

March 27, 1962

F. R. BARNET ET AL

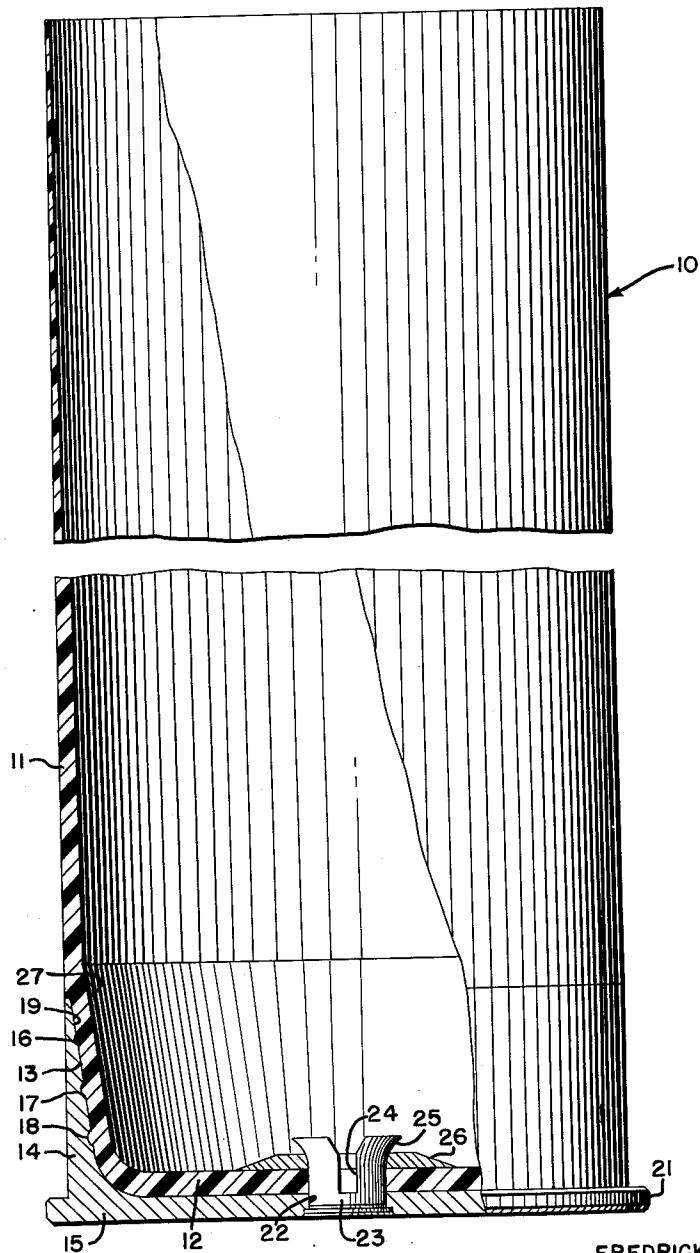
3,026,802

PLASTICS LIGHTWEIGHT CARTRIDGE CASE

Filed Dec. 16, 1958

2 Sheets-Sheet 1

FIG.1.



INVENTORS.

FREDRICK R. BARNET
WALTER T. JOHNSON
STANLEY P. PROSEN

BY

W. H. O'Brien
Hodges ATTORNEYS.

March 27, 1962

F. R. BARNET ET AL

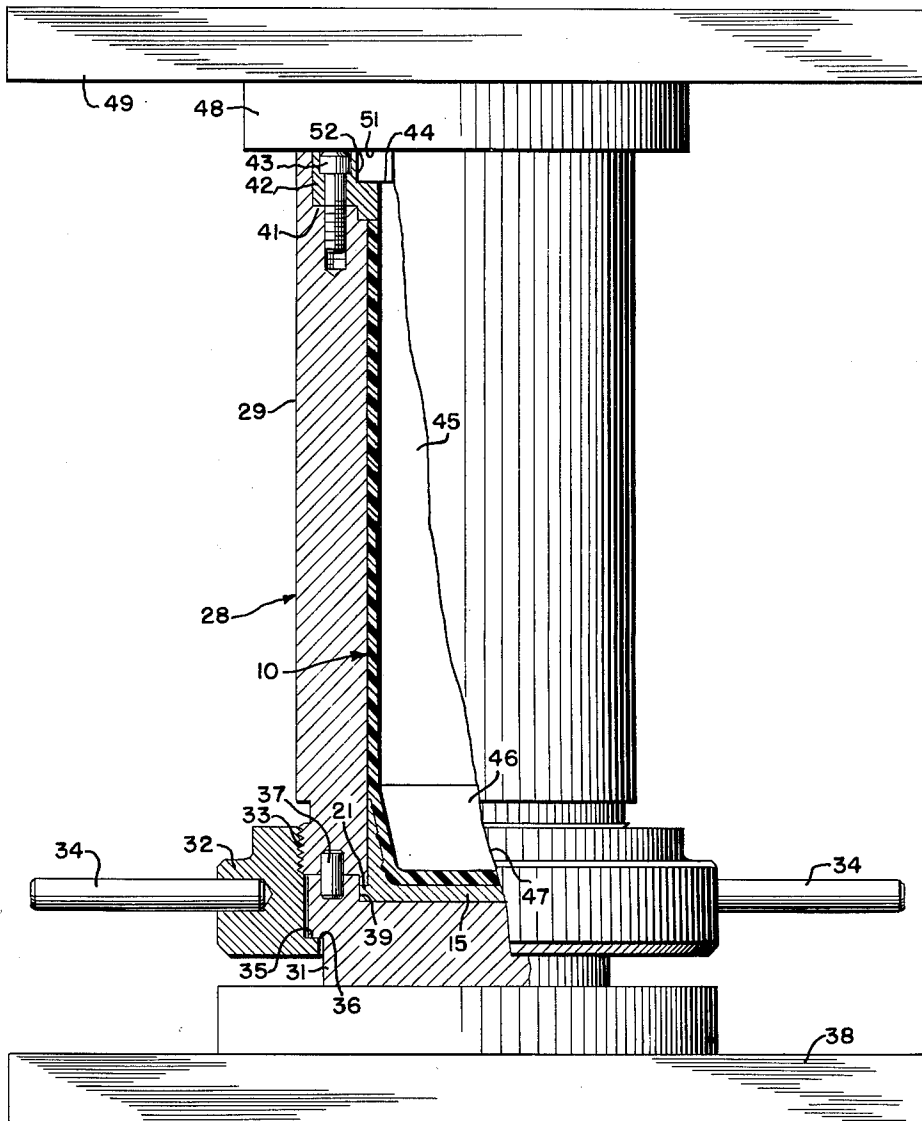
3,026,802

PLASTICS LIGHTWEIGHT CARTRIDGE CASE

Filed Dec. 16, 1958

2 Sheets-Sheet 2

FIG.2.



INVENTORS
FREDRICK R. BARNET
WALTER T. JOHNSON
STANLEY P. PROSEN

BY

G. D. O'Brien
J. D. Hodges
ATTORNEYS

1

3,026,802

PLASTICS LIGHTWEIGHT CARTRIDGE CASE
Fredrick R. Barnett and Walter T. Johnson, Kensington,
and Stanley P. Prosen, Lanham, Md., assignors to the
United States of America as represented by the Secretary
of the Navy

Filed Dec. 16, 1958, Ser. No. 780,911

1 Claim. (Cl. 102-43)

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

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.

This invention relates to a cartridge case for a gun and more particularly to a lightweight cartridge case employing thermoplastic materials in its construction and the method of making same.

Cartridge cases heretofore have been fabricated from metals such as steel, brass or the like which have been subjected to a series of successive drawings and heat treating operations to produce a cartridge case unit having the necessary shape, size and strength requirements. A second method heretofore employed in the fabrication of cartridge cases is to spirally wrap metal sheets to form the case. Regardless of whichever of these methods is employed, the resulting product is a cartridge case which is relatively heavy, requires great quantities of critical material and in addition requires complex industrial facilities and highly skilled manpower.

The cartridge case of the present invention possesses all of the advantages of the cartridge cases heretofore devised and none of the foregoing disadvantages. This result is achieved by employing a cartridge case composed of two interfitting sections, one of which sections comprises a plastic sidewall and the other section a metal base within which an end portion of the plastic sidewall is closely fitted and retained. The manner in which this is achieved will become more clearly apparent as the description proceeds.

One of the objects of the present invention is the provision of a new and improved cartridge case for use with a gun or howitzer which is relatively light in weight and requires a minimum of critical material in its construction.

Another of the objects is the provision of a cartridge case composed of a plastic material suitable for the purpose and having the base portion thereof reinforced by a metallic base member.

Still another object resides in the new and improved method of fabricating a cartridge base by a molding operation of a plastic within a die.

Still other objects, advantages and improvements will become apparent from the following description taken in connection with the accompanying drawings of which:

FIG. 1 is a view in elevation partially in section and partially broken away of a plastic cartridge case in accordance with a preferred form of the invention; and

FIG. 2 is an elevational view partially broken away and partially in section of a die suitable for fabricating the plastics cartridge case shown therein.

Referring now to the drawings for a more complete understanding of the invention and more particularly to FIG. 1 thereof, there is shown thereon a cartridge case indicated generally by the numeral 10 comprising a sidewall 11 and a base portion 12 formed integrally therewith. The outer configuration of the sidewall 11 is cylindrical for closing fitting engagement with the bore of a gun or howitzer and the lower portion, as viewed on the drawing, is tapered as at 13 for close fitting engagement with the upstanding portion 14 of a base member 15. A plurality of annular grooves such as the grooves 16, 17 and 18 illustrated are formed interiorly within a tapered sur-

2

face 19 of the upstanding portion 14 of the base member to prevent separation of the plastics shell from the base member 15 during firing of the explosive charge therein and during extraction of the cartridge case from the gun.

The base member 15 is provided with an outwardly projecting flange 21 as is well known in the art of cartridge case making. The base member 15 is provided with an aperture 22 adapted to receive a primer base member 23 having slotted portions 24 therein adapted to be flared outwardly as in 25 and engage washer 26 to maintain a firm clamping connection between the base of the plastic cartridge case and the metallic base member 15, as will more clearly appear hereinafter.

The interior of the cartridge case is tapered slightly throughout a major portion of the axial length thereof and at a point slightly above the upper end of the upstanding portion of the base member 15. This taper is increased as at 27. Also, if desired, the internal taper of the cartridge case may terminate at the point slightly below the upper end of the casing to facilitate sealing the explosive charge therein.

Referring now to FIG. 2 of the drawing for a better understanding of a method of fabrication suitable for producing the cartridge case of FIG. 1 there is shown thereon a molding die 28 comprising a rigid cylindrical member 29 secured to a base member 31 by the clamping ring 32 threaded at 33 for movement by the handle 34 thereabouts. The lower end of the clamping ring is provided with an inwardly extending shoulder 35 in engagement with a complementary shoulder 36 formed on the base member 31, a plurality of dowel pins 37 preferably being provided as shown to prevent rotative movement of the member 29 with respect to the base member 31. The base member 31 may be secured to a foot plate 38 in any suitable manner thereby to support the die immovably when pressure is applied to the upper portion thereof during a molding operation. The inner cylindrical surface of member 29 is of sufficiently less diameter than the cylindrical surface 39 formed on the base 31 thereby to receive the flange 21 of the base member 15 of the cartridge shell when the base member is placed in abutting relation with the base 31 as shown and securely held thereto by the clamping ring 32 as the clamping ring is tightened against shoulder 36 of the base 31.

The upper portion of the cylindrical member 29 is formed as at 41 to receive an annular member 42 securely held therein as by the bolts 43. The annular member 42 is provided with a circular aperture or bearing surface 44 therein for close fitting engagement with a plunger 45 when the plunger has been forced downward to the position shown on the drawing. The plunger 45, it will be noted, is provided with a slight taper throughout substantially the length thereof to facilitate withdrawal of the plunger after the cartridge case has been molded, this tapered portion of the plunger flowing into a second tapered surface 46 substantially as shown and abutting a flat surface 47 at the bottom portion of the plunger. The plunger is secured to a support 48 abutting pressure plate 49 and provided with an outwardly extending annular member 51 for engagement with an annular recess 52 formed within the upper portion of the member 42 as shown.

The method of making the plastic cartridge case by employing the molding die 28 will now be described. The base member 15 is assembled within the die as shown on FIG. 2 and securely clamped therein by the clamping ring 32 which is tightened by handle 34 to a suitable degree of tightness. A quantity of plastic material suitable for the purpose is placed within the die and the plunger 45 is inserted therein. Sufficient pressure is applied to the plunger to force it into the position shown on the drawing

3

thereby compressing the plastic material sufficiently to form a hard durable cartridge case. The plunger is withdrawn from the die and the die disassembled and the cartridge case including the base member 15 is removed therefrom. A hole is now made in the base 15 and the base portion 12 of the cartridge case of sufficient size to receive the primer base member 23. The washer 26 is now placed over the primer base member and the slotted portions projecting therefrom are bent over by pressure applied to a steel ball in engagement therewith or by a rounded tool sufficiently to establish and maintain a tight firm connection between the washer 26 and the base member 15.

Whereas the invention has been described with particularity with reference to a die employing compression techniques, it will be understood that, if desired, the cartridge case of the present invention may be fabricated by an injection molding process and furthermore, if desired, this molding process may be achieved after the primer member has been inserted within the base member 15 at the primer hole thereof.

While any of the various plastics suitable for the purpose may be employed, a plastic material which performs best at all firing conditions and in test for environmental resistance was found to be a material known in the trade as Cylolac developed by the Marbon Chemical Div. of the Borg-Warner Corp., Gary, Indiana, which material was well adapted to give the low temperature properties and high impact strength needed in cartridge cases. This material also is suitable for use with conventional injection molding equipment and may be employed if the cartridge case of the present invention is to be injection molded. Another molding material which has been found suitable for the purpose is high-density polyethylene.

While the invention has been described with reference to a specific example which gives satisfactory results, it is not so limited as various changes and modifications will become apparent to those skilled in the art, after under-

4

standing the invention and it is intended in the appended claim to cover all such changes and modifications.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

- 5 A cartridge case having a uniformly cylindrical outer surface throughout its length and a slightly tapered interior surface coaxial with said outer surface, said cartridge case being composed of thermoplastics material and having a cup-shaped base portion integrally formed therewith and contiguous with the smaller end portion of said tapered interior surface, a plurality of discrete, annular raised projections on the exterior surface of said cup-shaped base portion, a metallic cup-shaped base member having a like plurality of discrete annular recessed portions on the interior surface thereof in locking engagement with said raised projections, a substantially cylindrical primer device having a flared bifurcated portion, said primer device being embedded within said base member and the bifurcated portion extending through said base portion, said primer device located along the longitudinal axis of said outer surface, a washer disposed about said bifurcated portion adjacent said base portion and engaging said flared portion in a manner to clamp said metallic base member and said base portion of said
- 10
- 15
- 20
- 25 cartridge case tightly together.

References Cited in the file of this patent

UNITED STATES PATENTS

2,193,573	Tackler	Mar. 12, 1940
2,196,018	Korpium	Apr. 2, 1940
2,357,950	Goessling	Sept. 12, 1944
2,654,319	Roske	Oct. 6, 1953
2,855,632	Groce et al.	Oct. 14, 1958

FOREIGN PATENTS

562,225	France	Oct. 29, 1923
797,262	France	Feb. 8, 1936
1,010,871	Germany	June 19, 1957