United States Patent

[11] **3,577,924**

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[73] Assignee **Canadian Industries Limited Montreal, Quebec, Calif.**
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[33] **Canada**
[31] **015936**

[54] **SHOTSHELLS**
4 Claims, 4 Drawing Figs.

[52] **U.S. Cl.** **102/42R,** 102/44, 102/95
[51] **Int. Cl.** **F42b 7/08,** F42b 9/26
[50] **Field of Search** ..... 102/42, 42 (C), 43, 44

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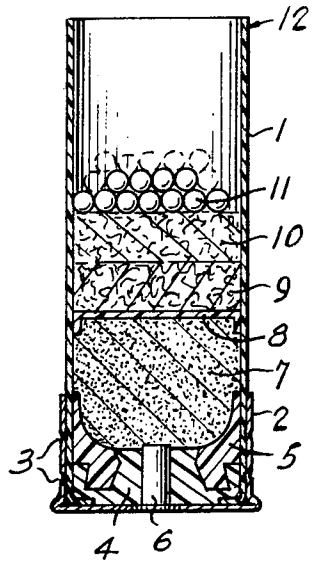
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ABSTRACT: The present invention provides a novel shotshell basewad construction by which the useful life of reloadable shotshells may be increased. The basewad comprises two interlocking components of molded thermoplastic material which are pressed into the bottom end of a shotshell tube. The basewad construction provides increased durability and improved gas sealing properties over earlier known types.



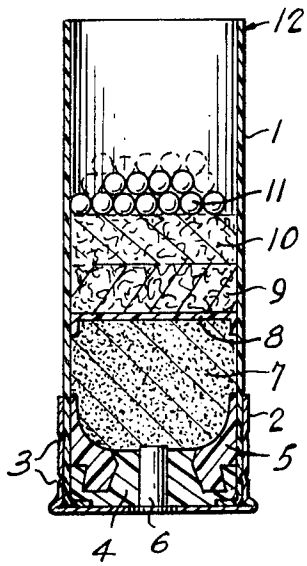


FIG. 1

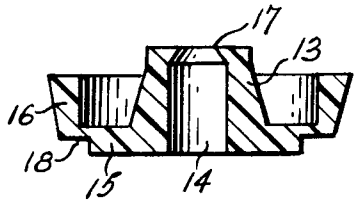


FIG. 2

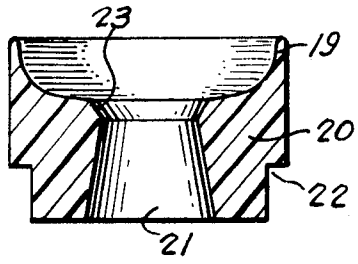


FIG. 3

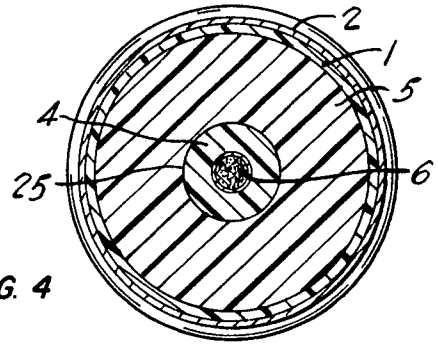


FIG. 4

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SHOTSHELLS

The present invention relates to shotshells and in particular to the internal basewad structure of a shotshell.

By "basewad" is meant that component of a shotshell which rests within the shotshell tube at the bottom end thereof, immediately below the propellant charge, and which is provided with a central aperture for the reception of the primer.

Basewads of known design are, in general, deficient in durability and hence limit the number of times a shotshell may be reloaded with propellant and shot charge for reuse. During the firing of a shotshell, the heat and pressure of the gases from the ignited propellant causes a deterioration of the basewad, reducing its ability to contain the propelling gases and frequently causes the expansion of the shotshell head or rim so that the shotshell cannot be readily fitted into the chamber of the shotgun or may not feed from the gun magazine. Basewads of known design thus either deteriorate themselves or produce a deterioration in the shotshell body thereby reducing the reloadability of the shotshell. The average shooter currently may generally expect not more than about five to 10 reloads of a plastic body shotshell before basewad failure and accompanying damage takes place.

The particular object of the present invention is to provide an improved shotshell containing a novel basewad construction which will generally double the useful life of reloaded shotshells.

A further object of the invention is to provide a shotshell basewad assembly of improved gas sealing characteristics.

Yet another object of the invention is to provide a novel two-component basewad assembly which combines high durability with an essential gas sealing function.

These and other objects of the invention will become apparent from the following description taken in connection with the accompanying drawing in which;

FIG. **1** is a sectional view of a shotshell showing the compressed placement of the two-component basewad of the invention;

FIG. **2** is a sectional view of the bottommost component of the two piece basewad of FIG. **1** in an unconfined or "natural" state;

FIG. **3** is a sectional view of the topmost component of the two piece basewad of FIG. **1** in an unconfined or "natural" state; and

FIG. **4** is a top plan view of the interlocked components of FIGS. **2** and **3** within a shotshell.

Referring to FIG. **1**, a laminated paper or plastic tube **1** is held in a cup-shaped metallic head **2** by means of crimps **3** and compressed basewad components **4** and **5**. A primer cap **6** is mounted in the central aperture of metallic head **2** and bottom basewad component **4**. A propellant powder charge **7** is shown adjacent to primer cap **6**. An over-powder gas sealing element **8** and filler wads **9** and **10** are shown above the propellant charge **7**. Shot **11** is shown above wad **10**. The tube end **12** is shown in the open position but may be closed by known means (not shown).

Bottom basewad component **4**, as shown in its unconfined or natural state in FIG. **2**, comprises a molded thermoplastic central frustoconical section **13** with an aperture **14** therein for the insertion of primer **6**. Extending radially outward from the base of frustoconical section **13** and integral therewith is flange section **15**. At the periphery of flange section **15** and integral therewith is upright wall section **16**. Wall section **16** is preferably flared slightly outward from a perpendicular position to provide improved frictional contact with the inside of tube **1**. Central frustoconical section **13** has at the upper and inner wall of the aperture thereof a projection **17** to provide gas-sealing contact with inserted primer **6**. A peripheral recess, indicated by **18**, is provided at the intersection of flange section **15** and upright wall section **16**.

Top basewad component **5**, as shown in its unconfined or natural state in FIG. **3**, comprises a molded thermoplastic body having an upstanding, tapered skirt portion **19** and integral therewith, a body portion **20**. A tapered aperture **21** extends through body portion **20** and is of a size adapted to receive therein conical section **13** of bottom wad component **4**. A peripheral recess, indicated by **22**, is provided at the outside lower edge of body portion **20** to receive therein wall section **16** of bottom wad **4**. A similar recess indicated by **23** is provided at the top of tapered aperture **21** to receive any outward expanding material from frustroconical section **13** of bottom wad **4**.

Superimposed and interlocked wad components **4** and **5** are shown in FIG. **4** within tube **1** and metallic head **2**. Circle **25** indicates the line of contact between projection **17** of bottom wad **4** and recess **23** of top wad **5**. Primer **6** is shown in position in aperture **14** of bottom wad **4**.

As shown in FIG. **1**, lower basewad **4** and upper basewad **5** are interlocked by pressure forces applied against their peripheral surfaces by the inner wall of tube **1**, by primer **6** and by the inner face of metallic head **2**. Before insertion into tube **1**, wad components **4** and **5** are preferably preassembled in snap-fit relationship. If desired, component **4** may first be inserted into tube **1** and component **5** inserted on top of component **4**. Components **4** and **5** are then compressed together during the shotshell heading operation.

The components of the basewad assembly as embodied in FIGS. **2** and **3** may be made by known means such as by injection molding techniques from suitable thermoplastic material. It has been found that the two-component wad of the present invention may most suitably be fabricated from polyethylene, the polyethylene of the topmost component being of a low density type and that of the bottommost component being of a high density type. By low density is meant a material of from about 0.91 gm./cm.^{3} to about 0.93 gm./cm.^{3} while by high density is meant a material of from about 0.95 gm./cm.^{3} to about 0.97 gm./cm.^{3}. While polyethylene is a preferred material for the basewad assembly of the invention, it will be obvious to those skilled in the art that other suitable materials may be successfully employed such as, for example, nylon, polypropylene, selected grades of acrylonitrile/butadiene/styrene copolymer and polyvinyl chloride, rubber compounds and the like. It will be appreciated that a material subject to destruction under conditions existing during the initiation of the propellant powder charge would be unsuitable. In addition, a material lending itself to fabrication into the desired shape, such as by molding methods, is to be preferred in the interest of economy. In the preferred embodiment of the present invention, the use of polyethylene of lower density and hence greater flexibility for wad component **5** provides an optimum gas sealing function against the inner wall of the tube **1**. The use of higher density polyethylene for wad component **4** provides the strength and rigidity required to withstand the high pressures resulting from the ignited propellant charge.

The following Example and Table will illustrate the improved shotshell of the invention but the latter is in no manner to be limited in scope to the embodiments described.

EXAMPLE

Shotshells were prepared containing the basewad assembly of the present invention. In a series of trials, these shotshells were fired, reloaded and fired again until the shotshell could no longer be reloaded due to failure. A series of similar tests were conducted with commercially available shotshells. The comparative results are recorded in the table below.

TABLE

Type of shotshell	Type of basewad	Sample size	Average No. of reloads	Basewad failure	Body failure
Plastic body	2-component [1]	20	20.6(13-28)[2]	Nil	20
Do	Compressed paper	10	7(3-9)[2]	10	Nil
Plastic body (manufacturer A)	Plastic overlay on compressed fibres	10	11(4-20)[2]	8	2
Paper body (manufacturer B)	Compressed paper	10	4.7(4-6)[2]	3	7
Do	do	10	5.5(4-8)[2]	10	Nil

[1] Basewad of present invention.
[2] Numbers in parentheses indicate lowest and highest number of reloads to cause failure.

An examination of the results of the table will show that the use of the basewad assembly of the present invention permitted an exceptionally high average number of reloads compared to the other commercial samples tested and in no case did basewad failure result using the basewad assembly of the present invention. Failure of the shotshell body itself was the sole cause of inability to continue use of the cartridge. In all other comparative tests basewad failure resulted.

In the manufacture of the shotshell of the present invention, cut shotshell tubes, with the lower ends preformed to a desired shape, are inserted in standard reinforced, expanded metal heads. Basewad components **4** and **5** are inserted, right side up, into the open end of the cut tubes and the tubes "headed" in the normal manner. During the heading operation, the lower end of the preformed cut tube is folded into the recess **18** on the lower peripheral edge of bottom wad **4**. The pressure of the shotshell tube against wall section **16** of wad component **4** compresses section **16** into the outer peripheral recess **22** of body portion **20** of upper wad **5** thus locking the basewad components together. Additionally, a heading punch is projected through the primer aperture **14** of the lower wad **4** forcing the material at projection **17** at the upper end of frustoconical section **13** into a receiving recess **23** in upper wad **5** to provide added interlocking of the wad components and preventing separation during firing. The primer and propellant charges superposed by filler wads and the shot charge are inserted into the open tube and the tube end is closed in a known manner.

We claim:

1. A shotshell comprising in combination a cup-shaped metallic head having a central aperture, a primer cap mounted in said aperture, a tubular casing held within said metallic head by the sidewall thereof, a propellant charge within said casing, a basewad positioned between said propellant charge and said metallic head, an over-powder filler wad or wads adjacent said propellant charge and a shot load within said container and adjacent said filler wad, the said basewad consisting of two separate but interlockingly engaged resilient thermoplastic body components in superimposed upper and lower relationship, the upper of said body components comprising a cylindrical thermoplastic body having a frustoconical aperture centrally thereof, an upwardly extending tapered wall at the periphery of said cylindrical body and integral therewith and a peripheral recess at the outer, lower edge of said cylindrical body, said tapered wall being adapted to provide a gastight seal between said upper body component and said tubular casing; and the lower of said body components comprising a frustoconical thermoplastic body having an aperture centrally thereof adapted to receive said primer cap in firm, gastight relationship, an outwardly radially extending flange at the base of said frustoconical body and integral therewith and an upwardly extending wall at the periphery of said outwardly extending flange and integral therewith, the said upwardly extending wall being of a height not substantially greater than the height of the said frustoconical body.

2. A shotshell as claimed in claim **1** wherein the bottom component of the two-piece basewad is provided with a peripheral recess at the outer lower edge thereof at the point of intersection of its outwardly extending flange and its upwardly extending wall.

3. A shotshell as claimed in claim **1** wherein the thermoplastic material comprising the top component of the two-piece basewad is of greater flexibility than the thermoplastic material comprising the bottom component of said basewad.

4. A shotshell as claimed in claim **3** wherein the top component of the two-piece basewad is made of polyethylene of a density of from about 0.91 gm./cm.^{3} to about 0.93 gm./cm.^{3} and the bottom component of said basewad is made of polyethylene of a density of from about 0.95 gm./cm.^{3} to about 0.97 gm./cm.^{3}.