ABSTRACT

Two or more fully combustible components assembled to form a cartridge case by a fully combustible thread stitching adjoining portions of the components.

5 Claims, 2 Drawing Figures
COMBUSTIBLE CARTRIDGE CASE

The invention described herein may be manufactured, used and licensed by or for the Government for Governmental purposes without the payment to me of any royalties thereon.

BACKGROUND OF INVENTION

This invention relates generally to munitions technology and more specifically relates to the technology of combustible cartridge cases.

Various designs have heretofore been proposed for cartridge cases intended to burn up upon firing of the associated munitions round in a gun chamber environment. The object in providing a case having such consumable properties is that of eliminating the requirement for extraction of the spent cartridge case after firing of the said round.

Because of manufacturing considerations, the aforesaid combustible cartridge cases typically comprise two or more distinct components which are separately formed and subsequently assembled to provide the finished case. In a representative procedure the said components may, for example, be fabricated by preparing a slurry of stabilized nitrocellulose fibers with minor quantities of cellulose fibers, felting the fibers onto formers having the desired shape of the components, drying the components, impregnating the dried components with a resin, and heat-curing the resin.

In a typical instance the assembly process for the case thereafter commonly includes a step of adhering the case components to one another via use of an epoxy resin. Unfortunately such procedures have led to problems in subsequent use of the case; for while the epoxy bond does indeed effect a substantially strong joint, it has nevertheless been found that the said resins are one of the major contributors to residue and debris in the gun chamber after each firing of the gun. In an effort to alleviate this problem attempts have been made to utilize industrial-type cements having nitrocellulose bases. While it is found that these latter materials do not leave any residue after ballistic firing of the weapon, the bond strength present between components thereby adhered is less than satisfactory. In addition the long term storage of nitrocellulose-based cemented bonds is poor; temperature changes causing contractions and expansions of the case material appear to contribute to breakdown of bonds of this type in a rather rapid fashion.

In accordance with the foregoing, it may be regarded as an object of the present invention, to provide a combustible cartridge case, which when fired in a weapon chamber leaves exceedingly low residue.

It is a further object of the invention, to provide a combustible cartridge case which is formed of component parts, such parts being, however, so joined as to allow combustion of the assembled case without leaving substantial residues.

It is an additional object of the invention, to provide a combustible cartridge case wherein the joint between component parts thereof is of such nature as to burn without leaving any substantial residue, and which is yet strong and possessed of storage life comparable to the adjoined materials themselves.

SUMMARY OF INVENTION

Now in accordance with the present invention, the foregoing objects, and others as will become apparent in the course of the ensuing specification, are achieved in a construction wherein the separate components of the combustible cartridge case—typically a tubular body member and a base member—are assembled to one another by a sewing machine technique. The type of stitch is preferably of the lock stitch variety in order to prevent unraveling of the thread; and the thread is preferably of the viscose rayon type as such material both burns up completely and is compatible with propellant compositions commonly used in the assembled casings.

BRIEF DESCRIPTION OF DRAWINGS

The invention is diagrammatically illustrated, by way of example, in the drawings appended hereto, in which:

FIG. 1 is a longitudinal cross-sectional view of a cartridge case in accordance with the present invention; included is a partial view of the case exterior; and

FIG. 2 is an end view of the said case.

DESCRIPTION OF PREFERRED EMBODIMENT

In FIGS. 1 and 2, longitudinal cross-sectional and end views, respectively, appear of a cartridge case 1 in accordance with the invention. The case 1 comprises two components—a generally tubular body 3, and a base member 5. The said components are separately formed and thereafter assembled to yield the case 1. Both components are formed of a fully combustible material, as for example of stabilized nitrocellulose fibers mixed with minor proportions of cellulose fibers. In a representative procedure such components may, for example, be thus formed in a sequence of steps, the first of which involves felting the fibers onto suitably shaped formers from an aqueous slurry. The formed component may then be dried between heated dies. Thereafter the components may be impregnated with a resin such as a polyvinyl-formal resin (e.g., Formvar), which resin is then heat cured. If desired, additional shaping between heated dies may then be utilized to refine the article shape and yield the finished component.

The generally tubular body 3 comprises a wall 4, which tapers inwardly toward the lower end of body 3 (in the sense of the Figure, to the left) where it adjoining base member 5. Toward the upper end of body 3, wall 4 is tapered in the opposite direction and is formed sharply inwardly to define a shoulder portion 7. The said shoulder assists in orienting the associated ammunition round in a gun chamber. The wall 4 beyond shoulder portion 7 then curves in an arculate fashion, and terminates at a circular opening 9. The latter serves to receive the projectile which in combination with case 1 and suitable propellant constitutes an ammunition round.

The base member 5 is seen to be a shallow, generally cup-shaped member, the wall 6 of which bends upwardly at the periphery to define a rim portion 11. The wall is indented at the center of the base to define a recessed portion 13 adapted to receive a primer charge used to ignite the propellant. A small hole (not shown) in wall 6 may connect recessed portion 13 with the in-
terior of case 1, to provide a passage enabling the ignited gases from the said primer charge to impinge on the main propellant. Also not explicitly shown is a small circular opening which may be optionally provided through wall 6 for purposes of filling the cartridge case. Such an opening, as is known in the art, can be closed by a plug or the like after the cartridge case is filled with propellant.

In accordance with the present invention the adjoining portions of body 3 and base 5 are secured to one another to yield a firm joint and thus the assembled case 1, by a series of stitches 15 extending through the rim portion 11 of base 5 and adjacent portions of wall 4. The stitches 15 extend continuously about the entire periphery of case 1, and are typically applied by a standard sewing machine technique. Although but a single row of stitching is shown in the Figure, two or more rows may be applied depending upon the specific requirements of the configuration being thus sewn. Stitches 15 may be of any convenient stitch-type known in the sewing art; however in the present environment a lock stitch is preferable in that the well-known characteristic of such stitch according to which a break in the thread can unravel the stitching only so far as an adjacent interlock, is particularly important in the present environment to assure the integrity of the joint.

The thread utilized to form stitches 15, in accordance with the invention, comprises a material which is fully combustible in the ballistic cycle. In order, further, to prevent chemical deterioration of the joint, such material should desirably be compatible with the double-based propellants commonly utilized in the present cartridge cases. Viscose rayon-type thread meets both of the aforesaid requirements, and may be regarded as a preferred material for use in forming stitches 15.

In a typical assembly sequence for case 1, a locking ring 17 is initially secured to body 3 adjacent opening 9. The said ring, which carries threads at 19 for engagement with a mating projectile base, is secured to body 3 by rivets driven through holes 21 therein. The body 3 is then adjoined to base 5 by the stitching technique set forth in the preceding paragraph, after which propellant is loaded into the case 1. Finally a thin coat of epoxy resin or the like is applied to threads 19 and the mating projectile base is secured thereto.

While the present invention has been particularly described in terms of a specific embodiment thereof, it will be evident in view of the present disclosure that numerous variations upon the teaching set forth are now enabled to those skilled in the art, which variations are yet, in propriety, within the true scope of the present invention. For example while the invention has been largely described in connection with a combustible cartridge case comprising two components, it should be evident that three or more combustible components can be adjoined to one another by similar stitched joints as are set forth herein.

Accordingly I wish it to be understood that I do not desire to be limited to the exact detail of construction shown and described for obvious modification will occur to a person skilled in the art.

I claim:
1. A combustible cartridge case comprising in combination: (A) a plurality of fully combustible components adjoined to define said case; and (B) viscose rayon thread stitching adjoining portions of said components to one another.
2. A product in accordance with claim 1, wherein said thread stitching said components is in a lock stitch configuration.
3. A product in accordance with claim 1, wherein said components comprise a generally tubular body, and a base member enclosing one end of said body.
4. A product in accordance with claim 3, wherein said base member includes a rim portion adapted to overlap the adjacent wall of said tubular body, said thread being secured through said rim portion and said adjacent wall.
5. A product in accordance with claim 5, wherein said components contain a major proportion of stabilized nitrocellulose fiber.

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