Jan. 26, 1960 G. A. LYON 2,922,368

PROJECTILE STRUCTURE

Filed Oct. 22, 1953

Fig 1

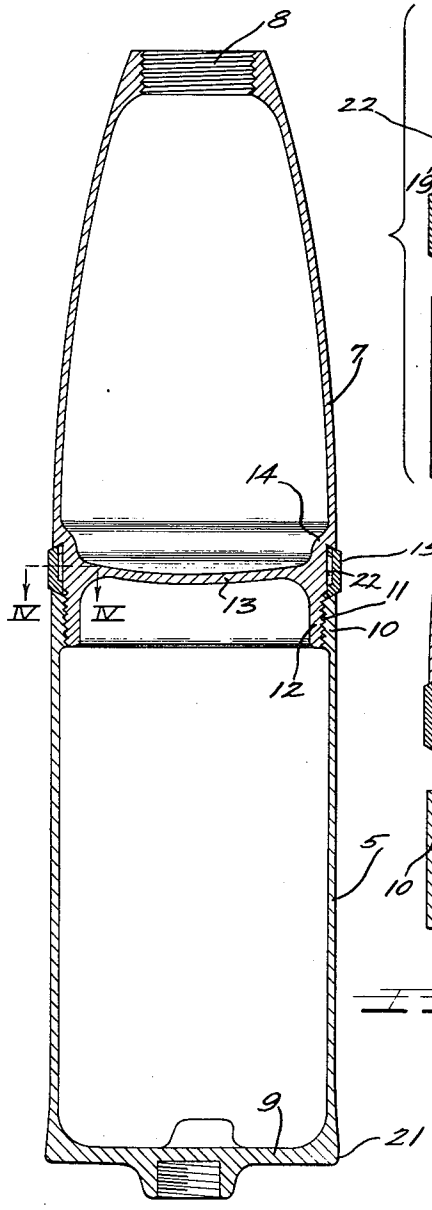


Fig 2

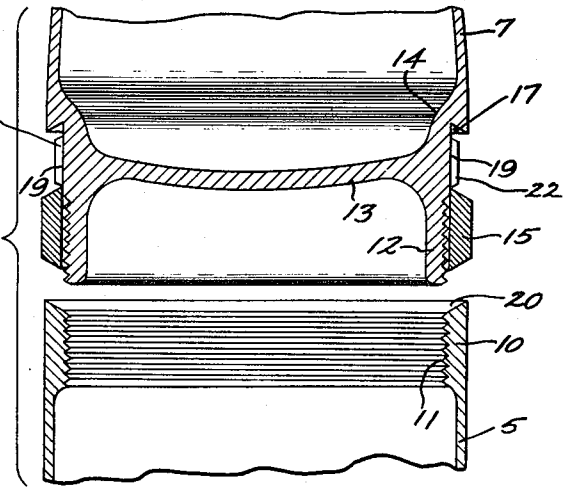


Fig 3

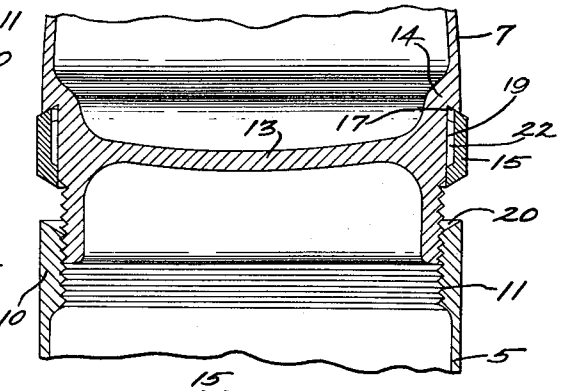
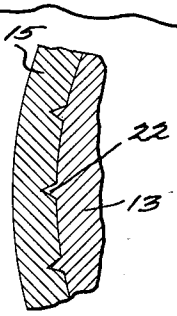


Fig 4



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United States Patent Office 2,922,368
Patented Jan. 26, 1960

2,922,368

PROJECTILE STRUCTURE

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Application October 22, 1953, Serial No. 387,760

4 Claims. (Cl. 102—92.5)

The present invention relates to improvements in projectile structures and more particularly concerns improvements affecting the assembly and cooperation of projectile structures involving rifling ring means.

An important object of the present invention is to provide an improved military projectile assembly.

Another object of the invention is to provide a novel projectile assembly wherein major components are united by screwing the same together.

Another object of the invention is to provide an improved projectile head structure of one-piece fabrication for attachment to a body casing of a projectile assembly.

Still another object of the invention is to provide a novel projectile assembly wherein a rifling ring of softer material serves as an anti-turn wedging device for the assembly.

A further object of the invention is to provide a novel rifling ring structure and assembly for military projectiles.

Other objects, features and advantages of the present invention will be readily apparent from the following detailed description of a preferred embodiment thereof taken in conjunction with the accompanying drawings in which:

Figure 1 is a vertical diametrical sectional view through a projectile embodying the features of the present invention;

Figure 2 is an exploded fragmentary sectional assembly view of the connectible portions of the components of the projectile;

Figure 3 is a sectional view similar to Figure 2 but showing the components in a partially assembled relationship; and

Figure 4 is a fragmentary enlarged sectional detail view taken substantially on the line IV—IV of Figure 1.

A projectile embodiment of the present invention comprises a body shell member 5 carrying a tapered head shell 7 which is preferably provided with an open tip portion internally threaded at 8 to receive a nose fuse plug. Where the projectile is of the self-propelled or propulsion assist type the body shell 5 may provide a motor chamber for housing propulsion fuel or explosive material. To this end the body casing 5 has a base closure 9 which may be provided with propulsion exhaust nozzles or may be fully closed, as preferred.

At its upper open end, the body casing 5 is provided with an internally thickened mouth or collar 10 which is internally threaded at 11 to engage an externally threaded depending integral annular attachment flange 12 on an integral bulkhead base 13 of the head 7. It will be observed that the bulkhead 13 with its attachment flange 12 is formed as an integral one-piece unit with the remainder of the head shell 7. A thickened annular juncture 14 with the main shell wall of the head 7 is provided with the bulkhead 13 above the flange 12.

A rifling ring and assembly maintaining wedging device 15 is provided for engagement between the upper edge of the body casing 5 and a downwardly directed

opposing annular shoulder 17 on the head member 7. To this end, the bulkhead 13 is provided above the outer side of the flange 12 with a cylindrical surface 19 receptive of the inner diameter of the ring member 15 and joining the shoulder 17.

For wedging interengagement of the ring member 15, with the shoulder 17 and the opposing end of the body casing 5, the opposite edges of the rifling ring 15 are beveled toward a narrower crown or outer face on the ring and the shoulder 17 is undercut, complementary to the opposing edge taper of the rifling ring. A complementary tapered shoulder 20 on the upper edge of the casing 5 engages the opposing tapered edge of the rifling ring. Through this arrangement when the threaded collar 10 of the casing 5 is screwed up tight against the rifling ring 15, the rifling ring, which, of course, is made from a softer material such as suitable copper or an alloy of copper, acts as a wedge between the convergingly tapered shoulders 17 and 20 and thus resists unscrewing of the casing 5 and the head 7. In addition, of course, the rifling ring 15 is effectively held in place about the bulkhead 13. The diameter of the rifling ring 15 is, of course, substantially greater than the adjacent diameter of the casing 5 and the head 7 so as to be engageable either with a smooth bore launching tube or a rifled gun barrel.

Where a smooth bore launching tube is used, the base and the body casing 5 may be provided with an annular radially projecting rib-like portion or shoulder 21 of substantially the same diameter as the external diameter of the rifling ring 15 and remote, that is substantially spaced, therefrom to cooperate therewith in guiding the projectile through the launching tube. Where, on the other hand, the projectile is to be fired from a rifled bore, the shoulder 21 may be of sufficiently smaller diameter than the rifling ring 15 to engage only in slidable relation with the inner diameter of the rifled bore while the rifling ring engages within the rifling to effect spinning of the projectile about its axis.

In order to anchor the rifling ring 15 against turning relative to the projectile, the cylindrical rifling ring receiving surface 19 is provided with a series of longitudinally elongated laterally projecting preferably knife edge spurs or interlock ribs 22 which become embedded in the softer material of the rifling ring 15 as an incident to driving of the ring into position by screwing the shoulder 20 thereagainst. Assembly of the rifling ring 15 can best be visualized by reference to Figure 2. First the rifling ring is placed about the flange 12 with the upper edge of the ring adjacent the lower ends of the interlock spurs 22. Then the casing 5 is brought into position with the shoulder 20 thereof bearing against the adjacent tapered shoulder of the rifling ring. As the threads 11 ride up the threads on the flange 12, the rifling ring is forced axially onto the cylindrical surface 19 and the spurs 22 become embedded in the inner periphery of the rifling ring until the rifling ring is wedged against the shoulder 17. The embedded relation of the spurs within the rifling ring 15 is best seen in Figure 4. If necessary the casing 5 can be backed off the rifling ring as seen in Figure 3 and the rifling ring will remain fast in place as held by the spurs 22. However, unless the components are deliberately unscrewed or backed off, the rifling ring maintains a strong wedged condition between the parts.

It will be understood that modifications and variations may be effected without departing from the scope of the novel concepts of the present invention.

I claim as my invention:

1. In a projectile structure including a body shell and a head shell with a reduced diameter lower end portion on said head shell having the lower extremity portion

thereof threaded to receive a threaded upper end portion of the body shell in assembly and with a shoulder at the upper end portion of said reduced diameter portion, radially projecting spurs on said reduced diameter portion of the head shell in the area between the threaded portion and said shoulder, and a rifling ring narrower than said threaded portion driven into engagement with said spurs and against said shoulder by said body shell as an incident to threading of the body shell onto said reduced diameter portion.

2. In a projectile structure including a body shell and a head shell with a reduced diameter lower end portion on said head shell having the lower extremity portion thereof threaded to receive a threaded upper end portion of the body shell in assembly and with a shoulder at the upper end portion of said reduced diameter portion, a plurality of circumferentially spaced radially projecting spurs having sharp outer edges elongated in an axial direction and being attached at their base to said reduced diameter portion of the head shell in the area between the threaded portion and said shoulder, and a rifling ring narrower than said threaded portion and having a smooth inner annular surface of a diameter to fit closely over said reduced diameter portion of the head shell, said inner surface deformed by said radially projecting spurs caused by axially forcing the rifling ring over the sharp edged spurs whereby the rifling ring is prevented from having rotation relative to the shell when passing through a gun barrel.

3. In a projectile structure including a body shell and a head shell with a generally cylindrical reduced and substantially continuous diameter lower end portion of substantial length on said head shell to receive closely thereabout an upper end portion of the body shell in assembly and with a shoulder at the upper end portion of said reduced diameter portion, a plurality of circumferentially spaced radially projecting spurs having sharp outer edges elongated in an axial direction and being attached at their bases to said reduced diameter portion of the head shell in the area thereof adjacent to said shoulder and spaced substantially from the lower end of the reduced diameter portion to leave a substantial free length of the reduced diameter portion between the spurs and said lower end, and a rifling ring substantially narrower than said free length but at least as wide as the length of said spurs and having an inner annular surface of a diameter to fit closely over said reduced diameter portion, the ring abutting said shoulder and having said radially projecting spurs bitingly embedded in said inner surface as a result of coaxial emplacement of the ring about said free length serving as a placement and concentricity guide and axially forcing of the rifling ring toward said shoulder as by thrust of said upper end portion of the body shell assembled about said free length below the lower end of the ring.

4. In a method of making a projectile structure, forming a head shell with a generally cylindrical reduced and substantially continuous diameter lower end portion of substantial length with a shoulder at the upper end of said reduced diameter portion and adapted to receive about such portion a complementary upper end portion of a body shell in assembly, providing said end portion with a plurality of circumferentially spaced radially projecting spurs having sharp outer edges elongated in an axial direction and with the spurs attached at their bases to said end portion in a limited area thereof adjacent to said shoulder and with the lower ends of the spurs spaced substantially from the lower end of said reduced diameter lower end portion to leave a substantial free length of the reduced diameter portion between the lower ends of the spurs and the lower end of said portion, forming a rifling ring substantially narrower than said free length but at least as wide as the length of said spurs and with an inner annular surface of a diameter to fit closely over said reduced diameter portion, placing the rifling ring about said free length of the reduced diameter portion and with an end contiguous the lower end of the spurs, and applying concentrically about said free length adjacent to the remaining end of the ring an axial thrust member and axially forcing the rifling ring from said free length onto and over the sharp edge spurs and thereby bitingly embedding the spurs in said inner surface and until the rifling ring abuts said shoulder and thus anchoring the rifling ring against rotation relative to the shell when passing through a gun barrel.

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