INCREMENT HOLDER FOR MORTAR SHELL

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The invention described in the specification and claims may be manufactured and used by or for the Government for governmental purposes without the payment to me any royalty thereon.

The present invention relates to means for securing propellent increments to mortar projectiles.

Mortar projectiles of the type for which the present invention is adapted are in the category of semi-fixed ammunition with the propellant charges formed as increments secured externally of the projectile, the number of increments varying with the required range. As a general rule each round comprises a fused projectile with a fin assembly, an ignition cartridge, and a percussion primer for initiating the ignition cartridge. The propellant increments are secured about the boom portion of the projectile which is also formed as an ignition cartridge container, and are set-off by flash from the ignition cartridge emitted through vents provided in the cartridge container.

Previous devices utilized for assembling the increments about the boom have been objectionable for one reason or another. In a first method, the powder increments are loaded into cellophane bags or waterproofed cotton bags which are retained in place about the boom by metallic fastening devices. When the projectile is fired the bags which are inflammable are consumed within the tube. However, the fastening devices tend to leave objectionable residue in the launcher tube.

In a second method of assembling propellant charge increments about the boom, the charges are preformed toroidal, or doughnut-shaped blocks which obviously must be placed about the boom before the projectile is assembled, thereby giving rise to problems of assembly, disassembly, and packaging for shipment to the point of use. Additionally, considerable expense is entailed in the casting and formation of the individual increments. Although the problems of assembly and packaging are not present for precast, horseshoe shaped resilient increments which may be easily applied to the assembled projectile just prior to use, the considerable expense of forming the blocks is not obviated.

It is accordingly an object of this invention to provide a device for securing increment charges to a mortar projectile, which is free of the defects noted in prior devices for accomplishing the same result.

It is also an object of this invention to provide means for securing increment bags to the boom of a mortar projectile, which is cheaper and permits the assembly and disassembly of the bags on the assembled projectile in a simpler and more expeditious manner.

It is also a further object of this invention to provide means for assembling increments on a mortar projectile, which avoids the deposition in the launcher tube caused by metallic fastening devices.

With these and other objects in view which will become apparent in the description of the invention which follows, reference is made to the accompanying drawings wherein

Figure 1 is a partial side elevation of the pertinent portion of a mortar projectile with increment bags held in place by the securing means of the invention.

Figure 2 is a longitudinal section of the projectile according to Figure 1.

Figure 3 is a transverse section taken on line 3—3 of Figure 1, and

Figure 4 is a transverse section taken on line 4—4 of Figure 1.

Referring again to the drawing wherein the same reference characters have been used to denote like or similar parts in the several views, reference character 1 designates a fusiform mortar projectile generally having the usual frontal ogive, and central boreurret section, which parts are not pertinent to the invention and have not been shown.

The central boreurret merges into a rearwardly tapering rear portion 2 provided with a rearwardly extending reduced section 3 having external threads 4, the projectile per se being hollowed out forwardly of section 3 to form a chamber 5, symmetrical about the longitudinal axis to receive an explosive charge 6, as is well known.

The boom section which is utilized to house the ignition cartridge comprises a rearwardly tapering section 7, merging with the taper of the portion 2, and provided in its forward face with a recess 8 provided with threads to screw-threadedly mate with the threads 4. Tapering section 7 ends in a rearwardly extending reduced portion 9, externally threaded at 10 to be screw-threadedly received in a recess 11 formed in a rearwardly extending cylindrical section 12, which is the hub of a fin assembly 13, later to be described.

The forward half of boom 7 is provided with an elongated axial chamber 14 extending rearwardly of recess 8, for housing an ignition cartridge 15, there being an axial flash passage 16 extending throughout the rearward half of the boom and communicating at its forward end with chamber 14. Boom 7 is also provided with several sets (3 sets shown) of axially spaced holes or vents 17, each vent extending radially outwardly between the inside wall of chamber 14 and the outer periphery of boom 7, each set providing equally angular spacing for each individual vent therein relative to the adjacent vent in its respective circumference.

The fin assembly 13 comprises the before-mentioned hub 12 about which are secured in equally angularly spaced relation, longitudinally extending radial fins 18, circumscribed about their rearward ends by a streamlined shroud 19 in the well known manner. Hub 12 is provided with an axial flash passage 20 communicating at its forward end with flash passage 16 and at its rearward end with an axial recess 21 of enlarged diameter having the rear portion of its inner wall threaded as at 21 a, and into which is received an insert 22 extending forwardly of the rearmost extent of recess 21, and provided rearwardly with an externally threaded reduced portion 23. A bushing 24 having internal threads 25 to mate with the threads on reduced portion 23, and external threads 26 to mate with threads 21 a occupies the remaining rearmost portion of recess 21 to provide a flash rear surface of hub 12 in radial alignment with the rearmost lateral edge of shroud 19.

Insert 23 is provided with a recess 27 to receive a relay 28, there being an axial flash passage 29 communicating at its forward end with recess 27, and at its rear end with a second recess 30 in insert 22 which continues rearwardly to the rear face of bushing 24. A percussion responsive primer 31 is received in the forward end of recess 30, and a firing pin 32 in the rear end thereof.

The holders for securing the increment bags about the projectile boom are clearly seen in Figures 3 and 4, and comprise a first metal wire ring or washer 33 having a
3 diameter such that it fits snugly about the periphery of reduced portion 3, and a second similar wire ring 34 adapted to fit about the periphery of reduced portion 9. Ring 33 is adapted to be received in the joint formed by the abutting faces of projectile portion 2 and boom 7, whereas ring 34 is received in the joint formed by the abutting faces of boom 7 and the reduced portion of the projectile portion 12. Since both rings are similar in structure except for the differences in diameter, only ring 33 will be described in detail. Increment holder 33 is a metal ring made of substantially heavy semi-rigid wire, such as, for example, 20 gauge steel wire of the type commonly used by bookbinders. In equally spaced relation about the wire and interchange therewith are formed a plurality of eyes or kidney shaped loops 35 (8 shown), formed by bending the wire radially outwardly and pinching the two radially extending portions adjacent the circumference of the wire so that they abut to form a loop shank portion 36 with an end 37 extending beyond the outer periphery of the projectile. The protruding portion 37 is first bent upwardly as at 38, then the outermost end is distended to form circumferentially elongated eyes or loops 35, each of which is adapted to lie in a transverse plane normal to the longitudinal axis of the projectile.

Each elongating increment comprises a bag 39 made of either cellophane, cotton cloth properly waterproofed, or the like. The cloth is folded over and stitched longitudinally along one edge to form the before-mentioned elongated tubular bags 39 which are first loaded with propellant powder 40 and then stitched rearwardly and forwardly of the forward and rear edges, respectively, as at 41 and 42 to form flaps 43 and 44, thereby retaining powder 40 in the bag portion intermediate the flaps. Flap 43 is provided with a longitudinal slot 43a, and flap 44 with a similar slit 44a, then the slit edges are stitched with threads to form buttonholes which are adapted to fit over a corresponding loop 35, each bag being held in place on the shank portion 37 by loop 35. Although each bag is illustrated as being impered toward the rearward end to compensate for the taper of the projectile, it is obvious that the increments may be made tubular, and approximately of pencil thickness, the only requirement being that each bag overlie a vent 17 so that it may be ignited. In addition, plastic inflatable members may be substituted for the flaps and buttonholes, and a projectile having a cylinder instead of tubular body may also be used. Although the exemplary illustration depicts a mortar projectile, other projectiles requiring propellant increments externally mounted, also fall with the purview of the instant invention. Other modifications of the structure disclosed may also be resorted to without departing from the spirit and scope of the invention set forth in the subjoined claims.

1 claim:

1. In combination with a projectile having a tail fin assembly, axially spaced means secured to said projectile entirely forwardly of said tail fin assembly and arranged in substantially longitudinal alignment, said means protruding radially outwardly of the external surface of said projectile, an axially elongated propellant increment, and means adjacent the opposed ends of said increment for engaging corresponding longitudinally aligned protruding means.

The combination of claim 1 including an ignition cartridge received in said projectile, there being a vent in said projectile forwardly of said tail fin assembly and extending radially between the surface of said ignition cartridge and the external surface of said projectile, said increment overlying said vent.

3. In combination with a projectile having a tail fin assembly, axially spaced means secured to said projectile entirely forwardly of said tail fin assembly, each said means having a projection protruding radially outwardly of the external surface of said projectile and in longitudinal alignment, an axially elongated propellant incre-
each of said latter projections extending radially outwardly of the external surface of said projectile, each of said projections on said first means being in substantial longitudinal alignment with a corresponding projection on said second means, a plurality of axially elongated cylindrical propellant increments, and means adjacent the opposed ends of each of said increments for mounting each of said increments on a respective pair of longitudinally aligned projections.

11. The combination in claim 8 including an ignition cartridge in said boom, there being a plurality of vents in said boom extending radially between the external surface of said boom and said ignition cartridge, each of said increments overlying at least one of said vents, and means in said projectile for initiating said ignition cartridges.

12. In combination with a fusiform mortar projectile having a rearwardly tapering tail section, said tail having a rearwardly extending section of reduced diameter provided with threads in its external surface, a rearwardly tapering boom, there being a recess formed in the forward face of said boom for screw-threadedly engaging the threads on said reduced section to provide a smooth surface between the tapers of said tail and said boom, a fin assembly having a cylindrical hub, there being a recess formed in the forward face of said hub to screw-threadedly mate with the threads on the reduced section of said boom, a first wire ring encircling said tail reduced section, a plurality of equi-angularly spaced loops integral with said ring, each said loop having a shank portion received between abutting faces of said tail and said boom, and an eye extending radially outwardly of the surface of said boom, a second wire encircling said boom reduced section, a plurality of equi-angularly spaced loops integral with said second ring, each of said latter loops having a shank portion received between abutting faces of said boom and said hub, and an eye extending radially outwardly of the surface of said boom, the loops on said first and said rings being in substantial longitudinal alignment, a plurality of elongated tubular propellant increments having forwardly and rearwardly disposed flaps, each of said flaps having longitudinal slits formed therein for engaging a corresponding pair of longitudinally aligned loops.

13. The combination in claim 12, there being an axially elongated chamber formed in said boom, an ignition cartridge in said chamber, there being a plurality of vents in said boom extending radially between said chamber and the external surface of said boom, each of said increments adapted to overlie at least one of said vents.

14. The combination in claim 13 including percussion responsive detonable means in said hub for initiating said ignition cartridge.

15. In a projectile having a hollow boom section and including a rearwardly tapering section, there being an annular peripheral recess formed adjacent the forward end of said boom section, an ignition cartridge received within said boom section, there being a vent formed in said boom extending radially outwardly from said ignition cartridge to the periphery of said boom, an elongated propellant increment, and means adjacent the forward and rear ends of said boom for mounting the opposed ends of said increment externally of said boom, said increment overlying said radial vent, said increment mounting means comprising a first endless wire adapted to be received in said annular recess, and a second similar endless wire adapted to encircle said reduced rearward section, each endless wire comprising a plurality of arcuate segments conjointly defining a circle of predetermined diameter, said wire extending radially outwardly from each end of each said segment to form arms, the arms between contiguous sections constituting a pair, each pair of arms being formed into a loop at the radially outward ends thereof, each said loop extending radially outwardly of the external surface of said boom, all said segments and arms being coplanar.

16. As an article of manufacture for detachably mounting containers for propellant charges on the tail portion of a projectile, a one-piece endless wire comprising a plurality of arcuate segments conjointly defining a circle of predetermined diameter, said wire extending radially outwardly from each end of each said segment to form arms, the arms between contiguous sections constituting a pair, each pair of arms being formed into a loop at the radially outward ends thereof, all said segments and pairs of arms being coplanar, each pair of arms being axially offset at the ends thereof whereby said loops lie in a second plane axially offset from the plane of said circle and arms.

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