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PLASTICS PROJECTOR CHARGE CARTRIDGE CASE

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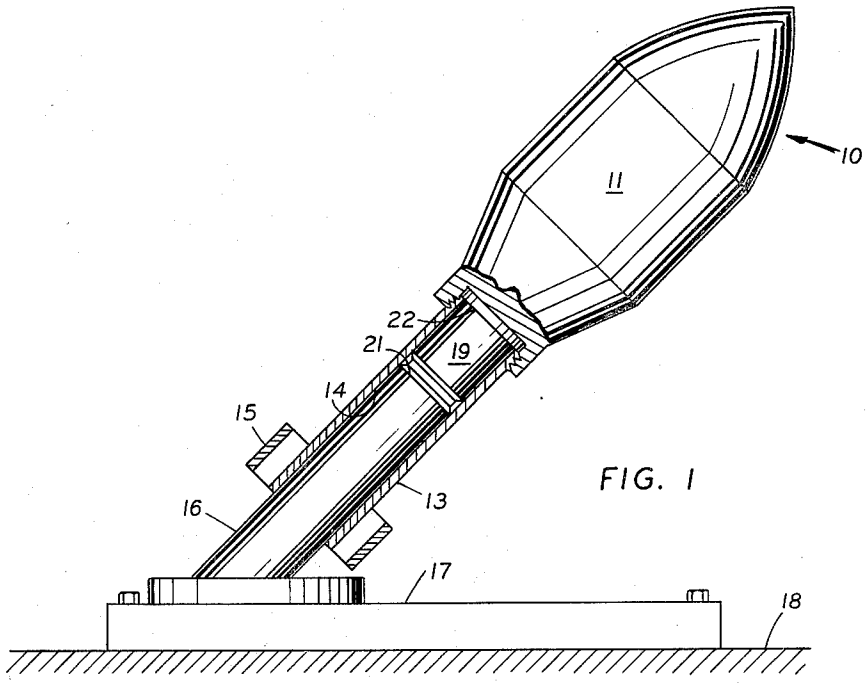


FIG. 1

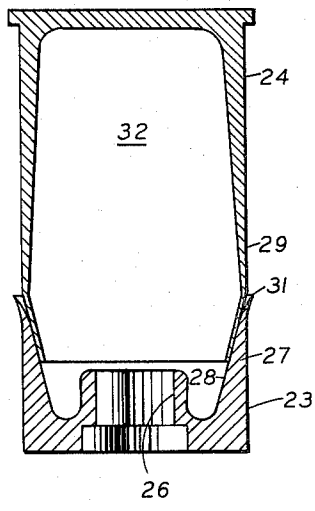


FIG. 2

PRIOR ART

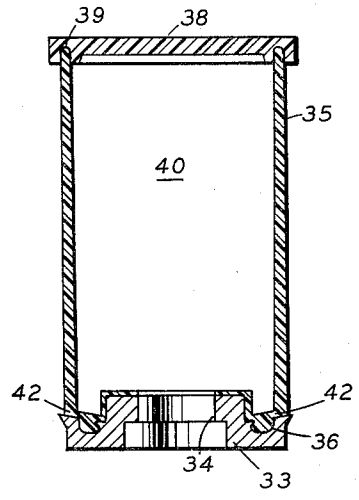


FIG. 3

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PLASTICS PROJECTOR CHARGE CARTRIDGE CASE

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(Granted under Title 35, U.S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

The present invention relates to the art of ordnance. More particularly, the invention relates to a novel cartridge case for containing the projector charge for an anti-submarine weapon which is explosively launched from a firing post.

As will appear more fully in the detailed description to follow, the weapon with which the present invention is intended to be used is an anti-submarine depth charge which is thrown into the water from the deck of an attack vessel, although it should be understood that the invention is not restricted to such weapons. The weapon is provided with a tail tube which may be telescoped over a firing post upstanding from the deck of the attack vessel. For the purpose of launching the weapon, there is disposed between the free-end of the firing post and the interior end of the tail tube a cartridge containing a charge of explosive material or propellant which upon being ignited creates gas pressure within the tail tube and thereby thrusts the weapon forcibly off the firing post. It is often necessary for the weapon to remain in place on the firing post ready for firing for extended periods of time during which it is exposed to the atmosphere and the action of the elements.

Heretofore, the cartridge case has been constructed of brass and has shown a marked tendency to leak moisture into the propellant chamber. Such leakage results in greatly reduced and highly erratic range performance and makes periodic replacement of the cartridges mandatory. Moreover, the brass cartridge case does not form an effective sliding seal in the tail tube of the weapon as it leaves the firing post so that gas pressure cannot build up to the maximum, this factor further contributing to the erratic nature of the firing results. A further disadvantage of the brass case is that it produces hazardous fragments upon firing.

Accordingly, it is an object of the present invention to provide a cartridge case which does not possess the disadvantages of the prior brass cartridge case in that it does not leak, forms an effective sliding seal in the tail tube of the weapon to thus increase the available range thereof and does not produce hazardous fragments when the cartridge is fired.

With these objects in view, the invention resides in the construction of the cartridge case primarily of plastics, the several parts of the case being secured together by special molding and welding techniques which result in moisture tight seals and a practical and economical product.

The invention and other objects and advantages thereof will become apparent from the following detailed description when considered in conjunction with the accompanying drawings wherein:

FIG. 1 is an elevational view partly in section showing the weapon on its launcher with the projector cartridge in place;

FIG. 2 is a cross-sectional view of the prior art brass cartridge case; and

FIG. 3 is a cross-sectional view of the cartridge case of the present invention.

To aid in a complete understanding of the present invention the weapon with which the present cartridge case is intended to be used is generally shown at **10** in FIG. 1. The weapon consists of a warhead **11** which as indicated above may be an anti-submarine depth charge. Secured to the rear end of warhead **11** in any suitable manner is a tail tube **13** which has a cylindrical inner bore **14** adapted to be telescoped over a firing post **16** to thereby support the warhead in launching position. A shrouded fin assembly **15** may be employed to stabilize the weapon. Firing post **16** is in turn supported by a base **17** secured in any desired manner to the deck **18** of the attack vessel.

In order to project warhead **11** off firing post **16**, a projector cartridge **19** is employed which in the pre-launch position of the weapon rests between the free end **21** of the firing post **16** and the inner end or bottom **22** of the tail tube **13**. The end of the cartridge abutting end **21** of firing post **16** has an electrical initiator therein which communicates with a suitable firing mechanism by means of a connector in the end **21** of the firing post. These elements have been omitted for clarity but their structure and operation should be readily apparent to those skilled in the art. Upon detonation of the charge housed within cartridge **19** the case of the cartridge separates as will appear more fully hereinafter and the expanding gases propel the weapon off the firing post.

The cartridge case which has been used heretofore is shown for comparison in FIG. 2. This case is constructed of two generally cup-shaped elements **23** and **24**, element **23** being the base and element **24** being the case body. Base **23** is provided with an opening **26** through the end wall thereof which opening serves to support an electrically initiated primer which has not been shown for purposes of clarity. Sidewall **27** of base **23** is inwardly tapered as shown at **28**, for reception of the open end of sidewall **29** of case body **24**, which has a complementary taper to provide a close fit in base **23**. A propellant chamber **32** is defined by case body **24**, and after this chamber is loaded with propellant and a primer is secured in opening **26** in base **23**, elements **23** and **24** are secured together in the configuration shown in FIG. 2 by means of an adhesive in the tapered joint between the two elements. The free end **31** of base **23** is outwardly flared to provide a sliding seal with the interior of the tail tube of the weapon as it leaves the firing post.

In operation, the assembled cartridge is loaded into the tail tube of the weapon and the weapon and cartridge are inserted over the firing post **16**, bringing the primer into engagement with the electrical connecting elements in the free end of the firing post **16**. When it is desired to launch the weapon, the electrical primer is initiated, the propellant is ignited and the resulting gas pressure causes the parts to separate at the adhesive joint. The expanding gases then throw the weapon off the firing post.

FIG. 3 shows the improved cartridge case of the present invention. This cartridge case has a metal disc shaped base **33** provided with an opening **34** which is equivalent to opening **26** in the prior cartridge. The upper surface of base **33** is slightly flared as shown and is provided with a machined undercut groove **36**. As part of the process of making the device, base **33** is clamped in a mold in an injection molding machine where hollow cylindrical case body **35** is directly molded thereto. During the molding operation, the plastics material, which may be high density polyethylene for example, will enter and fill the undercut groove **36**, and after hardening will provide a secure and leakproof connection between the two elements. The inherent shrinkage of the plastics contributes to the tightness of the seal by causing the plastics to tightly grip the lip of groove **36**.

The open free end of the cylindrical case **35** is closed

by a disc shaped end cap **38** which is injection molded in a separate operation. A leakproof connection between end cap **38** and case **35** is accomplished by securing case **35** in a groove **39** in end cap **38** by a spin-welding operation.

In the spin-welding operation, end cap **38** is securely clamped in a fixture so as to be held stationary. Case body **35** is clamped in a rotatable chuck and the open face end thereof is pressed into groove **39** in end cap **38**, the parts being dimensioned so that case body **35** fits snugly in groove **39**. Case body **35** is then rotated by the chuck. Heat is generated by the friction between the parts which results in melting of the plastics material in the zone of the groove. While the material is in the liquid state, the rotation is suddenly stopped. The material cools, and a sealed fused joint is thereby formed. The method as described lends itself favorably to mass production methods, and this, coupled with the use of relatively inexpensive plastics, results in a less expensive product.

As in the prior art cartridge, the propellant chamber **40** in the new cartridge is loaded with explosive material the loading being accomplished here through opening **34** in base **33** and thereafter a primer is inserted into opening **34**. Once the primer is sealed in place in the new cartridge, a moisture tight enclosure is provided for the propellant.

In operation, the new cartridge acts much the same as the old except for the manner of separation of the parts and the results achieved. Instead of separating at an adhesive joint as does the prior case, the new case separates near the zone of connection with base element **33** due to the weakening of the plastics material provided by molding the material with a thinner cross-sectional at this zone, which is indicated generally at **42** in FIG. 3. The ring of plastic material which is left attached to base element **33** after separation takes place is biased radially outwardly by the gas pressure within the chamber in the manner of a cup type seal and serves as an effective seal in the tail tube of the weapon. Moreover, the plastics material provides less friction at the sliding seal than was experienced with the prior brass cartridge. Overall, the new construction has had the important results of improving the range of the weapon by about 50 feet and of making range performance uniform, even after the cartridge has been exposed to the elements for long periods of time.

It is to be understood that the cartridge case as described above is a preferred embodiment of the invention and that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. A projector charge cartridge case for a cartridge for use with a weapon having a tail tube adapted to be telescoped over a firing post, said cartridge being adapted to be disposed between the free end of the firing post and the interior end of the tail tube and serving when fired to propel the weapon off the firing post, said cartridge case comprising:

a generally disc shaped metal base having an annular undercut groove in one face thereof,

a hollow cylindrical plastics case body secured to said base, said case body having an annular protruding portion thereon, said protruding portion entering and filling said undercut groove, said case body being formed with an annular portion of reduced cross-section at a location adjacent to the periphery of said metal base, whereby said case body is weakened at this location so that, when the cartridge is fired, separation takes place at said location and a ring of plastic material is left attached to the base, the edge of said ring contacting the interior cylindrical surface of said tail tube and acting as a sliding seal therein, and

an end cap sealingly secured to and closing the end of said case body opposite said base.

2. A projector charge cartridge case for a cartridge for use with a weapon having a tail tube which is adapted to be telescoped over a firing post, said cartridge being adapted to be disposed between the free end of the firing post and the interior end of the tail tube and serving when fired to propel the weapon off the firing post, said cartridge case comprising:

a disc shaped metal base having a slightly upwardly flared surface thereon, said surface having an annular undercut groove therein,

a hollow cylindrical case body made of plastics, said case body being sealingly attached to said metal base by injection molding said body directly onto said base, the plastics being forced into and solidifying in said annular undercut groove, said case body being formed with an annular portion of reduced cross-section at a location adjacent to the periphery of said metal base, whereby said case body is weakened at this location so that, when the cartridge is fired, separation takes place at said location and a ring of plastic material is left attached to the base, the edge of said ring contacting the interior cylindrical surface of said tail tube and acting as a sliding seal therein, and

a disc shaped plastics end cap closing the end of said case body opposite from said base, said end cap having an annular groove in one face thereof, and the end of said case body being disposed and fused in said groove in said end cap.

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