

Serial Number 954,883
Filing Date 9 October 1997
Inventor Craig S. Mello

NOTICE

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

OFFICE OF NAVAL RESEARCH
DEPARTMENT OF THE NAVY
CODE OCCC
ARLINGTON VA 22217-5660

DISTRIBUTION STATEMENT A
Approved for public release;
Distribution Unlimited

19980511 080

DTIC QUALITY INSPECTED 3

2
3 METHOD AND APPARATUS FOR RETAINING WIRES
4 IN A CYLINDRICAL TUBE

5
6 STATEMENT OF GOVERNMENT INTEREST

7 The invention described herein may be manufactured and used
8 by, or for, the government of the United States of America for
9 governmental purposes without the payment of any royalties
10 thereon or therefor.

11
12 BACKGROUND OF THE INVENTION

13 (1) Field of the Invention

14 This invention generally relates to a method and apparatus
15 for retaining wires in a cylindrical tube.

16 (2) Description of the Prior Art

17 Existing submarine signal launchers are substantially
18 similar to that shown in FIG. 1 of the present application by way
19 of example only. In particular, there is shown in FIG. 1 a
20 launch tube 16 having housed therein a gas generator 12, an
21 acoustic device countermeasure 14, and a ram plate 26.

22 More specifically, as shown in FIG. 1, a countermeasure
23 launch tube 16 has a countermeasure 14 loaded therein in front of
24 a ram plate 26. The ram plate 26 has gas seal gaskets 28 formed
25 therearound. The gas generator 12 is positioned behind the ram
26 plate 26 within the launch tube 16. A countermeasure status

1 cable 18 passes from countermeasure 14 through the ram plate 26.
2 The countermeasure status cable 18 has a connector 32 positioned
3 on the distal end thereof. A gas generator status cable 22
4 having a connector 24 joins with the countermeasure status cable
5 18 at the connector 32 between the ram plate 26 and the gas
6 generator 12. During a launch, the gas generator 12 explosively
7 generates gas behind the ram plate 26 thereby forcing the ram
8 plate 26 to the end of the launch tube 16, and thus forcefully
9 ejecting the countermeasure 14 from the launch tube 16. At the
10 time of the launch, the connectors 32, 24 detach, and the
11 countermeasure 14 begins its operation.

12 In use, the countermeasure 14 is fitted into the launch tube
13 16. The countermeasure 14 has the trailing status cable 18 which
14 is joined to the gas generator status cable 22 prior to loading
15 the gas generator 12 in the launch tube 16. The gas generator 12
16 is loaded tightly against the countermeasure 14. Often, the
17 status cables 18, 22 or the status cable connectors 32, 24 are
18 pinched between the gas generator 12 and the countermeasure 14.
19 This results in a malfunction of the status cable.

20 Other known technologies in this area include the following:

21 U.S. Patent No. 3,932,922 to Thastrup discloses pipe
22 systems for hot media including arranging a number of pipe
23 lengths in continuity to each other with a certain spacing
24 between the adjacent ends thereof, and interconnecting these ends
25 by means of relatively short, axially easily compressible
26 conductor elements such as tube bellows, after which the pipe

1 lengths are axially expanded by sending a hot medium through the
2 pipe system thus assembled, until the single pipe lengths, at a
3 temperature below the expected maximum operational temperature of
4 the system, have expanded sufficiently enough to cause the
5 adjacent pipe length ends to abut against each other, after which
6 these pipe length ends are joined rigidly to their surroundings
7 and subjected to temperature variations without the lack of
8 thermal movability of the pipes causing impermissible stress in
9 the pipes.

10 U.S. Patent No. 4,635,443 to Pino discloses a non-fouling
11 actuating mechanism in which an intermediate actuating metal
12 bellows filled with a liquid is positioned between an explosive
13 gas cartridge and an actuating piston in an ordnance ejector
14 system. The liquid in the bellows creates a fluid pressure
15 internal to the bellows equal to the gas pressure external to the
16 bellows. The fluid-filled bellows transmits gas pressure to the
17 piston but prevents damage to the piston and piston seals from
18 the high-pressure, high-temperature erosive gas.

19 U.S. Patent No. 5,495,819 to Marion discloses an endothermic
20 gas generator for use in a device propulsion including, in one
21 embodiment, an enclosure having stationary walls and a ram
22 dividing the enclosure into first and second sections and movable
23 in a particular direction to enlarge the first section and reduce
24 the second section. The arrangement fails, however, to teach or
25 suggest the collapsible tube of the present application.

1 DE Patent No. 4030-712-A to Wenzel et al. discloses a
2 submarine torpedo launching system which protects a torpedo and
3 guidance cable from hot exhaust gases using a sliding piston.
4 The launching system allows the torpedo to be fired from a closed
5 transport container and steered towards the target via a guidance
6 cable. The torpedo and the guidance cable are protected from the
7 hot exhaust gases provided by the firing jet by using a sliding
8 piston within the transport container between the torpedo and the
9 combustion space. The walls of the container are protected by a
10 flame resistant covering deployed by the forward movement of the
11 sliding piston. The flame resistant covering, however, does not
12 protect internal wires from being pinched by adjoining parts as
13 occurs in the present application.

14 The above devices substantially fail to teach or suggest the
15 method and apparatus disclosed in the present application as
16 directed to the modification of an existing submarine signal
17 launcher to prevent pinched control wires between a gas generator
18 and an acoustic countermeasure.

19
20 SUMMARY OF THE INVENTION

21 Therefore, it is an object of this invention to provide a
22 method and apparatus for modifying an existing submarine signal
23 launcher to prevent pinched control wires between a gas generator
24 and an acoustic device countermeasure which solves the problems
25 found in the above prior art.

1 In accordance with one aspect of this invention, there is
2 provided a submarine signal launcher for preventing pinched
3 control wires therein. The signal launcher includes a gas
4 generator, an acoustic device countermeasure, a launch tube for
5 housing the gas generator and the countermeasure, and a ram plate
6 positioned between the gas generator and the countermeasure. A
7 countermeasure status cable is connected to the countermeasure
8 and intermediately threaded through the ram plate and a first
9 connector member is connected to a distal end of the
10 countermeasure status cable. A gas generator status cable is
11 connected to the gas generator and a second connector member is
12 connected to a distal end of the gas generator status cable.
13 Each of the first and second connector members are separably
14 connected. A collapsible tube is provided having a first end
15 connected to a breech side of the ram plate and a second end
16 connected to a muzzle side of the gas generator. The first and
17 second connector members, and the countermeasure status cable and
18 the gas generator status cable are confined within the
19 collapsible tube. Opposing ends of the collapsible tube are
20 provided with members for securing the collapsible tube to each
21 of the ram plate and the gas generator, such that upon assembly
22 of the gas generator with the ram plate and the countermeasure
23 within the launch tube, the collapsible tube will protect the
24 cables from being pinched between joined ends of the ram plate
25 and the gas generator.

1 In accordance with another aspect of this invention, there
2 is provided a method for preventing pinched control wires in a
3 submarine signal launcher, including the steps of providing a gas
4 generator, providing an aco launch tube for housing the gas
5 generator and the countermeasure, and positioning a ram plate
6 between the gas generator and the countermeasure. A
7 countermeasure status cable is connected to the countermeasure
8 with the countermeasure status cable being intermediately
9 threaded through the ram plate. Further, connecting a first
10 connector member to a distal end of the countermeasure status
11 cable, connecting a gas generator status cable to the gas
12 generator, and connecting a second connector member to a distal
13 end of the gas generator status cable, each of the first and
14 second connector members being separably connected. Still
15 further steps include positioning the collapsible tube such that
16 a first end of a collapsible tube is connected to a breech side
17 of the ram plate and a second end of the collapsible tube is
18 connected to a muzzle side of the gas generator, connecting the
19 first and second connector members of the countermeasure status
20 cable and the gas generator status cable within the collapsible
21 tube, and forming members on opposing ends of the collapsible
22 tube for securing the collapsible tube to each of the ram plate
23 and the gas generator.

1 Upon assembly of the gas generator with the ram plate and
2 the countermeasure within the launch tube, the collapsible tube
3 protects the cables from being pinched between joined ends of the
4 ram plate and the gas generator.

5
6 BRIEF DESCRIPTION OF THE DRAWINGS

7 The appended claims particularly point out and distinctly
8 claim the subject matter of this invention. The various objects,
9 advantages and novel features of this invention will be more
10 fully apparent from the reading of the following detailed
11 description in conjunction with the accompanying drawings in
12 which like reference numerals refer to like parts, and of which:

13 FIG. 1 is a cross-sectional side view of a prior art
14 countermeasure launch tube;

15 FIG. 2 is a side view of a pleated tube in accordance with
16 the invention;

17 FIG. 3 is a cross-sectional side view of the pleated tube
18 used in a countermeasure launch tube;

19 FIG. 4 is an alternative countermeasure launch tube with a
20 pleated tube in a compressed configuration;

21 FIG. 5 is the alternative countermeasure launch tube as
22 shown in FIG. 4 in an expanded configuration;

23 FIG. 6 is an end view of a connector end of a gas generator
24 of the invention; and

25 FIG. 7 is an end view of a connector end of a ram plate of
26 the invention.

1 DESCRIPTION OF THE PREFERRED EMBODIMENT

2 The first embodiment of the invention is a modification of
3 the launcher shown in FIG. 1, and the details of the device shown
4 in FIG. 1 will therefore not be repeated herein for purposes of
5 simplicity.

6 FIG. 2 illustrates a pleated tube 34 according to the
7 present invention and FIG. 3 shows the incorporation of the
8 pleated tube 34 within the launcher. Specifically, in FIG. 2
9 there is shown an accordion pleated tube 34 for positioning in
10 the launch tube 16 between the ram plate 26 and the gas generator
11 12. The tube 34 is typically a plastic pleated tube such as that
12 used in home dryer exhaust connections.

13 The pleated tube 34 has at least two attachment members 36,
14 38 at each end. These two attachment members may be formed as,
15 for example, hook and pile type fasteners, having the trade name
16 of Velcro. Complementary attachment members 40, 42 are ,
17 positioned on the breech side of the ram plate 26 and the muzzle
18 side of the gas generator 12, respectively. Cables 18 and 22 and
19 connectors 32 and 24 are positioned inside of the tube 34. After
20 launch, the attachment members 36, 42 and 38, 40 can be detached
21 to allow the launch tube 16 to be reloaded.

22 As best illustrated in FIG. 3, the only modification to the
23 conventional submarine signal launcher is the insertion of the
24 pleated tube 34 therein and the attachment of the pleated tube to
25 the gas generator 12 and the ram plate 26 by means of the
26 complementary attachment members 36, 38, 40, 42.

1 FIG. 4 is an alternative embodiment having a jacking plate
2 44 joined within launch tube 16. The jacking plate 44 is
3 positioned within the launch tube 16 after loading the
4 countermeasure 14 and the ram plate 26. A forward snap ring 46a
5 and an aft snap ring 46b are used to hold the jacking plate 44 in
6 place. At least two jacking screws 48 are threaded through the
7 jacking plate 44 and contact the facing surface of the ram plate
8 26 at a peripheral edge of the ram plate. The jacking plate 44
9 and the screws 48 are used to hold the launch tube 16.

10 The pleated tube 34 is positioned within the peripheral
11 boundary of the jacking screws 48 such that the attachment
12 members 36, 38, 40, 42, excess cables 18, 22 and connectors 32,
13 24 are restrained within the collapsible pleated tube 34. The
14 attachment members, excess cables and connectors are therefore
15 free from any pinching during the mating of the gas generator 12
16 with the ram plate 26 and countermeasure 14.

17 As shown further in FIG. 5, 6, and 7 the attachment members
18 are folded in and attached to the inside of the ram plate 26,
19 while the attachment members are similarly folded inward and
20 attached to the inside of the gas generator 12.

21 The method of operation of the launchers shown with the
22 pleated tube 34 therein has been described above in connection
23 with the description of the apparatus of both the first and
24 second embodiments and should be understood by one of ordinary
25 skill in the art.

1 The method and apparatus described allows connection of
2 status cables between a countermeasure and a gas generator with a
3 lower failure rate by preventing the status cables from being
4 pinched. The invention uses low cost components and can be
5 applied in the field to existing signal launchers without major
6 modifications being made to the signal launcher.

7 The pleated tube 34 can be of any type of expandable tube.
8 The pleats, however, should be narrow enough to prevent the cable
9 from being pinched therebetween.

10 This invention has been disclosed in terms of certain
11 embodiments. It will be apparent that many modifications can be
12 made to the disclosed method and apparatus without departing from
13 the invention. Therefore, it is the intent

14 to cover all such variations and modifications as come
15 within the true spirit of this invention.

1 Navy Case No. 77622

2
3 METHOD AND APPARATUS FOR RETAINING WIRES

4 IN A CYLINDRICAL TUBE

5
6 ABSTRACT OF THE DISCLOSURE

7 A submarine signal launcher is disclosed for preventing
8 pinched control wires therein. The submarine signal launcher
9 includes a gas generator, an acoustic device countermeasure, a
10 launch tube for housing the gas generator and the countermeasure,
11 and a ram plate positioned between the gas generator and the
12 countermeasure. A status cable is connected to the
13 countermeasure and intermediately threaded through the ram plate
14 and joined to the gas generator. A collapsible tube connected to
15 the ram plate and to the gas generator. The status cable is
16 confined within the collapsible tube. Securing members are
17 formed on opposing ends of the collapsible tube for securing the
18 collapsible tube to the ram plate and the gas generator, wherein
19 upon assembly of the gas generator with the ram plate and the
20 countermeasure within the launch tube, the collapsible tube will
21 protect the cable from being pinched between joined ends of the
22 ram plate and the gas generator.

FIG. 1

(PRIOR ART)

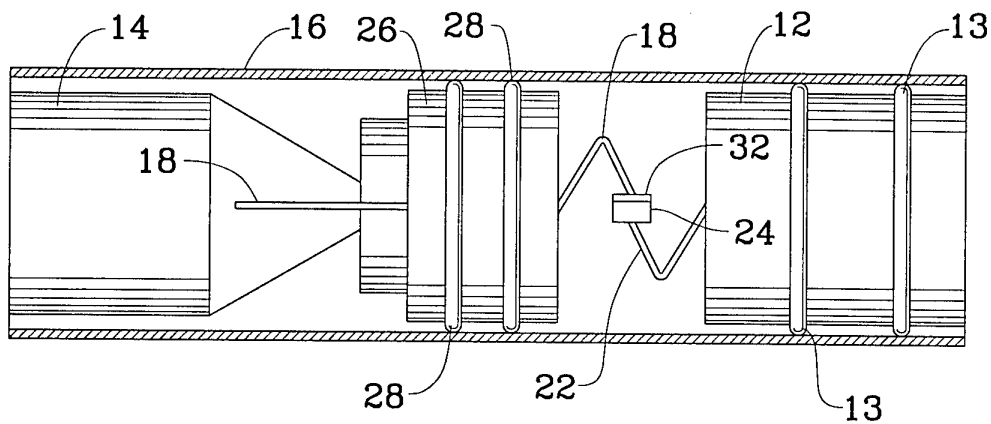


FIG. 2

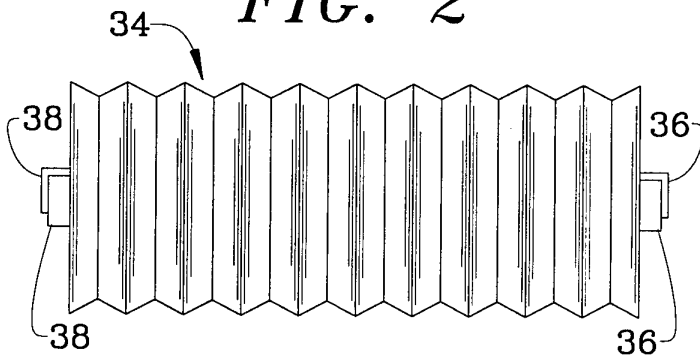


FIG. 6

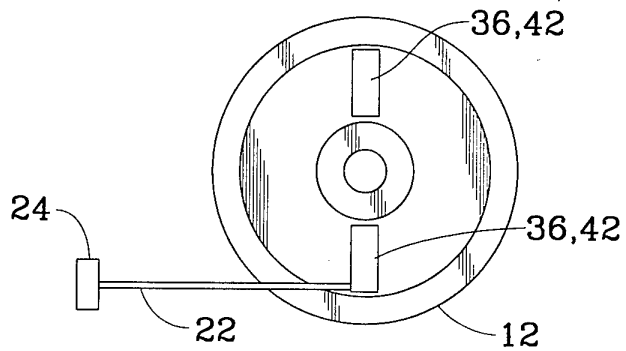


FIG. 3

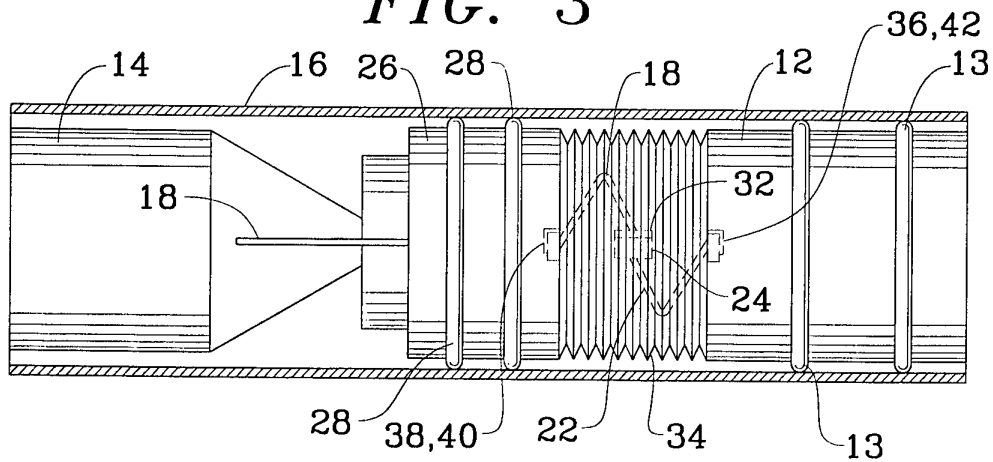


FIG. 4

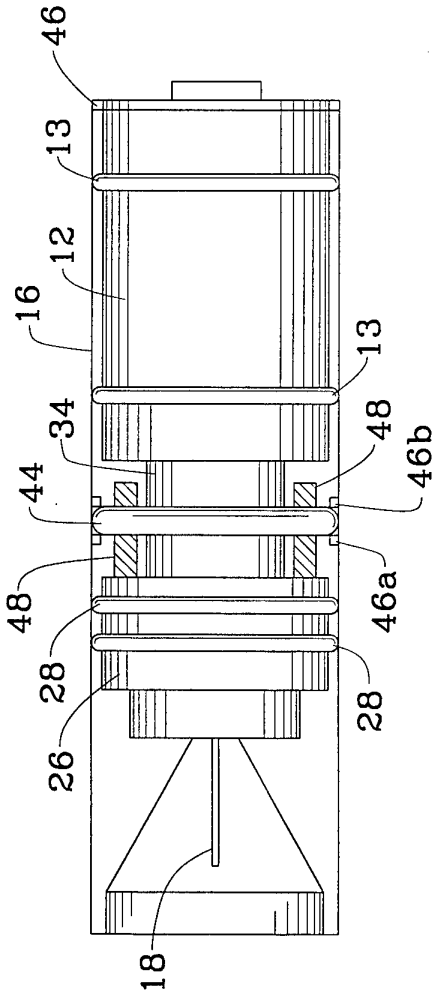


FIG. 7

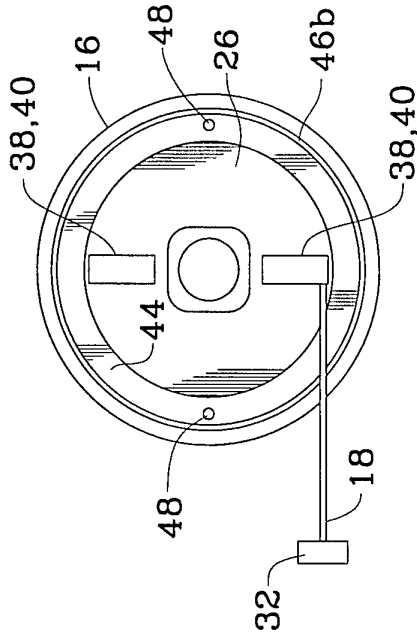


FIG. 5

