ABSTRACT: A plastic wad column for an ammunition cartridge in which the elongated shot protecting segments are molded to the main body of the wad column at an angle of about 5°-45° to the longitudinal center line of the wad column. The width of the individual segments is varied to provide a plurality of slots which diverge from the rear to the front of the segments so as to provide a better fit for the wad column in the associated ammunition cartridge.
This invention relates to an improved wad column capable of reducing barrel leading and shot abrasion, improving patterns, gas sealing, eliminating wad debris, as well as facilitating the molding of the wad column, and handling and loading of the wad column into the associated ammunition.

The idea of using plastic shot containers to improve patterns, reduce barrel leading, etc., is not new. Neither is it new to provide elongated shot protecting wall portions which peel back after being explosively projected from a gun to become disengaged from the shot load without interfering with the trajectory of the projectiles.

This invention has particular importance for use in long, slender, shot shells, e.g., 0.410 bore, where the volume within the shot shell casing is limited. Heretofore, after putting in the desired number of shot pellets and providing enough propellant powder to produce the necessary pressure and velocity, there has not been very much room left for cushioning and/or short containing means.

In addition to the lack of space in the 0.410 load, other difficulties arose when it was attempted to use long, thin-walled plastic injection molded shot containers including:

1. Molding difficulties:
   a. Ejection of the container from the mold without stretching or tearing of the walls.
   b. Core pin alignment.
2. Folding and/or bonding of the fins (elongated wall portions), thus preventing proper feeding, insertion in the shells, and shot charging during loading operations.
3. Nesting of the elongated shot containers during handling.
4. Mechanical orientation needed for loading.

The shot container, to be acceptable, must meet performance standards without creating difficult and/or costly process problems. These performance requirements include:

1. Contain shot column during its travel through the gun barrel and eliminate flattening of peripheral shot (due to abrasion) that is normally experienced with an unprotected shot column.
2. Improve patterns. The shot container must provide greater concentration and a more uniform distribution of shot pellets in a given area at any distance than standard filler wad loads.
3. Improve gas sealing. The container must use the propellant powder's expanding gas more efficiently than filler wad loads and must prevent hot burning gas from leaking through the shot column and deforming shot pellets.
4. Minimize leading in the gun barrel.
5. Quickly open up and fall away from the shot string after muzzle exit so as not to adversely affect patterns.
6. Elimination of objectionable wad fragmentation at gun muzzle and beyond, facilitates manufacturing of the shot containing unit, as well as handling and loading of the unit into loaded rounds.

It is an object of this invention to provide a shot containing unit for a long, slender ammunition cartridge which improves patterns, eliminates distracting wad fragmentation at gun muzzle and beyond, facilitates manufacturing of the shot containing unit, as well as handling and loading of the unit into loaded rounds.

A more precise explanation of the invention along with other objects and advantages thereof will become more apparent from consideration of the specification and drawing in which:

FIG. 1 is a longitudinal section through a loaded shotshell utilizing the wad column which is in the principal part of this invention;

FIG. 2 is a longitudinal section view of the improved wad column in the open (as molded) position;

FIG. 3 is a longitudinal section view of the improved wad column in the closed (as loaded) position;

FIG. 4 is a front view of FIG. 2;

FIG. 5 is a front view of FIG. 3; and

FIG. 6 is a pictorial view—partly in section—of the improved wad column in the open (as molded) position.

Referring to the drawing by reference numbers, it will be seen that FIG. 1 illustrates a loaded shotshell 10 embodying a metal head 12 having a tubular body 14 attached thereto and a basewad 16 inserted within said body. The body 14 may be a conventional body made of paper but is preferably formed of an oriented, high density polyethylene, as disclosed in U. S. Pat. No. 3,105,170 to R. A. Covington, et al., issued on Sept. 10, 1963.

Within body 14 is found the usual powder charge 18 and a wad column 20 to which this invention primarily relates and which is illustrated more specifically in FIGS. 2, 3, 4, 5, and 6.

A shot charge 22 is at least partially confined in the forward portion of the wad column or shot container 20, and the forward end of the shell body 14 is closed by a folded crimp 24 to maintain the shotshell assembly intact until firing.

Referring specifically to FIG. 2, the improved shot container 20 is seen to consist of a main cylindrical body portion 26 having a transverse wall member 28 which closes off the rear end of the shot container. Rearwardly extending from wall 28 is a tapered skirt gas sealing member 30. Wall 28 is shown separating the propellant charge 18 from the shot charge 22. However, depending on the ballistics required, the amount of propellant charge, weight of shot charge, wall 28 dimensions, etc., can be varied which might permit the use of a separate cushioning wad between the wall 28 and the propellant charge.

Extending forwardly and outwardly from the main body portion 26 are a plurality of elongated fin members or segments 32 integrally molded therewith at hinged portions 34. Although FIG. 4 shows three fin members 32, obviously more or less fins can be used. In the open or as-molded position, the fins diverge at an angle of about 5°-45°, but preferably about 15°, from the longitudinal center line A-A of the shot container. When inserted into the shotshell casing, the fins hinge about portions 34, and assume the cylindrical shape of the shotshell casing. As will be appreciated, the fins are stressed or biased during this operation so that upon being projected out of the shotshell and after travelling through the gun barrel, the fins move to their original or molded position and thus facilitate the opening up of the shot container and ultimate stripping away of the container from the shot charge.

Each of the fins 32 is wider at its front or open end 36 than at the hinged portion 34 so that when the fins are moved to the closed or loaded position (see FIG. 3), the forward longitudinal edges of the fins must butt squarely at that end and thus prevent the fins from overlapping as segments 32 are reformed to a smaller radius at insertion in the shotshell casing. As a result of the tapered fins, a plurality of slots 38 are formed when the fins are in the closed position. However, even in the open position (FIG. 2), it can be seen that there is a gap a between the rear portions of the fins. This gap a is the maximum width of the slot 38 when the fins are in the closed position (FIG. 3). This distance a is deliberately made greater than the thickness of the fins, identified as b, so that when containers in the open position are handled in mass, the elongated fins will not wedge at this point and interlock. By making gap a greater than thickness b, the problem of two or more open shot containers interlocking is avoided.

The reason for the tapered slots 38 is something else. In the 0.410 gauge shell, space is at a premium because of the narrow diameter of the shell, the length of the shell, and the necessary powder and shot requirements. In machine loading of shotshells in which shot containers are used, a problem occurs when the elongated fin members are positioned within the shotshell body and have one or more of the fin segments bent inwardly, i.e., the fin segments do not conform strictly to the inside diameter of the shotshell body. When this occurs and the shot pellets are inserted, the bent-over fin segment becomes pushed further by the shot charge and the result is an improperly-loaded shotshell because the full complement of shot cannot be accommodated.

With larger gauge shells, e.g., 12 gauge, this problem can be avoided by making the fin segments thicker so that they are
less flexible and not apt to bend inwardly. Another solution is to mold a stiffening rib on each fin segment to add rigidity to the fins. In the 0.410 shotshell, however, space is at a premium and neither the reinforcing ribs nor thicker fin walls are permissible. The tapered slots 38 which cause the longitudinal edges of the fins to butt squarely at the mouth end and prevent overlapping of the fins during insertion in the shotshell casing is a novel solution to this problem.

The invention has particular utility in shot containers where there are long fin segments—especially if the walls of the segments are relatively thin and thus not very rigid so that they tend to fold or bend toward the center at their open ends. Referring to FIG. 3, the overall length of the shot container is shown as c and the diameter of the shot container is shown as d. Although the invention has utility in all shotshells, it has particular importance where the overall length c is at least about three times the diameter d.

We claim:
1. A shot container comprising a rear cylindrical portion having a transverse wall member, a plurality of elongated, flexible, fin members integrally formed with said cylindrical portion and extending forwardly and diverging outwardly therefrom, said fins diverging from the longitudinal center line of said shot container at an angle of about 5°—45°, said fins adapted to hinge on said cylindrical portion when inserted into a shotshell so as to form a prestressed cylindrical shot-containing pouch, which upon being explosively projected from the shotshell tends to move to its original shape and thus opens up to facilitate the stripping away of the shot container from the shot pellets so as not to adversely affect patterns, each of the fin members being wider at its front end than at the rear hinged end so that when the container is inserted into a shotshell, the fins are separated from one another by slot means which taper from a maximum width at the hinged intersection of the fins with the rear cylindrical portion to the forward ends of the fins where the edges of the fins butt squarely with each other to prevent the fins from overlapping.
2. A shot container, as recited in claim 1, wherein the maximum width of the slot means is greater than the thickness of the elongated flexible fin members.
3. A wad column for ammunition comprising a cylindrical rear end portion closed off by a transverse wall integrally formed therewith, a plurality of elongated sections each of which is flexibly hinged to said cylindrical portion and which extends forwardly and outwardly therefrom at an angle of between about 5°—45° to the longitudinal center line of the wad column, said elongated sections being tapered from a maximum width at their front ends to a minimum width near the point where the elongated sections are integrally formed with the cylindrical rear end portion so that when the wad column is inserted into a cylindrical shotshell casing, the elongated sections are stressed to assume the configuration of the shotshell casing and the front wider ends of the sections butt squarely upon each other.
4. For use in a cartridge having a cylindrical body casing, with a closed lower end portion in which a propellant charge is placed and an open upper end portion through which shot pellets are expelled upon firing, an improved shot container adapted to be positioned within said cartridge, said shot container comprising:
1. An integrally-molded cylindrical plastic member having a lower closed end and an upper open end, said member comprising:
2. a transverse wall member defining said lower closed end separating the propellant charge and the shot pellets; and
3. a plurality of thin-walled segments hinged to the cylindrical plastic member and biased from a first unloaded position wherein the segments are inclined outwardly about 5°—45° from the longitudinal center axis of the shot container to a second loaded position wherein the segments assume a stressed cylindrical form and are in contact with the inner periphery of the cylindrical cartridge body casing, said thin-walled segments increasing in width from the attached base portion of the segments to the open front mouth portion so that in the loaded position the adjacent edges of two segments form a longitudinally extending slot means which tapers from a maximum width at the base portion to a minimum width at the open end of the shot container.
5. A shot container, as recited in claim 4, wherein the width of the slot means at the base portion of the thin-walled segments is greater than the thickness of the thin-walled segments in order to prevent wedging, interlocking or nesting of shot containers during handling of a plurality of shot containers before insertion in shotshells.
6. A shot container, as recited in claim 5, wherein the overall length of the shot container is at least three times the diameter of the cylindrical plastic member.