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METALLIC SHOTSHELL

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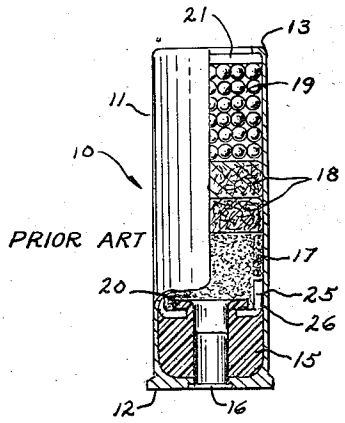

FIG. 1

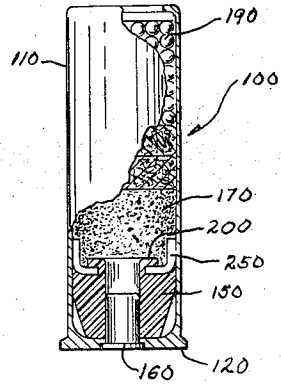

FIG. 2.

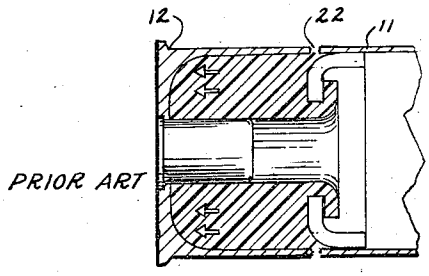

FIG. 3.

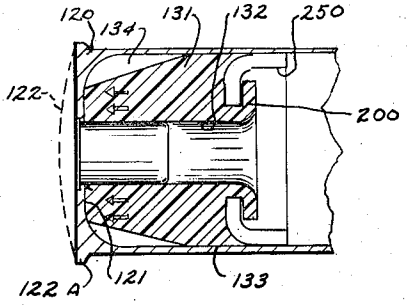

FIG. 4.

INVENTORS.
MERTON L. ROBINSON
JAMES G. BAKER
Richard S. Strickler
ATTORNEY

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METALLIC SHOTSHELL

Merton L. Robinson, Woodbridge, and James G. Baker, Hamden, Conn., assignors to Olin Mathieson Chemical Corporation, a corporation of Virginia

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1 Claim. (Cl. 102—42)

This invention relates to shotshells and in particular to thin-walled metallic shotshells.

One of the chief difficulties which is encountered in the use of thin-walled metallic shotshells is the occurrence of "cut-offs." In the art to which this invention pertains, the term "cut-off" defines the development of a partial or a complete separation between the cylindrical portion of the shotshell and the head or primer end of the shell upon firing. Such a shell failure is undesirable for several reasons. For example, a partial or a complete "cut-off" will permit hot, high pressure gases to escape from the chamber endangering the operator of the gun. Furthermore, a ruptured shell is difficult if not impossible to extract.

The "cut-off" problem is particularly bothersome in the use of thin-walled metallic shells having wall thicknesses of the order of .020 thousandths of an inch or less.

Frequently it is desirable to fabricate metallic shells from materials which are susceptible to hardening. For example, shotshells made of aluminum are heat treated to develop desirable hardness and tensile characteristics so as to withstand ordinary handling without marring or scoring and to facilitate loading and ejecting. Aluminum shotshells which exhibit good handling characteristics as a result of hardening frequently exhibit low elongation properties such that upon firing within the chamber of a shotgun, there is a separation or a "cut-off" between the head of the shell and the main body thereof.

Accordingly, it is a particular object of the present invention to provide a new and improved metallic shotshell.

Another object of the present invention is to provide a new and improved aluminum shotshell.

A still further object of the present invention is to provide a thin-walled metallic shotshell which is not susceptible to "cut-offs."

A still further object of the present invention is to provide an aluminum shotshell having an improved base wad.

A metallic shotshell embodying certain features of the present invention may comprise a tubular member having one end substantially closed, a base wad disposed within the tubular member and positioned adjacent the closed end, said base wad having a diameter at the end thereof nearest said closed end which is substantially smaller than the diameter of the opposite end of the wad so as to create a circumferential void about the wad.

A complete understanding of the present invention may be obtained from the following detailed description of a shotshell constituting a specific embodiment thereof, when read in conjunction with the appended drawing in which;

Fig. 1 is an elevational view, partially in section, of a metallic shotshell having a conventional or prior art base wad structure;

Fig. 2 is a view similar to Fig. 1 and illustrates an aluminum shotshell embodying the present invention

wherein the base wad is tapered downwardly and inwardly.

Fig. 3 is a sectional view of a portion of the shotshell of Fig. 1 showing the area of application of thrust upon the head of the shell and the location of a typical separation or "cut-off" occurring between the head and the side wall of a prior art shell; and,

Fig. 4 is a view similar to Fig. 3 showing the focal point of thrust in an aluminum shotshell utilizing the tapered wad of the present invention.

Referring now in detail to the drawing and in particular to Fig. 1, there is shown a prior art aluminum shotshell indicated generally by the reference numeral **10**. The shell comprises a side-wall portion **11** with integral head **12** and is formed with an inwardly turned crimp **13**. Disposed within the shell and immediately adjacent the head **12** is a base wad **15**. The wad **15** is generally representative of prior art base wads, usually formed of paper, whose performance has been found unsatisfactory in combination with metallic shotshells.

The base wad **15** is formed with a central aperture **14** for receiving a primer assembly **16** of conventional arrangement. The base wad **15** is further formed with a flange **20** which serves to "rivet" or secure an overlay wad **25** to the base wad. The overlay wad **25** is generally cup-shaped and acts to make a gas-tight seal between the interior of the side-wall **11** and the exterior of the base wad as at **26**. A powder charge **17** is positioned immediately above the overlay base wad assembly. Suitable wads **18** are disposed between the powder charge and a shot column **19**. A closure is accomplished by securing a top wad **21** between the crimp **13** and the shot column, or a folded type crimp without top wad may be applied.

At this point, it is well to note that in firing a metallic shell such as the aluminum shotshell **10** of the general configuration shown in Fig. 1 in a commercially available shotgun, it has been found that there is such severe thrust upon the head **12** of the shell in a direction shown by the arrows of Fig. 3 that a separation or a "cut-off" frequently occurs. For example, the head portion **12** partially or completely separates from the side wall **11** leaving a gap as shown at **22** in Fig. 3, which may extend around the full periphery of the casing.

Although the cause for "cut-offs" in metallic shotshells is not completely understood, one explanation advanced is that during detonation of the shotshell within the chamber of a shotgun the side wall **11** of the shell is forced outwardly by explosive gases against the interior walls of the chamber to the extent that side wall of the shell momentarily seizes the chamber. Simultaneously, there is a rearward thrust in the direction of the arrows of Fig. 3 which drives the head **12** to the rear taking up head space, temporary yield, or other "play" frequently found in the breech of a conventional shotgun. Since the side wall **11** is momentarily seized against the chamber, while a rearward thrust is being applied against the head of the shell, a separation, as shown at **22**, frequently occurs. The amount of "play" is often as much as .035 thousandths of an inch and in cases where the metallic shell has very little ability to elongate the "cut-off" problem is very serious.

Referring now to Figs. 2 and 4, it is noted that the present invention contemplates a metallic shell such as an aluminum shotshell **100** generally similar to the shotshell of Figs. 1 and 3 with the exception that a base wad **150** is provided having a downwardly and inwardly tapered configuration with respect to the head of the shell **120**. The wad is constructed of a generally rigid material capable of retaining its shape under firing pressure. The shell **100** has a side wall **110** having a thickness of approximately .011 thousandths of an inch and

the head **120** has a wall thickness of approximately .038 thousandths of an inch. It is not intended that the shell be limited to the above-noted wall thickness; the figures are noted primarily for purposes of illustration of a particular embodiment of the invention. In all other respects the interior elements of the shell **100** are generally similar to corresponding elements of the shell of Fig. 1.

Since the present invention is directed to the base wad **150** and to the combination of the base wad **150** with a thin-walled metallic shotshell such as the aluminum shell **100**, it is not deemed necessary to describe the other elements of the shell in detail other than to state that it is contemplated that a shotshell embodying the principles of the present invention may include, among other elements, a primer assembly **160**, an overlay wad **250** secured by a flange **200** integral with the base wad, a powder charge **170**, and a shot column **190**.

Referring now to Fig. 4, it is apparent that the rigid tapered wad **150** is formed with a frusto-conic section **131** and a central aperture **132**. By virtue of this arrangement, the thrust resulting from the detonation of a shell is directed inwardly towards the center of the head **120** and is distributed about an area defining an annulus **121**. The effect of thus concentrating the rearwardly directed thrust is to cause the head **120** to bow outwardly at the moment of detonation to a position shown in exaggerated fashion by the dotted line at **122**.

Concentration of the thrust load upon the center of head **120** and the attendant bowing of the center of the head satisfies the tendency for the head to take up the play in the breech at firing. Movement of the rim portion **122A** of the head is substantially reduced with the result that "cut-offs" between the head **120** and the side wall **110** are eliminated.

Note that the cylindrical portion **133** of the wad makes a snug fit with the interior of the side wall **110** and that a gas seal for preventing the flow of gas into the annular void **134** is provided by the overlay wad **250**. The overlay is held in place, of course, by the collar **200** formed integral with the base wad; the collar **200** is used to "rivet" the overlay wad in place.

As stated before, utilization of the tapered base wad **131** in combination with metallic shell such as aluminum has overcome the "cut-off" problem in shotguns having play or head space in the breech mechanism of as much as .035 thousandths of an inch.

It is not intended that the present invention be limited to aluminum shells and it is within the contemplation of the present invention to utilize shotshells formed of any suitable metallic material such as brass, steel, aluminum alloys, titanium and the like. The base wad may be formed of any suitable material such as polyethylene, nylon, paper, including paper or cloth impregnated with plastic which is sufficiently rigid to resist deformation under firing pressure.

It is anticipated that various arrangements and modifications of the present invention may be devised without a departure from the spirit and scope of the present invention.

What is claimed is:

In a metallic shotshell having a head portion formed integral with a tubular body portion, said head portion being formed with a generally flat interior surface defining an annulus, means including a gas sealing cup-shaped overlay wad and an interlocked base wad for preventing physical separation of the head and body portions upon firing, said base wad being formed with an exterior tapered part extending along more than one-half of its height, the remaining part of said wad snugly engaging the interior of said tubular body portion, said base wad engaging the annulus whereby a circumferential, annular void is provided within the shell in the area of the junction of the head portion and tubular body portion of the shotshell, said overlay wad and said base wad cooperating to prevent the development of fluid pressure within said void.

References Cited in the file of this patent

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