United States Patent [19]

Herter

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[54] **TAPERED CUP WAD**

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[52] **U.S. Cl.** .....**102/95,** 102/42 C
[51] **Int. Cl.** **F42b 7/06**
[58] **Field of Search** .....162/42.42 C, 95

[56] **References Cited**

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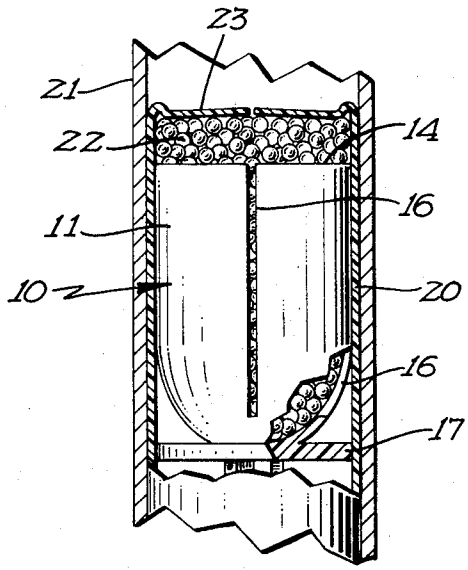
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Attorney—Williamson, Palmatier & Bains, H. Dale Palmatter, Herman H. Bains and Malcolm L. Moore

[57] **ABSTRACT**

A combination shot cup and wad for a shotshell with a sealing base and a connecting structure attached to the bottom of the tapered shot cup which has a slitted sidewall tapering convergently away from the open end and toward a base disc which extends outwardly to the sidewall of the shotshell case.

2 Claims, 3 Drawing Figures



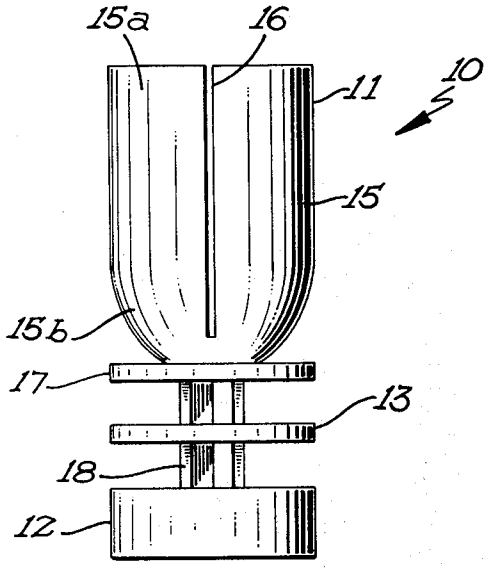


Fig 1

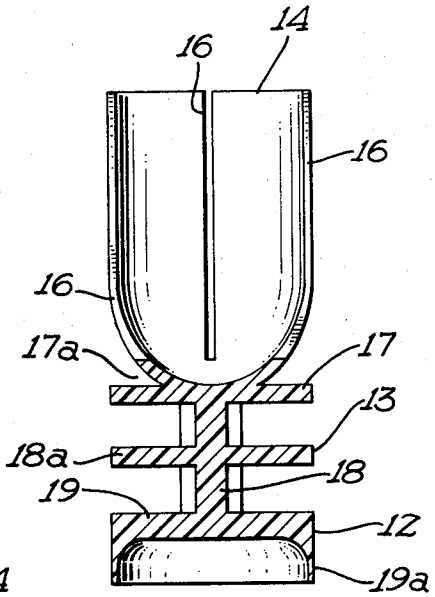


Fig 2

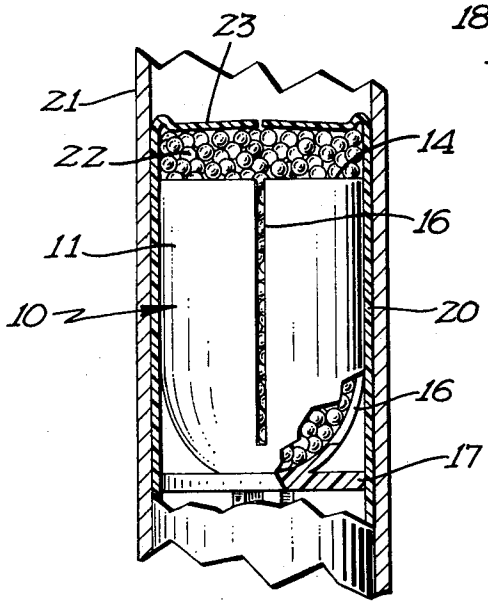


Fig 3

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TAPERED CUP WAD

BRIEF SUMMARY OF THE INVENTION

The important aspects of this invention are the use of a tapered shot cup which is tapered convergently away from the open mouth of the shot cup for a shotshell and generally toward the sealing base which is spaced from the bottom of the shot cup by a suitable connecting structure. The connecting structure may be of any of a number of designs.

The bottom of the shot cup is provided with a base disc or platform which extends transversely outwardly from the inwardly tapered bottom of the shot cup so as to engage the interior of the wall of the shotshell case, and the interior of the barrel wall when the shotshell is fired and the shot cup and shot charge are ejected from the shotshell and barrel.

BRIEF DESCRIPTION OF DRAWINGS

FIG. **1** is an elevation view of the invention.

FIG. **2** is a longitudinal section view of the combination shot cup and wad illustrated in FIG. **1**.

FIG. **3** is a detail section view of a portion of a shotshell case and the cup portion of the shot cup and wad at the instant of firing the shotshell which is confined in the chamber portion of a shotgun barrel.

DETAILED DESCRIPTION OF INVENTION

One form of the invention is shown in the drawings and is described herein.

The combination shot cup and wad is indicated in general by numeral **10** and includes a shot cup **11**, a sealing base **12**, and a connecting structure **13** which may or may not provide cushioning. The cup **11** has an open top or mouth end **14** and a closed bottom.

The entire combination shot cup and wad is formed in one piece of relatively soft and flexible polyethylene plastic, and is normally produced by injection molding.

The wall **15** of the cup has a plurality of elongate slits **16** extending through the open end of the cup and extending down into proximity with the closed bottom of the cup so that the sidewall **15** of the cup defines a plurality of sidewall segments which may flare outwardly under the combined pressure of the shot within the cup and the air so as to quickly slow down the shot cup and wad after the cup leaves the muzzle of the shotgun barrel and quickly separate from the shot charge which is being ejected.

The upper portion **15*a*** of the sidewall is substantially cylindrical in shape, and the lower portion **15*b*** of the sidewall tapers inwardly to a reduced diameter adjacent the bottom of the cup. The tapered lower portion **15*b*** of the cup wall is smoothly rounded in a longitudinal direction so that the degree of taper progressively changes from the substantially cylindrical portion of the cup sidewall to the lowermost portion of this sidewall.

The cup **11** is also provided with a base or bottom disc **17** formed integrally with the bottom of the cup, and with the connecting structure **13**. The disc **17** is of the same outside diameter as the diameter of the sealing base **12** so as to engage the sidewall **20** of a shotshell case, and as to engage and guide along the interior periphery of the shotgun barrel **21** when the shotshell is fired.

It will be noted that the tapered lower portion **15*b*** of the cup sidewall intersects with the disc **17** at a location inwardly from the circular periphery of the disc **17**.

As illustrated in FIG. **3**, the cup **11** is formed of such a length, relative to the size of the shot charge **22** and relative to the length of the shotshell case **20** so that the open mouth end **14** of the cup is spaced from the inwardly turned star crimp **23** at the end of the case wall **20**. As a result of this spaced relation between the end of the cup **11** and the star crimp **23**, the charge of shot, as distinguished from the end edge of the cup, applies the principal pressure for opening the crimp end of the case wall upon firing of the shotshell.

When the combined shot cup and wad **10** is inserted into a shotshell together with powder and shot charges, and the shotshell case is closed, a void remains at **17*a*** adjacent the inwardly tapered lower portion of the cup wall and adjacent the disc **17**.

In the form illustrated, the connecting structure **13** comprises a central post **18** with one or more discs **18*a*** extending transversely outwardly to guide along the sidewall **20** of the shotshell case. Other forms of connecting structures may be utilized, in place of the post and disc, and such other forms may include ribs or webs which extend from the disc **17** to the sealing base **12**.

The sealing base **12** is conventional and comprises a base wall **19** with a thin tapered flange **19*a*** to flare outwardly and seal against the sidewall **20** of the shotshell case and subsequently against the barrel wall upon firing the shotshell.

When the combined shot cup and wad **10** have been inserted into a shotshell case over the charge of powder so that the sealing base **12** overlies the powder, and a charge of shot is inserted into the cup **11** and into the upper portion of the shotshell case so as to fill the case wall up to the location of the crimp, the shotshell may be fired in a shotgun whereupon the powder beneath the base **12** is suddenly ignited so as to create a sudden pressure beneath the sealing base to thrust the entire load of the shotshell forwardly toward the muzzle end of the barrel. As the forward thrust of the pressure is applied against the shot within the cup **11**, the inertia of the shot tends to restrain movement of the shot and as a result of the tapered lower portion **15*b*** of the shotshell cup sidewall and the disc **17**, cushioning of the shot is effected. The cushioning occurs as a result of the deformation of the tapered lower portion **15*b*** of the cup sidewall into the shape and condition substantially illustrated in FIG. **3** wherein the void **17*a*** around the entire periphery of the tapered sidewall portion **15*b*** and above the disc **17** is substantially closed. The deformation of the tapered wall portion starts adjacent the acute angled intersection between the tapered sidewall and the disc **17** and then the deformation of the sidewall progressively moves outwardly so that the lower tapered portion of the sidewall substantially conforms to the interior shape of the case sidewall **20** and to the shape of the disc **17**. It will be noted that because the connecting structure **13** engages the disc **17** at a location spaced inwardly from the outer periphery of disc **17**, the disc **17** will flex or bow slightly during ignition of the powder and acceleration of the shot charge so as to provide additional cushioning.

After the shot charge and combination shot cup and wad **10** have exited the muzzle of the barrel, the sidewall segments will flare outwardly under combined influence of the shot in the cup and the air pressure so as to quickly decelerate the cup and wad **10** and allow the charge of shot **22** to proceed by itself toward the target.

The combination shot cup and wad **10** will rapidly decelerate and fall to the ground only a few yards down range.

After the combination shot cup and wad **10** has exited the muzzle of the gun, the tapered lower portion **15***b* of the cup wall resiliently returns, substantially to its original shape.

The flexing of this tapered lower portion of the cup wall and the cushioning effect provided thereby tends to decrease the rate of acceleration of the shot charge and tends to decrease the shot-to-shot pressure and, as a result, the deformation of the shot. Of course, as the tapered lower portion of the cup wall changes its shape, the shot in the cup will move around slightly relative to each other so that all of the shot-to-shot pressure is not applied against any one shot all in one location and, as a result, the tendency is to prevent extreme flattening of shot at any one location.

What is claimed is:

1. A combination shot cup and over powder wad for a shotshell, comprising:

a sealing base of resiliently yieldable and flexible plastic to overlie the powder in the shotshell case and to engage the sidewall of the case,

a connecting structure of such plastic and formed integrally of the base, and

a shot cup of such plastic and having a base disc on the connecting structure and formed integrally with the connecting structure, said disc lying transverse to the cup axis to engage the sidewall of the case, the cup also including a peripheral cup wall formed integrally of and connected to the disc and having an upper substantially cylindrical portion adjacent the open top of the shot cup, the upper portion of the cup wall having a plurality of circumferentially spaced longitudinally extending slits, and the cup wall also having a lower portion tapering convergently to the base disc and smoothly rounded in a longitudinal direction, said lower portion joining the base disc at a location spaced inwardly from the peripheral edge of the disc to normally diverge from the sidewall of the shotshell case and flex outwardly against the case sidewall and against the base disc to provide cushioning during acceleration of the shot.

2. A combination shot cup and over powder wad for a shotshell according to claim **1**, wherein the upper portion of the peripheral cup wall being substantially cylindrical adjacent the open top of the shot cup, the cup wall also having a plurality of circumferentially spaced slits extending longitudinally through the upper portion of the cup or wall and into and through a substantial portion of the smoothly rounded and convergently tapered lower portion of the cup wall to relieve tension on the cup wall against the pressure of shot within the cup while continuing to confine the shot therein.

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