Feb. 8, 1955 H. E. VAN DINE 2,701,524

FIXED AMMUNITION

Filed Feb. 19, 1951

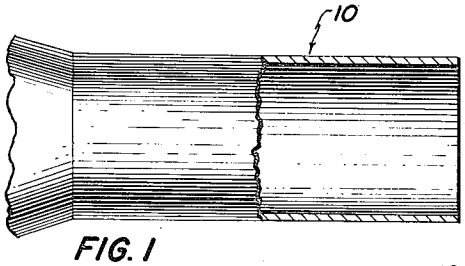


FIG. 1

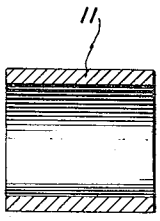


FIG. 2

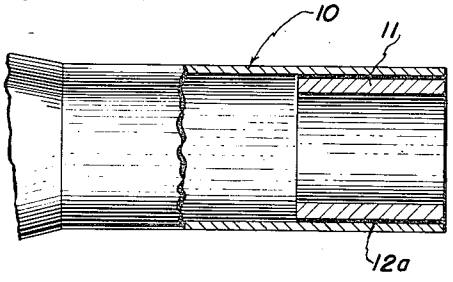


FIG. 3

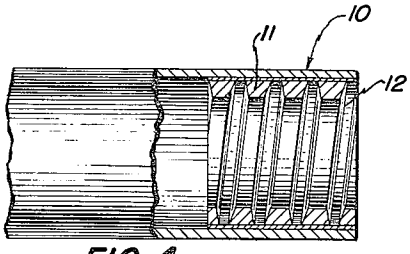


FIG. 4

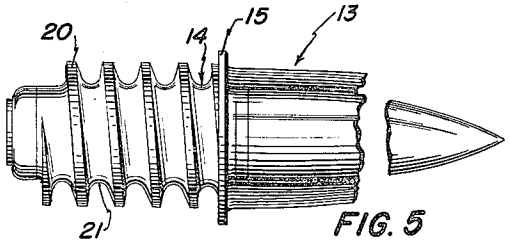


FIG. 5

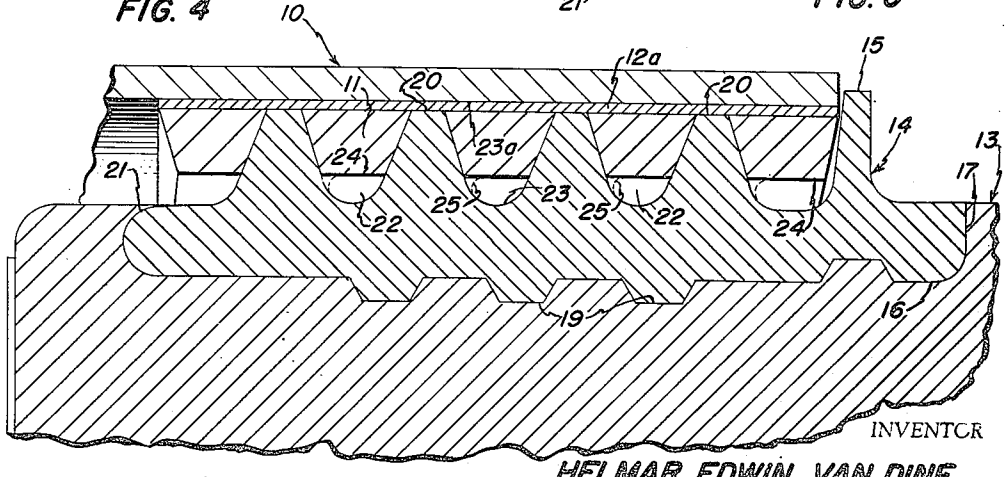


FIG. 6

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United States Patent Office 2,701,524
Patented Feb. 8, 1955

2,701,524

FIXED AMMUNITION

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Application February 19, 1951, Serial No. 211,760

2 Claims. (Cl. 102—38)

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

This invention relates to ammunition for smooth or rifled bore guns and more particularly to novel means for attaching a projectile to a cartridge case in what is referred to in the art as "fixed" ammunition.

Ammunition of this type comprises a cartridge case of generally tubular shape having a closed rear end and an open forward end adapted to receive therein the base of a projectile. Heretofore, the cases have almost universally been made of brass and the projectile has been secured in the open end of the case by radially crimping or indenting the material at the open end so that it tightly encompasses the base of the projectile. When the ammunition is fired the crimped end of the cartridge case is radially expanded so that it must be recrimped for use with a new projectile. This repeated deformation of the case quickly fatigues it causing early failure thereof so that it can be reused safely with only two or three projectiles.

Since the powder contained in fixed ammunition stored in the field must undergo periodic surveillance tests for deterioration, it heretofore has been necessary to extract forcefully the projectile from sample ammunition selected at random in order to inspect the powder. This is dangerous and of course destroys the usefulness of the rounds of ammunition so inspected.

The present invention contemplates overcoming these disadvantages by providing in the open end of a cartridge case a threaded insert or bushing or the like which is removably engaged by mating threads or other cooperating means about the base of a projectile. The insert is formed and united with the case so as to enable the firing of the projectile without deforming the cartridge case, thereby rendering it indefinitely reusable by the simple process of replacing the insert and securing additional projectiles thereto. Furthermore, by the use of the present invention cartridge cases can be constructed of any cheap, strong, relatively nonconductile material such as steel, plastic, or the like.

Hence one object of the present invention is to provide novel means for assembling projectiles to cartridge cases.

Another object of the present invention is to provide fixed ammunition wherein the cartridge case thereof will not be deformed when a projectile is fired, and may be reused, if desired.

Another object of the present invention is to provide fixed ammunition for bore guns which may easily be disassembled and reassembled with minimum danger to personnel and without damage to the ammunition.

Another object of the present invention is to combine in such ammunition means for lubricating the bore of a gun.

Another object of the present invention is to provide an attachment joint for cartridge cases and projectiles which joint is of great strength and which can be constructed of cheaper stronger materials than heretofore has been possible.

Still another object of the invention is to provide an attachment of the above type which is simple to manufacture, inexpensive, and permits the rapid assembly of ammunition without the use of complicated tools or equipment.

Other objects and their attendant advantages will become apparent when the following detailed description is read in conjunction with the accompanying drawings wherein:

Fig. 1 is a partial longitudinal cross-sectional view of the forward end of a cartridge case for use with the present invention;

Fig. 2 is a longitudinal cross-sectional view of one form of bushing or insert that may be employed with the case of Fig. 1;

Fig. 3 is a partial longitudinal cross-sectional view showing the bushing of Fig. 2 positioned in the end of the cartridge case of Fig. 1;

Fig. 4 is a view similar to Fig. 3 showing the insert or bushing of Fig. 2 provided with threads;

Fig. 5 is a fragmentary side elevation of a projectile for use with the cartridge case of Fig. 3; and

Fig. 6 is an enlarged longitudinal cross-sectional view of a portion of a projectile and cartridge in assembled condition.

Referring now to the drawings and more particularly to Figs. 1 and 2, the numeral **10** designates a cartridge case whose forward portion is of substantially uniform diameter for receiving an insert or bushing **11** which may be bonded to the interior surface of the case **10** at **12***a* (Fig. 3) by any suitable means. For example, the internal surface of the cartridge case may be tinned and over this a layer of solder may be applied so that the insert may be sweated in place. If desired, of course, molten metal may be applied or built up to a sufficient depth directly on the inner surface of the cartridge case. When the insert has been assembled, it may be provided with the internal threads **12** shown in Fig. 4, which may be machined in a conventional manner to a depth equal to the thickness of the cylindrical bonding zone peripherally of the bushing and adjacent the bushing wall so that the interior surface of case **10** forms the bottom of the thread groove as illustrated.

As shown in Figs. 5 and 6 a projectile **13** is provided with a sleeve **14** swaged within a groove **16** (Fig. 6) described about the base of the projectile. The forward lip **15** of sleeve **14** serves as a rifling-engaging portion similar to the conventional rotating band with which most projectiles are provided, and may be of any suitable form. As many lips as may be necessary or desirable for directing the rotational movement of the projectile as it is propelled through the rifled bore of a gun barrel may be provided. To prevent slippage between the sleeve **14** and the projectile **13** a series of spaced interrupted annular lands **19** may be provided in the bottom of the groove **16**. The rear portion **21** of sleeve **14** is provided with external threads **20** which are engageable with the threads **12** of the insert **11** enabling the projectile quickly and easily to be assembled to or detached from the cartridge case as the occasion arises. The bond **12***a* between the insert or bushing **11** and the cartridge case **10** is of sufficient strength to prevent accidental dislodgment of the projectile during normal handling, but is frangible under the influence of hot exploding powder gases in combination with the large shearing force exerted by the fired projectile so that the insert **11** moves axially with the projectile clear of the cartridge case with slight stress on the forward portion thereof and with little resistance to the movement of the projectile. A space or clearance **22** (Fig. 6) between the internal surface **24** of the insert **11** and the bottom **23** of the projectile threads **20** is provided to accommodate insert metal or material deformed or upset by the initial movement of the fired projectile. Space **22** enables the insert metal to bend inwardly substantially along the dotted lines **25** to prevent its jamming between the projectile threads **20** and the internal surface **23***a* of the cartridge case.

Since the cartridge case need not be crimped to retain the projectile in place it requires little if any ductility and therefore may be constructed of relatively cheap materials, such as steel or plastic. Since cases made of these cheaper materials may be reused indefinitely by merely replacing the threaded insert, the present invention tends to reduce a major expense in the manufacture of ammunition.

An additional feature of the invention resides in the lubricating properties of the metallic insert. It has been known that certain soft metals such as lead are vaporized by the instantaneous heat generated by exploding powder gases and that this vaporized metal serves for decopper-

ing and as a lubricant between the bore of the gun barrel and the projectile. Hence, it heretofore has been the practice to add a certain amount of vaporizable metal to the powder charge in the cartridge case for decoppering and to serve as such a lubricant. By forming the insert **11** of a similar vaporizable material, the necessity of adding it to the powder in the cartridge is obviated since it is apparent that the hot powder gases may readily circulate around the insert as the projectile travels through the barrel and the resulting metallic vapor will be forced through the grooves of the rifling and forward of the projectile to provide the desired lubrication. However, it must be understood that the present invention does not limit itself to the use of metallic substance for the construction of the insert **11** since any suitable material may be employed such as a suitable plastic or the like.

Modifications of the present invention will be apparent to those skilled in the art, and such modifications which are within the spirit and scope thereof as defined by the appended claims are within the contemplation of the present patent.

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.

What is claimed is:

1. An attachment joint for a cartridge case and a projectile, said cartridge case having a cylindrical projectile receiving end of substantially uniform internal diameter, a bushing having a peripheral portion integrally bonded in said projectile receiving end, said bushing being provided with internal screw threads of a depth substantially equal to the thickness of said bushing and threads on said projectile for detachable engagement with said bushing, the integrally bonded peripheral portion of said bushing being of a material weaker than the materials of said projectile threads and the projectile receiving end of said cartridge case so as to constitute a cylindrical zone of failure, and thus being shearable by the forward movement of the projectile when fired, whereby said projectile and said bushing threads spirally interengaged thereon are discharged from the cartridge case without distortion thereof.

2. A round of ammunition comprising a cartridge case, a projectile, a bushing formed of vaporizable material having a peripheral portion integrally bonded in the projectile receiving end of said case, said bushing being provided with internal screw threads of a depth substantially equal to the thickness of said bushing, and threads provided on the case entering portion of said projectile for cooperation with said bushing threads to removably secure said projectile to said case, the peripheral portion of said bushing being of a material weaker than the materials of said projectile threads and the projectile receiving end of said cartridge case so as to constitute a cylindrical zone of failure, the firing of the round shearing and vaporizing said peripheral portion to propel said round and bushing and to lubricate the barrel of a gun used for the firing.

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