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Schnirel et al.

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[54] **MAN OVERBOARD PACKAGE**

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[52] **U.S. Cl.** **9/14;** 9/14

[51] **Int. Cl.** **B63c 9/26**

[58] **Field of Search** ..... 9/9, 11 R, 14; 114/16.4

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Primary Examiner—Trygve M. Blix

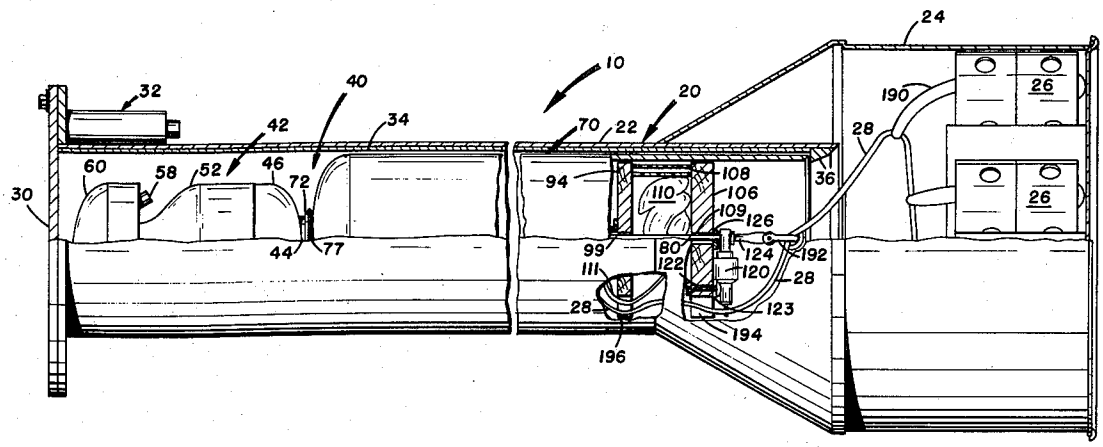
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[57] **ABSTRACT**

Life saving equipment is rocket propelled into the wake of a ship from a shipboard launcher which houses a line having the life saving equipment connected thereto. A pyro delay cutter and spring device within a container which houses the equipment cooperate to jettison the equipment at a specific time interval after launch and at a position substantially remote from the ship.

18 Claims, 4 Drawing Figures



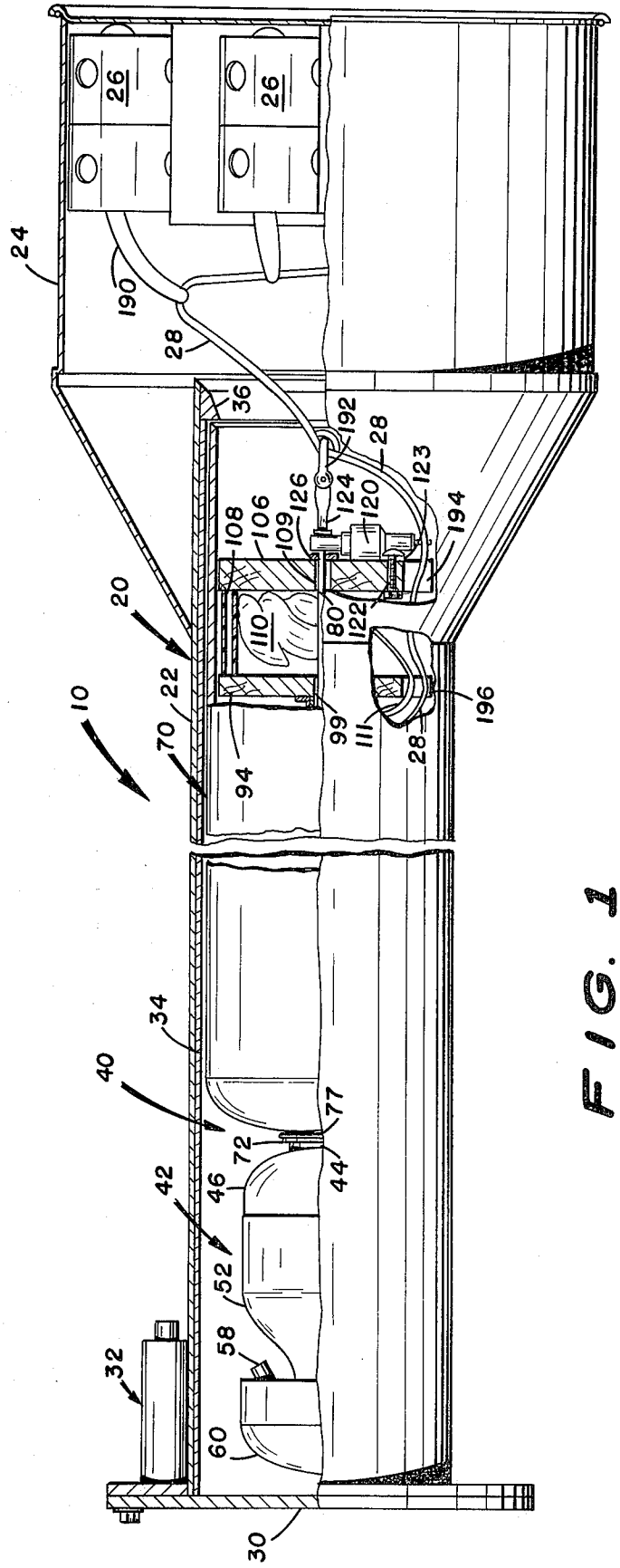

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FIG. 1

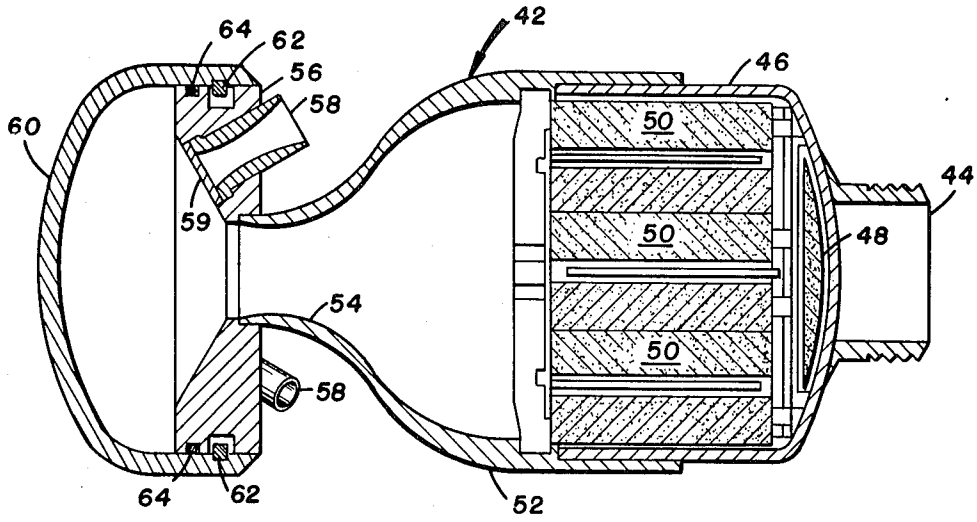


FIG. 2

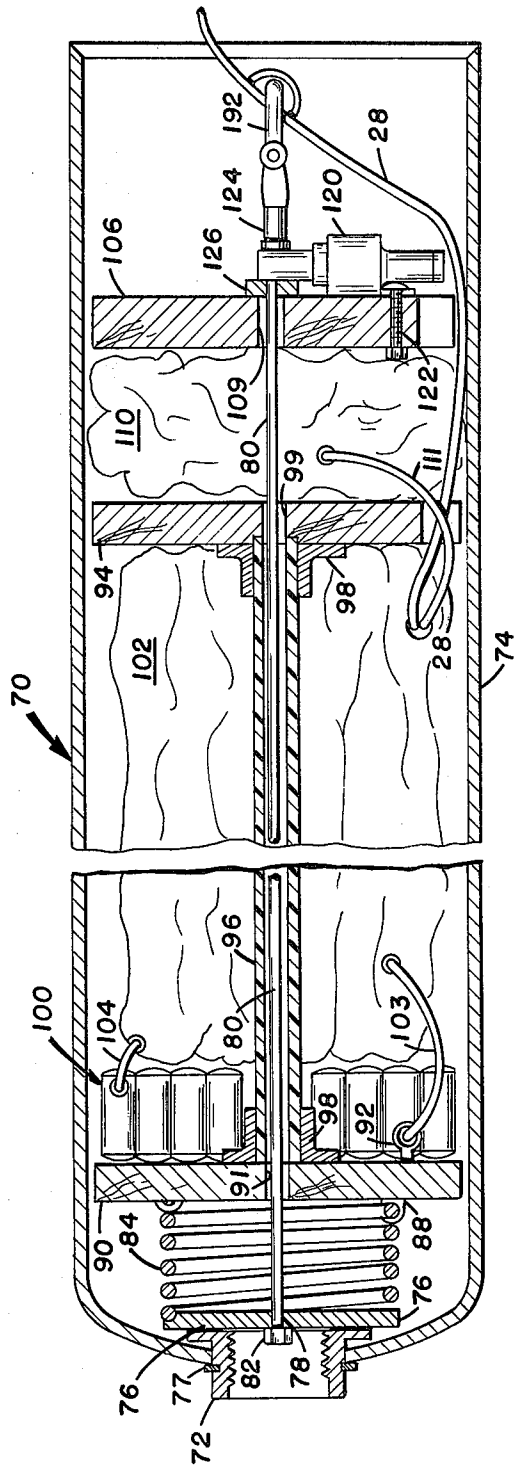

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FIG. 3

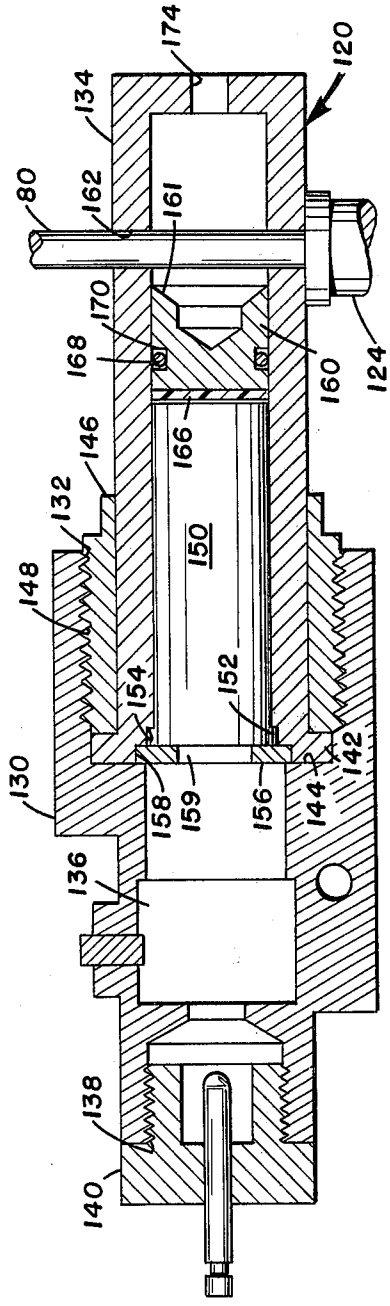

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FIG. 4

MAN OVERBOARD PACKAGE

BACKGROUND OF THE INVENTION

This invention relates to a life saving apparatus, and more specifically a life saving apparatus designed to be deployed by a rocket.

Drownings account for a large percentage of accidental deaths in this country. Many different types of apparatus are known for preventing drownings. With such apparatus, time of deployment and area covered by the equipment are key factors in the prevention of drownings, for if life saving apparatus can be quickly activated and elements thereof cover a wide enough area the person is able to reach safety more quickly and is exposed to danger for a substantially diminished time.

Persons on board ships at sea are exposed to drowning danger to a substantial degree. Most drowning victims of shipboard accidents could have been rescued if adequate floatation gear, survival gear and signal gear had been deployed quickly in the wake of the vessel in close proximity to the man instead of relying on presently used man overboard procedures. Fast deployment of life saving equipment is especially critical in frigid zones where a man's survival time in cold water is a matter of minutes before the cold water saps his strength and results in his demise. Devices presently available do not provide the desired quickness of deployment, and have a narrow area of coverage since they deploy only one life saving device giving the man in the water only one chance at safety.

SUMMARY OF THE INVENTION

Therefore, it is an object of this invention to provide an apparatus for saving lives.

Further, it is an object of this invention to provide an apparatus for saving lives which is rapidly deployable.

It is a still further object of this invention to provide an apparatus for saving lives which is rocket propelled.

Also it is an object of this invention to provide an apparatus for saving lives which provides adequate floatation gear.

Another object of this invention is to provide an apparatus for saving lives which provides adequate survival and signal gear.

It is a further object of this invention to provide an apparatus for saving lives which is deployable in close proximity to a man overboard and provides an extended area of coverage.

These and other objects are met by providing a rocket propelled, life saving apparatus which is rapidly and accurately deployable.

BRIEF DESCRIPTION OF THE DRAWINGS

A more complete appreciation of the invention and many of the attendant advantages thereof will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

FIG. 1 is a side view of the life saving apparatus of the present invention with portion thereof broken away for the purposes of illustration and in partial cross section:

FIG. 2 is a side view in partial cross section of the rocket motor;

FIG. 3 is a side view in partial cross section of the stores container; and

FIG. 4 is a side view in partial cross section of the pyrodelay cutter.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings wherein like reference characters designate identical corresponding parts throughout the several views and more particularly to FIG. **1**, thereof, the life-saving apparatus generally shown at **10** includes a launcher **20** and a launch package generally designated at **40.** The launcher **20** is illustrated as including a hollow tubular member **22** constructed of strong, light weight material, such as asbestos-phenolic or the like, terminating at the breech end thereof in an enlarged closed section **24** for housing a plurality of modified Sav-A-Life canisters **26** which are connected at specified intervals along a main line **28.** As an example, it is contemplated that the line **28** would be 600 feet in length and eight canisters **26** would be appropriately attached thereto at 75 foot intervals. The Sav-A-Life canisters are of a type commercially available which have water-activated life rings included therein. The line **28** is also stored within the enlarged section **24** in any convenient manner as for example in an alternating basket weave configuration permitting easy deployment when the launch package **40** moves out of the launcher **20.** Line **28** may be of any type suitable for strength and durability and may be, for example, one having a double braid with a nylon cover and polypropylene center core and with a specific gravity of not more than 1.02.

The launcher **20** is supported on its launch platform by lugs, not shown, positioned along the length thereof at appropriate locations. The muzzle end of launcher **22** has a frangible plate **30** constructed of styrofoam covered with aluminum foil or the like attached thereto and adjacent to which is mounted an electrical junction box of conventional design and illustrated generally at **32** having appropriate pin connectors for electrical connection to various components discussed in greater detail. Slides **34,** also of asbestos phenolic material, are located at 120° intervals (only one of which is illustrated) about the inner periphery of the tube **22** and along the length thereof and together with stop **36** at the breach end serve to position the launch package **40** within the tube **22.**

Referring now to FIGS. **1** and **2,** the launch package **40** is illustrated as including a tractor or pulling rocket motor generally indicated at **40** coupled by a threaded boss member **44** at the rear end thereof to a stores container generally shown at **70** and more completely described hereinafter. Rocket motor **42** is of substantially standard design and includes a thrust chamber **46** for containing both an igniter **48** and a propellant **50.** Attached to chamber **46** is an exhaust nozzle **52** which terminates in a restricted throat portion **54** and is secured, as by welding or the like, to a nozzle block **56** of disc-shaped configuration having a series of three nozzle inserts **58** spaced at 120° degree intervals thereabout. A burst diaphragm **59** covers one end of each of the nozzle inserts **58.** A pipe cap **60** forms a chamber for receiving the exhaust gases and is connected to the nozzle block **56** by a lock wire **62** and a seal between the pipe cap and nozzle block is provided by an O-ring **64.**

Although not shown, the igniter **48** is electrically coupled in a conventional manner to the source of

power at 32 for ignition of the rocket motor 42 at the launch command. When the firing circuit, not shown, is initiated, igniter 48 which may be electrically sensitive ignites and burns. The burning of igniter 48 ignites propellant 50. The burning of propellant 50 produces gas which moves out of thrust chamber 46 into exhaust nozzle 52, out of exhaust nozzle 52 through restricted throat portion 54 into the chamber formed by pipe cap 60. As the propellant 50 continues burning, pressure is built up in the chamber formed by pipe cap 60. This pressure ruptures burst diaphragm 59 permitting gas to pass through nozzle inserts 58. The passing gas causes a pulling force on the rocket motor 42 and stores container 70 which pulls motor 42 and stores container 70 through frangible plate 30.

Referring now to FIG. 3, the stores container generally indicated at 70 is connected to the tractor motor 42 by reason of the threaded inner connection between the threaded boss 44 of the motor 42 and a mating female boss member 72 on the stores container 70. The stores container 70 includes a hollow cylindrical chamber 74 opened at its forward end to permit a portion of the female boss member 72 to pass therethrough and opened at the rear end to permit the evacuation of the stores container within the chamber as will be described in greater detail hereinafter. The female boss member 72 at its rear end is welded or otherwise secured to a spring plate 76 and at its forward end extending outwardly of chamber 74 is circumferentially grooved to receive a snap ring 77 therein for holding various components described hereafter with the chamber 74. Spring plate 76 has an aperture 78 formed centrally thereof for receiving the forward end of a longitudinal rod 80 extending through substantially the length of the stores container. Rod 80 is threaded at each end thereof with the forward end thereof extending beyond the plate 76 and receiving a fastener 82.

A coil spring 84 surrounds rod 80 and is tack welded or otherwise fastened at its forward coil to the rearward facing surface of the spring plate 76. Spring 84 terminates at its rearward coil adjacent the forward facing portion of a forward bulkhead 90 constructed of plywood of similar material. The terminal coil of spring 84 is attached to the forward bulkhead 90 by retainer clip 88 spaced at 90° intervals about bulkhead 90. As viewed most clearly in FIG. 3, the forward bulkhead 90 has an opening 91 therethrough for receiving rod 80 and allowing sliding movement with respect thereto. Also, an eye bolt generally indicated at 92 is fastened to the forward bulkhead in a standard manner for the purposes to be described hereinafter.

Longitudinally spaced rearwardly from the forward bulkhead 90 is a center bulkhead 94 which together with the forward bulkhead 90 forms a storage area in which the stores more specifically defined hereinafter are packaged. The aforementioned bulkheads are maintained spaced apart along the longitudinal rod 80 by a hollow tube 96 which surrounds the rod 80 and appropriately butts against a portion of the bulkheads and by cylindrical top-hat supports 98, shown only in FIG. 3, which are bolted to each bulkhead and slidably surround the hollow tube 96 to provide adequate support therefore. Center bulkhead also includes an opening 99 for receiving rod 80.

Packaged between the forward and center bulkheads is standard signal/survival gear generally indicated at 100 and a standard life-raft indicated at 102. As viewed more clearly in FIG. 3, a lanyard 103 is attached at one end thereof to the eyebolt 92 and at the other end to the raft's CO_2 bottle of standard design and not illustrated. Similarly, another lanyard, shown representatively at 104, independently interconnects the packaged gear 100 and the raft 102.

An aft bulkhead 106 is spaced from the center bulkhead 94 by a pair of tubular spacers 108, only one of which is shown in FIG. 1, and provides a chamber therebetween for receiving a packaged drogue chute 110 of standard design and connected to the life raft 102 by a line 111. The aft bulkhead 106 is of similar construction to that of the other bulkheads and has an opening 109 formed therein for permitting the rearward end of the longitudinal rod 80 to pass therethrough. The terminal end of rod 80 is threaded adjacent the aft bulkhead and receives thereabout a pyro-delay cutter generally indicated at 120 to be more thoroughly described hereinafter. The cutter 120 is fastened to the aft bulkhead 106 by a bolting arrangement 122 cooperating with a screwfoot 123 formed in the cutter 120, best illustrated in FIG. 1, and is held in position on the rod 80 by a clevis 124 internally threaded to receive the threaded portion of rod 80. A washer 126 surrounding rod 80 is provided between the rearward facing surface of aft bulkhead 106 and the cutting portion of cutter 120.

Referring now to FIG. 4, the pyro-delay cutter generally illustrated at 120 is illustrated to include a cylindrical body portion 130 having a forward chamber 132 fitted to receive a barrel 134 to be described in greater detail hereinafter. A central bore 136 is formed in body 130 to receive fuse material, not shown. It is contemplated that the fuse material will be a delay column of propellant material from a controlled burning rate of, for example, five seconds. A rear bore 138 communicating with central bore 136 is also formed in the body 130 and is internally threaded to receive an electrical initiator 140 of the type known and used in the art for detonating the fuse material positioned in bore 136.

Barrel 134 includes flanges 142 at one end thereof for engagement within the rearward wall 144 of bore 132. A threaded cylindrical sleeve 146 threadably engages the threaded portion 148 of bore 132 and the flange 142 of the barrel 144 to retain the barrel 134 within the body 130.

Barrel 134 is of hollow cylindrical configuration opened at its rearward end to receive an explosive cartridge 150 which, as presently contemplated, can be a conventional 38 caliber gun cartridge. A flange 152 on cartridge 150 is seated in a counter bore 154 formed in barrel 134, and is further held in this position by a steel washer 156 positioned in a larger counter bore 158 formed in the barrel 134. Washer 156 has an aperture 159 formed therethrough permitting the fuze material not shown, to abut the rear face of the cartridge 150.

Positioned within the barrel 134 and in line with the cartridge 150 is a cutter 160 of standard design and construction having the cutting edges 161 thereof adjacent a rod aperture 162 formed diametrically of the longitudinal extent of the barrel 134. A disc or obturator made of Teflon (polytetrafluoroethylene) or like material 166 is positioned between the cartridge 150 and cutter 160 and to provide an additional seal against the escape of gases an O-ring 168 is placed in an circumferential groove 170 formed about the cutter 160. A vent hole 174 is formed at the terminal end of the

barrel **134** to permit the release of any pressure formed when the cutter is initiated.

As viewed clearly in FIGS. **1** and **3** the line **28** which, as presently contemplated can be of double braid with a nylon cover and polypropylene center core, has a series of Sav-A-Life canisters **26** spaced at regular intervals and connected thereto by tethers **190** along the line. Water-activated life preservers are located within the canisters **26** and are deployed subsequent to the firing of rocket **42** in a manner set forth more clearly hereinafter. The terminal end of the line **28** stored conveniently within enlarged section **24** has a small drogue chute, not shown, attached thereto which will be free of the launcher when the line **28** is fully deployed and act as a sea anchor for the line **28,** maintaining it somewhat taut along the length thereof. As viewed in FIG. **3,** line **28** is attached at a point along the exposed length thereof to a shackle **192** which is pivotally secured to the clevis **124.** The line **28** continues through a cut-out portion **194** formed at the bottom of the aft bulkhead **106** through the drogue chute chamber and a cut-out **196** in the center bulkhead **94** and is attached to the life raft **102** in a manner known and used in the art. As indicated previously, a separate line **111** connects the drogue chute **110** and life raft **102** through a cut-out portion **196** in the center bulkhead **94.** Within this chamber a still further separate line **104** is secured in a conventional manner between the life raft **102** and the signal survival gear **100.** Still another separate line **103** extends between the bulkhead **90** and the raft's CO_2 bottle not shown.

As is readily observable, the stores are packed within the container **70** by sliding the stores, the bulkhead and the attached cutter along rod **80** so as to compress spring **84.** When the stores are properly positioned and the spring **84** sufficiently compressed, the clevis **124** is threaded onto the exposed threaded end of the rod **80** and the snap ring **77** inserted in the exposed circumferential groove in boss **72.** After the rocket motor **42** is threaded to the boss **72,** the launch package **40** is complete and insertable into the launcher **20.**

The life saving apparatus **10** is adjustably mounted on the stern of a ship and aimed into the wake thereof at an angle, for example, of **30** degrees. In operation, and at the man overboard command, a remote station, for example the bridge, initiates an electrical signal to the power supply **32** located on the launcher which in turn sends electrical signals to both the igniter **48** of rocket motor **42** and the initiator **140** of cutter **120.** Upon ignition the rocket moves out of the launcher **20** and through the frangible bulkhead **30** pulling the stores container **40** therealong and immediately deploys the line **28** and the attached canisters **26.** After a preset time interval established by the delay column, for example **5** seconds, the pyro delay cutter **160** will activate and sever the rod **80.** Upon the cutting of the rod **80,** the spring **84,** previously compressed during the loading of the stores container **70.** is free to expand and, together with the pull somewhat of the line **28,** forces the aft bulkhead **106** and drogue chute **110** to slide along the rod **80** and jettison out of the open end of the cylinder **74.** The drogue chute **110** will then deploy pulling the raft **102** and signal/survival gear **100** free of the container **74.** At the time the raft **102** leaves the container **74** the lanyard **103** will activate the raft CO_2 bottle, not shown. By the time the raft and gear enter the bitter end of the line **28** and its small drogue chute will have been free of the launcher. Upon water entry the raft will continue to inflate to the full inflation and the Sav-A-Life rings will deploy from their canisters along the length of the line **28.** The small drogue chute at the bitter end of the line **28** will act as a sea anchor for the line and hold the same somewhat taut along its length. Thus, the inflated raft, with the drogue chute **110** acting as a sea anchor, therefore will be located a substantial distance from the point of launch and the line **28** will be deployed along the flight path toward the ship with the inflate life rings deployed at intervals therealong. This arrangement provides an extended area of coverage for the man overboard and permits recovery if he is able to reach either the life raft, the line **28,** or the life ring.

Obviously numerous modifications and variation of the present invention are possible in light of the above teachings. It is therefore to be understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically described.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. Apparatus for carrying life-saving equipment from a launcher to a selected target comprising:
- a rocket motor;
- a container open at one end and closed at another end;
- said container connected to said rocket motor at said another end;
- life-saving equipment housed within said container;
- anchoring means between said life saving equipment and said open end, said anchoring means being attached to said lifesaving equipment;
- means for urging said life-saving equipment out of said container;
- releasable means for holding said life-saving means in said container;
- a length of buoyant line free at one end stored in said launcher and connected to said life-saving equipment at the other end thereof; and
- life saving rings connected to said buoyant line at intervals therealong.

2. The apparatus of claim **1** wherein said container at said another end is closed by:
- a. a female boss member mounted therein; and
- b. a plate welded to an end of said female boss member within said container.

3. The apparatus of claim **2** wherein said means for urging said lifesaving equipment out of said container is:
- a. a spring secured within said container.
- b. said spring secured at one end to said plate and at another end to a forward bulkhead.

4. The apparatus of claim **3** wherein:
- a. a rod threaded at both ends is mounted on the central axis of said container and extends substantially the length of the container;
- b. a forward end of said rod extends through a centrally located aperture in said plate and is secured therein by means of a fastener;
- c. said spring surrounds said rod;
- d. said forward bulkhead is slideably mounted on said rod; and
- e. said forward bulkhead and said plate combine to form a spring chamber and compress said spring to form said means for urging.

5. The apparatus of claim **4** wherein:

a. said forward bulkhead and a central bulkhead combine to form an equipment chamber;
b. said equipment chamber is within said container and adjacent said spring chamber;
c. said forward bulkhead and said central bulkhead are slideably mounted on said rod, through centrally located apertures therein;
d. a hollow tube is slideably mounted around said rod and spaces said forward bulkhead from said central bulkhead to form said equipment chamber; and
e. said tube is positioned relative to said forward bulkhead, said central bulkhead and said rod by a forward cylindrical top hat support mounted on said forward bulkhead within said equipment chamber and by a central cylindrical top hat support mounted on said central bulkhead within said equipment chamber.

6. The apparatus of claim **5** wherein:
a. signal survival gear is slideably mounted surrounding said hollow tube and adjacent said forward bulkhead within said equipment chamber;
b. a life raft is slideably mounted surrounding said hollow tube and adjacent said central bulkhead within said equipment chamber; and
c. said signal survival gear and said life raft substantially fill said equipment chamber.

7. The apparatus of claim **6** wherein:
a. a lanyard activates an inflating mechanism for said life raft;
b. said lanyard is secured at one end to said forward bulkhead within said equipment chamber; and
c. said lanyard is secured at said other end to said inflating mechanism.

8. The apparatus of claim **7** wherein said life raft is secured to said signal survival gear.

9. The apparatus of claim **8** wherein:
a. said central bulkhead combines with an aft bulkhead to form an anchor means chamber;
b. said aft bulkhead is slideably mounted on said rod by means of a central located aperture.
c. said aft bulkhead is spaced from said central bulkhead by at least two tubular spacers; and
d. said anchor means chamber is adjacent said equipment chamber.

10. The apparatus of claim **9** wherein:
a. said anchor means is a drogue chute;
b. said drogue chute is secured to said life raft by means of a chute line; and
c. said chute line passes through a cut out portion of said central bulkhead.

11. The apparatus of claim **10** wherein:
a. a cutter is slideably mounted on said rod adjacent said aft bulkhead and externally of said chute chamber;
b. said cutter is positioned on said rod by a clevis;
c. said clevis being in threaded relation with said rod;
d. said cutter being secured to said aft bulkhead by means of a bolting arrangement with a screw foot; and
e. said cutter, said spacers and said tube combining with said forward bulkhead, said central bulkhead, said after bulkhead and said plate to compress said spring.

12. The apparatus of claim **11** wherein said cutter comprises:
a. a cylindrical body portion;
b. said cylindrical body portion having a forward chamber;
c. said forward chamber being adapted to receive a barrel;
d. a central bore in said cylindrical body portion is adjacent said forward chamber and is adapted to receive fuse material;
e. a rear bore is in said cylindrical body portion adjacent said central bore; and
f. said rear bore is to receive an initiator.

13. The apparatus of claim **12** wherein:
a. said barrel is mounted in said forward bore at a rearward barrel end;
b. said rearward barrel end is adapted to receive an explosive cartridge;
c. a rear cartridge face is adjacent said central bore; and
d. a forward cartridge face is adjacent a cartridge base of a cutting edge.

14. The apparatus of claim **13** wherein:
a. a cutting head said cutting edge is adjacent said rod; and
b. said cutter is mounted on said rod through an aperture in said barrel formed diametrically of the longitudinal extent of the barrel.

15. The apparatus of claim **14** wherein:
a. said launcher has a frangible cover adjacent said rocket motor at a launching end of said launcher; and
b. said launcher has an enlarged line containing end at another end of said launcher.

16. The apparatus of claim **15** wherein:
a. said line containing end holds a line;
b. one end of said line is secured to said launcher;
c. another end of said line is secured to said raft;
d. said line passes through said anchor means chamber to said raft by means of a cutout portion in said aft bulkhead, and a cutout portion in said central bulkhead.

17. The apparatus of claim **16** wherein:
a. said launcher includes a stop adjacent said line containing end and within said launcher;
b. said stop abutting said container adjacent said the cutter.

18. Apparatus for carrying life-saving equipment from a launcher to a selected target comprising:
a rocket motor;
a container open at one end and closed at another end connected to said rocket motor at said closed end;
life-saving equipment housed within said container;
a drogue chute attached to said life-saving equipment and within said container between said life-saving equipment and said open end for deploying said life-saving equipment;
spring means for urging said life-saving equipment and said drogue chute out of said open end;
cutter means for releasably holding said life-saving equipment and said drogue chute against said urging force of said spring;
delay means associated with said cutter means for actuating said cutter at a present time interval after launch thereby permitting said spring means to urge said life saving equipment and said drogue chute out of said container;

a length of buoyant line free at one end stored in the launcher and connected to said life-saving equipment at the other end thereof; and

life-saving rings connected to said buoyant line at intervals therealong;

whereby when the rocket motor and container are launched from the launcher the buoyant line will be deployed from the launcher, and at a preset time thereafter the drogue chute will jettison said life-saving equipment into the water providing an extended area of coverage encompassed by the life-saving equipment, the buoyant line and the life-saving rings.

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