ORIGINAL

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UNITED STATES DISTRICT COURT

DISTRICT

2:05cv1380

COMBINED SYSTEMS, INC., a New York Corporation,

Plaintiff,

vs.

ROYAL ARMS INTERNATIONAL, INC., a Nevada Corporation,

Defendant

COMPLAINT FOR PATENT INFRINGEMENT

JURY DEMAND REQUESTED

Plaintiff COMBINED SYSTEMS, INC., by its attorneys Ellis & Venable, P.C., as and for its complaint against the Defendant, Royal Arms International, Inc., alleges as follows:

JURISDICTION AND VENUE

1. This is an action for patent infringement arising under 35 U.S.C. §271. This Court has original subject matter jurisdiction under 28 U.S.C. §1338(a).
2. Plaintiff, Combined Systems, Inc. ("COMBINED"), is a New York Corporation, having its principal place of business in Plainview, New York.
3. On information and belief, Defendant, Royal Arms International, Inc., ("ROYAL ARMS") is a Nevada corporation with its principal place of business in Woodland Hills, California. As a Nevada corporation, Royal Arms is thus subject to personal jurisdiction in this Judicial District.

4. As a result of the Defendants' residence within this judicial district, venue is proper in this forum based on 28 U.S.C. §1391(c).

FIRST CLAIM FOR RELIEF

Infringement of U.S. Patent No. 6,752,086

5. Combined incorporates by reference the allegations of paragraphs 1 through 4 as if fully alleged herein.

6. Combined is the assignee of non-expired United States utility patent No. 6,752,086 (" '086 patent") entitled "Method of preparing a low lethality round," issued on June 22, 2004 (See Exhibit A).

7. The '086 patent were first published as United States Patent Application Publication No. US2003/0116051 on June 26, 2003 with claims substantially similar to the claims in the issued '086 patent.

8. On information and belief, Royal Arms manufactures, tests, sells and offers for sale two devices: the "Bean Bag" and the "Royal Sock Bag", hereinafter collectively referred to as a Less Lethal Bean Bag Rounds (See Exhibit B).

9. Royal Arms' acts of manufacturing, testing, selling and offering for sale the Less Lethal Bean Bag Rounds, infringe one or more claims of the '086 patent and thereby violate one or more of Combined's exclusive rights under 35 U.S.C. §§ 271 and 289 as the assigned owner of the '086 patent.

10. On information and belief, Royal Arms has had and continues to have actual knowledge that their Less Lethal Bean Bag Rounds are similar to Combined's '086 patent and uses methods of manufacturing and testing which infringe on the '086 patent.

11. In addition to infringing one or more claims of the '086 patent directly, Royal Arms has contributorily infringed the '086 patent as evidenced by Royal Arms' sale to others knowing the device will be used in a

substantially infringing manner by performing specific steps of the patented method.

12. On information and belief, Royal Arms' acts of infringement of the '086 patent are willful and intentional.

13. Royal Arms' acts of infringement of one or more claims of the '086 patent are of a continuing nature and have caused and are causing irreparable injury to Combined and will continue unabated unless and until they are enjoined by an Order of this Court.

SECOND CLAIM FOR RELIEF

Infringement of U.S. Patent No. 6,755,133

14. Combined incorporates by reference the allegations of paragraphs 1 through 13 as if fully alleged herein.

15. Combined is the assignee of non-expired United States utility patent No. 6,755,133 (" '133 patent") entitled "Low Lethality Projectile Flight Shape," issued on June 29, 2004 (See Exhibit C).

16. The '133 patent was first published as United States Patent Application Publication No. US2003/0116051 on June 26, 2003 with claims substantially similar to the claims in the issued '133 patent

17. On information and belief, Royal Arms manufactures, tests, sells and offers for sale two devices: the "Bean Bag" and the "Royal Sock Bag", hereinafter collectively referred to as Less Lethal Bean Bag Rounds (See Exhibit B).

18. Royal Arms' acts of manufacturing, testing, selling and offering Less Lethal Bean Bag Rounds, infringe upon one or more claims of the '133 patent and thereby violate one or more of Combined's exclusive rights under 35 U.S.C. §§ 271 and 289 as the assigned owner of the '133 patent.

19. On information and belief, Royal Arms has had and continues to have actual knowledge that their Less Lethal Bean Bag Rounds are similar to Combined's '133 patent.

20. In addition to infringing one or more claims of the '133 patent directly, Royal Arms has contributorily infringed the '133 patent as evidenced by Royal Arms' use and sale to others knowing the device will be used in a substantially infringing manner by performing specific steps of the patented method.

21. On information and belief, Royal Arms' acts of infringement of the '133 patent are willful and intentional.

22. Royal Arms' acts of infringement of one or more claims of the '133 patent are of a continuing nature and have caused and are causing irreparable injury to CTS and will continue unabated unless and until they are enjoined by an Order of this Court.

THIRD CLAIM FOR RELIEF

Infringement of U.S. Patent No. 6,202,562

23. Combined incorporates by reference the allegations of paragraphs 1 through 22 as if fully alleged herein.

24. Combined is the assignee of non-expired United States utility patent No. 6,202,562 (" '562 patent") entitled "Method Of Preparing A Low Lethality Round For Flight," issued on March 20, 2001 (See Exhibit D).

25. Royal Arms' acts of manufacturing, testing, selling and offering for sale the Less Lethal Bean Bag Rounds, infringe one or more claims of the '562 patent and thereby violate one or more of Combined's exclusive rights under 35 U.S.C. §§ 271 and 289 as the assigned owner of the '562 patent.

26. On information and belief, Royal Arms has had and continues to have actual knowledge that their Less Lethal Bean Bag Rounds are similar to

Combined's '562 patent and uses methods of manufacturing and testing which infringe on the '562 patent.

27. In addition to infringing one or more claims of the '562 patent directly, Royal Arms has contributorily infringed the '562 patent as evidenced by Royal Arms' sale to others knowing the device will be used in a substantially infringing manner by performing specific steps of the patented method.

28. On information and belief, Royal Arms' acts of infringement of the '562 patent are willful and intentional.

29. Royal Arms' acts of infringement of one or more claims of the '562 patent are of a continuing nature and have caused and are causing irreparable injury to Combined and will continue unabated unless and until they are enjoined by an Order of this Court.

FOURTH CLAIM FOR RELIEF

Infringement of U.S. Design Patent No. D429,792

30. Combined incorporates by reference the allegations of paragraphs 1 through 29 as if fully alleged herein.

31. Combined is the assignee of non-expired United States Design patent No. D429,792 (" '792 patent") entitled "Anti Personnel Projectile," issued on August 22, 2000 (See Exhibit E).

32. Royal Arms' acts of manufacturing, testing, selling and offering for sale the Less Lethal Bean Bag Rounds, infringe the claim of the '792 patent and thereby violate one or more of Combined's exclusive rights under 35 U.S.C. §§ 271 and 289 as the assigned owner of the '792 patent.

33. On information and belief, Royal Arms has had and continues to have actual knowledge that their Less Lethal Bean Bag Rounds are similar to

Combined's '792 patent and uses methods of manufacturing and testing which infringe on the '792 patent.

34. In addition to infringing the claim of the '792 patent directly, Royal Arms has contributorily infringed the '792 patent as evidenced by Royal Arms' sale to others knowing the device will be used in a substantially infringing manner by performing specific steps of the patented method.

35. On information and belief, Royal Arms' acts of infringement of the '792 patent are willful and intentional.

36. Royal Arms' acts of infringement of the claim of the '792 patent are of a continuing nature and have caused and are causing irreparable injury to Combined and will continue unabated unless and until they are enjoined by an Order of this Court.

JURY DEMAND

Combined hereby demands a trial by jury of the causes of action in this Complaint.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff Combined Systems, Inc. prays for entry of judgment against Defendant Royal Arms International, Inc., which decrees, *inter alia*, the following:

a. Royal Arms has infringed and continues to infringe one or more claims of the '086 patent;

b. The infringed claims of the '086 patent are substantially similar to the claims of United States Patent Application Publication No. US2003/0116051 published on June 26, 2003;

c. Combined is awarded damages from June 26, 2003 for Royal Arms' infringement of the '086 patent, including lost profits, totaling an amount

to be proven at trial, and furthermore Combined is entitled to a reasonable royalty for all infringing sales by Royal Arms;

d. Royal Arms has infringed and continues to infringe one or more claims of the '133 patent;

e. Combined is awarded damages from June 29, 2004 for Royal Arms' infringement of the '086 patent, including lost profits, totaling an amount to be proven at trial, and furthermore Combined is entitled to a reasonable royalty for all infringing sales by Royal Arms;

f. Royal Arms has infringed and continues to infringe one or more claims of the '562 patent;

g. Royal Arms has infringed and continues to infringe one or more claims of the '792 patent;

h. Combined receives prejudgment interest in an amount to be proved at trial;

i. Combined is to receive its costs and reasonable attorneys' fees;

j. Combined's damages should be trebled based on Royal Arms' knowing and willful infringement of one or more claims of the '133 patent, the '086 patent, the '562 patent and/or the '792 patent.

k. The case is exceptional;

l. Royal Arms' officers, agents, servants, employees and attorneys, and all those in active concert or participation with them, who received actual notice by personal service or otherwise, be permanently enjoined from infringing one or more claims of the '086 patent, the '133 patent, the '562 patent and/or the '792 patent; and

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m. Any other remedy that the Court deems necessary to fulfill the purposes of justice.

Dated this 11 day of November 2005.

#7886

By _____

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Exhibit A

US006752086B2

(12) **United States Patent**
Kravel et al.

(10) **Patent No.: US 6,752,086 B2**
(45) **Date of Patent: *Jun. 22, 2004**

(54) **METHOD OF PREPARING A LOW LETHALITY ROUND**

(76) Inventors: **Jacob Kravel**, 3 S. Circle Dr., Great Neck, NY (US) 11021; **Michael Brunn**, 308 Littleworth La., Sea Cliff, NY (US) 11579

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **10/304,040**

(22) Filed: **Nov. 21, 2002**

(65) **Prior Publication Data**

US 2003/0116051 A1 Jun. 26, 2003

Related U.S. Application Data

(60) Division of application No. 10/114,726, filed on Apr. 2, 2002, which is a continuation of application No. 09/648,559, filed on Aug. 28, 2000, now Pat. No. 6,374,742, which is a continuation-in-part of application No. 09/434,453, filed on Nov. 5, 1999, now Pat. No. 6,202,562.

(51) **Int. Cl.**[7] **F42B 12/34**; F42B 7/02
(52) **U.S. Cl.** **102/502**; 102/444
(58) **Field of Search** 102/395, 439, 102/444, 498, 502, 529; 244/3.3

(56) **References Cited**

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OTHER PUBLICATIONS

Product Update: 12 Gauge Beam Bag Rounds by Bill Moles Apr. 10, 2000.*

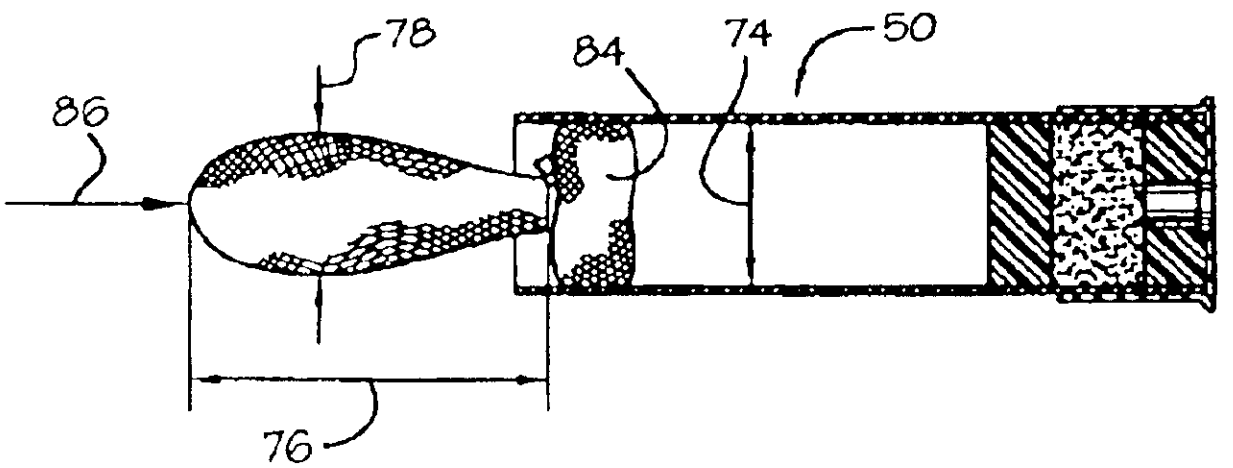
* cited by examiner

Primary Examiner—Michael Carone
Assistant Examiner—James S. Bergin
(74) *Attorney, Agent, or Firm*—Ellis & Venable, P.C.

(57) **ABSTRACT**

An anti-personnel projectile launched from a weapon shell required at impact to have a low lethality consequence, in which the projectile is fitted in the shell in a shape characterized by a blunt end in the direction of flight and maintained in this shape by oppositely directed air resistance and propelling forces to obviate a change of shape during flight that might cause a serious injury.

10 Claims, 1 Drawing Sheet



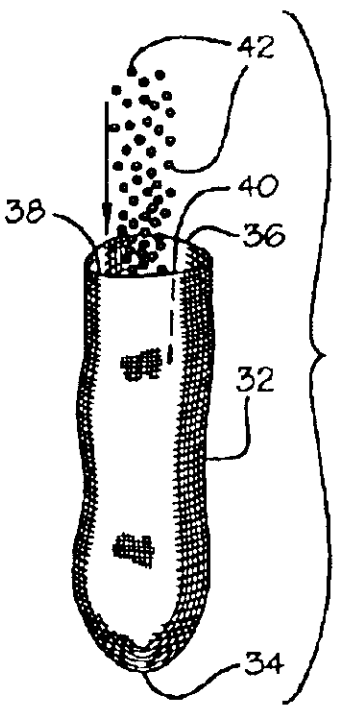


FIG. 1

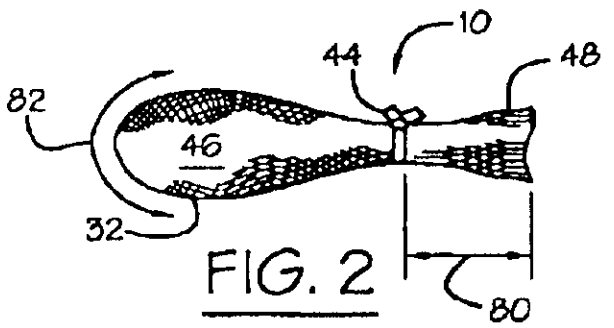


FIG. 2

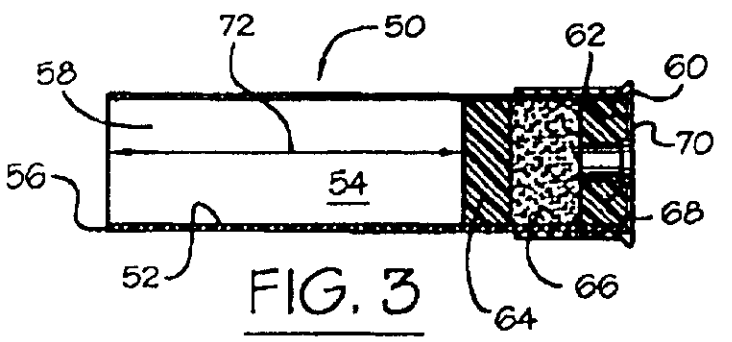


FIG. 3

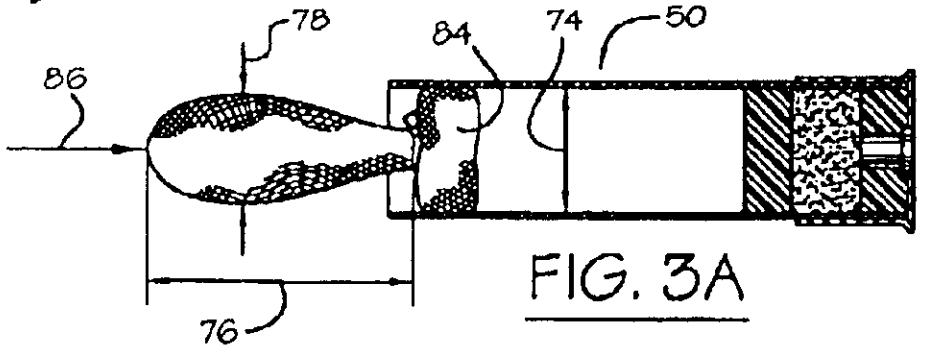


FIG. 3A

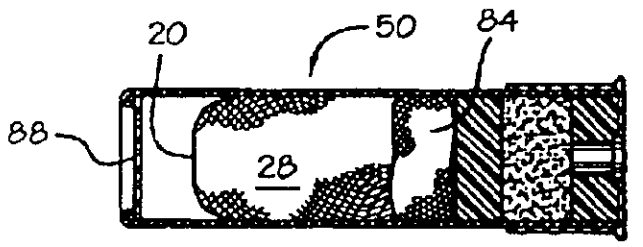


FIG. 3B

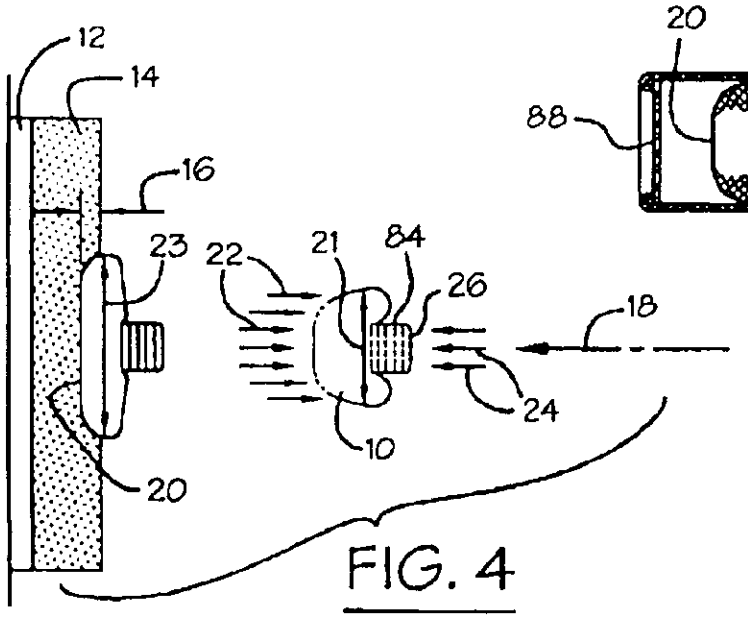


FIG. 4

METHOD OF PREPARING A LOW LETHALITY ROUND

This application is a divisional of earlier filed U.S. application Ser. No. 10/114,726 filed Apr. 8, 2002, which is a continuation application of earlier filed U.S. application Ser. No. 09/648,559 filed Aug. 28, 2000, now U.S. Pat. No. 6,374,742, itself a continuation-in-part of U.S. patent application Ser. No. 09/434,453 filed Nov. 5, 1999, now U.S. Pat. No. 6,202,562.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to projectiles used primarily for low lethality antipersonnel end use, as for example for crowd control by a municipality police force, and more particularly relates to improvements for assuring that a projectile in use will have the requisite low lethality consequence upon impact, and thus avoiding unintentional severe injury to any individual.

2. Discussion of the Related Art

The need for low lethality projectiles is well known in the art, and additionally can be inferred from the promulgation by the National Institute of Justice of low lethality-qualifying standards exemplified by its standard 0101.03 tests. A known projectile which currently is a low lethality munition of choice consists of a flat bag which is folded in half to fit within a 12 gauge shotgun shell, and after exiting from the muzzle is supposed to unfold into a flat bag shape and impact in this flat bag shape upon a target. As such the kinetic energy is distributed over the area of the bag instead of at a point as in regular ammunition. As a consequence there is less of a possibility of an undesirable penetration while permitting the delivery of a desirable incapacitating impact.

The shape of the above described projectile at impact is not always predictable based solely on its construction as a bag, because the bag can be flat at impact only if it unfolds after exiting from the muzzle. However, on numerous occasions in practice it does not unfold and contacts a target with its folded together side edges and thus, with a shape that can, and often does, inflict serious injury. The inability to predict the projectile shape that will contact the target is believed to occur when several shapes are involved such as, in the case of the above described projectile, i.e., a first shape to accommodate the size dimensions to facilitate being loaded into the 12 gauge shotgun shell, and a second shape to achieve a low lethality consequence upon impact.

Logic dictates that the need to change shapes during flight is a happenstance that perhaps most often will occur but which might not occur on occasion due to the shape-change complication.

SUMMARY OF THE INVENTION

Broadly, it is an object of the present invention to provide a low lethality anti-personnel projectile overcoming the foregoing and other shortcomings of the prior art.

More particularly, it is an object to impose a low lethality contacting surface of the projectile at impact by the manner in which it is loaded into a weapon shell, thus requiring no shape change but maintaining in flight the singular shape involved, all as will be better understood as the description proceeds.

The description of the invention which follows, together with the accompanying drawings should not be construed as

limiting the invention to the example shown and described, because those skilled in the art to which this invention appertains will be able to devise other forms thereof within the ambit of the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of a projectile in accordance with the present invention in a work-in-process condition;

FIG. **2** is an elevational view of the constructed projectile preparatory to being loaded into a weapon shell;

FIG. **3** is a longitudinal cross sectional view of an empty weapon shell;

FIGS. **3A** & **3B** are similarly longitudinal cross sectional views, but showing, in sequence, the loading of the projectile of FIG. **2** into the weapon shell of FIG. **3**; and

FIG. **4** is an elevational view showing, in full line, the shape of the projectile at impact, and in phantom perspective, the shape of the projectile in flight.

DESCRIPTION OF AN EMBODIMENT

By way of one example of many to serve as background in understanding the present invention, in police management of an unruly crowd, even kept at bay by a barricade, it often escalates to a confrontation between the police and an individual crossing the barricade, which necessitates management of the individual. It is police standard operating procedure to limit force in such a confrontation commensurate to the danger posed. A first and lowest level of force dictated by the circumstances would be to strike the individual, typically at eight to twenty yards, with a low lethality munition, i.e., a munition that does not kill or seriously maim the individual. If, however, continuing with the example, the individual withdraws a concealed weapon, the use of a lethal munition would be dictated.

To qualify a munition as being of low lethality, and as best understood from FIG. **4**, the projectile **10** is subjected to testing similar to the standard 0101.03 tests used by the National Institute of Justice, which 0101.03 tests to determine the effectiveness of, for example, a "bulletproof vest measures the depth of deformation of a projectile in a known specific type of viscous clay. Thus, in the testing of projectile **10**, there is applied on a target **12**, a selected thickness of said known viscosity of clay **14** and it is required that in the typical range of confrontation that a projectile fired from a weapon (not shown) not penetrate the clay **14** beyond a specified depth **16**, which currently is 40 mm.

Underlying the present invention is the recognition that projectile **10**, although having physical attributes that might disqualify it as low lethality, can be shaped preparatory to being fired along a path of flight **18** to the target **12** with a blunt or flat end **20** and, most important, that this optimum shaped end **20** is effectively maintained during flight **18** by air resistant forces **22** exerted against the front or blunt end **20** of the projectile **10** and the opposite direction flight-propelling forces **24** exerted against the rear end **26** of the projectile **10**. Stated somewhat differently, the opposing forces **22** and **24** maintain an interposed cylindrical shape **28** in the body of the projectile **10**, and this shape **28** is characterized by the noted blunt end **20** and, as a result, does not impact upon the target **12** with a lethal consequence.

In practice in fact, the opposite directional forces **22** and **24** cause the projectile blunt end **20** to undergo a progressive expanse during flight, as noted at **21**, and at impact, as noted at **23**.

To achieve low lethality utility, projectile **10** is constructed using a tubular sock-like body of stretchable fabric

construction material **32** having a closed front end **34** and a rear edge **36** bounding an opening **38** into a body compartment **40**. In a work-in-process condition, as illustrated in FIG. **1**, a deformable mass (e.g. metal shot, rubber pellets, gel packet(s), etc.), individually and collectively designated **42**, is inserted through the opening **38** to partially till the compartment **40**, particularly in the area of the closed end **34**. As best shown in FIG. **2**, the construction of the projectile **10** is completed by a tie or the like, as at **44**, which delineates the deformable mass-filled body **46** from a length portion or tail **48** of the fabric construction material **32**.

To launch or propel the constructed projectile of FIG. **2**, use is made of an empty weapon shell, which in FIG. **3** is selected for illustration to be a 37 mm weapon shell but which also could be a 40 mm, or a 12-gauge weapon shell. The weapon used for the 37 mm shell is in the parlance of munitions a so-called riot or gas gun used by and for law enforcement, and the weapon used for the 40 mm shell, again in the parlance of munitions, is a so-called grenade launcher used by the military. The 37 mm, 40 mm, and 12-gauge weapons and associated shells are hereafter referred to by the designation weapon shell(s).

Each shell is generally designated **50**, and the FIG. **3** illustration thereof having a cylindrical wall **52** bounding a compartment **54**. Wall **52** has a front edge **56** bounding an opening **58** into the compartment **54** and a rear wall **60** serving as a closure for the compartment. Prior to loading the projectile **10** through the front opening **58** and into the compartment **54**, there is positioned in the rear of casing **50** a plastic cap **64** which holds propellant **66** in combustible relation to a primer **68**. In munitions parlance, the plastic cap **64** is generally known as a "wad," "pressure wad," or "gas wad," and functions like a piston, pushing the projectile out of the shell and down the barrel while containing the gasses behind it as well as protecting the projectile **10** against the heat of explosion.

For completeness' sake, it is noted that although the dimensions of the 37 mm weapon shell are well known, that these dimensions as related to the loading of the projectile **10** within the compartment **54** are a compartment length **72** of 3.5 inches with the propellant **66** in place and a diameter **74** of approximately 1.5 inches, and that the 40 mm weapon shell similarly has a compartment length of 3.5 inches, not including the propellant **66**, and a slightly larger diameter. It is noted that in practice best results are achieved with a constructed projectile **10** having a length **76** from its closed end **34** to the applied tie of approximately 4 inches and, flattened by slight finger pressure, a maximum width **78** of approximately 2 inches. The tail **48** is cut to length **80** but preferably should not exceed 4 inches.

The dimensions of the 12-gauge shell are also well known. These dimensions are related to the loading of the projectile **10** within the compartment **54** and are a compartment length **72** of 2 1/16ths inches and a diameter **74** of 3/8ths of an inch. It is noted that best results have been observed with a constructed projectile **10** having a length **76** from its closed end **34** to the applied tie of approximately 1¾ inches and, flattened by slight finger pressure, a maximum width **78** of approximately 1 inch. The tail **48** is cut to length **80** but preferably should not exceed 2½ inches.

The bulk of the FIG. **2** constructed projectile **10** is then manually stuffed through the front opening **58** into the compartment **54** which, not only of course properly positions the projectile **10** for firing, but also reshapes the projectile **10** so it can qualify for low lethality end use. Without this reshaping, the curvature shape **82** of the projectile front end **34** would penetrate the field-testing clay **14** beyond the depth **16**, and thus disqualify the projectile **10** as a low lethality munition.

In the preferred loading sequence of the projectile **10** into the shell compartment **54**, the tail **48** is folded into a resulting bulk, as at **84**, and in this folded configuration is urged in movement **86** into the compartment **54**, as illustrated in FIG. **3**A. Continuing to apply the force **86**, the deformable mass-filled projectile front **34** is worked fully into the compartment **54**, as illustrated in FIG. **3**B, aided by rotational twists of the projectile front end **34** in addition to the longitudinally directed force **86**.

Alternatively, the projectile **10** can be inserted through a funnel (not shown), preferably tail first, and will assume a folded configuration as a result of being compressed between the deformable mass-filled body **32** and the rear confines of the shell **50**. After either loading sequence, the shell front end opening **58** in then closed in a well known fashion by an appropriate closure **88** appropriately seated and held in place in the end opening **58**.

The propellant **66** is then ignited, in a well understood manner, by the primer **68** which, also in a well understood manner, causes the projectile **10** in the shape illustrated in FIG. **3**B and, is characterized by a blunt-shaped front end **20**, reshaped thereinto from a curvature shape **82**, to be launched along a path of movement **18** for eventual impact against the target **12** wherein the forces **22** and **24** maintain the blunt shape of the front end **34** during flight movement **18** and, consequently also at impact.

It should be noted: that force **24** exists as an applied influence on the shaping of the projectile **10** during flight as a result of the reaction to the decelerating force **22**, but not as part of the force causing the projectile **10** to be accelerated down the barrel of the launching weapon which, as generally understood, is a force of the expanding gas phenomenon of the ignited primer **68**, since said expanding gas force ceases when the projectile **10** exits from the weapon barrel.

It is further to be noted that the projectile **10** requires ballast which as hereinbefore noted preferably is to consist of the deformable mass **42** which in practice provides a desired volume, a weight not exceeding 60 grams in the size fabric body **32** noted and is particulate in nature. However, it is to be understood that deformable masses **42** and particulate ballast pellets of materials other than rubber can be used and provide similar projectile weight and volume to achieve a low lethality consequence.

While the apparatus for practicing the within inventive method, as well as said method herein shown and disclosed in detail is fully capable of attaining the objects and providing the advantages hereinbefore stated, it is to be understood that it is merely illustrative of the presently preferred embodiment of the invention and that no limitations are intended to the detail of construction or design herein shown other than as defined in the appended claims.

Although the invention has been described in detail with reference to one or more particular preferred embodiments, persons possessing ordinary skill in the art to which this invention pertains will appreciate that various modifications and enhancements may be made without departing from the spirit and scope of the claims that follow.

What is claimed is:

1. A method of shaping a projectile so as to have a specified low lethality consequence upon impact against an individual, said shaping method comprising the steps of using an empty 12 gauge shotgun shell having a cylindrical wall bounding a projectile compartment and a front edge and

a rear edge at opposite ends of said cylindrical wall respectively bounding a front and a rear opening into said projectile compartment, closing said rear opening of said 12 gauge cartridge shell with projectile-propelling explosive means, using preliminarily an unfilled tubular projectile body of fabric construction material having a closed front end and a rear edge bounding a rear opening thereinto, filling through said rear opening of said tubular projectile body a selected amount of lead shot, constricting said tubular sock-like projectile body forward of said rear opening to close said rear opening thereby forming a tail, inserting said tail of said tubular sock-like projectile body into said projectile compartment front opening, urging in movement said lead shot-filled closed front end of said tubular projectile body fully into said projectile compartment to an extent causing said tail thereof to contact against said closed 12 gauge shotgun shell end and said lead shot-filled closed front end to expand radially into contact with said 12 gauge shotgun shell cylindrical wall so as to assume said cylindrical shape thereof characterized by a blunt front end, whereby upon igniting said projectile-propelling means said tubular projectile body exits from said 12 gauge shotgun shell projectile compartment in said blunt-ended cylindrical shape against a force of air resistance to flight exerted against a front thereof and pushed by a force urging said shape in flight exerted against a rear thereof such that said blunt-ended cylindrical shape is maintained during flight and prior to impact to thereby contribute to a low lethality consequence.

2. The method in claim **1** wherein,

the step of constricting said tubular sock-like projectile body comprises circumferentially constricting said tubular sock-like projectile body.

3. The method in claim **2** wherein,

the step of circumferentially constricting said tubular sock-like projectile body comprises tying.

4. The method in claim **2** wherein,

the step of circumferentially constricting said tubular sock-like projectile body comprises binding.

5. The method in claim **2** wherein,

the step of circumferentially constricting said tubular sock-like projectile body comprises sewing.

6. The method in claim **2** wherein,

the step of circumferentially constricting said tubular sock-like projectile body comprises tying.

7. The method in claim **2** wherein,

the step of circumferentially constricting said tubular sock-like projectile body comprises binding.

8. The method in claim **2** wherein,

the step of circumferentially constricting said tubular sock-like projectile body comprises sewing.

9. A method of shaping a projectile so as to have a specified low lethality consequence upon impact against an individual, said shaping method comprising the steps of using an empty 12 gauge shotgun shell having a cylindrical wall bounding a projectile compartment and a front edge and a rear edge at opposite ends of said cylindrical wall respectively bounding a front and a rear opening into said projectile compartment, closing said rear opening of said 12 gauge cartridge shell with projectile-propelling explosive means, using preliminarily an unfilled tubular projectile body of fabric construction material having a closed front end and a rear edge bounding a rear opening thereinto, filling through said rear opening of said tubular projectile body a selected amount of lead shot, delineating said tubular sock-like projectile body forward of said rear opening to close said rear opening thereby forming a tail, inserting said tail of said tubular sock-like projectile body into said projectile compartment front opening, urging in movement said lead shot-filled closed front end of said tubular projectile body fully into said projectile compartment to an extent causing said tail thereof to contact against said closed 12 gauge shotgun shell end and said lead shot-filled closed front end to expand radially into contact with said 12 gauge shotgun shell cylindrical wall so as to assume said cylindrical shape thereof characterized by a blunt front end, whereby upon igniting said projectile-propelling means said tubular projectile body exits from said 12 gauge shotgun shell projectile compartment in said blunt-ended cylindrical shape against a force of air resistance to flight exerted against a front thereof and pushed by a force urging said shape in flight exerted against a rear thereof such that said blunt-ended cylindrical shape is maintained during flight and prior to impact to thereby contribute to a low lethality consequence.

10. The method in claim **9** wherein,

the step of delineating said tubular sock-like projectile body comprises circumferentially constricting said tubular sock-like projectile body.

* * * * *

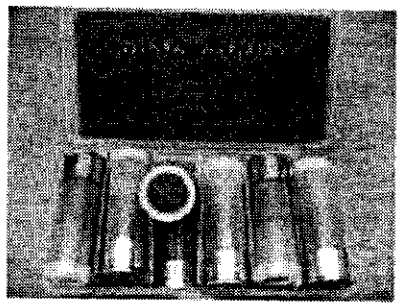
Exhibit B

Tactical Weapons
Breaching Barrels
Door Trainer
Grips & Acces.
Slings
Disruptor Canons
Canon Kits
Ammunition
Igniters
DET Plier
Stands & Acces
Replacement Parts
Tactical
E.O.D.
Breaching
Certified Courses
Shot Trainer
F.A.Q.
FET Form
FET w/ NTOA logo
Buyers Dec
RAI 52.212-3
Web Terms of use
RAI Terms of Sale

AB-50 / PEPPER BANG

Less Lethal - Diversionary Round 180 dB 1.5 Second delay will break Standard pane windows from 20 Yards Used to divert/ent suspects in an area to be cleared

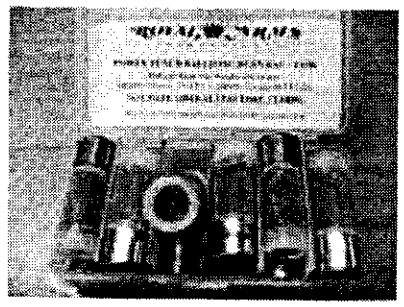
Material: Special Powder Charge in Blue plastic Casing
Velocity: 170 Ft p/sec -18 Barrel
Use: Diversionary - Crowd control
Pepper bang Same as AB-50 with 1 Gram of 5,000,000 S.H.U. O.C. powder added



FLASH BANG #FB-82H

Less Lethal - Diversionary Round **185 dB** will Breach solid wood doors, light Steel, sliders, Car windows and use in crawl spaces

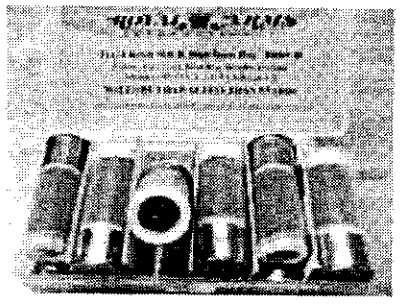
Material: Powder Compressed with two hard fiber wads
Use: Diversionary - Disorientation Breaching - Crowd control
Hearing Protection MUST be worn by team Only to be used in 21" or shorter Cylinder bore Barrel (RAI recommends use of a stand off)



BEAN BAG Low, Med., & High

Less Lethal - round in three levels #BB-L, #BB-M & #BB-h Color Coded

Material: Nylon Bag filled with 50 Grams of lead Shot
Energy: *Low* 66 Ft lbs at 3 feet
Medium 264 lbs at 3 feet
High 396 Ft lbs at 3 feet
Velocity: Low 270 Fps, Med 280, High 325
Use: Disorient, Disarms, and Control Suspect with less liability to department



Royal Sock Bag Low & High

New style Bean bag with tail stabilization for accuracy Made in two Levels BB-RS-L & BB-RS-H Color Coded
Material: Special mesh Bag to flatten upon impact so blunt trauma is not concentrated like other bags.
Energy: *Low* 86 Ft lbs at 3 feet
High 115 Ft lbs at 3 feet
Velocity: Low 250 Fps, High 310 Fps
Use: Disorient, Disarms, and Control Suspect with less liability to department

P.O. Box 6083 • Woodland Hills, CA 91365-6083 • (818) 704-5110 • Fax (818) 887-2059
Website: Http://www.RoyalArms.com • E-mail: Sales@RoyalArms.com

Exhibit C

US006755133B1

(12) **United States Patent**
Brunn et al.

(10) **Patent No.: US 6,755,133 B1**
(45) **Date of Patent: Jun. 29, 2004**

(54) **LOW LETHALITY PROJECTILE FLIGHT SHAPE**

(76) Inventors: **Michael Brunn**, 308 Littleworth La., Sea Cliff, NY (US) 11579; **Jacob Kravel**, 3 S. Cir. Dr., Great Neck, NY (US) 11021

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 90 days.

(21) Appl. No.: **10/114,726**

(22) Filed: **Apr. 2, 2002**

Related U.S. Application Data

(63) Continuation of application No. 09/648,559, filed on Aug. 28, 2000, now Pat. No. 6,374,742, which is a continuation-in-part of application No. 09/434,453, filed on Nov. 5, 1999, now Pat. No. 6,202,562.

(51) **Int. Cl.**[7] **F42B 12/34**; F42B 7/02
(52) **U.S. Cl.** **102/502**; 102/444
(58) **Field of Search** 102/395, 439, 102/444, 498, 502, 529; 244/3.3

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6,374,742	B1	*	4/2002	Brunn et al.	102/502

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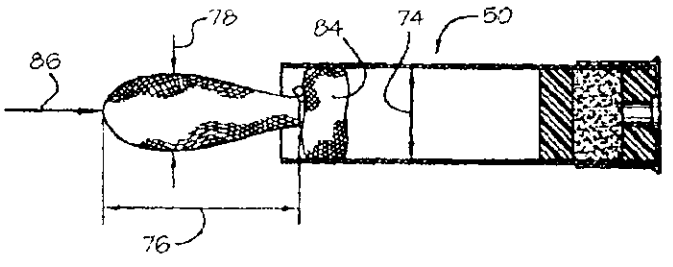
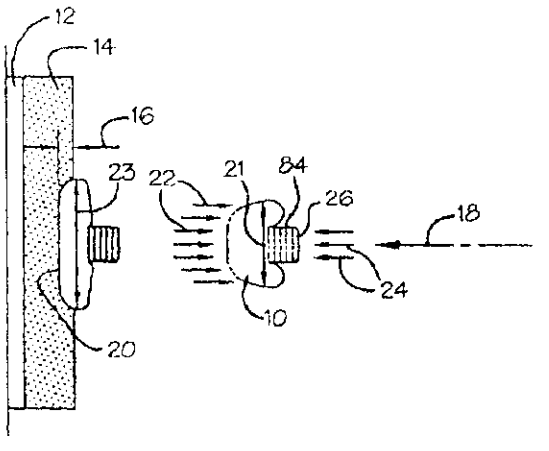
Primary Examiner—Michael J. Carone
Assistant Examiner—James S. Bergin
(74) *Attorney, Agent, or Firm*—Ellis & Venable, P.C

(57) **ABSTRACT**

An anti-personnel projectile launched from a weapon shell required at impact to have a low lethality consequence, in which the projectile is fitted in the shell in a shape characterized by a blunt end in the direction of flight and maintained in this shape by oppositely directed air resistance and propelling forces to obviate a change of shape during flight that might cause a serious injury.

11 Claims, 1 Drawing Sheet





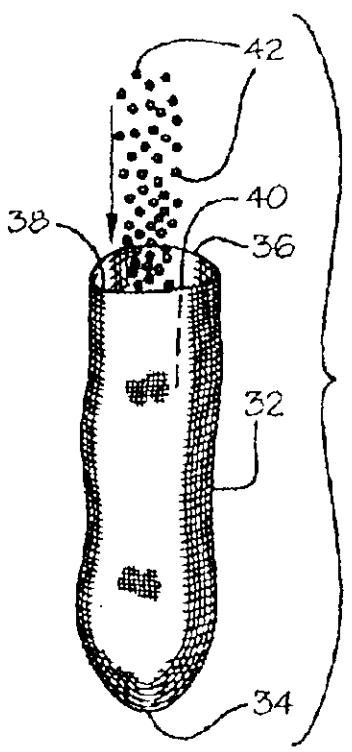


FIG. 1

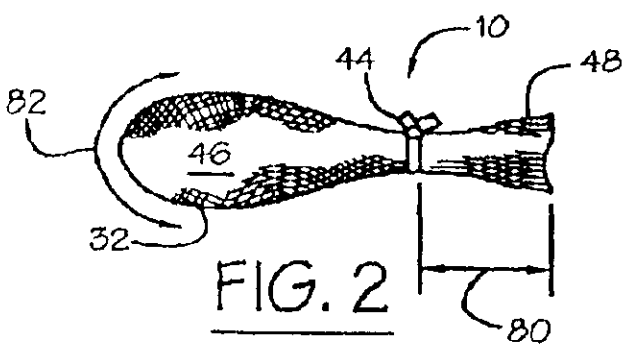


FIG. 2

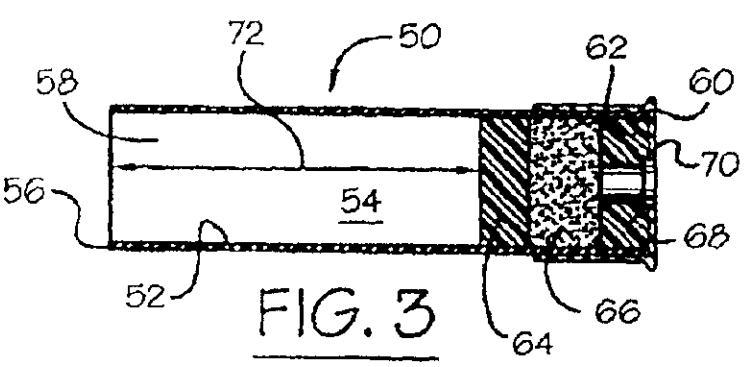


FIG. 3

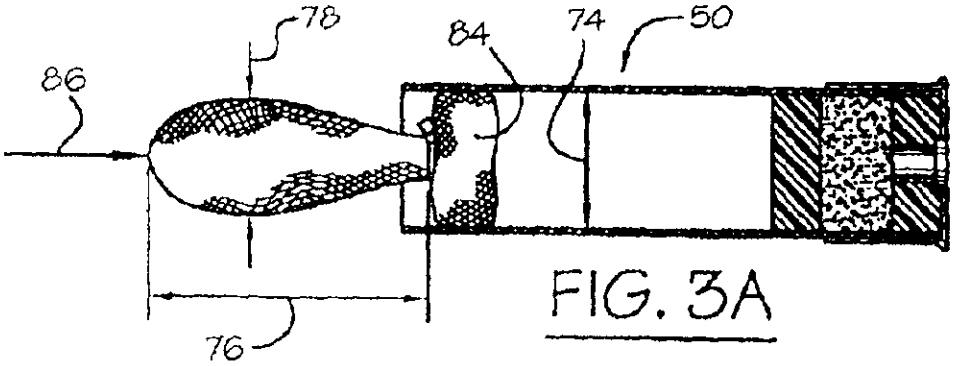


FIG. 3A

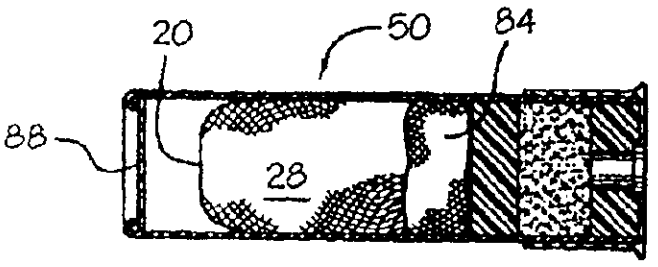


FIG. 3B

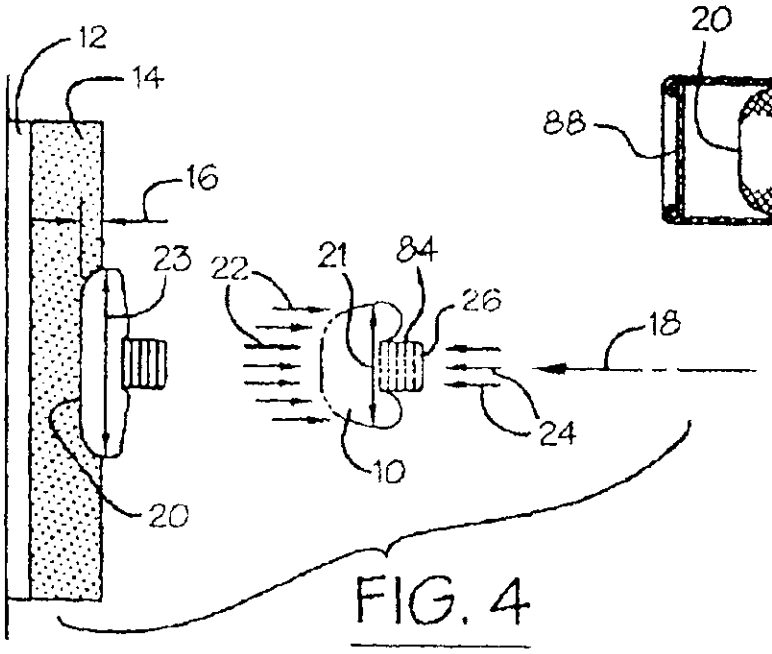


FIG. 4

LOW LETHALITY PROJECTILE FLIGHT SHAPE

This application is a continuation of earlier filed U.S. application Ser. No. 09/648,559 filed Aug. 28, 2000, now U.S. Pat. No. 6,374,742, itself a continuation-in-part of U.S. patent application Ser. No. 09/434,453 filed Nov. 5, 1999, now U.S. Pat. No. 6,202,562.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to projectiles used primarily for low lethality antipersonnel end use, as for example for crowd control by a municipality police force, and more particularly relates to improvements for assuring that a projectile in use will have the requisite low lethality consequence upon impact, and thus avoiding unintentional severe injury to any individual.

2. Discussion of the Related Art

The need for low lethality projectiles is well known in the art, and additionally can be inferred from the promulgation by the National Institute of Justice of low lethality-qualifying standards exemplified by its standard 0101.03 tests. A known projectile which currently is a low lethality munition of choice consists of a flat bag which is folded in half to fit within a 12 gauge shotgun shell, and after exiting from the muzzle is supposed to unfold into a flat bag shape and impact in this flat bag shape upon a target. As such the kinetic energy is distributed over the area of the bag instead of at a point as in regular ammunition. As a consequence there is less of a possibility of an undesirable penetration while permitting the delivery of a desirable incapacitating impact.

The shape of the above described projectile at impact is not always predictable based solely on its construction as a bag, because the bag can be flat at impact only if it unfolds after exiting from the muzzle. However, on numerous occasions in practice it does not unfold and contacts a target with its folded together side edges and thus, with a shape that can, and often does, inflict serious injury. The inability to predict the projectile shape that will contact the target is believed to occur when several shapes are involved such as, in the case of the above described projectile, i.e., a first shape to accommodate the size dimensions to facilitate being loaded into the 12 gauge shotgun shell, and a second shape to achieve a low to lethality consequence upon impact.

Logic dictates that the need to change shapes during flight is a happenstance that perhaps most often will occur but which might not occur on occasion due to the shape-change complication.

SUMMARY OF THE INVENTION

Broadly, it is an object of the present invention to provide a low lethality anti-personnel projectile overcoming the foregoing and other shortcomings of the prior art.

More particularly, it is an object to impose a low lethality contacting surface of the projectile at impact.

The description of the invention which follows, together with the accompanying drawings should not be construed as limiting the invention to the example shown and described, because those skilled in the art to which this invention appertains will be able to devise other forms thereof within the ambit of the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a projectile in accordance with the present invention in a work-in-process condition;

FIG. 2 is an elevational view of the constructed projectile preparatory to being loaded into a weapon shell;

FIG. 3 is a longitudinal cross sectional view of an empty weapon shell;

FIGS. 3A & 3B are similarly longitudinal cross sectional views, but showing, in sequence, the loading of the projectile of FIG. 2 into the weapon shell of FIG. 3; and

FIG. 4 is an elevational view showing, in full line, the shape of the projectile at impact, and in phantom perspective, the shape of the projectile in flight.

DESCRIPTION OF AN EMBODIMENT

By way of one example of many to serve as background in understanding the present invention, in police management of an unruly crowd, even kept at bay by a barricade, it often escalates to a confrontation between the police and an individual crossing the barricade, which necessitates management of the individual. It is police standard operating procedure to limit force in such a confrontation commensurate to the danger posed. A first and lowest level of force dictated by the circumstances would be to strike the individual, typically at eight to twenty yards, with a low lethality munition, i.e., a munition that does not kill or seriously maim the individual. If, however, continuing with the example, the individual withdraws a concealed weapon, the use of a lethal munition would be dictated.

To qualify a munition as being of low lethality, and as best understood from FIG. **4**, the projectile **10** is subjected to testing similar to the standard 0101.03 tests used by the National Institute of Justice, which 0101.03 tests to determine the effectiveness of, for example, a "bulletproof vest measures the depth of deformation of a projectile in a known specific type of viscous clay. Thus, in the testing of projectile **10**, there is applied on a target **12**, a selected thickness of said known viscosity of clay **14** and it is required that in the typical range of confrontation that a projectile fired from a weapon (not shown) not penetrate the clay **14** beyond a specified depth **16**, which currently is 40 mm.

Underlying the present invention is the recognition that projectile **10**, although having physical attributes that might disqualify it as low lethality, can be shaped preparatory to being fired along a path of flight **18** to the target **12** with a blunt or flat end **20** and, most important, that this optimum shaped end **20** is effectively maintained during flight **18** by air resistant forces **22** exerted against the front or blunt end **20** of the projectile **10** and the opposite direction flight-propelling forces **24** exerted against the rear end **26** of the projectile **10**. Stated somewhat differently, the opposing forces **22** and **24** maintain an interposed cylindrical shape **28** in the body of the projectile **10**, and this shape **28** is characterized by the noted blunt end **20** and, as a result, does not impact upon the target **12** with a lethal consequence.

In practice in fact, the opposite directional forces **22** and **24** cause the projectile blunt end **20** to undergo a progressive expanse during flight, as noted at **21**, and at impact, as noted at **23**.

To achieve low lethality utility, projectile **10** is constructed using a tubular sock-like body of stretchable fabric construction material **32** having a closed front end **34** and a rear edge **36** bounding an opening **38** into a body compartment **40**. In a work-in-process condition, as illustrated in FIG. **1**, a deformable mass (e.g. metal shot, rubber pellets, gel packet(s), etc.), individually and collectively designated **42**, is inserted through the opening **38** to partially fill the compartment **40**, particularly in the area of the closed end **34**. As best shown in FIG. **2**, the construction of the

projectile **10** is completed by a tie or the like, as at **44**, which delineates the deformable mass-filled body **46** from a length portion or tail **48** of the fabric construction material **32**.

To launch or propel the constructed projectile of FIG. **2**, use is made of an empty weapon shell, which in FIG. **3** is selected for illustration to be a 12-gauge weapon shell but which also could be a 40 mm, or a 37 mm weapon shell. The weapon used for the 37 mm shell is in the parlance of munitions a so-called riot or gas gun used by and for law enforcement, and the weapon used for the 40 mm shell, again in the parlance of munitions, is a so-called grenade launcher used by the military. The 37 mm, 40 mm, and 12-gauge weapons and associated shells are hereafter referred to by the designation weapon shell(s).

Each shell is generally designated **50**, and the FIG. **3** illustration thereof having a cylindrical wall **52** bounding a compartment **54**. Wall **52** has a front edge **56** bounding an opening **58** into the compartment **54** and a rear wall **60** serving as a closure for the compartment. Prior to loading the projectile **10** through the front opening **58** and into the compartment **54**, there is positioned in the rear of casing **50** a plastic cap **64** which holds propellant **66** in combustible relation to a primer **68**. In munitions parlance, the plastic cap **64** is generally known as a "wad," "pressure wad," or "gas wad," and functions like a piston, pushing the projectile out of the shell and down the barrel while containing the gasses behind it as well as protecting the projectile **10** against the heat of explosion.

For completeness' sake, it is noted that although the dimensions of the 37 mm weapon shell are well known, that these dimensions as related to the loading of the projectile **10** within the compartment **54** are a compartment length **72** of 3.5 inches with the propellant **66** in place and a diameter **74** of approximately 1.5 inches, and that the 40 mm weapon shell similarly has a compartment length of 3.5 inches, not including the propellant **66**, and a slightly larger diameter. It is noted that in practice best results are achieved with a constructed projectile **10** having a length **76** from its closed end **34** to the applied tie of approximately 4 inches and, flattened by slight finger pressure, a maximum width **78** of approximately 2 inches. The tail **48** is cut to length **80** but preferably should not exceed 4 inches.

The dimensions of the 12-gauge shell are also well known. These dimensions are related to the loading of the projectile **10** within the compartment **54** and are a compartment length **72** of 2 $^{1}/_{16}$ths inches and a diameter **74** of $^{9}/_{8}$ths of an inch. It is noted that best results have been observed with a constructed projectile **10** having a length **76** from its closed end **34** to the applied tie of approximately 1¾ inches and, flattened by slight finger pressure, a maximum width **78** of approximately 1 inch. The tail **48** is cut to length **80** but preferably should not exceed 2½ inches.

The bulk of the FIG. **2** constructed projectile **10** is then manually stuffed through the front opening **58** into the compartment **54** which, not only of course properly positions the projectile **10** for firing, but also reshapes the projectile **10** so it can qualify for low lethality end use. Without this reshaping, the curvature shape **82** of the projectile front end **34** would penetrate the field-testing clay **14** beyond the depth **16**, and thus disqualify the projectile **10** as a low lethality munition.

In the preferred loading sequence of the projectile **10** into the shell compartment **54**, the tail **48** is folded into a resulting bulk, as at **84**, and in this folded configuration is urged in movement **86** into the compartment **54**, as illustrated in FIG. **3**A. Continuing to apply the force **86**, the deformable mass-filled projectile front **34** is worked fully into the compartment **54**, as illustrated in FIG. **3**B, aided by rotational twists of the projectile front end **34** in addition to the longitudinally directed force **86**.

Alternatively, the projectile **10** can be inserted through a funnel (not shown); preferably tail first, and will assume a folded configuration as a result of being compressed between the deformable mass-filled body **32** and the rear confines of the shell **50**. After either loading sequence, the shell front end opening **58** in then closed in a well known fashion by an appropriate closure **88** appropriately seated and held in place in the end opening **58**.

The propellant **66** is then ignited, in a well understood manner, by the primer **68** which, also in a well understood manner, causes the projectile **10** in the shape illustrated in FIG. **3**B and is characterized by a blunt-shaped front end **20**, reshaped thereinto from a curvature shape **82**, to be launched along a path of movement **18** for eventual impact against the target **12** wherein the forces **22** and **24** maintain the blunt shape of the front end **34** during flight movement **18** and, consequently also at impact.

It should be noted that force **24** exists as an applied influence on the shaping of the projectile **10** during flight as a result of the reaction to the decelerating force **22**, but not as part of the force causing the projectile **10** to be accelerated down the barrel of the launching weapon which, as generally understood, is a force of the expanding gas phenomenon of the ignited primer **68**, since said expanding gas force ceases when the projectile **10** exits from the weapon barrel.

It is further to be noted that the projectile **10** requires ballast which as hereinbefore noted preferably is to consist of the deformable mass **42** which in practice provides a desired volume, a weight not exceeding 60 grams in the size fabric body **32** noted and is particulate in nature. However, it is to be understood that deformable masses **42** and particulate ballast pellets of materials other than rubber can be used and provide similar projectile weight and volume to achieve a low lethality consequence.

While the apparatus for practicing the within inventive method, as well as said method herein shown and disclosed in detail is fully capable of attaining the objects and providing the advantages hereinbefore stated, it is to be understood that it is merely illustrative of the presently preferred embodiment of the invention and that no limitations are intended to the detail of construction or design herein shown other than as defined in the appended claims.

Although the invention has been described in detail with reference to one or more particular preferred embodiments, persons possessing ordinary skill in the art to which this invention pertains will appreciate that various modifications and enhancements may be made without departing from the spirit and scope of the claims that follow.

What is claimed is:

1. A low-lethality projectile that exhibits a low-lethality flight shape after the projectile is propelled out of a weapon shell, the projectile comprising a pliable tubular body having a closed front end and a rear edge bounding an opening into a body compartment into which an amount of lead shot is inserted prior to closure of the body compartment, the low-lethality flight shape comprising:

a blunt projectile front end portion augmented by substantially parallel opposing forces of air resistance and opposite post ignition propelling force; and

a tail portion that is narrow relative to the blunt projectile front end portion and substantially cylindrically shaped.

2. The low-lethality projectile flight shape in claim 1 wherein,

the blunt projectile front end portion comprises the closed front end.

3. The low-lethality projectile flight shape in claim 1 wherein,

the tail end portion comprises at least the rear edge of the projectile.

4. The low-lethality projectile flight shape in claim 1 wherein,

a constriction of the liable tubular body closes the body compartment and delineates the blunt projectile front end portion from the tail portion.

5. The low-lethality projectile flight shape in claim 4 wherein,

the constriction is formed by a tie around the pliable tubular body.

6. The low-lethality projectile flight shape in claim 1 wherein,

the weapon shell is a 12-gauge shell.

7. A low-lethality projectile that exhibits a low-lethality flight shape after the projectile is propelled out of a weapon shell, the projectile comprising a pliable tubular body having a closed front end and a rear edge bounding an opening into a body compartment into which an amount of lead shot is inserted prior to closure of the body compartment, the low-lethality flight shape comprising:

a blunt projectile front end portion maintained by substantially parallel opposing forces of air resistance and opposite post ignition propelling force; and

a tail portion that is narrow relative to the blunt projectile front end portion and substantially cylindrically shaped.

8. The low-lethality projectile flight shape in claim 7 wherein,

the blunt projectile front end portion comprises the closed front end.

9. The low-lethality projectile flight shape in claim 7 wherein,

the tail end portion comprises at least the rear edge of the projectile.

10. The low-lethality projectile flight shape in claim 7 wherein,

a constriction of the pliable tubular body closes the body compartment and delineates the blunt projectile front end portion from the tail portion.

11. The low-lethality projectile flight shape in claim 10 wherein,

the constriction is formed by a tie around the pliable tubular body.

* * * * *

Exhibit D

US006202562B1

(12) **United States Patent**
Brunn et al.

(10) **Patent No.: US 6,202,562 B1**
(45) **Date of Patent: Mar. 20, 2001**

(54) **METHOD OF PREPARING A LOW LETHALITY PROJECTILE FOR FLIGHT**

(76) Inventors: **Michael Brunn**, 308 Littleworth La., Sea Cliff, NY (US) 11579; **Jacob Kravel**, 2 S. Circle Dr., Great Neck, NY (US) 11021

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/434,453**

(22) Filed: **Nov. 5, 1999**

(51) **Int. Cl.**[7] **F42B 7/02**; F42B 12/34
(52) **U.S. Cl.** **102/502**; 102/293
(58) **Field of Search** 102/293, 400, 102/502

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5,450,795 * 9/1995 Adelman 102/444

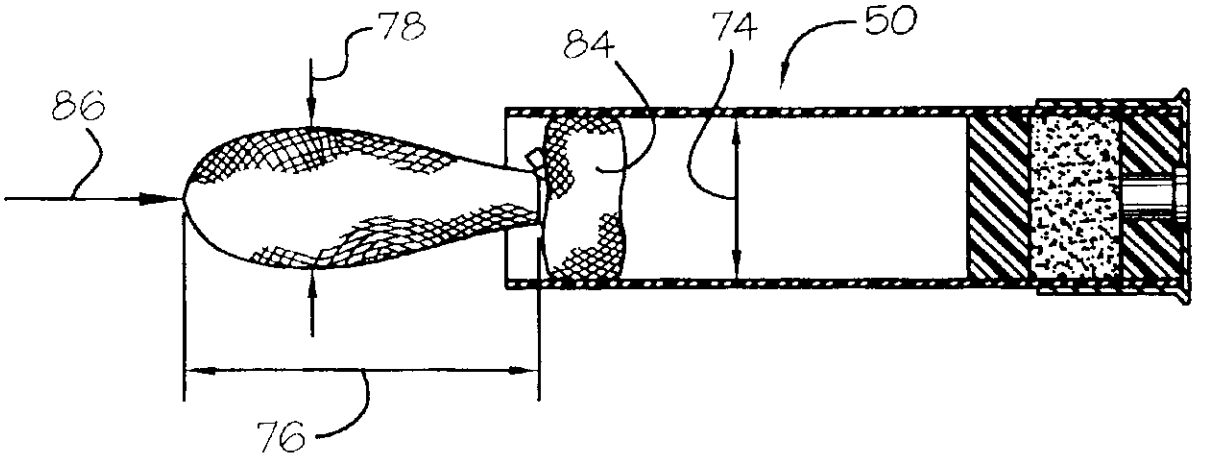
* cited by examiner

Primary Examiner—Charles T. Jordan
Assistant Examiner—Kimberly Smith
(74) *Attorney, Agent, or Firm*—Myron Amer P.C.

(57) **ABSTRACT**

An anti-personnel projectile launched from a 12 gauge shotgun shell required at impact to have a low lethality consequence, in which the projectile is fitted in the shell in a shape characterized by a blunt end in the direction of flight and maintained in this shape by oppositely directed air resistance and propelling forces to obviate a change of shape during flight that might cause a serious injury.

1 Claim, 1 Drawing Sheet



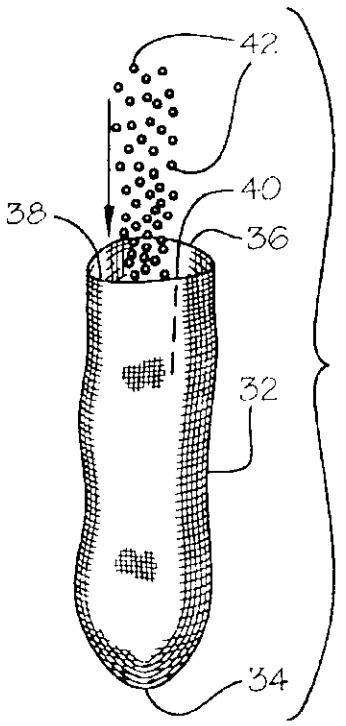


FIG. 1

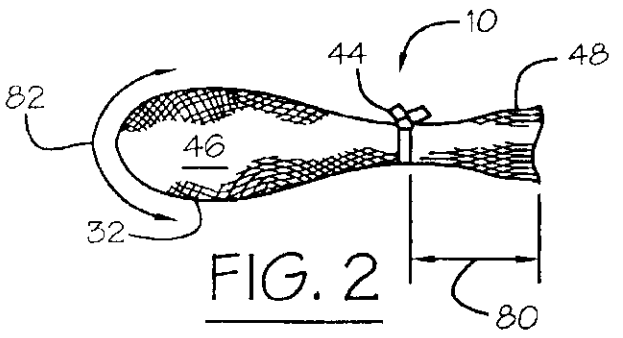


FIG. 2

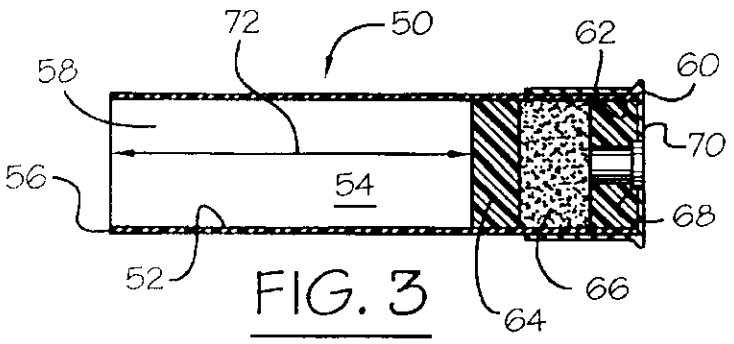


FIG. 3

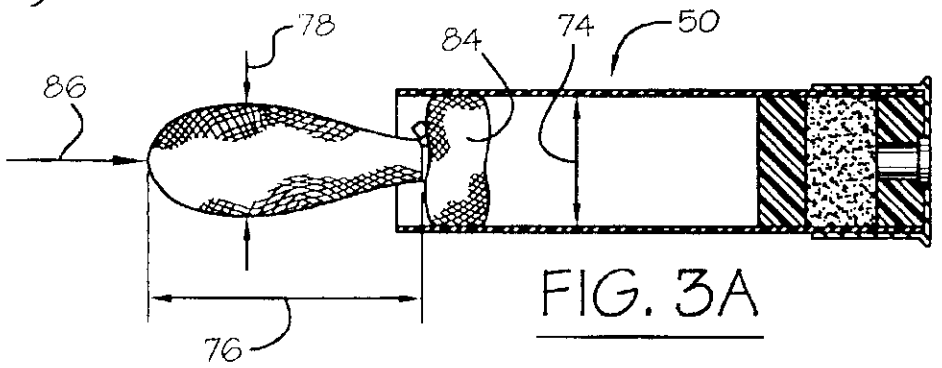


FIG. 3A

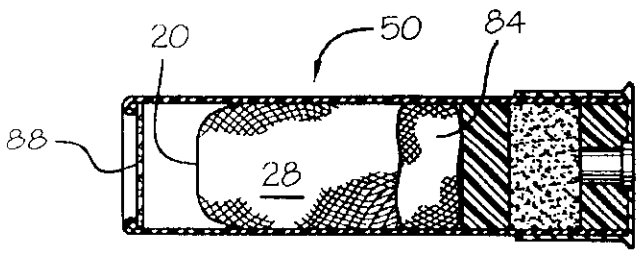


FIG. 3B

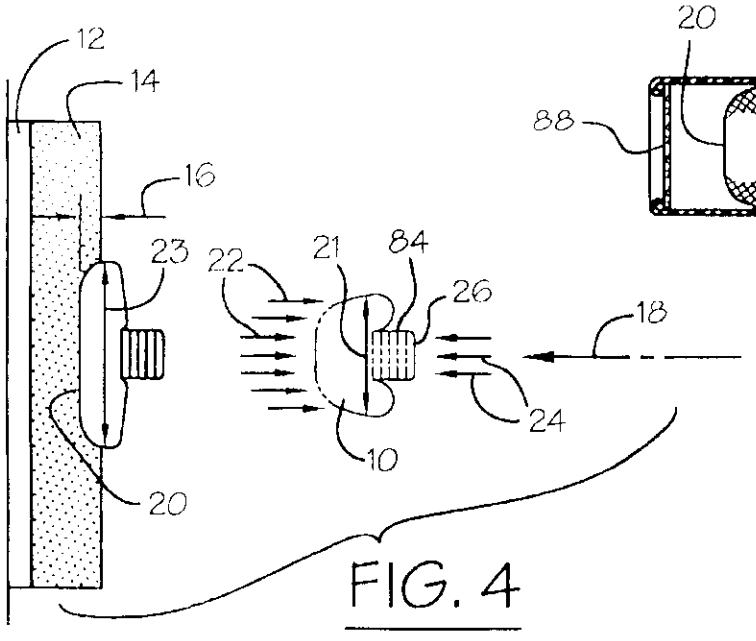


FIG. 4

METHOD OF PREPARING A LOW LETHALITY PROJECTILE FOR FLIGHT

The present invention relates generally to projectiles used primarily for low lethality anti-personnel end use, as for example for crowd control by a municipality police force, and more particularly relates to improvements for assuring that a projectile in use will have the requisite low lethality consequence upon impact, and thus avoiding unintentional severe injury to any individual.

EXAMPLE OF THE PRIOR ART

The need for low lethality projectiles is well known in the art, and additionally can be inferred from the promulgation by the National Institute of Justice of low lethality-qualifying standards exemplified by its standard 0101.03 tests. A known projectile which currently is a low lethality munition of choice consists of a flat bag which is folded in half to fit within a 12 gauge shotgun shell, and after exiting from the muzzle is supposed to unfold into a flat bag shape and impact in this flat bag shape upon a target. As such the kinetic energy is distributed over the area of the bag instead of at a point as in regular ammunition. As a consequence there is less of a possibility of an undesirable penetration while permitting the delivery of a desirable incapacitating impact.

The shape of the above described projectile at impact is not always predictable based solely on its construction as a bag, because the bag can be flat at impact only if it unfolds after exiting from the muzzle. However, on numerous occasions in practice it does not unfold and contacts a target with its folded together side edges and thus, with a shape that can, and often does, inflict serious injury. The inability to predict the projectile shape that will contact the target is believed to occur when several shapes are involved such as, in the case of the above described projectile, i.e., a first shape to accommodate the size dimensions to facilitate being loaded into the 12 gauge shotgun shell, and a second shape to achieve a low lethality consequence upon impact. Logic dictates that the need to change shapes during flight is a happenstance that perhaps most often will occur but which might not occur on occasion due to the shape-change complication.

Broadly, it is an object of the present invention to provide a low lethality anti-personnel projectile overcoming the foregoing and other shortcomings of the prior art.

More particularly, it is an object to impose a low lethality contacting surface of the projectile at impact by the manner in which it is loaded into the 12 gauge shotgun shell, thus requiring no shape change but maintaining in flight the singular shape involved, all as will be better understood as the description proceeds.

The description of the invention which follows, together with the accompanying drawings should not be construed as limiting the invention to the example shown and described, because those skilled in the art to which this invention appertains will be able to devise other forms thereof within the ambit of the appended claims.

FIG. **1** is a perspective view of a projectile in accordance with the present invention in a work-in-process condition;

FIG. **2** is an elevational view of the constructed projectile preparatory to being loaded into a 12 gauge shotgun shell;

FIG. **3** is a longitudinal cross sectional view of an empty 12 gauge shotgun shell;

FIGS. **3**A and **3**B are similarly longitudinal cross sectional views, but showing, in sequence, the loading of the projectile of FIG. **2** into the 12 gauge shotgun shell of FIG. **3**; and

FIG. **4** is an elevational view showing, in full line, the shape of the projectile at impact, and in phantom perspective, the shape of the projectile in flight.

By way of one example of many to serve as background in understanding the present invention, in police management of an unruly crowd, even kept at bay by a barricade, it often escalates to a confrontation between the police and an individual crossing the barricade, which necessitates management of the individual. It is police standard operating procedure to limit force in such a confrontation commensurate to the danger posed. A first and lowest level of force dictated by the circumstances would be to strike the individual, typically at eight to twenty yards, with a low lethality munition, i.e., a munition that does not kill or seriously maim the individual. If, however, continuing with the example, the individual withdraws a concealed weapon, the use of a lethal munition would be dictated.

To qualify a munition as being of low lethality, and as best understood from FIG. **4**, the projectile **10** is subjected to testing similar to the standard 0101.03 tests used by the National Institute of Justice, which 0101.03 tests to determine the effectiveness of, for example, a "bulletproof" vest measures the depth of deformation of a projectile in a known specific type of viscous clay. Thus, in the testing of projectile **10**, there is applies on a target **12**, a selected thickness of said known viscosity of clay **14** and it is required that in the typical range of confrontation that a projectile fired from a shotgun (not shown) not penetrate the clay **14** beyond a specified depth **16**, which currently is 40 mm.

Underlying the present invention is the recognition that projectile **10**, although having physical attributes that might disqualify it as low lethality, can be shaped preparatory to being fired along a path of flight **18** to the target **12** with a blunt or flat end **20** and, most important, that this optimum shaped end **20** is effectively maintained during flight **18** by air resistant forces **22** exerted against the front or blunt end **20** of the projectile **10** and the opposite direction flight-propelling forces **24** exerted against the rear end **26** of the projectile **10**. Stated somewhat differently, the opposing forces **22** and **24** maintain an interposed cylindrical shape **28** in the body of the projectile **10**, and this shape **28** is characterized by the noted blunt end **20** and, as a result, does not impact upon the target **12** with a lethal consequence. In practice in fact, the opposite directional forces **22** and **24** cause the projectile blunt end **20** to undergo a progressive expanse during flight, as noted at **21**, and at impact, as noted at **23**.

To achieve low lethality utility, projectile **10** is constructed using a tubular sock-like body of fabric construction material **32** having a closed front end **34** and a rear edge **36** bounding an opening **38** into a body compartment **40**. In a work-in-process condition, as illustrated in FIG. **1**, a selected amount of lead shot, individually and collectively designated **42**, is inserted through the opening **38** to partially fill the compartment **40**, particularly in the area of the closed end **34**. As best shown in FIG. **2**, the construction of the projectile **10** is completed by a tie or the like, as at **44**, which delineates the lead shot-filled body **46** from a length portion or tail **48** of the fabric construction material **32**.

To launch or propel the constructed projectile of FIG. **2**, use is made of an empty 12 gauge shotgun shell, generally designated **50**, having a cylindrical wall **52** bounding a compartment **54**. Wall **52** has a front edge **56** bounding an opening **58** into the compartment **54** and a rear edge **60** also bounding an opening **62** into the compartment. Prior to loading the projectile **10** through the front opening **58** and

into the compartment **54**, the rear opening **62** is closed by a sandwiched arrangement of a wad **64** which holds in place propellant **66** in combustible relation to a primer **68**, and a brass cap **70**.

For completeness' sake, it is noted that although the dimensions of the 12 gauge shotgun shell are well known, that these dimensions as related to the loading of the projectile **10** within the compartment **54** are a compartment length **72** of 2⅛ inches and a diameter **74** of ⅜ of an inch.

Similarly for completeness' sake, it is noted that in practice best results are achieved with a constructed projectile **10** having a length **76** from its closed end **34** to the applied tie of approximately 1¾ inches and, flattened by slight finger pressure, a maximum width **78** of approximately 1 inch. The tail **48** is cut to length **80** but preferably should not exceed 2½ inches.

The bulk of the FIG. 2 constructed projectile **10** is then manually stuffed through the front opening **58** into the compartment **54** which, not only of course properly positions the projectile **10** for firing, but also reshapes the projectile **10** so it can qualify for low lethality end use. Without this reshaping, the curvature shape **82** of the projectile front end **34** would penetrate the field-testing clay **14** beyond the depth **16**, and thus disqualify the projectile **10** as a low lethality munition.

In the loading of the projectile **10** into the cartridge compartment **54**, the tail **48** is folded into a resulting bulk, as at **84**, and in this folded configuration is urged in movement **86** into the compartment **54**, as illustrated in FIG. **3**A. Continuing to apply the force **86**, the lead-filled projectile front **34** is worked fully into the compartment **54**, as illustrated in FIG. **3**B, aided by rotational twists of the projectile front end **34** in addition to the longitudinally directed force **86**. The cartridge front end opening **58** in then closed in a well known fashion by an appropriate closure **88** appropriately seated and held in place in the end opening **58**.

The propellant **66** is then ignited, in a well understood manner, by the primer **68** which, also in a well understood manner, causes the projectile **10** in the shape illustrated in FIG. **3**B and is characterized by a blunt-shaped front end **34**, reshaped thereinto from a curvature shape **82**, to be launched along a path of movement **18** for eventual impact against the target **12** wherein the forces **22** and **24** maintain the blunt shape of the front end **34** during flight movement **18** and, consequently also at impact.

While the apparatus for practicing the within inventive method, as well as said method herein shown and disclosed in detail is fully capable of attaining the objects and providing the advantages hereinbefore stated, it is to be understood that it is merely illustrative of the presently preferred embodiment of the invention and that no limitations are intended to the detail of construction or design herein shown other than as defined in the appended claims.

What is claimed is:

1. A method of shaping a projectile so as to have a specified low lethality consequence upon impact against an individual, said shaping method comprising the steps of using an empty 12 gauge shotgun shell having a cylindrical wall bounding a projectile compartment and a front edge and a rear edge at opposite ends of said cylindrical wall respectively bounding a front and a rear opening into said projectile compartment, closing said rear opening of said 12 gauge cartridge shell with projectile-propelling explosive means, using preliminarily an unfilled tubular sock-like projectile body of fabric construction material having a closed front end and a rear edge bounding a rear opening thereinto, filling through said rear opening of said tubular sock-like projectile body a selected amount of lead shot to assume a position therein against said closed end, forming folds in said tubular sock-like projectile body immediately forward of said rear opening thereof, inserting said formed folds of said tubular sock-like projectile body into said projectile compartment front opening, urging in movement said lead shot-filled closed front end of said tubular sock-like projectile body fully into said projectile compartment to an extent causing said formed folds thereof into firm contact against a said closed 12 gauge shotgun shell end and said lead shot-filled closed front end to expand radially into contact with said 12 gauge shotgun shell cylindrical wall so as to assume said cylindrical shape thereof characterized by a blunt front end, and igniting said projectile-propelling means, whereby said tubular sock-like projectile body exits from said 12 gauge shotgun shell projectile compartment in said blunt-ended cylindrical shape against a force of air resistance to flight exerted against a front thereof and pushed by a force urging said shape in flight exerted against a rear thereof such that said blunt-ended cylindrical shape is maintained during flight and at impact to thereby contribute to a low lethality consequence.

* * * * *

Exhibit E

US00D429792S

United States Patent [19]

Brunn et al.

[11] **Patent Number: Des. 429,792**

[45] **Date of Patent: ** Aug. 22, 2000**

[54] **ANTI PERSONNEL PROJECTILE**

[76] Inventors: **Michael Brunn**, 308 Littleworth La., Sea Cliff, N.Y. 11579; **Jacob Kravel**, 3 S. Circle Dr., Great Neck, N.Y. 11021

[**] Term: **14 Years**

[21] Appl. No.: **29/114,031**

[22] Filed: **Nov. 17, 1998**

[51] **LOC (7) Cl.** **22-03**

[52] **U.S. Cl.** **D22/115**; D22/100; D22/116; D22/199

[58] **Field of Search** D22/100, 114, D22/115, 199; 102/502

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Primary Examiner—Louis S. Zarfas
Assistant Examiner—Monica A. Weingart
Attorney, Agent, or Firm—Myron Amer PC

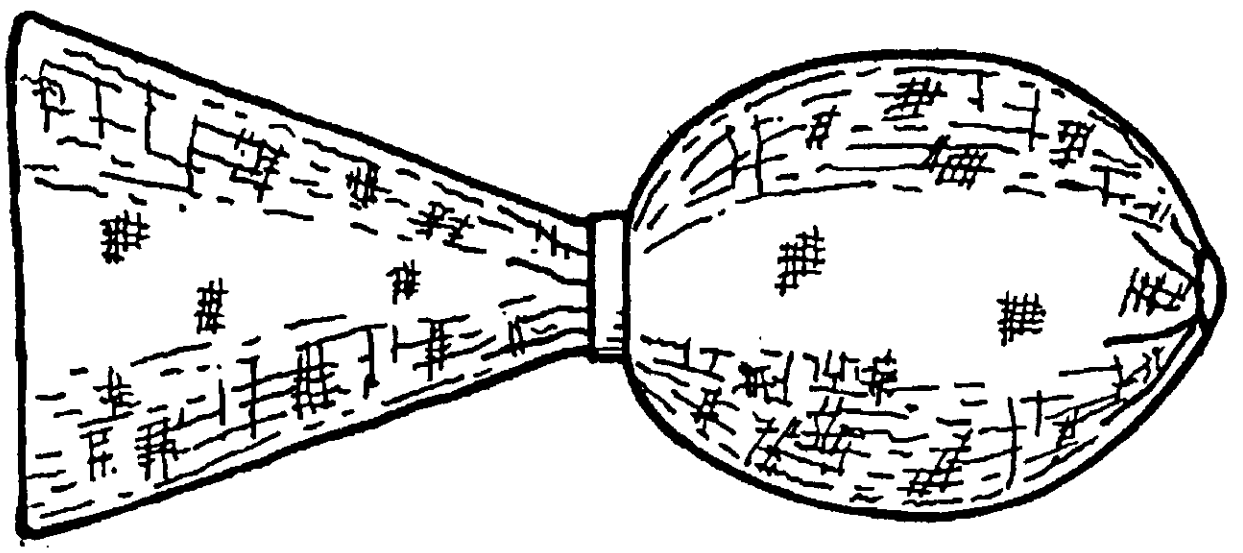
[57] **CLAIM**

The ornamental design for an anti personnel projectile, as shown and described.

DESCRIPTION

FIG. **1** is a left side elevational view of an anti personnel projectile showing my new design;
FIG. **2** is a rear elevational view thereof;
FIG. **3** is a top plan view thereof;
FIG. **4** is a front elevational view thereof;
FIG. **5** is a right side elevational view thereof; and,
FIG. **6** is a bottom view thereof.

1 Claim, 1 Drawing Sheet



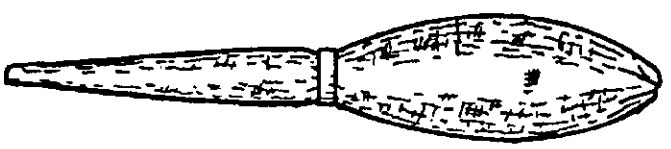


Fig. 1

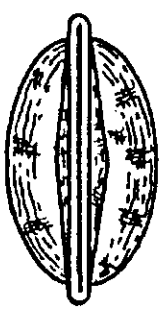


Fig. 2

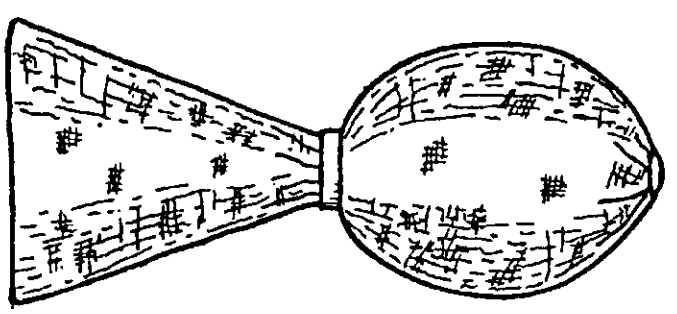


Fig. 3

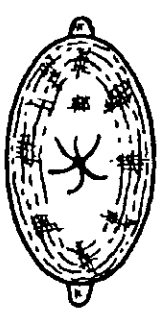


Fig. 4

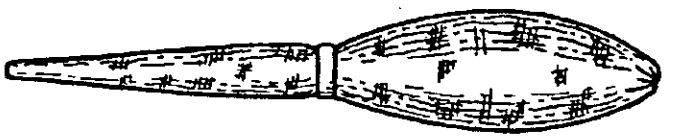


Fig. 5

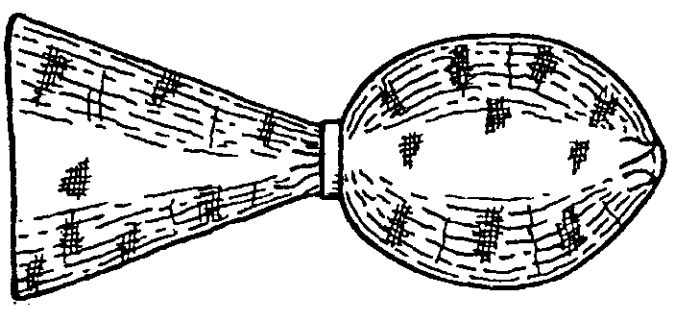


Fig. 6