A non-lethal round of ammunition including an interior non-lethal projectile within an outer casing and a cylindrical foam liner, such as a Styrofoam® liner, surrounding non-lethal projectile. The foam liner is advantageous in that it guides and contains the round and dissipates some of the projectile energy so as not to severely injure the targeted person.
NON-LETHAL SHOTGUN ROUND WITH FOAM LINER

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims priority from provisional application Ser. No. 60/558,010 filed Mar. 30, 2004.

FIELD OF THE INVENTION

[0002] The present invention relates to munitions in general and specifically to non-lethal ammunition.

BACKGROUND OF THE INVENTION

[0003] In law enforcement, penal, self-defense and military tactical situations, there is an increasing demand for non-lethal force options. An increasing emphasis has been placed on the use of non-lethal force in stopping or disabling the targeted individual. The use of non-lethal force has the additional advantage of reducing harm to non-targeted bystanders.

[0004] In law enforcement, military and self-defense applications, a number of non-lethal force alternatives are currently in use. These include chemical sprays, such as mace or capsicum sprays which are projected in a stream at a potential attacker, and “stun guns” which disable a targeted individual at close range with electrical current. These devices, although achieving non-lethal force, require that an alternative device be used in place of the ordinary weapon. In addition these options are viable only at close range.

[0005] Another non-lethal force alternative is the use of ammunition which does not impart lethal force. The use of this ammunition has the advantage that it may be used with conventional firearms. The psychological deterrent of the standard firearm is maintained. In addition the range of non-lethal ammunition is sometimes much greater, expanding tactical options.

[0006] One type of non-lethal ammunition uses a dispersable load to produce a less lethal ammunition. U.S. Pat. No. 3,865,038 to Barr discloses a rifle shell comprised of a rubber housing containing a flowable powder, liquid, or gas. The body of the housing has thin rupture zones and thicker reinforcement zones to promote rupture of the bullet at selected locations. The nose portion of the bullet lacks the zones of the body and forms a more rigid piston portion of the bullet. Upon impact, the nose of the housing will be elastic yet resist tearing, while the body of the housing will tear and impart force. The thicker nose of the bullet ensures that the nose will not rupture, distributing the force of the bullet. A similar piston device is used for signaling artillery shells disclosed in U.S. Pat. No. 3,983,817 to Tucker. This reference describes an artillery shell having a longitudinal internal chamber which opens to the rear of the shell but is closed to the front of the shell by side walls and the shell nose. Positioned within this chamber is an amount of spotting powder. Upon firing, the spotting powder is accelerated to the nose section of the shell. Upon impact, the powder is ejected by the compressed gas in the shell, allowing the location of the shell to be spotted. U.S. Pat. No. 3,650,213 describes ammunition which fires a hollow projectile from a casing. The hollow projectile is assembled of a body having tail fins added for flight stability and a cap. The hollow projectile may be filled with a dispersible substance. The ammunition has a primer and powder charge positioned behind the hollow projectile. The projectile is propelled by the ignited powder charge. When the projectile strikes an object, the hollow projectile will rupture transferring the contents of the hollow projectile onto the object. The cap has rupture zones to aid in the dispersal of the contents of the projectile.

[0007] In addition to these piston based ammunition, there are also non-lethal projectiles which may be used. For example, U.S. Pat. No. 5,652,407 to Carbine discloses an ammunition round in which a number of cylindrical projectiles are fired from the round. The projectiles fly in various orientations, striking the target at different locations. The projectiles may be used with an associated dye which marks the target for subsequent identification.

[0008] U.S. Pat. No. 6,283,037 to P. J. Scalfani discloses a shot round that features an elastomeric sack, such as a latex sack, filled with a packed particulate load, such as sand, sawdust, soil or grease. The round is constructed with a cylindrical base into which a plastic hull is inserted. The plastic hull extends from the bottom of the base to a closed top end of the hull. Within the round, a wad separates the powder propellant within the base and the chamber above the base encased by the hull. The elastomeric sack is located within this chamber. Additionally the elastomeric sack may contain a dye which would leave a mark on the location of impact. The dye may be separated from the particulate load by a membrane.

[0009] When the round is fired, a primer within the base ignites the powder with the base. The power explosion causes the wad to project the particle packed elastomeric sack from the hull. The elastomeric sack is sufficiently packed to allow for a relatively long distance, i.e. a few hundred yards, with good accuracy. As the elastomeric bag travels it expands slightly. If a dye is included in the elastomeric bag, the different densities of the dye and the packed particle load cause the two elements to mix within the elastomeric bag. Upon impact, the elastomeric bag disintegrates, spreading the force of the impact over an area of the target. As the elastomeric bag ruptures the packed powder disperses. If a dye is included, the target will be marked with the dye. The round provides a cost effective non-lethal projectile alternative which may be used with conventional shotguns.

[0010] Although several different non-lethal projectiles are known, there is still a need for a non-lethal projectile which is simple to manufacture, has adequate range and accuracy, may be made from conventional materials, and may be fired from conventional weapons.

[0011] It is an object of the invention to provide a cost effective shotgun round which may disable a targeted individual without using lethal force. This round should have adequate accuracy, range and stopping power to be used in tactical situations.

[0012] It is an additional object of the invention to provide a round of ammunition which may be manufactured with inexpensive, conventionally available materials.

[0013] It is an additional object of the invention to provide a shotgun round which leaves a mark on the target for subsequent identification, if desired.
SUMMARY OF THE INVENTION
[0014] The above objects have been met with a shot round similar to the prior '037 patent, described above, except that instead of using the outer plastic hull as the container for the elastomeric sack, now a styrofoam cylinder is used as an inner container coaxial with the outer plastic hull, i.e. a cylindrical foam liner is used within an outer cylindrical casing to contain the elastomeric sack with a load or projectile. Dye may be contained in the elastomeric sack with the load, separated from the dye by a membrane. Propellant is separated from the sack by a wad. A cap is used to close the casing and inner liner. Use of foam liners provides energy dissipation as well as trajectory guidance for the elastomeric sack.

BRIEF DESCRIPTION OF THE DRAWINGS
[0015] FIG. 1 is a cutaway view of a non-lethal round of ammunition including a projectile surrounded by a foam liner.

[0016] FIG. 2 is an exploded view of the non-lethal round of FIG. 1.

[0017] FIG. 3 is a perspective view of a barrel of a gun discharging the non-lethal round of FIG. 1.

DESCRIPTION OF THE INVENTION
[0018] With reference to FIGS. 1 and 2, there is seen a non-lethal round of ammunition round 8 comprised of a base 10 and an outer cylindrical casing 18, for example plastic hull 18, inserted within the base. The top of the plastic casing 18 is shut with, for example a cap 13. Inserted into the bottom of the base 10 is a propellant for propelling the round, including, for example, primer 12. Primer 12 may be electronic, for example, a spark plug-like structure, or chemical, for example a lacquer seal. Contained with the outer casing 18 is an inner cylindrical foam liner 23, such as a Styrofoam® liner, containing a non-lethal projectile. In one example, the non-lethal projectile is an elastomeric bag 24 including particles having sand or dye (such as the non-lethal round described in the '037 patent described above). The elastomeric bag 24 is surrounded by the foam liner 23. An inner cylindrical casing 21 may be disposed within the outer casing 18 and the foam liner 23 may be disposed within the inner cylindrical casing. The foam liner 23 guides and contains the non-lethal projectile.

[0019] With reference to FIGS. 1 and 3, upon firing the shotgun round 8 from the shotgun barrel 25, the primer 12 ignites the propellant powder 14 exerting a force on barrier/wad 16 and expelling the elastomeric bag 24 and Styrofoam® liner 23 from the hull 18. Styrofoam is a registered trademark for expanded plastic made of polystyrene. Upon firing, the Styrofoam® liner 23 and non-lethal projectile 24 leave the shotgun barrel. The foam liner 23 guides the projectile 24 and dissipates some of the projectile energy so as to prevent the projectile from severely injuring a person. For example, without the Styrofoam® liner 23, the projectile 24 could penetrate the skin of the targeted person. The foam liner 23 breaks apart into foam particles 29, as seen in FIG. 3, while the projectile 24 hits its target 27. Upon impact, the elastomeric bag 24 will deform from an elongate projectile to a wider impact surface, as shown in FIG. 3. Upon impact, the elastomeric bag may rupture. A high density particle load, such as sand or materials described in the '037 patent may be used.

1. A non-lethal shotgun round, comprising:
   a base;
   an outer cylindrical casing inserted within the base;
   a cylindrical foam liner inserted within the outer cylindrical casing;
   a projectile inserted within the cylindrical foam liner;
   a cap covering the outer cylindrical casing; and
   a propellant.
2. The apparatus of claim 1 wherein the foam liner contains an elastomeric bag containing said projectile.
3. The apparatus of claim 2 wherein said projectile is a particulate load.
4. The apparatus of claim 3 wherein a dye is enclosed in the elastomeric bag.
5. The apparatus of claim 4 wherein the dye is separated from the particulate load by a membrane.
6. A non-lethal shotgun round, comprising:
   a first cylindrical casing;
   an ignitable propellant charge rearwardly disposed with said first casing;
   a wad disposed as a barrier within said first casing forwardly disposed over said propellant charge;
   a second cylindrical casing disposed within said first cylindrical casing forwardly located from said wad; and
   a load within said second cylindrical casing.
7. The apparatus of claim 6 wherein said second cylindrical casing is expanded plastic made of polystyrene.
8. The apparatus of claim 6 further having a sealed elastomeric bag within the second cylindrical casing.
9. The apparatus of claim 6 further having packed, high density particles as said load.
10. The apparatus of claim 8 further having a dye contained within said elastomeric bag.
11. The apparatus of claim 10 further having a membrane separating said dye from said packed, high-density particle load within said elastomeric bag.
12. A non-lethal shotgun round, comprising:
   a cylindrical outer casing;
   an ignitable propellant charge rearwardly disposed with said outer casing;
   an inner cylindrical casing nested within the outer casing;
   a wad disposed as a barrier within said outer casing forwardly disposed over said propellant charge but rearward of the inner cylindrical casing;
   a sealed soft plastic bag composed of a uniform material disposed within said inner cylindrical casing forwardly located from said wad;
   a packed, high density particle load packed within said sealed soft plastic bag;
   a dye contained within said soft plastic bag; and
   a membrane separating said dye from said packed, high-density particle load within said soft plastic bag.
13. The apparatus of claim 12 wherein the inner casing is expanded plastic made of polystyrene.

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