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MISSILE NOSE CAP

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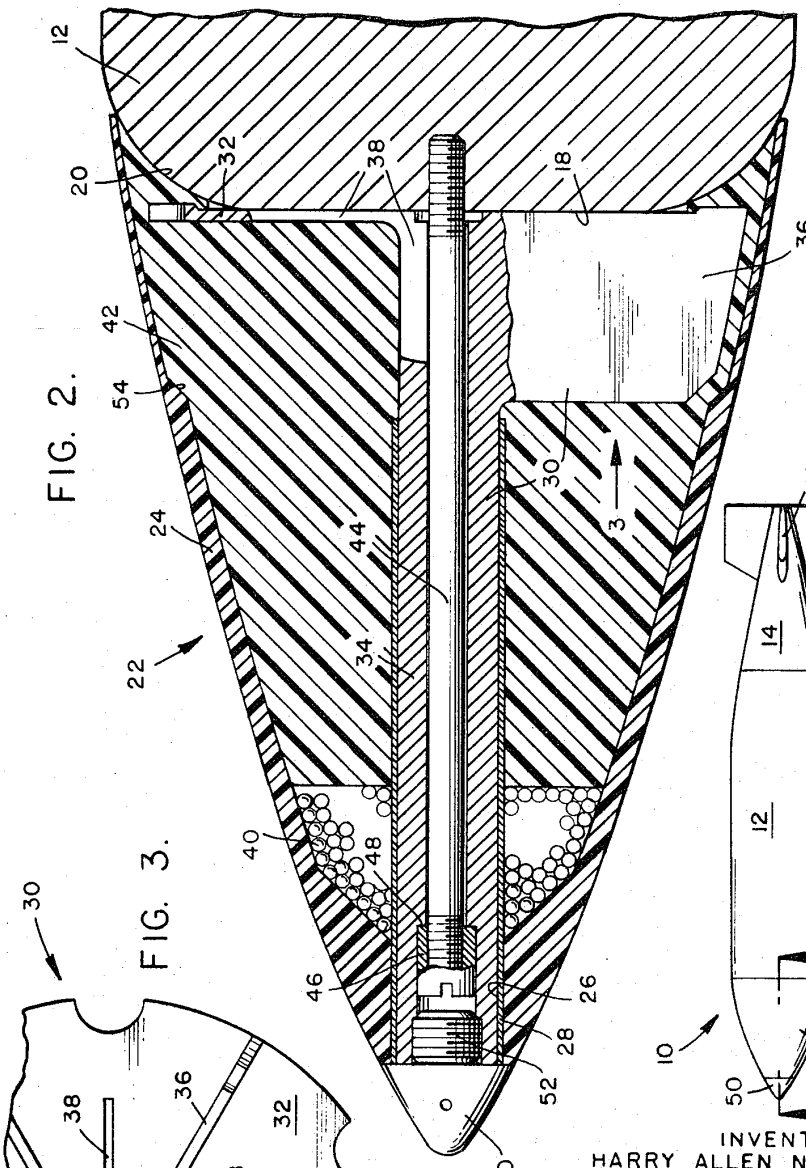

FIG. 2.

FIG. 3.

FIG. 1.

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MISSILE NOSE CAP

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ABSTRACT OF THE DISCLOSURE

Nose for a rocket propelled missile, carrying a depth charge, formed of frangible components which disintegrate upon water entry, absorbing some of the energy of impact. The nose is shaped to reduce air drag on the missile, increasing its velocity, and its distribution of mass moves the C.G. of the missile forwardly, improving its stability during its air trajectory after separation from its booster rocket.

BACKGROUND OF THE INVENTION

The ASROC (antisubmarine rocket) system comprises an underwater missile which is launched from shipboard by a tandem rocket motor which separates at a point in the air trajectory, the missile thence following a ballistic trajectory to the point of impact with the water. In one variation of the missile, it carries a depth charge payload and sinks to a target locus without propulsion. The forward end of the missile is flat with a radiused transition to its outer diameter, this configuration being optimum for course stability after it enters the water and also for obviating broaching upon water entry. Such configuration, however, is not ideal for the air trajectory since it has undesirable air drag and other aerodynamic characteristics. It has been the practice, accordingly, to provide a frangible nose cap on the missile which reduces air resistance and disintegrates upon water entry, thus providing an optimum nose configuration for both the air trajectory and directional course in the water. It also serves the purpose of absorbing some of the energy of water impact to obviate damaging shock loads on its internal components. Due to the desire to increase the range of such missile, a redesign of the nose cap has been found necessary, due to increased water entry velocity and its attendant increase in water entry shock. Also, to improve its stability in its ballistic trajectory, after separation from the rocket motor, it has been found desirable to shift the center of mass of the missile forwardly. Nose caps of the type referred to are well known, the patent to Howard, U.S. 2,889,772, being exemplary of an early development disclosing the use of a frangible foam material for mitigating shock. The patent to West, U.S. 3,048,110, is exemplary of a later development, utilizing foam material and other frangible components, and the patent to West, U.S. 3,110,262, is exemplary of a still later development utilizing the addition of a mass of lead shot.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a side elevation of a conventional missile and the attached nose forming the subject of the invention;

FIG. 2 is an enlarged section taken on line 2—2, FIG. 1; and

FIG. 3 is a fragmentary view in the direction of arrow 3, FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Missile **10** is circular in cross section, having a generally cylindrical forward end **12** and a generally frustoconical tail cone **14** to which is affixed stationary stabilizing fins **16**. A rocket motor (not shown) is affixed to the rear end of the missile which separates from same at a desired point in the air trajectory. The forward end of the missile is provided with a flat face **18** and a curved transition surface **20** with a radius of approximately ¼ of the missile diameter, the construction so far described being conventional.

Nose **22** comprises an ogival shell **24** formed of epoxy impregnated fibre glass cloth which is spirally wound on a mandrel and cured, the outer surface thereafter being machined to a smooth finish. The front end is provided with an aperture **26** which receives one end of a fibre glass tube **28**, the purpose of which will subsequently be described. A frangible cast aluminum member **30** comprises a disc shaped base **32**, a tubular portion **34** and equiangularly spaced radial ribs **36**, joining the base and tubular portion. Slots **38**, disposed between the ribs, extend through the base and tubular portion to weaken the member and facilitate break-up of same. A mass of lead shot **40** is disposed in the forward end of the shell and the remainder of the space is filled with foam material **42**. The rear end of a stud **44** threadedly engages the missile and a nut **46** threadedly engages its front end, the nut abutting a shoulder **48** on member **34** which retains the entire nose assembly on the missile. A metallic nose tip fairing **50**, having a projection **52**, threadedly engages the front end of member **34**.

In the fabrication of the nose, shell **24** is disposed on a support with the plane of its rear end in a horizontal position. Tube **28** is then inserted in aperture **26**. The desired amount of lead shot **40** is then poured into the shell and leveled. A measured quantity of liquid foaming material is then poured into the shell to a level somewhat below the upper end of tube **28**. Member **30** is then dropped into the tube, seating on an annular abutment **54**, and a plug (not shown) having the shape of the front end of the missile, is disposed in the base end of the shell and suitably clamped therein in engagement with the rear face of base **32**. As the foaming material expands it fills the entire space between the shot and the front surface of base **32** and around its periphery and against the plug.

What is claimed is:

1. In an elongated rocket propelled missile of circular cross section adapted to enter water from a terminal ballistic trajectory after its separation from a rocket motor, the missile having a flat circular front surface of a diameter approximately one-half of the missile major diameter and a surrounding annular radiused transition surface joining the flat surface with the outside surface of the missile, the improvements comprising an ogival nose affixed to the front end of the missile and projecting forwardly thereof for a distance in excess of the missile major diameter, said nose including:

(a) a frangible fibre glass shell;

(b) a frangible metallic member having a disk shaped flat base abutting said flat surface of the missile;

(c) an integral tubular portion projecting forwardly from said flat base and to the front end of the shell;

(d) the metallic member having integral angularly spaced radially extending ribs joining its base and the tubular portion and having radially extending weakening slots extending through the base and tubular portion;

(e) a mass of lead shot disposed in the forward end of the shell and surrounding said tubular portion;

(f) frangible foam material filling the space between

the lead shot and said base and the space surrounding said transition surface;

(g) a rod affixed to the forward end of the missile and extending axially and forwardly thereof substantially the length of the shell and adapted to shear from the missile adjacent said flat surface upon water entry of the missile;

(h) a nut threadedly engaging the front end of the rod, and

(i) a nose tip providing an ogival fairing for the front end of the shell and closing access to said nut.

2. A nose in accordance with claim **1**, including a fibre glass tube having its forward end disposed within an axial bore in the front end of the shell and extending rearwardly thereof, its rear end being disposed between the shot and said base, said tube being of an internal diameter to slideably receive said tubular portion, said tube forming an annular space therearound into which a measured quantity of liquid foaming material may be poured when the longitudinal axis of the shell is disposed vertically and before said tubular portion is slideably inserted in said tube.

3. The method of assemblying a nose for a missile, said nose comprising a prefabricated ogival shell having an open end, a prefabricated frangible metallic member having a disc shaped base and a projecting tubular portion, a mass of lead shot, and a frangible tube, which comprises the steps of:

(a) supporting the shell with its longitudinal axis disposed in a vertical position;

(b) inserting the front end of the tube into the front end of the shell;

(c) pouring the mass of shot into the shell and leveling same;

(d) pouring a measured quantity of liquid foaming material into the shell;

(e) inserting said tubular portion into said tube; and

(f) securing a plug to the open end of said shell in abutting relation with said base, preventing flow of said foaming material from the shell when it expands to fill same.

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