METALLIC MOUTH FOR A PLASTIC CARTRIDGE CASE

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References Cited
UNITED STATES PATENTS
2,083,665 6/1937 Pohl et al. .................... 102/43 P
2,889,749 6/1959 Janson ......................... 102/43 P
3,745,924 7/1973 Scanlon .......................... 102/43 P

FOREIGN PATENTS OR APPLICATIONS
1,115,158 10/1961 Germany ...................... 102/43 P

ABSTRACT

A cartridge case having a plastic body has a metallic tubular mouth member affixed thereto. A generally cylindrical projectile-receiving portion may be crimped to securely hold a projectile and a rear portion of the mouth member is tapered to match the inner contour of the plastic case. Interaction of a circumferential rib with a forward gum chamber wall and the interaction of matching shoulders on the mouth member and the plastic body prevent separation of the mouth member from the cartridge case during firing, extraction and ejection. The mouth member provides enhanced reloadability for the cartridge case and produces a center of gravity matching that of metallic cartridge cases for optimum ejection characteristics.

10 Claims, 4 Drawing Figures
METALLIC MOUTH FOR A PLASTIC CARTRIDGE CASE

This invention relates to ammunition and, more particularly, to a metallic mouth member for a plastic cartridge case.

Traditionally, cartridge cases for ammunition have been made from suitable metals, such as brass. However, in recent years, these metals have increased in cost to such a great extent that it has become desirable, if not necessary, to seek less expensive substitute materials. This has been particularly true in large caliber ammunition wherein the volume of material utilized for the cartridge case is much higher.

Recently, advances have been made resulting in the manufacture of successful and highly functional plastic cartridge cases having steel multi-component heads. Examples of this type of cartridge case are shown in U.S. Pat. application Ser. No. 23,861, filed by John J. Scanlon on Mar. 30, 1970, now U.S. Pat. No. 3,745,924, and U.S. Pat. application Ser. No. 320,328, filed by H. Jackson Hale on Jan. 2, 1973, both assigned to the assignee of this invention. While such cartridge cases represent a great advance over the prior art, their reloadability and their ability to hold large caliber projectiles are limited by the ability of the plastic mouth portion to hold a projectile and may be severely diminished by a split in the plastic mouth or expansion resulting from relaxation of the plastic.

Previous attempts have been made to attach a metallic mouth member to a non-metallic cartridge case. Such an attempt is represented by U.S. Pat. No. 2,083,665, issued to Paul E. Pihletal on June 15, 1937, wherein the metallic mouth member has a rearwardly extending annular flange which is molded into the synthetic resin material of the cartridge case. Such attempts, however, have been unsuccessful inasmuch as it has not been possible to prevent the separation of the mouth member from the plastic cartridge case. Separation may occur during firing as a result of the high forwardly directed forces exerted by the projectile during its separation from the mouth member or during extraction of the forces exerted in removing the round from the chamber.

In accordance with this invention, a metallic mouth member is provided for attachment to a plastic cartridge case body. The mouth member has a thickened external rib which interacts with a forward wall of the chamber to prevent any motion of the mouth member into the bore upon firing. A tapered rear portion of the mouth member has an outer contour matching the inner contour of the plastic body and a forward end portion of the plastic cartridge case body surrounds a frusto-conical attachment portion of the mouth member to provide positive interaction between the body and the mouth member and prevent separation during extraction. The mouth member, by adding metal to the forward end of the cartridge case, makes center of gravity control a simple matter, thus ensuring proper ejection characteristics for the case, and may, if desired, be thermally or chemically bonded to the plastic body.

It is an object of this invention to provide a metallic mouth member for a plastic cartridge case which enables heavy, large caliber projectiles to be securely held to the cartridge case. It is an additional object of this invention to provide a metallic mouth member for a plastic cartridge case which will not be separated from the cartridge case during firing of the cartridge.

It is a further object of this invention to provide a metallic mouth member for a plastic cartridge case which is positively withdrawn by the cartridge case during extraction, thus remaining firmly secured thereto.

These and other objects and advantages of this invention will be more apparent when the following specification is read in conjunction with the drawings, wherein:

FIG. 1 is a partially sectioned side elevation of a round of ammunition having a cartridge case made in accordance with this invention;

FIG. 2 is a perspective view of a metallic mouth member for use in the cartridge case of FIG. 1;

FIG. 3 is a fragmentary sectional view of the cartridge of FIG. 1 chambered in a gun; and

FIG. 4 is a fragmentary sectional view, similar to FIG. 3, of a chambered cartridge case.

Referring now to the drawings, a cartridge 10 is made with a multi-component cartridge case 11, which, for the purposes of this description, may be of a size for use in a 20 mm. gun. The cartridge case 11 has a non-metallic body portion 12, preferably molded from a suitable plastic, and may have a metal head 14. The head 14 may be substantially unitary in construction or may, as shown, be of a multi-component construction such as is disclosed in the above-identified U.S. Pat. application Ser. No. 320,328. A primer 15 is secured in the breech end of the cartridge case 11 for igniting a charge of a suitable propellant 16 when the primer 15 is struck by a firing pin (not shown).

A metallic mouth member 20 is secured to a forward end portion of the body 12 and receives a projectile 21 in a generally cylindrical projectile-receiving portion 22 of the mouth member 20. The projectile 21 may be secured to the mouth member 20 by forming a crimp 24 in the projectile-receiving portion 22 in a conventional manner.

An outer surface of the mouth member 20, rearwardly of the projectile-receiving portion 22, tapers outwardly matching the outer contour of a shoulder portion 25 of the cartridge case 11 while the inner surface of the mouth member 20 preferably continues its generally cylindrical shape so that a circumferential rib 26, having a greater thickness of metal than the remainder of the mouth member 20, is formed at the forward end of the shoulder portion 25. The rib 26 is preferably in abutment with an inwardly tapered forward end portion 12a of the plastic body 12 which forms the remainder of the shoulder portion 25 of the cartridge case. A generally frusto-conical interlocking portion 27 of the mouth member 20, immediately rearward of the rib 26, is contiguous with the forward end portion 12a of the body 12. A rear portion 29 of the mouth member 20 extends rearwardly from the interlocking portion 27 and is outwardly tapered to match the inner contour of the body 12.

The mouth member 20 is preferably machined or drawn from a single piece of steel, or other suitable material, and may be secured to the body 12 by any suitable method consistent with the mode of manufacture of the cartridge case, such as by insert molding or by positioning the mouth member 20 within the forward end of the body 12 before necking down the forward end portion 12a. For certain applications with large caliber ammunition wherein the cartridge is to be sub-
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projected to high torques during loading, the contiguous surfaces of the mouth member 20 and body 12 may be further secured to each other by induction welding in a manner well known to those skilled in the art. However, it should be noted that such additional securement is not necessary to maintain the structural integrity of the cartridge case 11 during firing and extraction.

When the cartridge 10 is to be fired, it is placed in the chamber 30 (see FIG. 3) of a suitable caliber gun with the shoulder portion 25 of the cartridge case 11 abutting a tapered forward wall 31 of the chamber 30 and with the projectile-receiving portion 22 of the mouth member 20 and the attached projectile 21 extending into the bore 32 of a barrel 33.

When the cartridge 10 is fired, combustion of the propellant 16 produces copious quantities of expanding gases which increase the pressure in the cartridge case 11 to a level, generally on the order of about 50,000 psi, sufficient to open the crimp 24 and cause the separation of the projectile 21 from the mouth member 20.

The projectile 21, in being forced to separate from the cartridge case 11, applies a significant, forwardly directed force to the mouth member 20 which might be sufficient to pull it into the bore 32 and thus separate the mouth member 20 from the body 12. This is prevented, however, by the construction of the mouth member 20 and its interaction with the chamber 30. When the mouth member 20 is urged forwardly by the projectile 21, the circumferentially thickened rib 26 is pulled in the direction shown by an arrow 34 in FIG. 4. It can be clearly seen that the rib 26 is immediately engaged by the tapered forward wall 31 of the chamber 30 thus preventing any forward motion which could otherwise separate the mouth member 20 from the body 12.

Although this interfering relationship between the rib 26 and the forward chamber wall 31 is sufficient to hold the mouth member 20 in place, continued application of force by the projectile 21 could cause the rib 26 to be compressed, thus allowing it, and the entire mouth member 20, to be extruded into the bore 32, separating it from the body 12. However, the propellant gas pressure applying this force is simultaneously applying an outwardly directed force against the central interlocking portion 27 and the rear portion 29 of the mouth member 20. This force is greater than the force applied to the projectile 21 because of the greater surface area of the mouth member 20 to which the pressure of the propellant gases is applied. In addition to forcing the mouth member into tighter engagement with the body 12, this outwardly directed force holds the circumferential rib against the forward wall 31 of the chamber 30 preventing any reduction in diameter which could defeat its function.

Extraction of the empty cartridge case is accomplished by the application of a rearward force on an extractor rim of the cartridge case 11 by an extractor claw (not shown). This rearward force pulls the cartridge case 11 from the chamber 30 and it is important that the mouth member 20 be withdrawn from the cartridge case 11 without separation from the body 12.

The folding of the forward end portion 12b of the body 12 around the central interlocking portion 27 of the mouth member 20 provides a positive interaction of components to ensure that proper securement of the mouth member 20 to the body 12 is maintained throughout extraction and ejection. When the body 12 is withdrawn from the chamber 30, the forward end portion 12a applies a rearwardly directed force against the central attachment portion 27 of the mouth member 20, as shown by an arrow 35 in FIG. 4. The interaction of the mouth member 20 and body 12 is strengthened during firing, as has been shown, so that mouth pull-out, often experienced with prior art plastic-steel cartridges, will not occur. The body 12 positively grasps the mouth member 20 for removal.

By controlling the relative weights of the metal head 14 and mouth member 20, the position of the center of gravity of the cartridge case 11 can be accurately and easily controlled. It will be readily understood that a plastic-steel cartridge case having the same center of gravity as a comparable brass cartridge case will exhibit ejection characteristics substantially identical to the brass cartridge case, even though the plastic-steel case is substantially lighter in weight.

Thus, a metallic mouth member is provided for a plastic-steel cartridge case which provides enhanced reloadability for the cartridge case, prevents mouth pull-out during firing, extraction and ejection, and produces a center of gravity enabling the cartridge case to duplicate the ejection characteristics of brass cartridge cases. As described herein, a multi-component cartridge case is intended to include any cartridge case having two or more components, including a body (which may have an integral head) and a mouth member. While a plastic body and metal mouth member are utilized in the preferred embodiment, other combinations of similar or dissimilar materials may be utilized without departing from the spirit and scope of this invention.

We claim:

1. In a cartridge case having a plastic body with an inwardly tapered forward end portion, the improvement comprising a tubular mouth member having a generally cylindrical projectile-receiving portion and a generally frusto-conical interlocking portion, the mouth member being secured within the plastic body with the inwardly tapered forward end portion of the plastic body engaging the interlocking portion of the mouth member and with the projectile-receiving portion extending forwardly of the plastic body.

2. The cartridge case of claim 1 wherein said plastic body has an inner surface and said metal mouth member includes a rear portion extending from said interlocking portion for tightly engaging the inner surface of said plastic body.

3. The cartridge case of claim 1 wherein said mouth member includes a circumferential rib positioned at a forward end of said interlocking portion.

4. The steel case of claim 1 wherein said mouth member is steel.

5. The cartridge case of claim 1 wherein the inwardly tapered forward end portion of said plastic body is bonded to the interlocking portion of said mouth member.

6. A mouth member for a multi-component cartridge case, said mouth member comprising a tubular projectile-receiving portion, a tubular rear portion, a generally frusto-conical interlocking portion joining the projectile-receiving portion and the rear portion, and a circumferential rib positioned at one end of the interlock-
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7. In a cartridge for firing in a gun chamber having a tapered forward wall, said cartridge including a cartridge case having a body with a tapered forward end portion, the improvement comprising a unitary tubular mouth member having a generally cylindrical projectile-receiving portion, a generally frusto-conical interlocking portion positioned within the forward end portion of the body, and a circumferential rib positioned between the projectile-receiving portion and the interlocking portion for engaging a forward wall of a gun chamber during firing of the cartridge.

8. A cartridge case comprising a body having an inwardly tapered forward end portion and a mouth member having a tubular projectile-receiving portion, a generally frusto-conical interlocking portion for positioning within the tapered forward end portion of the body, and a circumferential rib joining the projectile-receiving portion and the interlocking portion.

9. The cartridge case of claim 8 wherein the forward end portion of said body has an outer surface and said circumferential rib has an outer surface adjoining the outer surface of said forward end portion.

10. The cartridge case of claim 8 wherein said mouth member has a tubular rear portion extending from said attachment portion a predetermined distance along said body.

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