OXIDE LAYER 15-20 μTHICK
LACQUER LAYER 15-25 μTHICK
ALUMINUM ALLOY
The invention relates to aluminum alloy cartridge cases, and has the primary object of providing such cartridge cases which are safely protected against erosion by the hot combustion gases developing within the case proper, an oxide layer covering said case, and a lacquer layer at least partly covering the said oxide layer.

It is another object of the invention to provide a cartridge case made of an aluminum alloy which is safely protected from being partly fused at its mouth by the hot combustion gases issuing therefrom when firing the shot whereby the fouling of the gun barrel by such fused metal consisting of its inner surface is prevented.

It is yet another object of the invention to provide a method for the protection of aluminum alloy cartridges from erosion and part-fusion by the hot combustion gases when firing a shot.

It has been proposed to prevent the erosion and partial-fusion of the mouth of a cartridge case made from aluminum alloy by the hot combustion gases issuing at high pressure from said mouth when firing the shot by applying an oxide layer to the surface of the cartridge case by anodic oxidation. In order to give effective protection against the above phenomenon, called "burning-out" for brevity, a minimum thickness of the said oxide layer of 40µ would be required.

However, it has been found that the thickness of the said oxide layer cannot be increased to this value required for an absolute protection of the case because the deformation which occurs at the mouth of the case when the projectile is inserted therein, produces a strain which overstresses and damages such thick oxide layers. The damaged oxide layer, crossed by fine cracks, has not proved to afford sufficient protection against the erosive hot combustion gases.

It is yet another object of the present invention to provide a cartridge case of aluminum alloy which has good sliding properties as required for ejecting the spent cartridge case from the weapon.

With these and other objects in view, which will become apparent later in this specification, I provide an aluminum alloy cartridge case comprising in combination: an aluminum alloy cartridge case proper, an oxide layer covering said case, and a lacquer layer at least partly covering the said oxide layer.

According to a preferred embodiment, the said lacquer layer is composed of a synthetic resin layer based on ethylene (epoxy) resin.

Owing to its resiliency such a lacquer prevents cracking resulting from the deformation which occurs at the mouth of the cartridge case when the projectile is driven into said mouth and said lacquer alloy coating both said oxide layer to provide the protection of the metal that is required and desired against corrosion as well as against the erosion and burning out of the mouth of the case when firing a shot.

Applying the said lacquer not only to the inner surface but also to the outer surface of the case has proved advantageous in view of its good sliding properties when ejecting a spent cartridge from the weapon after firing a shot.

The drawing illustrates a cartridge case made according to the invention.

The method I provide according to the present invention comprises the following consecutive steps: producing an oxide layer by anodic oxidation on an aluminum alloy cartridge case, dipping the said anodised cartridge case into a lacquer bath, removing excess lacquer from the said cartridge case by dripping and centrifuging, drying the lacquer remaining on the surface of the said cartridge case by heating to a medium temperature for a moderate period, dipping the said cartridge case a second time in the said lacquer bath, removing again excess lacquer by dripping and centrifuging, and baking-in the said lacquer on the said cartridge case for a prolonged period.

Preferably the lacquer is applied at a viscosity determined by the time for flowing off a Ford beaker at room temperature.

In order that the invention may be clearly understood and readily carried into effect, the same will now be described by way of example.

The cartridge case proper consists for example of an aluminum alloy of the kind Al-Zn-Mg-Cu 54. This cartridge case proper is covered by an oxide layer of a thickness of 15 to 20µ. This oxide layer is covered by a lacquer layer of a thickness of 15 to 25µ.

The following is an example of the method according to the present invention:

On the surface of a cartridge case proper made of an aluminum alloy of the kind Al-Zn-Mg-Cu 54, an oxide layer of 15 to 20µ is produced by anodic oxidation. Densifying of this oxide layer by a known "sealing" process is preferably dispensed with.

The said oxidised cartridge case proper is dipped a first time into a lacquer bath, and after removing the excess lacquer, the oxidised cartridge case is dried for 20 minutes at an oven temperature of 160° C. Subsequently the cartridge case is dipped into the said lacquer bath a second time, excess lacquer is again removed by dripping and centrifuging, and the adhering lacquer is baked-in by heating for one hour at an oven temperature of 180° C.

The lacquer is preferably applied at a viscosity defined by the period of 27 to 28 seconds required for flowing out of a Ford beaker No. 4, measured at a room temperature of 20° C.

The lacquer layer produced should preferably have a thickness of 15 to 25µ.

What I claim as my invention and desire to secure by Letters Patent is:

1. A cartridge case comprising in combination, an aluminum alloy case proper with a mouth at one end adapted to be closed by a projectile, and means for protecting said mouth from the detrimental effects of the hot combustion gases when firing, said means comprising an anodic oxide layer having a thickness of about 15µ or about 20µ, and a layer of resin having good sliding properties baked on the surface of said oxide layer, said layers covering at least the outside of said cartridge case and the inside of said mouth.

2. A method for manufacturing cartridge cases comprising the following consecutive steps: providing an aluminum alloy cartridge case, producing an anodic oxidation an oxide layer on said cartridge case, said oxide layer having a thickness of about 15µ to about 20µ, dipping the oxide coated case into a bath of resin-base lacquer, removing excess lacquer and baking the adhering layer thereon.

3. A cartridge case comprising in combination, an aluminum alloy case proper with a mouth at one end adapted to be closed by a projectile and means for protecting said mouth from the detrimental effects of the hot combustion gases when firing, said means comprising an anodic oxide layer having a thickness of about 15µ to about 20µ, a layer of epoxy resin having good sliding properties baked on the surface of said oxide layer, said layers covering at least the outside of said cartridge case and the inside of said mouth and being baked on the surface of said oxide layer.
4. A method for manufacturing cartridge cases comprising the following consecutive steps: providing an aluminum alloy cartridge case, producing by anodic oxidation an oxide layer on said cartridge case, said oxide layer having a thickness of about 15μ to about 20μ, dipping the oxide coated case into a bath of lacquer comprising an epoxy resin, removing excess lacquer and baking the adhering layer thereon.

References Cited in the file of this patent

UNITED STATES PATENTS

1,862,565  Burke -------------------- June 14, 1932

2,196,018 2,448,397 2,703,529 2,901,510 2,919,647

455,761 528,114

Korpiun ------------------ Apr. 2, 1940
Schilling ------------------ Aug. 31, 1948
Tuckerman et al. -------- Mar. 8, 1955
Molotsky ------------ Aug. 25, 1959
Dear et al. ------------ Jan. 5, 1960

FOREIGN PATENTS

Great Britain ------------ Oct. 27, 1936
Great Britain ------------ Oct. 23, 1940