Jan. 7, 1969 H. G. REMPEL 3,420,178

WAD FOR SHOTGUN SHELLS

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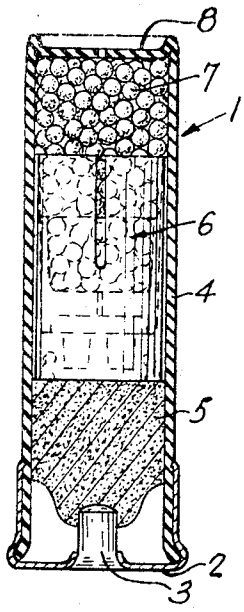

FIG. 1

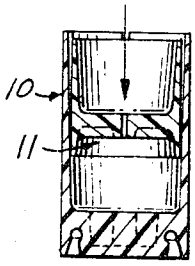

FIG. 2

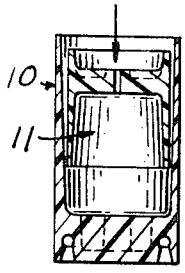

FIG. 3

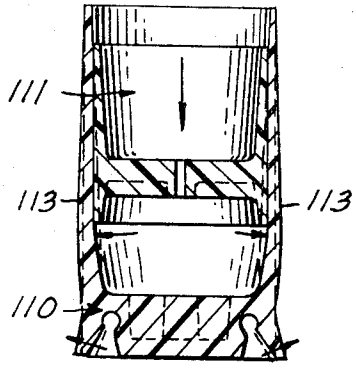

FIG. 10

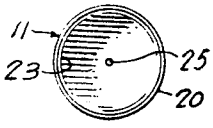

FIG. 8

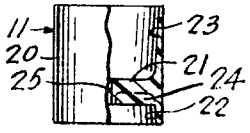

FIG. 7

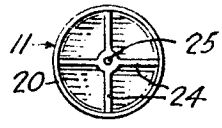

FIG. 9

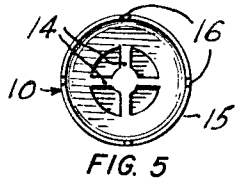

FIG. 5

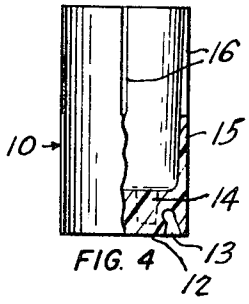

FIG. 4

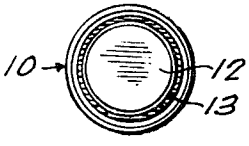

FIG. 6

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WAD FOR SHOTGUN SHELLS

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ABSTRACT OF THE DISCLOSURE

An improved wad for shotgun shells is disclosed, the same element of which may be assembled for use in shells of various gauges and in shells of the high and low inner base type. The wad comprising an inner and outer member may be assembled in an alternative manner so that the total wad can be adapted to all principal kinds of shotgun shells.

This application relates to a new and improved wad for shotgun shells. As is well known, shoutgun shells require wadding of some sort to keep the powder in place and ensure that when the shell is fired, the explosion of the powder will be transmitted properly to the shot pellets and will force the latter forward toward the muzzle for a proper discharge of the shotgun.

Many kinds of wads have been manufactured in the past of various materials such as paper, cotton, wool and plastic. Such wads are ordinarily made in specific sizes corresponding to the main shell sizes, 10, 12, 16, .410 and 20 gauge which cover a bore diameter size range from 0.775 inch to 0.410 inch.

It is a principal object of the present invention to provide a universal wad in the sense that it may be used with all principal types of shotgun shells, high inner base shells and low inner base shells and all variations in between.

Another object is to provide an improved wad which in addition to accomplishing the foregoing objects provides for improved discharge of the shot pellets with a minimum of scattering.

Other objects and advantages will be apparent from a reading of the present specification and the appended claims, and will be apparent to a person familiar with firearms and ammunition of the kind under discussion.

Although the definition of the present invention is to be taken from a reading of the appended claims, it may be stated that the present invention provides an improved wad consisting of a combination of two principal members, an outer member and an inner member adapted to be arranged one inside the other; the construction of the said members is such that depending on the position of the inner member inside the outer member, the total wad can be made to adapt to all principal kinds of shotgun shells as aforesaid, high and low inner base shells. At the same time the wad can be made in all diameters of ordinarily-used shells in addition to providing other advantages.

The present invention will now be described by way of example with reference to the accompanying drawings.

In the accompanying drawings,

FIGURE 1 shows a cross-sectional view of a shotgun shell in which a wad made in accordance with the present invention has been fitted, the shotgun shell shown being, apart from the wad, quite conventional;

FIGURE 2 shows a cross-sectional view of the wad by itself;

FIGURE 3 shows a further cross-sectional view of the wad in which there is a juxtaposition of the two principal elements as compared with FIGURE 2;

FIGURE 4 shows a partly cross-sectional view of the outer part of the wad;

FIGURE 5 shows a top plan view of that part of the wad as illustrated in FIGURE 4 looking downwardly upon FIGURE 4;

FIGURE 6 shows a bottom or reverse plan view of that part of the wad illustrated in FIGURE 4 looking upwardly toward FIGURE 4;

FIGURES 7, 8 and 9 are the same kind of views as FIGURES 4, 5 and 6 respectively, only they illustrate the inner part of the wad;

FIGURE 7 shows a partly cross-sectional view of the inner part of the wad;

FIGURE 8 shows a top plan view of that part of the wad as illustrated in FIGURE 7 looking downwardly upon FIGURE 7;

FIGURE 9 shows a bottom or reverse plan view of that part of the wad illustrated in FIGURE 7 looking upwardly toward FIGURE 7;

FIGURE 10 shows a somewhat exaggerated cross-sectional view of the wad to illustrate the manner in which the wad is deformed so as to be adaptable to different shotgun shell diameters.

Referring now to the accompanying drawings wherein the same reference numerals denote like parts in all figures, and referring first to FIGURE 1, a shotgun shell of conventional construction, apart from the wad of the present invention is shown generally at **1**. Shotgun shell **1** has a conventional base **2**, which in this example is shown with a low inner base. The priming cap **3** is in the center of base **2**. The side wall is at **4** of the usual hollow cylindrical construction. The propellant charge is at **5** and is typically smokless powder. The wad in accordance with this invention is shown at **6** and will be further described below. The shot pellets denoted as **7** are kept in place by the closed end of the shell denoted as **8**. As stated previously, every element described up to the present time, except for wad **6** are perfectly conventional.

The construction of the wad **6** can be understood with particular reference to the remainder of the drawings, FIGURES 2–10. FIGURE 2 illustrates the elements of wad **6** in some detail as seen in longitudinal medial cross-section, and as will be seen there are two main components, an outer hollow element rather resembling a tumbler with a thick bottom, which will be referred to as outer cup **10**. Inside the latter element is a component somewhat similar in appearance to outer cup **10** but of lesser length and of smaller size so that it fits inside outer cup **10**, denoted herein as inner cup **11**.

Outer cup **10** has a base of which the extreme lower surface is particularly shown in FIGURES 4 and 6 denoted herein as end **12**. End **12** of outer cup **10** has a relatively deep annular groove running therearound fairly close to its periphery denoted by **13**. The effect of groove **13** is to provide a pressure skirt whereby the exploding powder charge adjacent end **12** creates gas which enters groove **13** and pushes the extremities outwardly so as to cause wad **6** to grip tightly upon the inside of wall **4** of shotgun shell **1**. A gripping effect of the kind described is known in the firearm art but chiefly in relation to projectiles—the so-called "Minié effect" whereby a projectile is caused to expand outwardly so as to grip tightly upon the inside of the bore of a firearm during discharge.

End **12** is thin in cross-section except in the region of groove **13** and where strengthening ribs are provided at **14** seen particularly in FIGURE 5, the latter for the obvious purpose of making the wad **6** as strong as possible with a minimum of material.

Extending outwardly of end **12** of outer cup **10** on the same side of end **12** as ribs **14** is a cylindrical flange denoted by **15** of typical length approximately twice the diameter of outer cup **10**. The external surface of flange

15 is cylindrical in the sense that it is of uniform diameter from one end to the other insofar as this can be accomplished by standard manufacturing methods. The inside of flange is not, however, of uniform inside diameter but the inside diameter increases from left to right as seen in FIGURE 2 to provide a distinct thickness taper for flange **15**. That is, the flange **15** tapers in thickness from left to right as seen in FIGURE 2 becoming thinner in that direction. A taper of approximately 3° along the length of flange **15** is typically used.

It is contemplated that inner cup **11** will be moved within outer cup **10** and a consequence of this along with the taper just referred to is that flange **15** of outer cup **10** caused to expand, and this assists in accommodating whatever internal diameter of shotgun shell may be used. In addition, the flexibility of the flange **15** is such that the tightly packed shot pellet **7** aids in such expansion. To liberate the shot to be expelled in a body from the wad it has been found desirable that flange **15** shall have slots such as are denoted by **16** running approximately half the length of flange **15**. Four slots arranged in quadrature as particularly shown in FIGURE 5 have been found to be a satisfactory arrangement.

Although exact dimensions are subject to variation and keeping in mind that the purpose of the device described controls to a large extent the size, it has been found satisfactory if the dimensions of outer cup **10** are as follows:

	Inches
Overall length	1.375
Overall width	0.720
Inside diameter of flange **15** at open end	0.670
Inside diameter of flange **15** at closed end	0.650
Length of slot **16**	0.625
Width of slot **16**	1/16

Referring now to inner cup **11** particularly shown in FIGURES 7, 8 and 9, the inner cup **11** consists of a cylindrical flange **20** which is of uniform outside diameter. Inside cylindrical flange **20** is wall **21** closing the cylinder formed by cylindrical flange **20** at a position approximately a third of the distance along the length of cylindrical flange **20**, as seen from the bottom of FIGURE 7.

While the outside of inner cup **11** is of uniform diameter, the inside is not necessarily uniform, and from the standpoint of moulding inner cup **11**, it is preferable if the inside surfaces shown at **22** and **23** be slightly tapered. However, this feature is not of special importance and all that is required is substantial uniform inside diameter and a relatively thin cylindrical flange **20**.

Wall **21** is perforated by a small centrally-located hole at **25**, the purpose of which is to allow air to escape when two units are put together. Wall **21** has rib members **24** somewhat similar to ribs **14** of outer cup **10** already referred to.

As in the case of outer cup **10**, dimensions are subject to variation. By way of example an inner cup **10** to fit the dimensions set forth above for outer cup **10** have been found satisfactory:

	Inches
Overall length	0.705
Overall width	0.672
Distance from upper side of inner cup **11**, as seen in FIGURE 7 to upper edge at extreme top as seen in FIGURE 7	0.450
Size of hole **25**	1/16

FIGURES 2 and 3 show how outer cup **10** and inner cup **11** fit together. FIGURE 3 is very similar to FIGURE 2 except that inner cup **11** is reversed in longitudinal position. FIGURE 2 represents the relative positions of outer cup **10** and inner cup **11** when wad **6** is to be used with high inner base shells, while FIGURE 3 represents the relative positions of outer cup **10** and inner cup **11** for use with low inner base shells. FIGURE 1 illustrates a high inner base shell, and as will be seen the wad **6** is in FIGURE 1 as shown in FIGURE 2. The object is to have wall **21** at roughly the same distance from either end of the shell regardless of whether the shell is high base or low base and it will be seen that this is accomplished by the present invention.

The gripping action of wad **6** is important in either position. It will be obvious that having regard to the pressure of shot **7** as well as the taper of the inside diameter of outer cup **10**, outer cup **10** can be caused to bulge and have its outside diameter increased in a region of outer cup **10** depending on the position of inner cup **11**.

The distortion of outer cup **10** contributing to the gripping action of wad **6** is shown in exaggerated form in FIGURE 10 wherein outer cup **10** is now represented by cup **110** and wherein the taper of the inside is exaggerated. The inner cup **11** is now shown as inner cup **111**. The effect of the pressure of shot **7** should not be overlooked in achieving the gripping action referred to.

As may be seen, as inner cup **111** is moving in a downward direction as seen in FIGURE 10, outer cup **110** is caused to bulge as at **113** thereby increasing the outside diameter of the wad **6**, and the effect is similar whether outer cup **10** and inner cup **11** are in the relative positions shown in FIGURE 2 or 3.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A wad for shotgun shells comprising an outer cup member and an inner cup member, the outer cup member comprising a first hollow cylinder having internal and external cylindrical surfaces and a base closing one end of said cylinder, the inner cup member comprising a second hollow cylinder having internal and external cylindrical surfaces and a partition member disposed internally of said second member at a position closer to one end of said second cylinder than to the opposite end thereof, whereby said second cylinder is divided into two chambers of unequal volume, the relative dimensions of the internal cylindrical surface of said outer cup member and the external cylindrical surface of said inner cup member being such that the two said surfaces have a sliding fit therebetween, whereby the inner cup member may be assembled in said outer cup member with either end of the inner cup member adjacent the base of the outer member providing wads of alternative volumes.

2. A wad for shotgun shells according to claim **1** wherein said partition member disposed internally of said second member is located at a distance from one end of said second cylinder equivalent to about one-third of the total length of said second cylinder.

3. A wad for shotgun shells according to claim **1** wherein said base of said outer cup member has cross-ribbed reinforcing means.

4. A wad for shotgun shells according to claim **1** adapted to be used inside a cylindrical shotgun shell casing wherein said base of the outer cup member has an annular groove adjacent the periphery of said base capable of being pushed outwardly by the force of an explosion therebehind to provide to provide an improved seal with said cylindrical shotgun shell casing.

5. A wad for shotgun shells according to claim **1** wherein the partition member of the inner cup member has cross-ribbed reinforcing means.

6. A wad for shotgun shells according to claim **1** wherein said outer cup member has a plurality of grooves extending from the edge of said outer cup member remote from said base to substantially the mid-point of said outer cup member.

7. A wad for shotgun shells according to claim **1** wherein the substantially cylindrical inner surface of said

outer cup member is tapered so that the diameter decreases toward the base whereby insertion of the inner cup member into the outer cup member causes the outer cup member to bulge outwardly.

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