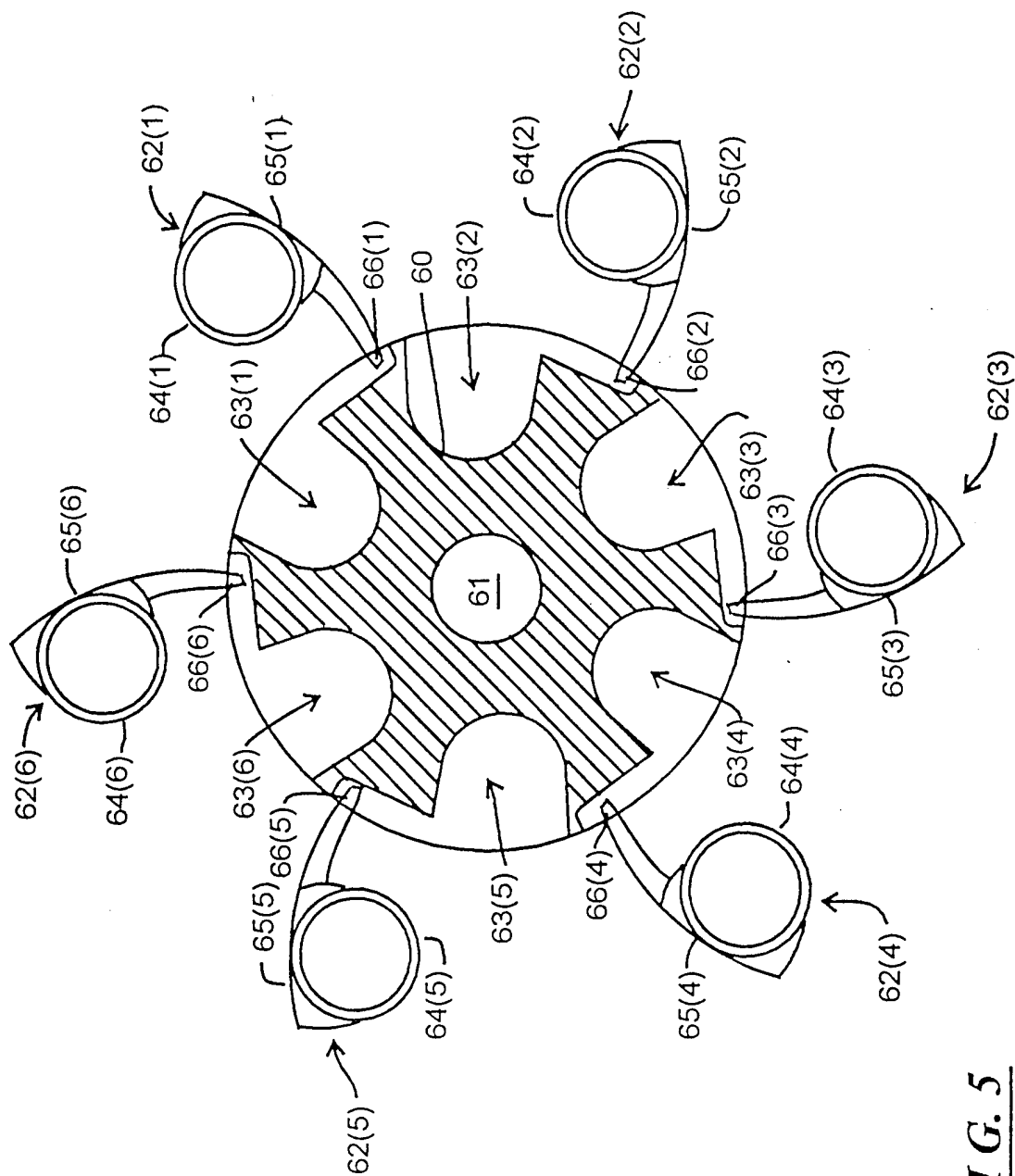


FIG. 5

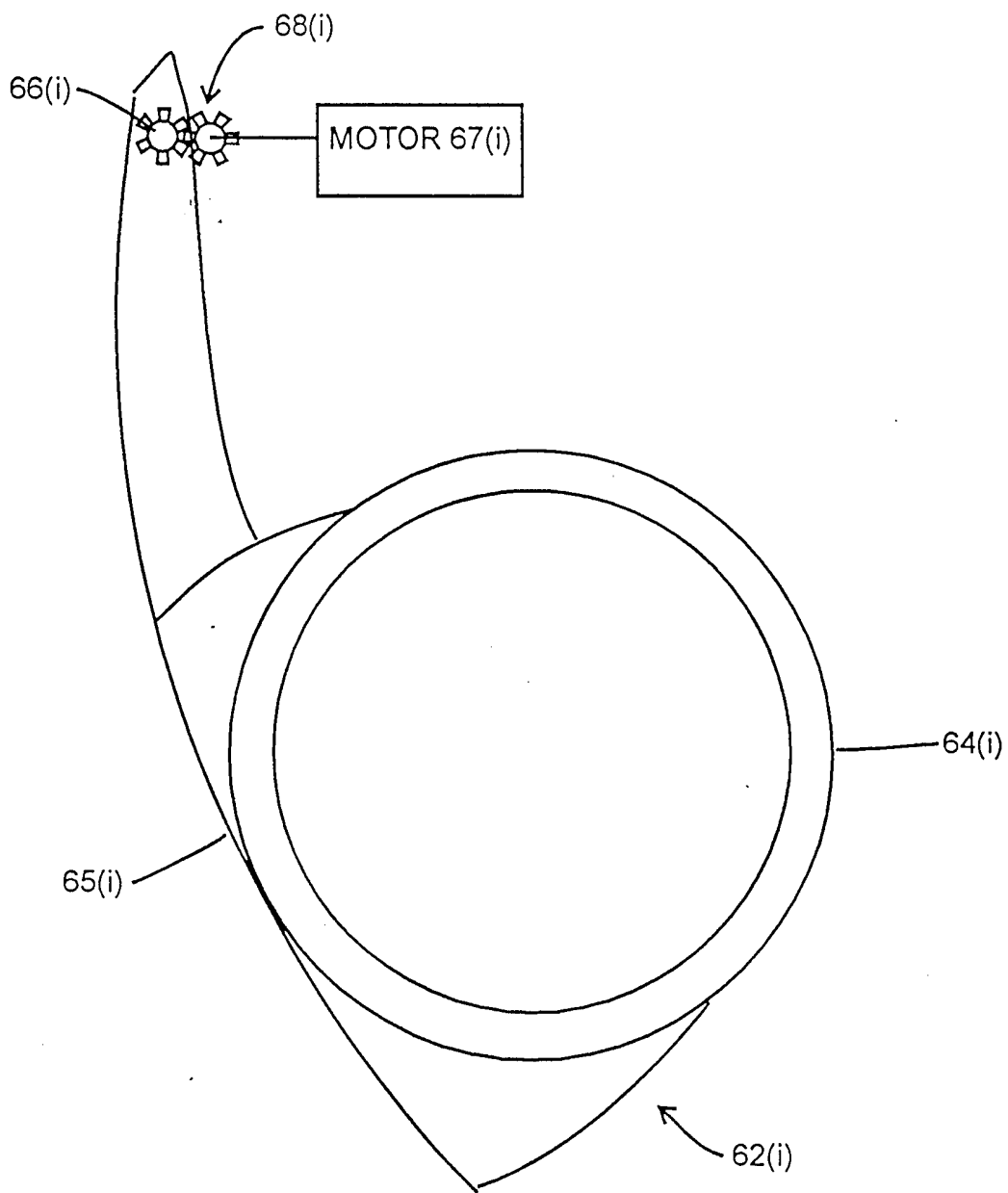


FIG. 6

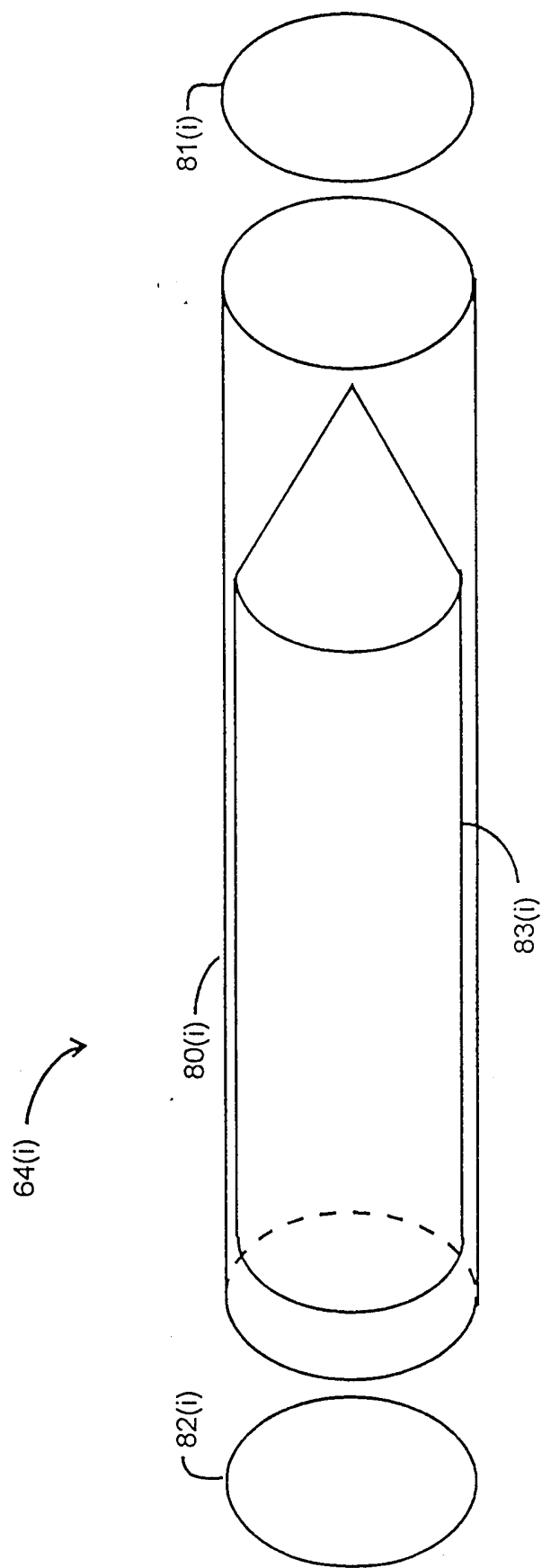


FIG. 7

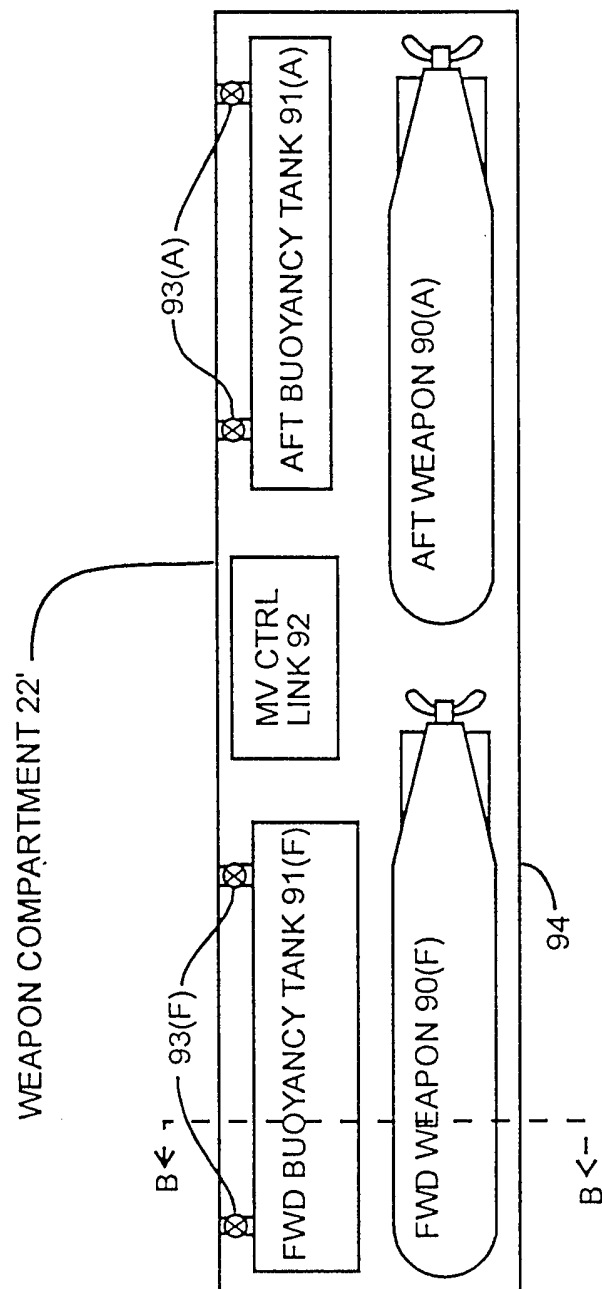


FIG. 8

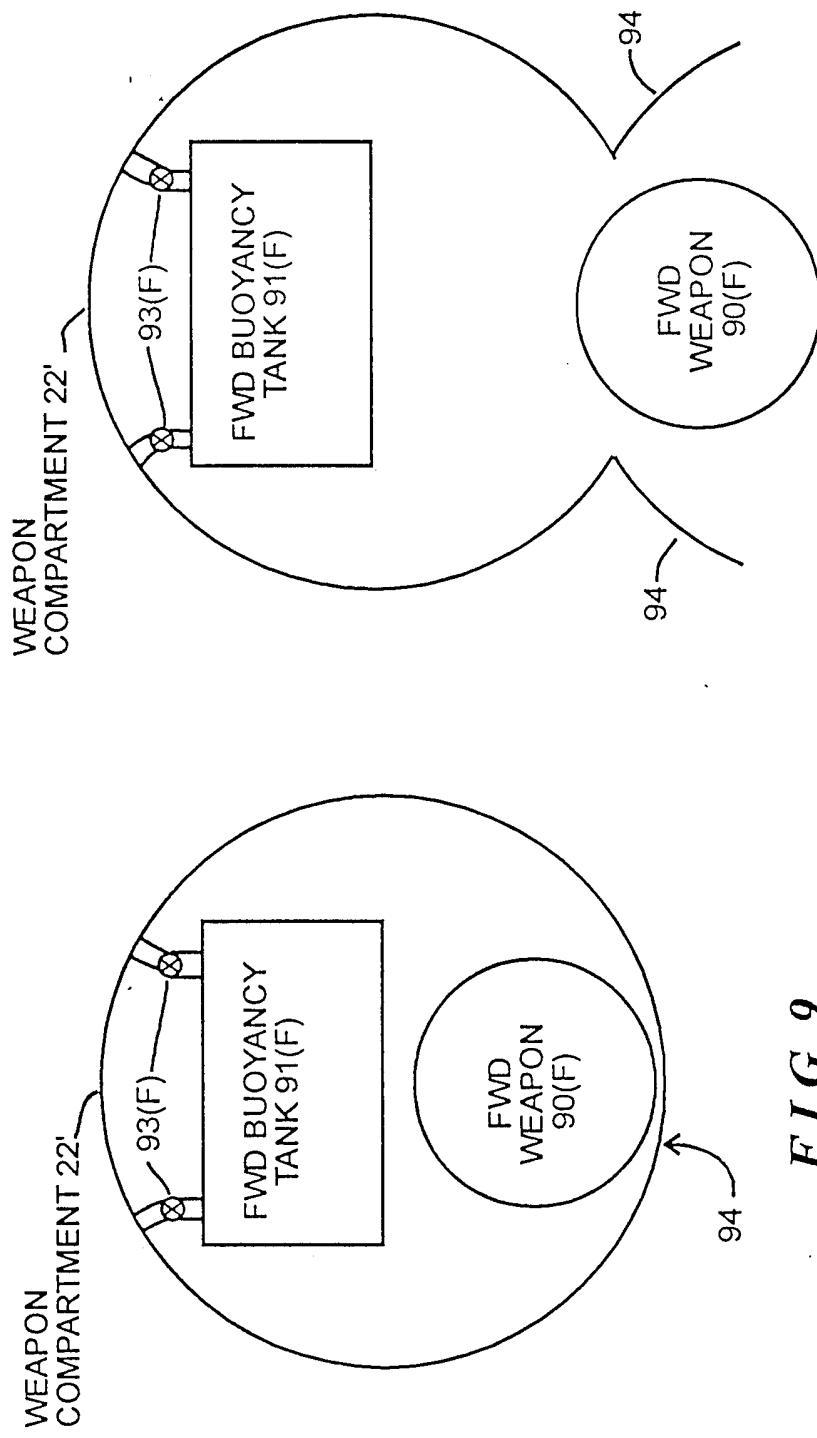


FIG. 9

FIG. 10