April 19, 1966 R. W. COMERFORD 3,246,603

SHOTGUN CARTRIDGE

Original Filed Oct. 23, 1962

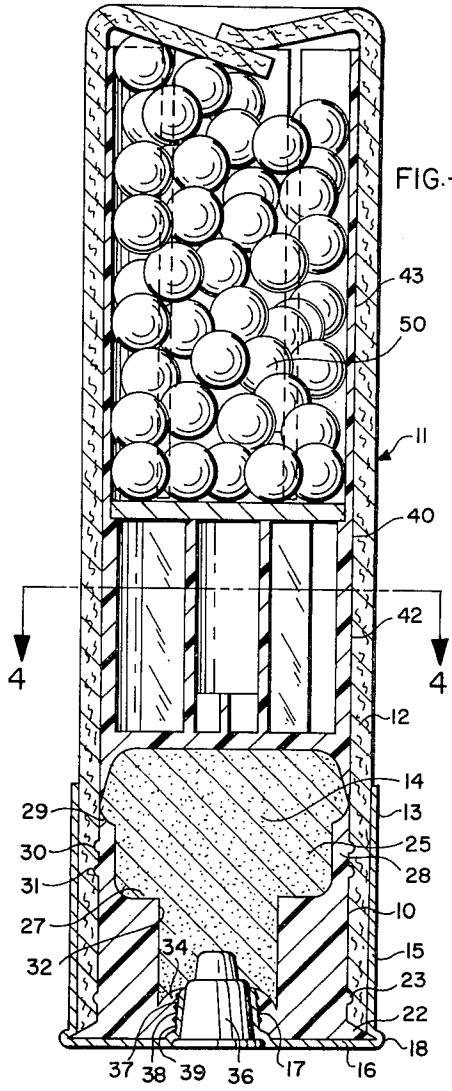


FIG.—1

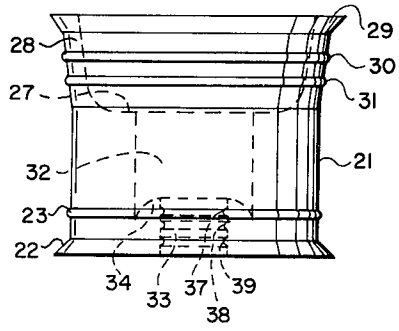


FIG.—2

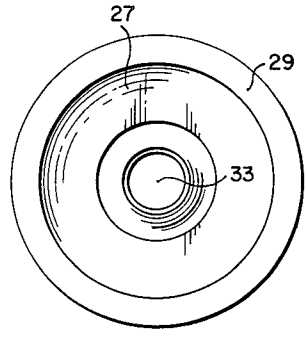


FIG.—3

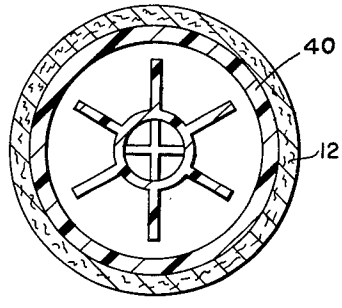


FIG.—4

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SHOTGUN CARTRIDGE

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Original application Oct. 23, 1962, Ser. No. 232,420. Divided and this application Jan. 27, 1964, Ser. No. 340,479

10 Claims. (Cl. 102—42)

The present invention is a division of an application entitled "Shotgun Cartridge," Serial No. 232,420, filed October 23, 1962 and is directed to the subject matter which is a continuation-in-part of an earlier application entitled "Shotgun Shell," Serial No. 188,646, filed April 19, 1962 now abandoned.

The present invention relates generally to ammunition and more specifically to shotgun cartridges.

The composite cartridge of the invention is particularly suitable for use in sporting weapons by those gun enthusiasts who like to reload their own cartridges. In general, the composite type of cartridge is formed of a cylindrical cardboard case and a metal base or cap telescoping over the rearward end thereof. A fiber basewad is normally provided in the base end of the cardboard and has a central "flash hole," or firing channel, connecting the primer pin in the base to the powder charge.

A very serious problem involved in reloading prior cartridges is the fragmentation, or even disintegration, of fiber basewad when the powder charge is fired. Subsequent reloading of the cartridge often resulted in a hangfire or a mis-fire caused by fragments of the basewad obstructing the firing channel. Moreover, the fragments removed before a subsequent use prevented a uniform distribution of the powder charge as was originally designed into the basewad. Thus, generally in the past the number of times a cartridge could be refilled and refired was dependent upon the useful life of the basewad.

Another problem with prior basewads is that they leak between the basewad and the cartridge case. Those wads made by wrapping or coiling a long strip of paper to form a roll which is pressed into place in the cartridge case leak between the layers of paper also. Such leakage often results in the metal cap fracturing just above a rim formed at the base of the cap. This type of fracture can be extremely dangerous as a person firing such a cartridge in a weapon will receive a blast of explosion gases in his face. The leakage of the prior paper wads increases with each firing so that they leak rather severly after a few firings, thereby increasing the danger of such a fracture.

Still another problem with prior basewads is that the gases escaping between the basewad and the metal base cap circumferentially expand the portions of the base cap adjacent the rim. Such expansion eliminated the rim edge engaged by the extractor mechanism of the gun in use to eject the cartridge from the breech after firing. Without an abrupt rim edge the extractor mechanisms tend to override the rim making it extremely difficult to remove the cartridge.

The basewad of the present invention and that described in the above-mentioned applications is made of a synthetic plastic material having a forward powder charge cavity and an axial, flash hole. The basewad includes a flexible skirt around the powder charge cavity which radially expands upon explosion of the powder charge to seal the rearward end of the cartridge against the escape, or blow-by of explosion gases. The basewad is not susceptible to fracture, fragmentation or disintegration and remains intact throughout the useful life of the cartridge. The basewad is also provided with annular rings and a rib projecting from the outer cylindrical surface of the basewad to additionally seal the escape of gases and to rigidly secure the cartridge case to the metal base cap concentrically disposed therearound. The basewad of the present invention further includes a seal around a primer disposed in the rearward portion of the flash hole. The seal is a flexible, annular lip formed in the interior surface defining the flash hole and includes a plurality of sealing ring protrusions circumferentially engaging the primer-receiving portion of the metal base cap.

A purpose of the annular lip and sealing rings is (1) to clamp the primer in place so as to prevent it from popping rearwardly out of the cartridge when the powder charge is ignited, and (2) to seal against the escape of gases between the basewad and the metal cap. When the powder charge is ignited its explosive thrust pushes against the flexible sealing lip. The lip and sealing rings then squeeze against the primer clamping it in place and inhibiting any gases from escape, both between the primer and the metal cap and between the metal cap and the basewad.

Acordingly, an object of the present invention is to provide a new and improved composite cartridge wherein the basewad does not limit the useful life of the cartridge.

Another object of the invention is to provide a new and improved cartridge having a basewad which very effectively seals and rearward end of the cartridge against the escape of gases.

A further object of the present invention is to provide a new and improved cartridge wherein the basewad will not fragment and will remain intact throughout the useful life of the cartridge.

Still another object of the invention is to provide a new and improved cartridge wherein the entire explosive thrust of the burning charge of powder is expelled out the forward end of the cartridge.

An additional object of the present invention is to provide a new and improved composite cartridge wherein the original distribution of the powder charge is uniformly maintained in each subsequent reuse.

Yet an additional object of the present invention is to provide a new and improved composite cartridge wherein the basewad prevents the primer from popping out upon ignition of the powder charge.

A final object of the present invention is to provide a new and improved basewad for use in the composite cartridge, the basewad including a seal around the primer pin in the rearward end of the flash hole, the seal preventing the escape of explosion gases between the basewad and the metal cap disposed around the base end of the cartridge case.

Other objects and a fuller understanding of the invention may be had by referring to the following description and claims taken in conjunction with the accompanying drawings in which:

FIGURE 1 is a sectional view, in a longitudinal plane, showing a composite cartridge using the basewad of the invention;

FIGURE 2 is a side elevational view of the basewad of the invention;

FIGURE 3 is a top view of the basewad of FIGURE 2; and,

FIGURE 4 is a section taken along line 4—4 of FIGURE 1.

Referring now to the drawings, wherein like reference characters designate like or corresponding parts throughout the several views, there is shown in FIGURE 1 a composite cartridge generally indicated by the reference character **11**.

The composite cartridge **11**, includes a cylindrical case **12** and a metal base **13**. The case **12** may be made of plastic, a fibrous material, or any other suitable materials

spirally or otherwise wound to form a cylindrical tube. The metal base, or end cap, **13** is made of brass or other suitable material. The base **13** reinforces a rearword portion of the cartridge case **12** containing a powder charge **14**. The metal base **13** also provides a surface or edge by means of which the cartridge is locked in the breech of a small arms weapon. The base **13** includes a cylindrical portion **15**, a transverse portion **16**, covering the bottom end of the cylindrical portion, and an inner primer-receiving portion **17** centrally located in the transverse portion **16**. A circumferential rim **18** is formed at the juncture of the cylindrical portion **15** and the transverse portion **16** to retain the cartridge within the breech of the particular weapon in use and to provide an edge for ejecting the cartridge after firing.

The basewad **10** disposed in the base end of the cartridge case **13** is made of a synthetic plastic material or other suitable resilient material and does not fracture or fragment upon the impact of an explosive force provided by igniting the powder charge **14**. The preferred plastic material is high density polyethylene.

As shown in FIGURES 1–3, the body of the basewad **10** has an outer cylindrical surface **21**. At the base or rearward end of the basewad a triangularly-shaped flange **22** projects radially from the cylindrical surface **21**. The flange **22** increases the base surface area of the basewad and is clamped between the opposing surfaces making up the base rim **18**. Clamping the flange **22** in the rim at the time the base **13** is fixed to the case **12** rigidly secures the basewad in the base of the cartridge **11** and effectively seals against blow-by of the explosion gases. Just above the flange **22**, a rib **23** also projects radially from the cylindrical surface **21** and compacts the cartridge case **12** against the metal base **13** to additionally secure the basewad in place and to seal against "blow-by."

The forward end of the basewad **10** is provided with a cavity, or well, **25** for receiving and holding the powder charge **14**. A skirt, or thin wall portion **28** sourrounding the powder charge cavity is flexible and expands radially to prevent the blow-by of explosion gases generated by ignition of the powder charge **14**. The skirt includes a flared lip **29** and two sealing rings **30, 31**. The lip **20** tapers to a very thin forward edge and forms a very flexible wedge-shaped flared extension of the skirt to prevent the entry of the blow-by gases between the basewad and the cartridge case. The lip **29** also prevents the entry of gun powder between the basewad **18** and the cartridge case **12**. The sealing rings **30, 31** act in the manner of piston rings to seal off the blow-by gases that get past the lip **29**. The skirt **28** is flared slightly radially outwardly to maintain the lip **29** and the sealing rings **30, 31** in constant pressure contact with the interior surface of the cartridge case **12**. In other words, the skirt **28** in its untensed state is flared radially outward as is shown in FIGURE 2. When the basewad **10** is disposed and confined within the cartridge case **12**, the skirt must conform to the cylindrical contour of the interior surface of the cartridge case **12** as is shown in FIGURE 1. The skirt **28** in the substantially cylindrically confined position shown in FIGURE 1 is tensed and urges the lip **29** and the sealing rings **30, 31** against the interior case surface. Since the lip **29** in an untensed state radially flares still further beyond the outer surface of the skirt **28** at the forwardmost end of the flared skirt **28** as is shown in FIGURE 2, the lip **29** provides a very tight gas seal when confined within the cartridge case **12**. These sealing devices have been found to be very effective and assure that none of the thrust of the exploding powder charge is lost out through the base of the cartridge.

A bottom surface **27** of the powder charge cavity **25** is flat so that the force of the explosion pushes straight against the base of the cartridge. This force is approximately 10,000 pounds per square inch (p.s.i.), and will push out the cylindrical portion **15** of the base if the bottom surface **27** is tapered, as the radial vector of the explosion force is concentrated more at the bottom of the skirt than uniformly over its length. Moreover, if the force is concentrated more at the base of the skirt, the sealing rings are drawn away from case **12** and do not seal effectively against the blow-by gases.

As shown in FIGURE 1, the cylindrical portion **15** of the base **13** extends axially beyond the end of the skirt **28**. This arrangement prevents shearing the cartridge case at the top of the base **13**. In other words, if the skirt **28** extended above the base **13** the explosive force of repeated firings of the cartridge might shear the cartridge case **12** at the top of the base.

A firing channel, or "flash hole" **32** extends axially in the basewad from the powder charge cavity **25** toward the rearward end of the basewad. A primer-receiving opening **33** extends axially in the basewad from the rearward end toward the powder cavity and opens into the flash hole **32**. The primer-receiving opening **33** is smaller in diameter than the flash hole **32** so that an annular surface connects them and forms an annular lip **34**. The annular lip surface **34** has a convex contour sloping rearwardly away from the longitudinal axis of the basewad. The annular lip surface **34** and the adjoining portion of the inner basewad surface defining the flash hole **32** form a flexible seal. The inner cylindrical surface defining the primer-receiving opening **33** includes primer sealing rings **37, 38** and **39**. The primer sealing rings **37–39** engage the primer-receiving portion **17** of the metal base **13** and act to seal against the blow-by gases much in the same manner as sealing rings **30, 31**.

The primer-receiving opening **33** receives the primer-receiving portion **17** of the metal base **13**. A primer **36** is provided in the primer-receiving portion **17** and protrudes axially into the flash hole **32**. The lip **34** surrounds the primer-receiving portion **16** and the primer **36**. When the powder charge **14** is ignited, the explosive force generated pushes the flexible lip **34** and the primer sealing rings **37–39** against the primer-receiving portion **17** to clamp the primer **36** therein and prevent the escape of explosion gases, particularly between the basewad **10** and the metal base **13**.

A one-piece middle wad and shot-receiving pouch **40** which is termed a "pouch-wad" is telescoped within the cartridge case **12** over the top of the powder charge **14**. The pouch-wad **40** is made preferably of a relatively low density polyethylene. The pouch-wad **40** includes a middle wad portion **42** and a shot-receiving pouch, or pocket portion, **43**. A more detailed description of the pouchwad **40** is found in the above referenced "Shotgun Cartridge" application.

A shot charge **50** of spherical pellets or other suitable projectile is provided in the pouch portion **43**. The forward end of the cartridge case **12** is crimped or turned over and inwardly across the top of the shot charge to enclose the cartridge case. When the powder charge **14** is ignited, the turned-over portion **27** of the case is pushed open by the emerging shot charge **50** and pouch-wad **40**.

Composite cartridges having the novel cartridge and basewad construction of the invention have been found to have a useful life of at least 10–12 firings. This is indeed significant in comparison to the 2–3 firings which is the useful life of prior cartridges. Moreover, increased safety is derived by substantially eliminating the chances of a misfire or hang-fire caused by basewad fragments obstructing the firing channel. Finally, increased efficiency is provided by an effective seal construction which assures that the entire thrust of the explosion forces is out the forward end of the cartridge.

The cartridge and base end construction of the present invention may be briefly described as comprising a basewad of a synthetic plastic material disposed in a case which is telescoped into a metal base; the basewad including a flexible, upper skirt and a sealing lip and a ring, both projecting radially from the skirt and engaging the interior of the case to prevent "blow-by" of the explosion gases.

The basewad of the invention further includes a base flange locked to the metal base and a circumferential rib

projecting radially outward to compact the case against the base so that the basewad, the cartridge case, and the metal base are locked together and prevent the rearward escape of gases. Finally, the basewad includes a primer-receiving opening which is defined in part by a flexible, annular lip including sealing ring protrusion means adapted to apply pressure to the sides of a primer pin disposed in the opening and to seal against the blow-by of gases through the primer-receiving opening.

Although the invention has been described in its preferred form with a certain degree of particularity, it is understood that the present disclosure of the preferred form has been made only by way of example and that numerous changes in the details of construction and the combination and arrangement of parts may be resorted to without departing from the spirit and the scope of the invention as hereinafter claimed.

What is claimed is:

1. A basewad for use in the powder charge portion of a cartridge comprising:

(a) a resilient body having a forward end, a base end and an outer cylindrical surface extending from adjacent said forward end to adjacent said base end;

(b) a flexible annular skirt extending axially from the forward end of the body and defining a powder charge storage well with the forward end of said body, said skirt having an outer circular surface adjoining said cylindrical surface, the outer circular surface of said skirt flaring outwardly beyond the cylindrical surface of said body; and,

(c) said skirt including a concentric, annular sealing means protruding still further beyond the outer surface of said skirt.

2. The basewad of claim **1** wherein said annular sealing means is a lip at the forwardmost edge of the skirt, and said lip tapers to a very fine forwardmost edge projecting radially beyond the outer surface of said skirt.

3. The basewad of claim **1** wherein said annular sealing means is a rounded protuberance projecting radially beyond the outer surface of the skirt adjacent the forwardmost edge of the skirt.

4. A basewad for use in the powder charge portion of a cartridge comprising:

(a) a resilient body having a forward end, a base end and an outer cylindrical surface extending from adjacent said forward end to adjacent said base end;

(b) a flexible annular skirt extending axially from the forward end of the body and defining a powder charge storage well with the forward end of said body, said skirt having an outer circular surface adjoining said cylindrical surface; and,

(c) said skirt including a tapered lip having an outer flared surface flaring outwardly beyond the outer surface of the skirt at the forwardmost edge of the skirt, and at least one concentric sealing ring protrusion projecting radially from the surface of the skirt between the lip and said body.

5. The device of claim **4** including, in combination:

(d) the outer circular surface of said skirt flaring outwardly from the cylindrical surface of said body and the flared outer surface of said lip being flared outwardly beyond the surface of said skirt.

6. A basewad for use in the powder charge portion of a cartridge comprising:

(a) a resilient body having a forward end, a base end and an outer cylindrical surface extending from adjacent said forward end to adjacent said base end;

(b) a flexible skirt extending axially from the forward end of the body and defining a powder charge storage well with the forward end of said body, said skirt having an outer circular surface adjoining said cylindrical surface;

(c) said skirt including a lip flaring outwardly beyond the outer surface of the skirt, at the forwardmost edge of the skirt, and at least one sealing ring protrusion projecting radially from the surface of the skirt between the lip and said body;

(d) a circumferential flange projecting radially from the surface of said body at the base end thereof; and,

(e) a circumferential rib protrusion projecting radially from the cylindrical surface of said body adjacent said circumferential flange.

7. The basewad of claim **6** including, in combination:

(f) the outer circular surface of said skirt flaring outwardly from the cylindrical surface of said body and said lip flaring still further outwardly beyond the surface of said skirt.

8. A cartridge comprising:

(a) a cylindrically contoured cartridge case including a powder charge portion and a shot-charge portion;

(b) a base including a cylindrical wall, a transverse wall across one end of said cylindrical wall, and a primer receiving opening in the center of the transverse wall;

(c) said cylindrical wall being concentrically mounted around the powder charge portion of the case;

(d) a basewad of a synthetic plastic material disposed within the powder charge portion of the case;

(e) said basewad having a forward extending flexible skirt defining a powder charge cavity, and a flash hole axially coextensive with said primer receiving opening and opening into said cavity;

(f) said basewad including the skirt having an outer circular surface of a dimension so as to be snugly received in the cylindrical cartridge case; and,

(g) said skirt including circumferential sealing ring protrusions projecting radially from the outer surface of the skirt whereby the force of an exploding powder charge causes said flexible skirt to expand radially outward to move said sealing ring protrusions tightly against the inner surface of said case in a gas sealing relation.

9. A cartridge basewad comprising:

(a) a synthetic plastic body having a cylindrical outer surface, a radially extending base surface at the rearward end, and a powder charge cavity formed in a forward end;

(b) said plastic body including:

(i) a first interior cylindrical surface extending from said base surface toward the powder charge cavity and defining a primer-receiving bore;

(ii) a second, larger interior cylindrical surface extending from said powder charge cavity toward said base surface and defining a flash hole bore;

(iii) an annular lip surface extending between said first and second cylindrical surfaces;

(c) adjacent portions of said first cylindrical and lip surfaces forming a resilient seal; and,

(d) sealing ring means protruding inwardly circumferentially from the adjacent portion of said first cylindrical surface.

10. A cartridge comprising:

(a) a cylindrically contoured cartridge case including a powder charge portion and a shot charge portion;

(b) a base including a cylindrical portion, a transverse portion covering one end of the cylindrical portion, and a primer-receiving portion in the center of the transverse portion;

(c) said cylindrical portion being concentrically mounted around the powder charge portion of the case;

(d) a basewad disposed within the powder charge portion of the case;

(e) said basewad including a powder charge cavity and a powder charge firing channel axially aligned with said primer-receiving portion and opening into said cavity;

(f) a primer disposed in said primer-receiving portion and in the firing channel;

(g) a resilient seal in said firing channel circumferentially engaging said primer-receiving portion; and,

(h) said resilient seal including sealing ring means protruding inwardly from said firing channel and circumferentially engaging said primer-receiving portion.

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