Feb. 14, 1961 G. C. POTTS 2,971,426

METHOD OF LOADING FIN STABILIZED AMMUNITION

Filed March 26, 1959

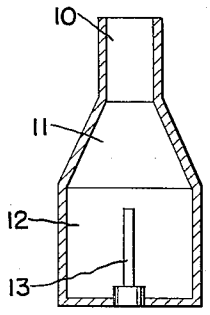

FIG. 1.

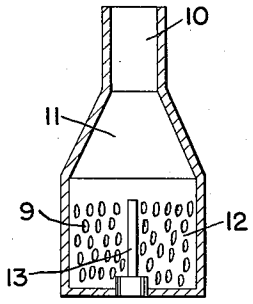

FIG. 2.

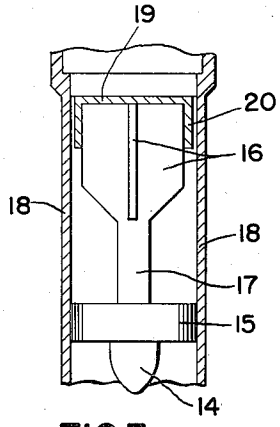

FIG. 3.

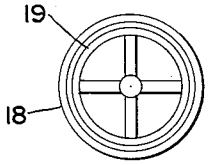

FIG. 4.

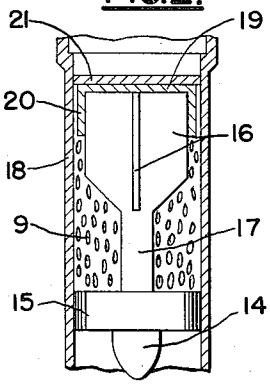

FIG. 5.

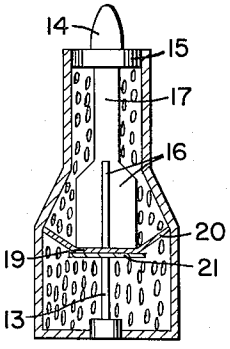

FIG. 7.

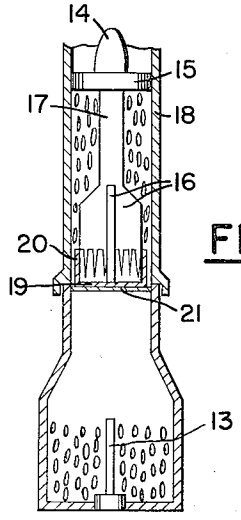

FIG. 6.

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METHOD OF LOADING FIN STABILIZED AMMUNITION

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1 Claim. (Cl. 86—20)

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

The invention described herein may be manufactured and used by or for the Government for governmental purposes without the payment to me of any royalty thereon.

This invention relates to a new method of loading fin-stabilized ammunition.

Heretofore, the loading of fin-stabilized ammunition has been achieved by inserting the propellant through a loading hole located in the base of the cartridge case. After loading, the hole is closed by a metal plug.

As a result of providing for the loading hole a comparatively thin metal web exists in the base of the cartridge case between the loading hole and the side wall. Upon firing of the round this thin web distorts due to thermal expansion and impact, allowing propelling gases to escape around the metal plug and producing expansion of the side wall of the cartridge case sufficient to cause the case to stick in the gun. Thus the probability of flashback is greatly increased (which would be extremely dangerous, for example when the gun is mounted on a tank), and the case must be rammed out of the gun after each round is fired.

It is the object of this invention to overcome the above difficulties, eliminate the cost of machining the loading hole and the mating plug, and materially reduce the time and tedium of loading by elimination of the loading hole entirely. This is accomplished by first partially loading the cartridge case with propellant and then adding the remainder of the propellant later while pressing the projectile into place as described hereinafter. More precisely the invention comprises a propellant supporting cylinder for a fin-stabilized projectile in combination with a cup washer and a back-up plate, to contain the propellant around the projectile, between the sabot and the stabilizing fins, while the projectile is pressed into the cartridge case and seated on the bed of propellant previously loaded into the case.

The invention can best be understood by reference to the figures in which:

Fig. 1 is a partial sectional view of a cartridge case with the primer in place;

Fig. 2 is the same view with the body of the cartridge case partially filled with propellant;

Fig. 3 is a partial sectional view of the fin-stabilized projectile in the propellant supporting cylinder, with the cup washer placed over the fins;

Fig. 4 is a top plan view showing the cup washer in place within the propellant supporting cylinder shown in Fig. 3;

Fig. 5 is a partial view of the propellant supporting cylinder containing the projectile and propellant, with the cup washer and back-up plate in position;

Fig. 6 is a partial sectional view of the cartridge case with the cylinder, containing the projectile and propellant, positioned at the mouth of the cartridge case, immediately preceding the projectile being pressed into place;

Fig. 7 shows the completed assembly with the projectile fully seated on the previously prepared propellant bed.

The cartridge case, as shown in Fig. 1, consists of three sections; a mouth section **10**, a tapered neck section **11**, and a body section **12**. The primer **13** is contained within the body of the cartridge case.

The first step in loading the cartridge case, shown in Fig. 2, is filling the body portion with propellant **9**, up to a height determined by the rear end of the stabilizing fins of a projectile when the projectile is inserted within the cartridge case.

The second step shown in Fig. 3 is placing the projectile **14** and sabot **15** in a propellant supporting cylinder **18**, with the stabilizing fins **16** of the projectile being uppermost. An open-based retaining cup washer **19**, having hinged slit side walls **20**, is placed over the rear end of the stabilizing fins, so that the hinged slit side walls extend longitudinally between the stabilizing fins and the propellant supporting cylinder. Fig. 4 is a view looking downward at the cup washer in place within the propellant supporting cylinder.

The third step shown in Fig. 5 consists of pouring propellant **9** through the open base of the retaining cup washer to fill the supporting cylinder with propellant around the boom **17** and the stabilizing fins of the projectile, between the sabot and the rear end of the stabilizing fins. A back-up plate **21** is then secured to the rear end of the stabilizing fins, thereby closing the open base of the cup washer and holding the cup washer and propellant in place.

The fourth step shown in Fig. 6 is inverting the cylinder containing the projectile, propellant, retaining cup washer, and back-up plate, and positioning it at the mouth of the partially-filled cartridge case. The projectile is then pressed into place within the cartridge case, carrying the propellant from within the cylinder into the cartridge case with it, and leaving the cylinder empty. As the rear end of the projectile moves from the mouth portion of the cartridge case into the tapered neck section, the hinged sidewalls of the cup washer spread outwardly to continue to contain the propellant around the projectile and prevent the propellant from tumbling out and interfering with the complete seating of the projectile on the previously prepared bed of propellant.

Fig. 7 shows the projectile fully seated within the substantially comp'etely filled cartridge case and the empty supporting cylinder removed. As an example of the problems involved, one might use a cartridge case for a 90 mm. projectile. Heretofore the cartridge case, having a base diameter of approximately 6 inches, had a loading hole of approximately 1¼ inches machined in the base between the primer pocket and the side wall of the case. Propellant, having a web size of about 0.070 inch (0.930 inch long by 0.327 in diameter), was then inserted through the loading hole to fill up the case around the projectile. The loading hole was then closed by inserting a machined plug.

As a result of this invention the loading time of the above cartridge case was reduced to approximately one-third of what it had been, and the necessity for machining the loading hole and plug, with its attendant cost and weakening of the case, were obviated. This was accomplished by making use of a cup washer having a base diameter of 3⅛ inches, and a back-up plate, having a diameter of 3½ inches, fastened over the cup washer. The back-up plate was perforated to allow the flame to go through it easily, and the cup washer and the back-up plate were both fabricated from 0.010 paper stock.

I claim:

A process for filling a cartridge case for a projectile having stabilizing fins and a sabot, said process comprising: partially filling such a cartridge case with its base

lowermost with the propellant to a height contiguous stabilizing fins of a projectile when later inserted; placing a propellant supporting cylinder around a projectile with its fins uppermost and with said cylinder extending longitudinally between the stabilizing fins and the sabot for the purpose of retaining propellant around the projectile until said projectile with propellant is later enclosed and held by the cartridge case; placing a retaining cup washer having an open base and hinged split sides over a rear end of the stabilizing fins, so that the slit sides extend longitudinally between the fins and the propellant supporting cylinder; loading propellant through the open base of said retaining cup washer to fill said cylinder between said sabot and said cup washer, said sabot retaining the propellant after it is loaded into the supporting cylinder around the projectile; securing a back-up plate to the rear end of the stabilizing fins and closing the base of said cup washer, to prevent the propellant from falling out when the supporting cylinder and projectile are inverted; inverting the propellant supporting cylinder and

projectile; positioning said cylinder and projectile at the mouth of the cartridge case preparatory to pressing the projectile with propellant into the cartridge case; pressing the projectile and propellant out of the supporting cylinder and into the partially filled cartridge case until said back-up plate, which is substantially coincident with the rear end of the stabilizing fins, is contiguous the top of the propellant in the partially filled cartridge case, the said hinged slit sides of said cup washer having spread outwardly due to the weight of the propellant, to continue to contain the propellant as the projectile moves into an enlarged throat portion of said cartridge case; and withdrawing the supporting cylinder from the mouth of the cartridge case, leaving the propellant substantially filling a space within the cartridge case around the projectile, between the base of the cartridge case and the sabot.

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