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D. S. FOOTE ET AL
MOLDED PLASTIC SHOTSHELL

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Fig. 1.

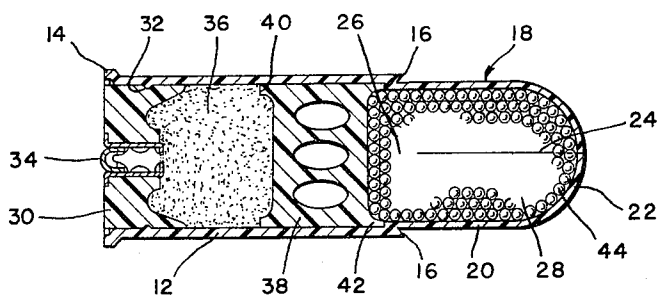


Fig. 2.

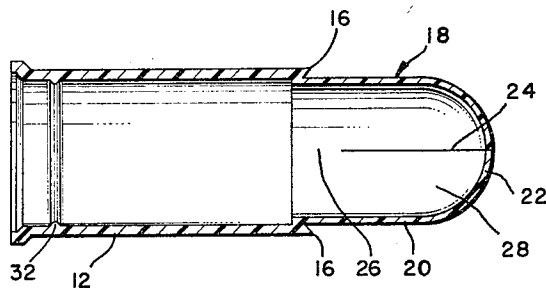
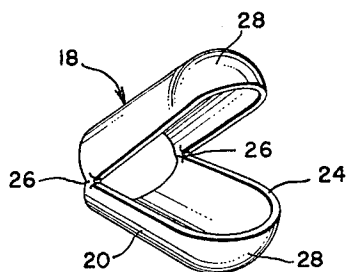


Fig. 3.



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MOLDED PLASTIC SHOTSHELL

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6 Claims. (Cl. 102-42)

This invention relates in general to an improved plastic shotshell construction and more specifically to a unique one-piece molded casing which functions as the shotshell body, as a shot container, and as the shotshell mouth closure.

Although shot containers are notoriously old in the art, there has been renewed interest expressed recently in this area of shotshell development. Thus, at the present time, the large United States sporting ammunition manufacturers and various small component manufacturers provide various designs of shot containers for use with paper and plastic shotshells. In general, the use of shot containers can be said to be useful in (1) preventing deformation of the shot pellets while being explosively projected through the gun barrel and thus improving shot distribution patterns; (2) prevent leading and erosion of the gun bore; and (3) provide assistance in protecting the mouth end of low tensile strength body casings. These advantages have been known for many years.

This invention does not deal with shot containers per se.

Although work on plastic shotshells has been going on for about forty years, it was only within the last five or six years that commercially acceptable plastic shotshells (of the biaxially oriented type) became available to the public. However, in order to manufacture oriented plastic shotshell bodies, a considerable amount of cold working is necessary and thus costs are relatively high. In short, it is desirable to provide a low cost injection molded plastic shotshell which will be ballistically acceptable to the shooter.

The present invention makes possible a one-piece injection molded plastic casing which is closed at the mouth end so that loading is effected through the rear end of the shell. It is appreciated that loading shotshells from the rear or head end is not novel. However, the present invention is designed to have a front shot-containing portion to cut off upon firing, travel through the gun barrel as a unit thus protecting the shot pellets and gun barrel from deformation and wear, and then separate from the shot pellets without affecting the trajectories of the shot pellets.

It can be seen that the one-piece body-container-closure construction permits various economies in manufacturing of a shotshell. The unit is made of relatively inexpensive plastic made by an inexpensive injection molding process. Crimping of the mouth end is eliminated since the shot container also serves as the end closure. Loading of the shell is simplified since the one-piece unit is merely inverted and the shot pellets, cushioning wad, propellant powder, and pre-assembled head means inserted. The handling of a separate shot-containing element is eliminated. Being molded, there is less variation in shell and component dimensions.

It is therefore an object of this invention to provide a low cost plastic shotshell having acceptable ballistics and shot patterns.

Another object of this invention is to provide a plastic shotshell having a one-piece molded unit which functions as a body portion, a shot container and a mouth end closure.

Still another object of this invention is to provide a molded body casing wherein a portion of the casing is

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cut off upon firing and which then functions as a shot container.

Other objects and advantages will become apparent from the following description and accompanying drawings in which:

FIGURE 1 shows a cross-section, elevational view of a shotshell illustrating the invention;

FIGURE 2 shows a cross-sectional elevational view of the one-piece molded plastic body casing; and

FIGURE 3 shows a perspective view of the cutoff container-closure portion after being fired from the gun.

It should be appreciated that although the following specification and the accompanying drawings disclose a preferred embodiment of the invention, there are various other ways in which the invention can be practiced. For example, although the specification and drawings disclose the container-closure portion as being split into halves, it is also possible to provide more than two sections.

As shown in FIGURE 1, the preferred embodiment of the invention shows a one-piece plastic shotshell casing 10 which can be made by simple injection molding of low-cost linear polyethylene or other suitable material. Casing 10 includes a tubular body portion 12 which has an outwardly directed shoulder 14 at its rear or breech end which functions to engage the associated gun chamber as well as permit the ejection device to grab and eject the body portion from the gun chamber after firing.

Integrally molded to the front end of the body portion 12 and directed inwardly at a substantial angle therefrom is a continuous flange 16. Although the drawing shows the flange 16 directed towards the rear slightly, the flange may be perpendicular to the casing or even slightly forwardly. Connected to the inner end of the continuous flange 16 and integrally molded therewith is a cup-shaped container-closure portion 18 having a tubular wall portion 20 and a transverse mouth end closure 22 which acts as the closure for the shotshell.

Slits 24 are formed in the container-closure portion 20 and extend longitudinally from a point adjacent the continuous flange 16 to the mouth closure end 22. For purposes of this application, it is intended that a slit may be a break in the surface of the plastic member which can either extend entirely through the plastic or for a portion of the plastic only, thus in effect forming a weakened portion which will rupture upon being exposed to sufficient pressure. Although the drawing shows the preferred form of providing an unslit portion 26 to act as a hinge means to permit sectional portions 28 to hinge about the unslit portion upon being expelled from the gun barrel, it should be appreciated that the slits can be designed to permit the sectional portions 28 to come apart upon being expelled.

Several points are important: (1) the container-closure portion of the integrally molded body-container-closure member must have preweakened portions but not to the extent that the shot can escape or that excessive moisture and foreign material can get into the shell; (2) the cutoff container-closure portion, even though with separated sectional portions 28, must substantially enclose and protect the shot (in cooperation with the filler wad) while being explosively projected through the gun barrel; and (3) the sectional portions 28 must either hinge open or separate from the shot upon being expelled from the gun.

The open head or breech end of the tubular body portion 12 is closed off by a head 30 which can be made of plastic or any other suitable material. Although the drawing shows the head 30 held in place in the body portion 12 by means of a detent and notch means 32, other well-known methods of attachment are possible such as by interference fit, gluing the head member, screwing the head into the body portion, etc.

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A conventional priming assembly 34 is inserted in the head 30 in communication with propellant means 36. Immediately above the propellant means 36 is a cushioning wad 38 having a gas sealing skirt 40 at the rear. It is anticipated that the cushion wad will have a similar skirt at the two ends so that it will not be necessary to orient the wad prior to insertion into the shotshell casing. However, for purposes of simplification, the front end of the wad is shown straight. The front end of the cushion wad 38 has a bearing portion 42 which is in abutting relationship with the continuous flange 16. Resting on top of the cushion wad 38 and contained within the container-closure portion 18 is a plurality of shot pellets 44.

It will be seen that upon firing of the gun, the primer ignites the propellant powder which burns rapidly and explosively moves the cushion wad 38 forwardly against the continuous flange 16. This results in cutting off the container-closure portion 18 so that the explosively projected cushion wad 38 pushes out the shot pellets 44 and the cup-shaped container-closure portion 18 which contains the shot pellets. Upon being expelled from the gun barrel, the slits 24 rupture and open up the container-closure portion 18 at the front so that the sections hinge about unslit portion 26 to let the shot pellets escape from within the container-closure and proceed on their original trajectories. The hinged container-closure then falls to the ground without interfering with the trajectories. Although the disclosure shows the hinge, it is possible and may be desirable to design the sectional portions of the container-closure 20 to fracture and separate rather than hinge.

It can be seen that the tubular body portion 12 has a larger diameter than the tubular wall 20 of the container-closure. It has been found that the shotshell of the present invention can be fired from a conventional shotgun. However, for maximum efficiency in gun operation as well as shot patterns, a special gun is preferable. Thus, it has been found that better patterns are obtained when a "stepped-chamber" is used to support the container-closure 18 and prevent initial expansion of the container-closure in the excess chamber space which is present when the chamber is constant size to accommodate the larger diameter body portion.

What is claimed is:

1. A shotgun cartridge comprising a plastic tubular casing having an open-ended main body portion and a shot container-closure portion integrally formed in one piece with the front end of said body portion, said container-closure portion having a smaller diameter than said body portion, abutment means integrally formed at the front end of said body portion and projecting inwardly to be integrally formed with the rear end of said container-closure, head means attached to the rear end of said body portion, priming means in said head means, propellant means positioned in said main body portion in communication with said priming means, cushion means adjacent to and forwardly of said propellant means, the forward end of said cushion means being in abutting relationship with said abutment means, a plurality of shot pellets located forwardly of said cushion means and arranged to be positioned substantially outside of the main body portion and within said container-closure portion, said priming means upon being fired being adapted to ignite said propellant means to explosively force said cushion means against said abutment means to cut off the container-closure portion with the shot enclosed therein and explosively project the shot and the protective container-closure portion through the associated gun barrel whereupon after being projected out of the barrel, the container-closure opens up to permit the shot pellets to escape therefrom without having their trajectories affected.

2. A shotgun cartridge comprising a tubular plastic

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body portion which is open-ended at its front mouth end and at its rear breech end, a cup-shaped container-closure means integral with and extending forwardly from the mouth end of the body portion, said container-closure means having an open end adjacent to the mouth end of the body portion and a transverse closure end at the front thereof, slit means on said container-closure means adapted to rupture upon being explosively projected from the associated gun, inwardly projecting abutment means integrally connecting said body portion and said container-closure means, said body portion, abutment means and container-closure means being formed as an integral, one-piece plastic unit, head means attached to and closing off the open breech end of said body portion to define an enclosed cavity in cooperation with said one-piece unit priming means positioned in said head means said cavity having propellant means positioned therein adjacent said head means in communication with said priming means, cushion means positioned forwardly of and adjacent said propellant means, means on said cushion means normally in abutting relationship with said abutment means and adapted to shear said abutment means to cut off said container-closure means upon firing, and shot means positioned substantially entirely within said container-closure means so that upon firing and being cut off, the container-closure means and the enclosed shot are explosively projected through the associated gun barrel and upon being expelled therefrom, said slit means ruptures to permit the container-closure means to hinge open and permit the shot to escape therefrom without affecting the trajectories of the shot.

3. In a shotgun cartridge, the improvement comprising an integrally molded, one-piece plastic member adapted to function as a combination body casing, shot container, and mouth end closure, said one-piece member including a tubular body portion, continuous flange means projecting inwardly in an approximately perpendicular direction from the front end of the body portion, and an elongated cup-shaped portion having an open rear end integrally formed with the continuous flange means and a front mouth end closed off by an integrally formed transverse closure portion, longitudinally extending means on said cup-shaped portion adapted to permit the cup-shaped portion to open up upon being explosively projected out of the associated gun barrel, shot means positioned within said cup-shaped portion, wad means underlying said shot means and having portions thereon which normally abut against said flange means, head means attached to the rear end of said tubular body portion, means to explosively project said wad means against said flange means to cut off the cup-shaped portion with the shot means inside, whereupon being expelled from the gun barrel, the longitudinally extending means on the cup-shaped portion opens to permit the shot means to escape from the cup-shaped portion.

4. A shotgun cartridge comprising a one-piece molded plastic shotshell casing including an elongated tubular member with an open head end and a transverse mouth closure at the opposite end, said elongated tubular member having a tubular body portion adapted to remain in the associated gun chamber after firing and a tubular shot-containing portion integrally formed in one piece with the front end of said body portion and adapted to be cut off therefrom upon firing to be expelled from the gun barrel while still containing substantially all of the shot therein, said transverse mouth closure end being integrally formed in one piece at the forward end of said shot-containing portion, said tubular shot-containing portion being of lesser diameter than said tubular body portion and integrally connected thereto by a substantially perpendicular continuous flange means, head means closing off the rear end of said body portion, explosive means positioned in said cartridge, wad means positioned within said tubular body portion in engagement with said flange means so that upon being explosively projected against

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the flange means, the wad means cuts off the tubular shot-containing portion with the shot therein and is expelled with the container and shot from the associated gun barrel.

5. A shotgun cartridge comprising a tubular molded plastic shotshell casing including a tubular body portion and a cup-shaped portion integrally formed in one piece with and extending forwardly from the front end of the body portion, a head portion attached to the rear end of said body portion, shot means contained substantially entirely within said cup-shaped portion, and means to sever said cup-shaped portion from said body portion upon firing so that the cup-shaped portion and the shot means contained therein are explosively projected through the associated gun barrel and expelled therefrom as a unit.

6. A shotgun cartridge as recited in claim 5 wherein means is provided on said cup-shaped portion which remains unaffected during normal handling of the shotgun

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cartridge but which is adapted to rupture upon being explosively expelled from the associated gun barrel to permit the cup-shaped portion to open up and separate itself from the shot means contained therein.

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