

[54] **FULLY TELESCOPED CASELESS CARTRIDGE**

[72] Inventor: **Morris Goldin**, Orange, Calif.

[73] Assignee: **Hughes Tool Co., Aircraft Division**, Culver City, Calif.

[22] Filed: **Jan. 22, 1970**

[21] Appl. No.: **5,031**

[52] U.S. Cl. **102/40, 102/45, 102/DIG. 1**

[51] Int. Cl. **F42b 5/18, F42b 9/16**

[58] Field of Search **102/38, 46, 45, 40, DIG. 1**

[56] **References Cited**

UNITED STATES PATENTS

3,482,516 12/1969 Farmer et al. 102/38

3,507,219	4/1970	Dardick.....	102/38
3,345,945	10/1967	Quinlan et al.	102/38
3,439,635	4/1969	Hensley.....	102/38
1,659,625	2/1928	Cowan.....	102/43

Primary Examiner—Robert F. Stahl
Attorney—Smyth, Roston and Pavitt

[57] **ABSTRACT**

An ammunition cartridge comprising a projectile which is fully telescoped within a sleeve of gunpowder. At the trailing edge of the projectile, and within the sleeve, a primer cap is positioned for containment of a primer charge which initiates combustion of the gunpowder sleeve. If desired, a casing of any suitable material may be provided for certain applications.

2 Claims, 5 Drawing Figures

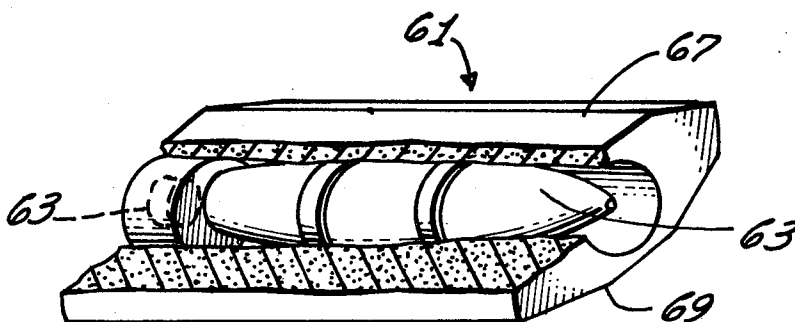
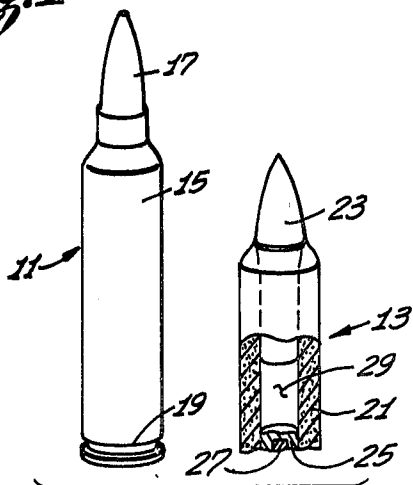


Fig. 1



PRIOR ART

Fig. 2

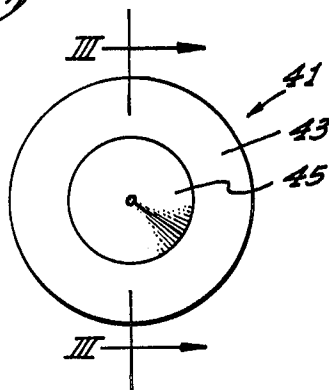


Fig. 3

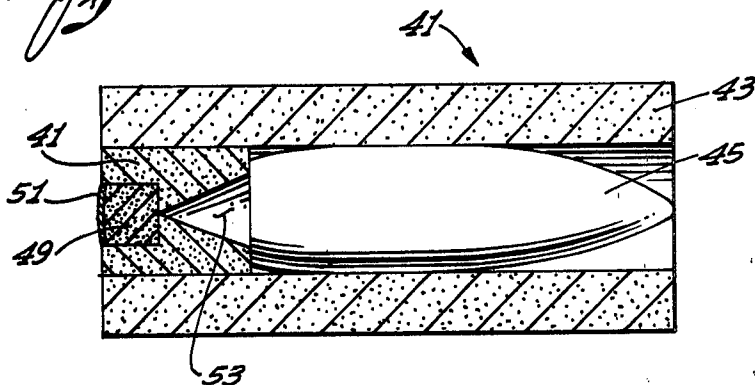


Fig. 4

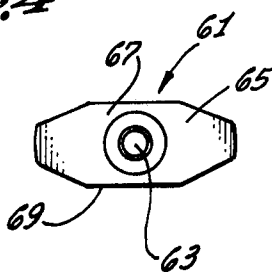
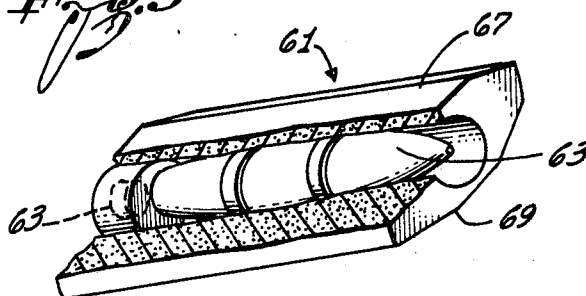


Fig. 5



INVENTOR:
Morris Goldin

By *Joseph L. Larkin & Larkin*
ATTORNEYS

FULLY TELESCOPED CASELESS CARTRIDGE
BACKGROUND OF THE INVENTION

In any situation in which fire power is required, whether stationary or mobile, such as an airplane, truck, or foot-soldier, the most significant logistics problem must be considered to be the provision of a maximum amount of ammunition with a given fire power in a minimum volume and with a minimum weight. Relatively modern weapons employ what has become known as a Standard Brass Cartridge type of ammunition in which a projectile is mounted at the forward end of a brass casing. A propellant powder is mounted within the casing and a suitable primer is positioned at the tail end of the casing. Impact of a firing pin or hammer on the casing in the area of the primer causes ignition and combustion of the primer and then the gunpowder so that the projectile is driven from the weapon with proper velocity.

More recently, an ammunition has been devised which comprises a tube of gunpowder into which a projectile is partially telescoped. A primer and primer cup are inserted in the opposite end of the tube and a large volume is formed within the tube, between the primer cup and the projectile, for expansion of the gases from the primer ignition when combustion begins due to the impact of the firing pin or hammer.

This type of ammunition, sometimes referred to as "Frankfort Arsenal Caseless," has resulted in an increased amount of ammunition within a given volume and weight. Therefore, the Frankfort Arsenal Caseless cartridge can be considered to be a significant improvement upon the Standard Brass Cartridge. However, that is not to say that these ratios have been optimized to the greatest extent.

SUMMARY OF THE INVENTION

The present invention relates to a fully telescoped caseless cartridge. More specifically, the invention generally comprises an ammunition cartridge in which a tubular gunpowder body telescopically encases a projectile which is positioned immediately adjacent a primer cap in the tail end of the cartridge.

Recent tests have shown that only a very small volume between the primer cup and the tail end of the projectile needs to be provided to produce a sufficient anvil force on the tail of the projectile to cause it to move out of the gunpowder tube and through the rifle barrel. Prior to these tests, it had been thought by those skilled in the art that a large expansion volume must be provided and the projectile must be positioned in manufacture to extend beyond the end of the tube in order to insure that the combustion of the gunpowder tube would take place wholly behind the tail end of the projectile. However, it has now been found that the ignition of the primer and combustion of the primer cap will produce a sufficient anvil force to start the projectile moving out of the tube in a sufficient amount of time to insure that the burning of the gunpowder tube always takes place behind the tail end of the projectile.

Thus, the cartridge of the present invention has all of the advantages found in the Frankfort Arsenal Caseless cartridge, compared to earlier cartridges, while providing the further advantages of significantly increasing the number of rounds per unit of volume.

In order to best illustrate the differences between the Standard Brass Cartridge (SBC), the Frankfort Arsenal Caseless (FAC) cartridge, and the fully telescoped caseless (FTC) cartridge, and the advantages of the fully telescoped caseless cartridge over the other two, the following chart is set forth for comparison, for 5.56 millimeter cartridges having cylindrical configurations, of the weight of the individual cartridges, the number of rounds per 5 pounds for each cartridge, the volume of each cartridge, and the number of rounds per cubic foot in the optimum nesting relationship between rounds.

	Standard Brass Cartridge 5.56 Millimeter	Frankfort Arsenal Caseless (cylindrical)	Fully SBC Telescoped vs Caseless FTC	FAC vs FTC
Weight (Grains)	178	91	91	-49% 0
Rounds/5 lbs.	200	384	384	+92% 0
Volume (in. ³)	.25	.165	.125	-50% -24%
Rounds/ft. ³	5,979	8,884	11,772	+97% +33%

Reference to this chart clearly discloses that both the Frankfort Arsenal Caseless and fully telescoped caseless cartridge, which weigh the same, produce a significant weight reduction with respect to the Standard Brass Cartridge. Further, it can be seen that the fully telescoped caseless cartridge can be stored in a far smaller volume than can the Standard Brass Cartridge or the Frankfort Arsenal Caseless cartridge. In other words, an ammunition box having a given volume of cartridges formed in accordance with the present invention may weigh slightly more than the same box containing the other types of cartridges but a far greater number of rounds of ammunition will be contained within the box. Thus, the logistical problems involved with supplying ammunition to a gun platform are significantly reduced.

As an additional advantage, with the projectile positioned close to the primer cup, it can be used as a back-up means for the cup, thereby increasing the strength of the cartridge.

Fully telescoped caseless cartridges also provide a further significant advantage over all other types of cartridges in that they clearly lend themselves to being formed in a wide variety of desirable configurations. For example, if the external configuration of such a cartridge is square, with the same amount of powder and the same size projectile, the number of rounds which can be stored in a given volume is increased still further. If the external configuration is octagonal, and two opposed sides are of a larger width than the others, thereby forming what shall hereafter be referred to as a "flat" cartridge, the storage capacity is not only increased over that of the round cartridge but the cartridges may also be handled with greater ease.

In order to more clearly illustrate the advantages of such a flat cartridge over the Standard Brass Cartridge and Frankfort Arsenal Caseless cartridge, a second chart is herewith provided which sets forth a comparison of the 0.50 caliber cartridge, according to the present invention, with those cartridges.

	Standard Brass cartridge	Frankfort Arsenal caseless (estimated)	Fully SBC Telescoped vs Caseless FTC	FAC vs FTC
--	--------------------------------	---	--	------------------

.50 Caliber (flat)				
Weight (Grains)	1788	1400	1400	-22% 0
Rounds/5 lbs.	14	25	25	+32% 0
Volume (in. ³)	2.73	1.98	1.58	-42% 0
				-20%
Rounds/ft. ³	541	744	1,144	+111% 5
				+54%

Thus, cartridges formed according to the present invention have a wide variety of advantages over prior art cartridges, as well as not requiring cases which reveal the presence of a soldier or rifleman when they are discharged from a rifle, clutter up the usable floor space of an aircraft when fired from a gun mounted in the aircraft, damage the airfoil surfaces of an aircraft when they are discharged from a gun mounted on the outside or nose of the aircraft, and are usable by an enemy in manufacturing boobytraps.

Other advantages, objects, modes, and embodiments of the invention will become obvious to those skilled in the art by reference to the Detailed Description and accompanying drawing which illustrate what are presently considered to be two preferred embodiments of the best mode contemplated for utilizing the novel principles set forth in the claims.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 comprises perspective illustrations of prior art cartridges of the Standard Brass and Frankfort Arsenal Caseless types;

FIG. 2 is an end view of a cylindrical cartridge formed according to the present invention;

FIG. 3 is a sectional view of the cartridge of FIG. 2, taken along the line III—III thereof;

FIG. 4 is an end view of a flat round cartridge according to the present invention; and

FIG. 5 is a perspective view, partly in section, of the flat round cartridge shown in FIG. 4.

DETAILED DESCRIPTION

The prior art cartridges shown in FIG. 1 basically comprise a Standard Brass Cartridge 11 and a Frankfort Arsenal Caseless-type cartridge 13. The Standard Brass Cartridge generally comprises a metal casing 15 containing a propellant charge which serves to propel a projectile 17 when a primer, in the area 19 in the cartridge, is ignited by impact with a firing pin or hammer.

The Frankfort Arsenal Caseless cartridge 13 basically comprises a tubular sleeve 21 of gunpowder into which a projectile 23 is partially telescoped. A primer cup 25 of gunpowder surrounds a primer charge 27 which ignites the primer cup and gunpowder tube 21 upon impact with a firing pin. A relatively large volume 29 is formed between the primer cup 25 and the tail end of the projectile 23.

Now, with reference to FIGS. 2 and 3, a cylindrical projectile 41 is illustrated in greatly enlarged form, as comprising an outer sleeve 43 of gun powder of ball, military, or any other grain configuration desired. A projectile 45 is fully telescoped within the outer sleeve and may be either bonded in place by use of a suitable adhesive or held in place by effectively shrink-fitting the tube onto the projectile. A primer cup 47 at the tail end of the cartridge surrounds a primer charge 49 which is held within the cup by fish paper 51 in a well-known manner. A volume 53 of any desired configuration may be formed between the tail end of the projec-

tile 45 and the primer cup. As shown, the volume is conical and allows the gases of combustion of the primer charge and the primer cup to expand and exert an anvil force on the tail end of the projectile to move it to the right so that, as the gunpowder tube 43 burns, the force generated thereby always acts against the tail end of the projectile.

If desired, the volume 53 can be similar in shape to that of volume 29 of the prior art projectile but will be much smaller since the projectile will be positioned closer to the primer cup. In either case the projectile will be close enough to the cup to act as a back-up means, thereby resulting in a stronger cartridge.

The gunpowder sleeves are formed in a variety of ways. For example, a projectile may be placed within a die and the desired gunpowder placed between the projectile and the surface of the die. Any solvent which will attack a nitrocellulose may then be injected into the gunpowder to soften it so that it becomes molded into the desired shape. If this method is used, proper solvent selection may cause the gunpowder sleeve to shrink onto the projectile so as to firmly hold it in place. Also, if desired, the primer cup 47 can be molded when the tube is molded and the primer charge 49 may be inserted into the cup at a later time.

Now, with reference to FIGS. 4 and 5, there is shown a cartridge 61 having a projectile 63 mounted within an outer sleeve 65. As shown, the cartridge 61 has an octagonal external configuration with a pair of opposed sides 67 and 69 being of greater dimension than either of the other pairs of sides. Proper formation of ammunition feeding systems and firing chambers will allow such a cartridge to be easily handled. In fact, if desired, such a cartridge may be moved into the firing chamber in a direction such that the cartridge may be partly injected into the chamber, and therefore under its guiding control, while still being moved and controlled by the feed means. Therefore, greater control of the cartridge can be exercised in the gunnery system.

Thus, the applicant has described and illustrated two embodiments of a new and improved concept in the ammunition art which yields a true advantage in that art. Many further modifications and alterations of these embodiments within the scope of the invention will be obvious to those skilled in the art.

What is claimed as the invention is:

1. In an ammunition cartridge,

a body comprising

an explosive charge having

a bore therein and

a polygonal external periphery so structured as to provide one pair of opposite sides having a greater dimension than any other pair of sides thereon,

a primer cup in said body adjacent said bore, and

a projectile in said bore having

a trailing end adjacent said primer cup and

a leading end adjacent the other end of said bore and within said bore.

2. An ammunition cartridge comprising

a sleeve member formed of

an explosive charge having

an octagonal polygonal external periphery having

an opposed pair of equal width sides having a
greater width than either of the other pairs
of sides,
a bore extending through said sleeve member,
a primer cup at a first end of said bore, and 5
a projectile entirely within said bore and having
a leading end adjacent the second end of said bore.

* * * * *

10

15

20

25

30

35

40

45

50

55

60

65