

Aug. 24, 1954

A. J. TUCKERMAN ET AL
PROCESS OF MANUFACTURING LININGS
FOR PERFORATED CARTRIDGE CASES

2,686,936

Filed March 8, 1950

2 Sheets-Sheet 1

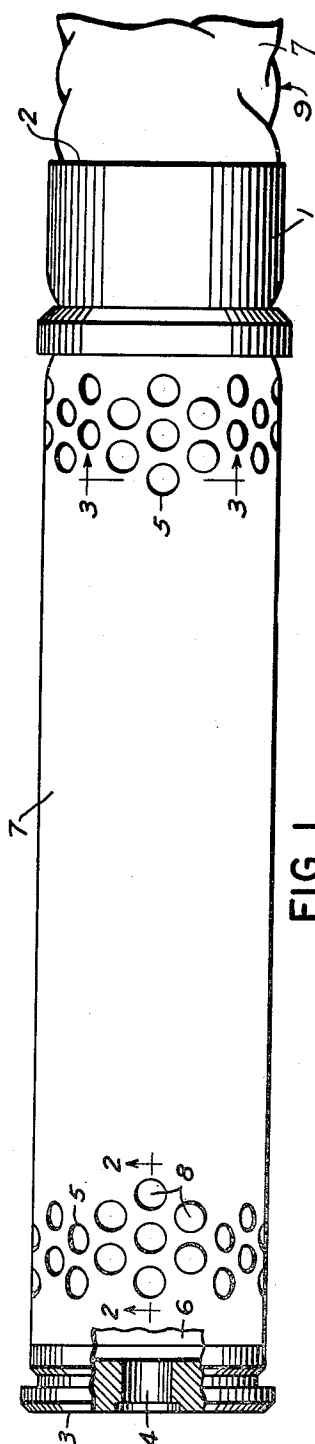


FIG. 1.

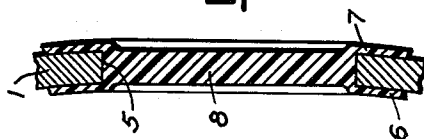


FIG. 3.

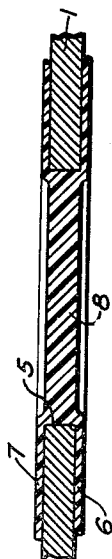


FIG. 2.

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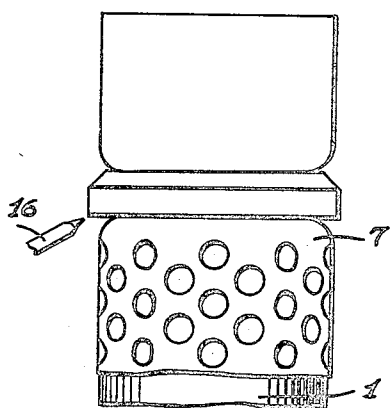


FIG. 4

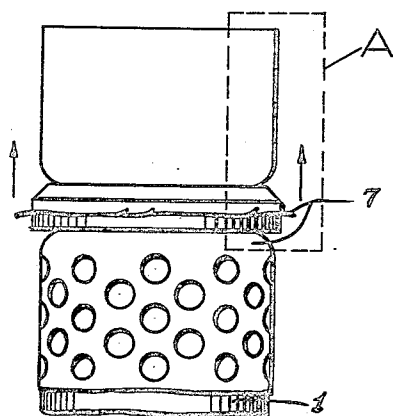


FIG. 5

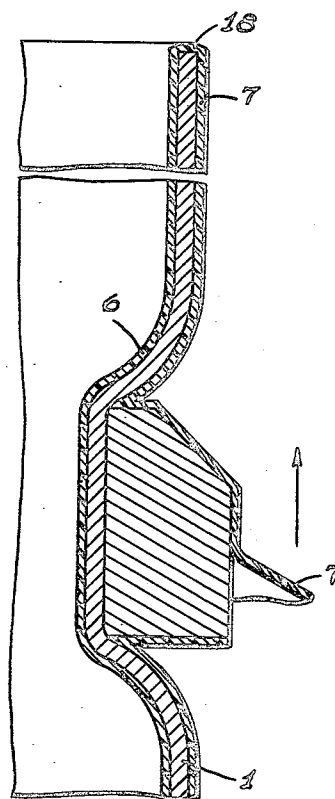


FIG. 5A

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PROCESS OF MANUFACTURING LININGS
FOR PERFORATED CARTRIDGE CASESArnold J. Tuckerman, Morton Kushner, and
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Application March 8, 1950, Serial No. 148,442

6 Claims. (Cl. 18—58.7)

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

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The present application is a continuation-in-part of application Serial No. 771,290, filed on August 29, 1947, in the name of Arnold J. Tuckerman, Morton Kushner and Anthony Gallaccio, for "Lining for Perforated Cartridge Case and Process of Manufacturing."

This invention relates to a lining for cartridge cases, particularly perforated cartridge cases for recoilless rifles, and a process of manufacturing such a cartridge case lining.

It is an object of this invention to provide a lining which affords a seal adjacent the inner end of a cartridge case surrounding the primer seat, a seal for the perforations through the side walls of the cartridge case, and a seal adjacent the open end of the cartridge case beneath the projectile carried therein.

It is a further object of this invention to provide a lining for a cartridge case, which lining is readily applied to the case, provides a maximum of room within the case because the lining is itself a thin wall, affords improved sealing against moisture or other agents harmful to the explosive charge in the cartridge case, burns completely upon firing the round of which the cartridge case forms a part, and facilitates the manufacture of such cartridge cases because of the reduced number and simplicity of the operations involved.

For a further exposition of this invention, reference may be had to the annexed drawing and specification at the end of which the novel features of this invention will be pointed out and claimed.

In the drawings:

Fig. 1 is a side elevation with the mouth of the lining left open.

Fig. 2 is a longitudinal cross section on an enlarged scale on line 2—2 of Fig. 1 through the wall of the cartridge case and the lining thereon.

Fig. 3 is a transverse cross section on the same scale as Fig. 2 on line 3—3 of Fig. 1.

Fig. 4 is a side elevation showing part of the cartridge case and a cutting tool adjacent the outer wall of the cartridge case preparatory to severing circumferentially the plastic coating which envelopes the case.

Fig. 5 shows the cartridge case portion of Fig. 4 with a severed, comparatively uneven edge of the plastic coating.

Fig. 5A is a greatly enlarged illustration of the portion of the Fig. 5 cartridge case bounded by the area marked "A," showing the inner and outer layers of the plastic coating which are joined together over the lip of the case's mouth.

Process

One example of our improved process is the following. We take a plasticized polyvinyl chloride jelly dispersion and add methyl-iso-butyl ketone as a solvent until the resulting mixture has a solid

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content of approximately 18% by weight. Other solid materials, which may be used in place of polyvinyl chloride, are any vinyl-type plastics. Solvents, which may be used instead of the methyl-iso-butyl ketone, are other ketones, preferably those boiling at about 100° to 150° C. The above-referred to admixture is then heated to a temperature less than 95° C. until the viscosity is suitable for a solid to be readily dipped into it.

A hollow tube is then force-fitted into the primer opening of a perforated cartridge case. The perforated cartridge case is then dipped (mouth end first) into the hot polyvinyl chloride admixture. This can be done by grasping the tube in the hand. The case is then slowly withdrawn from the admixture in a vertical position so as to secure as uniform as possible an inner layer 6 and an outer layer 7 of polyvinyl chloride on both the inner and outer surfaces of the cartridge case, respectively. The coatings or layers 6—7 on the inner and outer walls, respectively of the cartridge case coalesce or unite in the perforations on the side walls of the case sealing each of these perforations with a transparent film or pane, and also became joined together at the rim of the cartridge case's mouth as at 18 in Fig. 5A. The cartridge case is only dipped into the admixture to a sufficient depth so that the films adhere to the inner and outer faces of the side wall of the cartridge case between the closed or primer end and the adjacent holes. No coating is applied to the closed or primer end through which the primer seat extends. However, the bond between the film and the side walls of the cartridge case is ample to seal this end of the cartridge case.

Immediately after its withdrawal from the hot admixture the cartridge case is rotated either in a horizontal position, a vertical position, or a position with the axis of the cartridge case at an intermediate angle between the vertical and horizontal. The position which is selected is chosen to secure as uniform a thickness of the coating as possible. This rotation is continued until the film sets. The films constituting the lining are then allowed to dry in air for approximately one hour at room temperature. The solvent (methyl-iso-butyl ketone) is then driven off by heating the cartridge case and the lining in an oven for approximately 24 hours at a temperature of 55° C. until the lining is properly cured. Next, the cartridge case and the lining are allowed to cool to room temperature.

The outer layer of the lining is then cut circumferentially between the open mouth of the cartridge case and the nearest perforations. A convenient way of cutting the outer layer 7 is to bring a cutting tool 16 to bear so that it just severs outer layer 7 around its entire circumference. The severed outer layer 7 which appears as shown in Figs. 5—5A, then is stripped away from the wall of the

cartridge case in the direction of the arrows shown in Figs. 5-5A so that when it is pulled past the mouth end of cartridge case 1, it actually becomes a forward extension of inner layer 6 and thus forms a bag or bellows mouth 9 projecting from the open end of the cartridge case, as shown in Fig. 1. The case is then loaded with the powder or other propellant explosive which it is to contain. The cartridge case is sealed by stuffing the bag or bellows mouth 9 of the lining into the open end of the cartridge case, or by causing the walls of the bag or bellows end of the cartridge case to adhere together by the use of a solvent or heat, or by tying.

It will thus be seen that the lining of this invention provides a seal encircling the case wall between the primer seat and the nearest perforations, a seal for each of the perforations through the side wall of the cartridge case, and a seal for the lining adjacent the open or mouth end of the cartridge case.

Cartridge case and lining

The selected embodiment of the cartridge case and lining shown in the drawings and manufactured according to the foregoing process comprises a cylindrical cartridge case 1, preferably of metal, having an open or mouth end 2 and a primer or closed end 3 having a perforation or primer seat 4 passing through the closed end. For use with a recoilless rifle the cartridge case has a number of perforations 5 through its side walls. For simplicity, only a few of these perforations 5 are shown in Fig. 1. As is best seen in Figs. 2, 3, and 5A, the interior of the cartridge case is covered with a layer or film 6 and the outer surface of the cartridge case is covered (except adjacent the open end 2 from which the junction of fused layers 6-7 has been stripped free) with a layer or film 7. These layers or films 6 and 7 coalesce or unite to form a pane or seal 8 filling and bridging the side wall perforations 5, and after the stripping operation described above further serves to form an extension of the inner layer having the form of a bag or bellows mouth 9 as shown in Fig. 1. Layers or films 6 and 7 and the panes or seals 8 integral therewith afford a seal against moisture or other agents harmful to the explosive charge in the cartridge case. This seal burns when the explosive charge is fired and does not foul or otherwise damage the recoilless rifle or the cartridge case which forms a part of the ammunition therefor since the burnt film dissipates forming only a negligible residue or ash.

It is readily understood that many modifications of the foregoing process and article are possible within the scope of this invention. No limitation is to be implied because of the illustrative examples heretofore given or for any other reason save as the scope of appended claims express. For example, the case need not be a cartridge case but may be a package or container for other materials than combustible powder.

The invention described in the foregoing specification and claims may be manufactured and used by or for the Government for governmental purposes without the payment to us of any royalty thereon.

We claim:

1. A process of manufacturing a lining for a cartridge case which process includes, preparing a hot bath of a combustible vinyl type plastic and a solvent, dipping a cartridge case in said bath, withdrawing said cartridge case from said

bath with a film of said plastic adhering to the inner and outer surfaces of the side wall of said case to form inner and outer film layers fused together only at the case's open mouth end, rotating said case until said plastic film sets, driving off the solvent from said plastic, circumferentially cutting the layer of said plastic on the outside of said cartridge case adjacent the case's open end and stripping back the cut outer film layer so that this layer's cut end extends past the open end of the cartridge case while the stripped back layer's uncut end remains fused with the inner layer to form the closable end of a bag whose major portion is adherent to the inner case side wall.

2. A process of providing a perforated cartridge case for a recoilless rifle with a lining, which process includes, providing a bath of combustible vinyl type plastic heated to a maximum temperature of not more than 95° C., dipping a cartridge case open end first into said bath, withdrawing said cartridge case from said bath at a slow and uniform rate of speed with a coating of said plastic adhering to the inner and outer surfaces of the side walls of said case to form inner and outer film coatings fused together at the case's open mouth end and through the perforations in said case, allowing the coatings of plastic to set, driving off the solvent from said coatings of plastic, circumferentially cutting the coating of said plastic on the outside of said cartridge case at a point on the case sidewall forward of which to the open end of the case there are no perforations, and stripping back the cut outer coating so that its cut end extends past the open end of the cartridge case while its uncut end remains fused with the inner coating to form the closable end of a bag whose major portion is adherent to the inner case side wall.

3. A process of lining a perforated cartridge case including, mixing polyvinyl chloride into a solvent to form a fluid bath, dipping a perforated cartridge case into said bath, withdrawing said perforated cartridge case from said bath with polyvinyl chloride adhering to the inner and outer surfaces of the side walls of the cartridge case to form inner and outer film coatings fused together at the case's open mouth end and through the perforations in said case, allowing said polyvinyl chloride coatings to set, driving off the solvent from said polyvinyl chloride, circumferentially cutting a portion of the outer coating of polyvinyl chloride at a point on the case sidewall forward of which to the open end of the cartridge case there are no perforations, and stripping the cut outer coating so that its cut end extends past the open end of the cartridge case while its uncut end remains fused with the inner coating to form the closable end of a bag whose major portion is adherent to the inner case side wall.

4. A process of lining a perforated cartridge case including, forming a bath of a vinyl type plastic in methyl-iso-butyl ketone as a solvent, dipping a perforated cartridge case into said bath, withdrawing the cartridge case from the bath with the material of the bath adhering to the inner and outer surfaces of the side wall of said case to form inner and outer coatings fused together at the case's open mouth end and through the perforations in said case, setting said coatings, driving off said methyl-iso-butyl ketone solvent from said coatings, circumferentially cutting a portion of the outer coating at a point on the case sidewall forward of which to the

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open end of said cartridge case there are no perforations, and stripping the cut outer coating so that its cut end extends past the open end of the cartridge case while its uncut end remains fused with the inner coating to form the closable end of a bag whose major portion is adherent to the inner case wall.

5. A process of forming a strippable film lining for a perforated cartridge case for a recoilless rifle, which process includes, forming a bath of polyvinyl chloride and methyl-iso-butyl ketone having a solid content of approximately 18%, heating said bath to not more than 95° C., dipping a perforated cartridge case open end first into said bath, removing said cartridge case from said bath at a slow and uniform rate of speed with the material of said bath adhering to the inner and outer surfaces of said cartridge case to form inner and outer coatings fused together at the case's open mouth end and forming a seal filling each of the perforations through the side wall of said cartridge case, rotating said coated cartridge case until said coatings set, drying the coatings on said cartridge case in air for approximately one hour at room temperature, driving off the methyl-iso-butyl ketone leaving the polyvinyl chloride in the form of two flexible films removably adherent to the inner and outer walls of the cartridge case by drying the cartridge case and the coating thereon in an oven at 55° C. for approximately 24 hours, cooling said cartridge case to room temperature, circumferentially cutting through the outer coating to the outer surface of the cartridge case between the open end of the cartridge case and the nearest perforation, and stripping back the cut outer coating so that its cut end extends past the open end of the cartridge case while its uncut end remains fused with the inner coating to form the closable end

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of a bag whose major portion is adherent to the inner case wall.

6. A process of lining a perforated case including, coating the inner and outer surfaces of the side wall of a perforated case with a vinyl-type plastic in a solvent, evaporating said solvent so as to leave deposited on said case inner and outer plastic layers fused together at the case's open mouth end and in each of the perforations through the side wall a seal of plastic, circumferentially severing a portion of the outer plastic layer between the open end of the cartridge case and the nearest perforation, and stripping the severed outer layer so that its cut end extends past the open end of the cartridge case while its uncut end remains fused with the inner coating to form the closable end of a bag whose major portion is adherent to the inner case wall.

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