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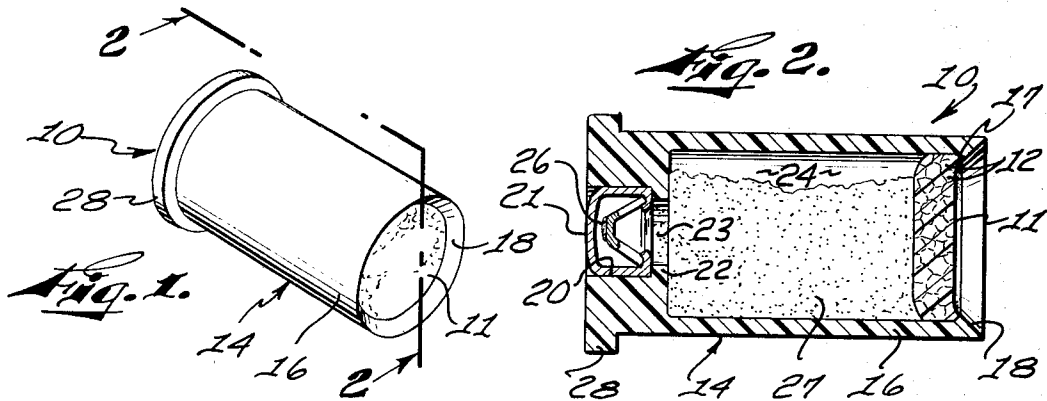
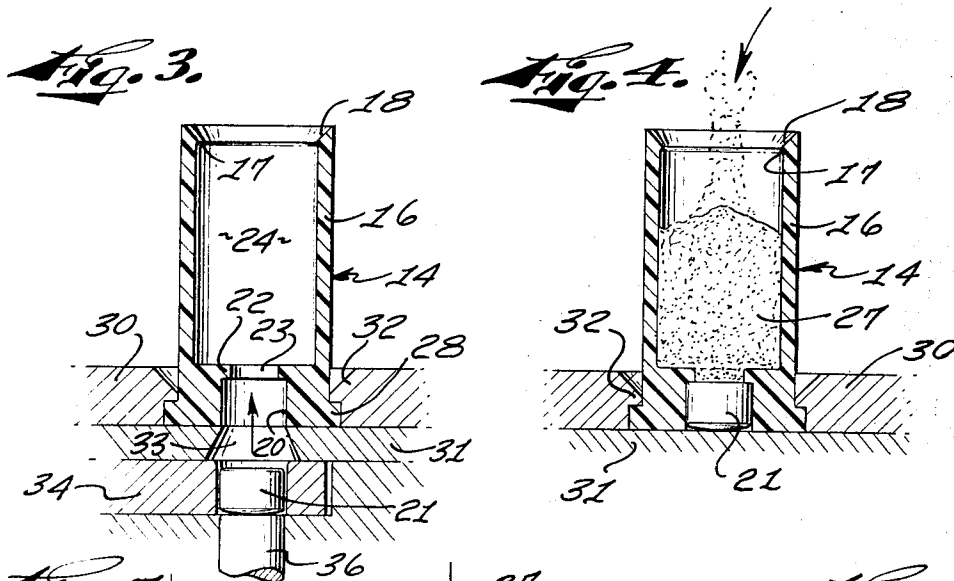
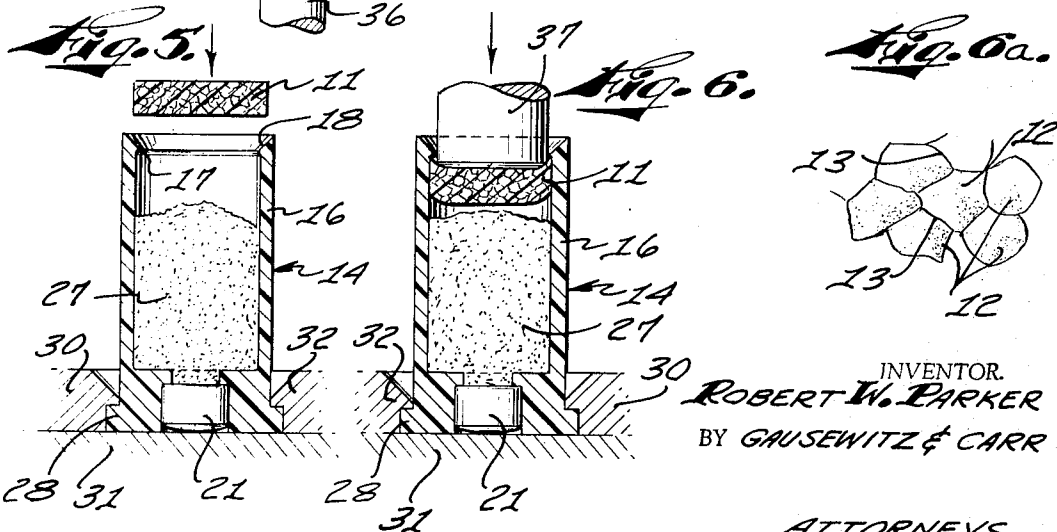
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BLANK-CARTRIDGE GUN AND CARTRIDGE THEREFOR

Original Filed Nov. 21, 1963

2 Sheets-Sheet 1



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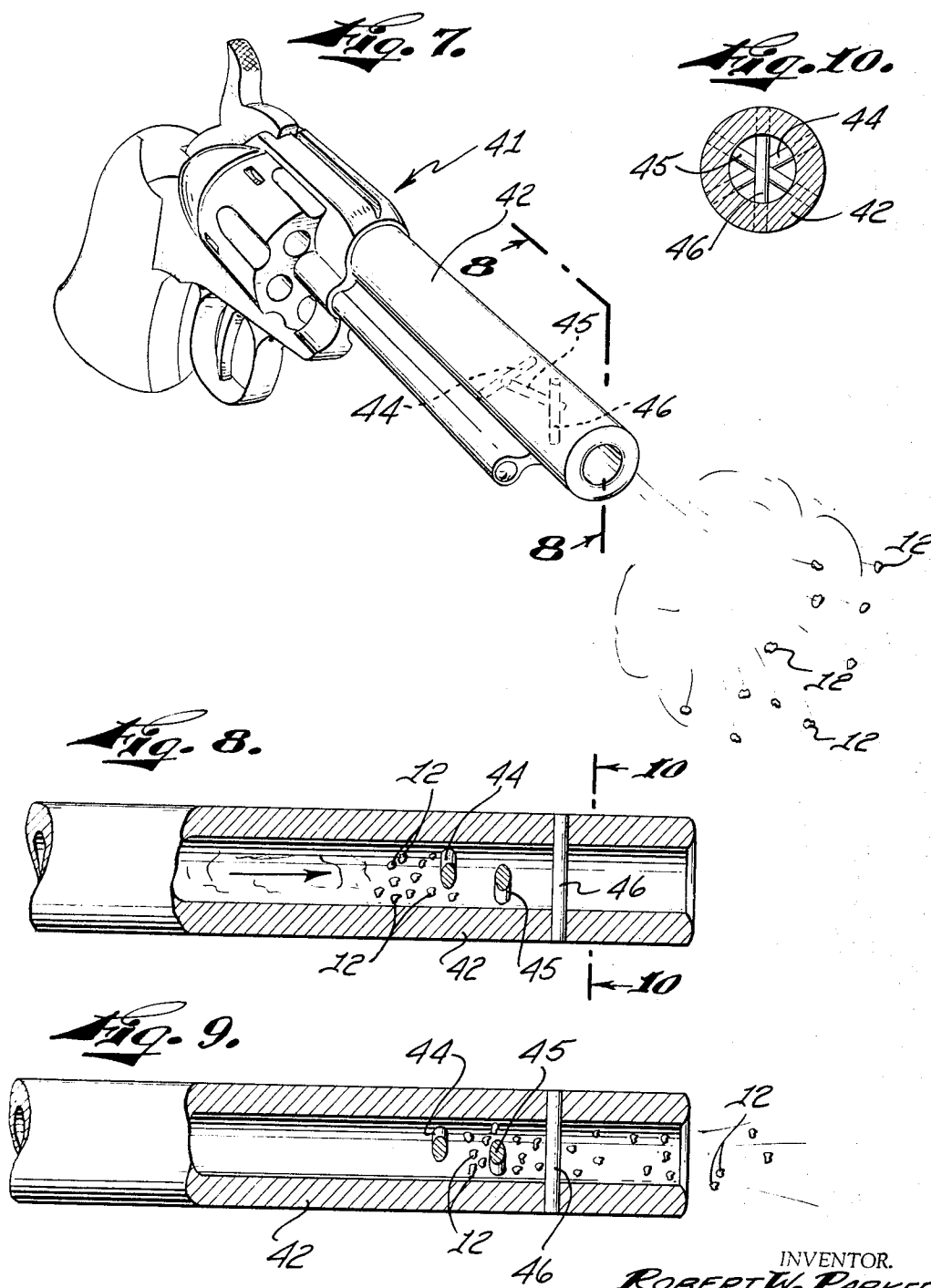
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BLANK CARTRIDGE GUN AND CARTRIDGE THEREFOR

Robert W. Parker, 668 N. Hart, Orange, Calif. 92667
Continuation of application Ser. No. 492,958, Aug. 27,
1965, which is a continuation of application Ser. No.
325,403, Nov. 21, 1963. This application May 19, 1966,
Ser. No. 551,471

10 Claims. (Cl. 42—1)

ABSTRACT OF THE DISCLOSURE

This disclosure relates to a blank cartridge wherein a generally tubular cartridge body has an open end and a closed end. The cartridge body contains a charge of flash powder. Wadding is provided between the powder and the open end and forms the only barrier between the powder and such open end, the wadding being heat-expanded beads of a synthetic resin having a raising agent in homogeneous dispersion therein. The disclosure also relates to the combination of such a cartridge with a gun the barrel of which incorporates obstruction members to further insure breaking up of the wad.

The present patent application is a continuation of my copending application Ser. No. 492,958, filed Aug. 27, 1965, now abandoned, for a Blank Cartridge and Method and Apparatus for Manufacturing and Firing the Same, which in turn is a continuation of application Ser. No. 325,403, filed Nov. 21, 1963, now abandoned.

The present invention relates to a blank cartridge. The invention also relates to a method of making the cartridge, and to a gun apparatus for firing the same.

Conventional blank cartridges have brass cases the open ends of which are crimped or rolled over cardboard wads. Such cartridges are characterized by at least two very important deficiencies, the first of which is that the cardboard wad, when ejected at high velocity from the gun, is a dangerous projectile which may cause severe injury to a person disposed a substantial number of feet from the gun. For this reason, guns containing blank cartridges are not conventionally pointed at persons within a range of at least twenty feet. This results in unrealistic actions in a stage play, for example, since the gun may not be pointed at the actor to be "shot" at short range. Despite the precautions employed by most users of blank cartridge guns, stinging and injurious contact between the wad and persons in the vicinity of the gun is a common occurrence.

The second of the above-indicated major deficiencies of conventional blank cartridges is the high price thereof. The high price results not only from the cost of the brass case itself, but also from the cost of crimping over the open end of the case after the powder and wad have been introduced therein.

In view of the above and other factors characteristic of conventional blank cartridges, it is an object of the present invention to provide a blank cartridge which is safe to use, and which may be manufactured for only a fraction of the cost of existing blank cartridges, there being no necessity for a metal case and no necessity for an operation whereby a portion of the case is crimped or rolled over the wad.

Another object of the invention is to provide a method of manufacturing the blank cartridge of the invention, and to provide a gun which operates in conjunction with the wad portion of the cartridge to achieve maximum safety conditions upon firing of the gun.

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These and other objects will become apparent from the following detailed description taken in connection with the accompanying drawings in which:

FIGURE 1 is a perspective view illustrating a blank cartridge constructed in accordance with the present invention;

FIGURE 2 is a longitudinal sectional view of the cartridge, taken on line 2—2 of FIGURE 1;

FIGURE 3 is a fragmentary vertical sectional view illustrating one step in the method, wherein the percussion cap is inserted into the plastic case;

FIGURE 4 illustrates a subsequent step in the method, in which powder is introduced into the case;

FIGURES 5 and 6 are corresponding views illustrating a subsequent step in the method, namely the insertion of the wad into the case, which wad is retained in the case in the absence of any crimping or rolling operation;

FIGURE 6a is a greatly enlarged, fragmentary view illustrating the cellular structure of the wad portion of the present blank cartridge;

FIGURE 7 is a perspective view illustrating the blank-cartridge gun of the present invention during firing of one of the cartridges;

FIGURES 8 and 9 are enlarged fragmentary vertical sectional views taken along line 8—8 of FIGURE 7, and illustrating the conditions which occur in the barrel of the gun immediately subsequent to firing; and

FIGURE 10 is a transverse sectional view taken on line 10—10 of FIGURE 8.

In accordance with a first aspect of the present invention, the blank cartridge 10 is formed with a wad 11 comprising a disc of foam plastic cells or beads. Stated otherwise, the disc which forms the wad 11 is a multi-cellular structure composed of small expanded beads of synthetic resin. The individual cells 12, or expanded beads, are sufficiently small that a multiplicity thereof are incorporated in each wad, as illustrated in the drawing.

Each of the individual expanded cells or beads 12 is light and resilient, and relatively coherent. Each cell is adhered to the adjacent cells by partial fusion, but the interface regions 13 are sufficiently weak that upon detonation of the powder within the cartridge the individual cells 12 will fly apart as illustrated in FIGURES 7—9. Thus, a person within range of the gun will be struck not by one or more large pieces of cardboard wadding, but instead by individual small cells 12 of extremely lightweight, resilient foam plastic. Such individual cells 12 are so harmless that, when projected against the skin of an individual located only a short distance from the gun, little or no stinging sensation or pain is experienced, and no injury is effected.

Stated with greater particularity, the disc or sheet 11 is formed by extruding, or expanding within a mold, beads which contain an expanding (foaming) or raising agent, such beads being sold extensively under the trademark "Pelistan" by Dow Chemical Company, and under the trademark "Dylite" by Koppers Company, Inc. Suitable beads are formed of polystyrene or the like, and contain a volatile hydrocarbon in homogeneous dispersion therein. When expanded in a confined region by application of steam, for example, the beads expand and adhere to each other to form a multi-cellular mass. It is to be understood that each of the wads 11 may be molded individually, or else a sheet thereof may be extruded or molded and then die cut into discs.

Further information relative to the multi-cellular expanded plastic of the type employed herein may be determined by referring to the following U.S. patents: 2,681,321 issued June 15, 1954, for Production of Porous

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Materials from Film-Forming Organic Thermoplastic Masses; 2,950,261 issued Aug. 23, 1960, for Process of Making Expandible Particulate Styrene Polymer by Diffusion of a Volatile Liquid Hydrocarbon Into Said Polymer Particles; and 2,744,291 issued May 8, 1956, for Production of Porous Shaped Articles from Thermoplastic Materials.

In accordance with another important aspect of the present invention, the cartridge 10 has a case 14 which is injection-molded of plastic and is adapted to retain the wad 11 in the absence of any crimping or other operation, either mechanical or thermal. To accomplish this end, the generally tubular body 16 of the case is formed at its open end with an internal bead or lip 17 which is illustrated as being triangular in section. The minimum diameter of the bead, that is to say the diameter thereof at the apex, is substantially smaller than the internal diameter of tubular body 16. Thus, the bead serves to prevent outward movement of wad 11 after the wad has been inserted into body 16 as will be described hereinafter. The end surface of body 16 adjacent the lip 17, namely the surface thereof between the lip 17 and the extreme forward end of the outer body surface, is frustoconical as indicated at 18. The surface 18 aids in guiding wad 11 into the body 16.

The end of cartridge case 14 remote from wad 11, that is to say the base or closed end thereof, is shown as being relatively thick and as having a cylindrical recess 20 formed axially therein to receive a percussion cap 21. Such cap seats on a shoulder 22 which is formed at the bottom of recess 20, there being an opening 23 formed coaxially of the recess to provide communication between the cap and the chamber 24 defined by the case. Thus, gases generated in response to detonation of the fulminating powder 26 (FIGURE 2) contained within cap 21 will pass instantly through opening 23 to detonate the powder 27 in chamber 24. Formed peripherally of the plastic case 14, at the extreme end thereof remote from frustoconical surface 18, is the rim portion 28 of the cartridge case.

Referring to FIGURES 3-6, inclusive, the method of manufacturing the blank cartridge will next be described. The injection-molded plastic case 14 is mounted in vertical relationship by means of a holding member 30 which is disposed on a support member 31. Holding member 30 is formed with a shoulder 32 which fits over the rim portion 28 of the case, the relationship being such that the rim is retained between shoulder 32 and the upper surface of support member 31.

As shown in FIGURE 3, a portion of the support member 31 has an upwardly-convergent frustoconical opening 33 adapted to receive percussion cap 21. Such cap is introduced into a position beneath opening 33 by means of a slide 34 having an opening therein into which the cap 21 is previously disposed. A plunger 36 shifts upwardly through the opening in slide 34, and through opening 33, to press-fit the cap 21 into recess 20 in the cartridge case.

As shown in FIGURE 4, a metered amount of powder 27 is then fed downwardly into the open upper end of the case, by means of a suitable charging apparatus, not shown. The amount of powder is insufficient to completely fill the chamber 24 within the cartridge case, so that adequate room remains between the powder and the lip 17 for reception of wad 11. However, the case should be substantially filled with powder.

Referring next to FIGURE 5, a previously die-cut wad 11 of the above-specified multi-cellular expanded plastic material is suitably supported near the upper end of body 16 and coaxially thereof. For example, the wad may be supported in an opening in a suitable feeding device which indexes to a position above the case. Thereafter, a cylindrical die or plunger 37 is brought downwardly against the upper surface of wad 11 and forces the wad into the upper end of the case.

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The outer diameter of the cylindrical die 37 is somewhat smaller than the minimum diameter of bead or lip 17. The outer diameter of the wad 11, when in its normal flat condition shown in FIGURE 5, is substantially greater than the diameter of the bead or lip 17 (at the apex thereof), and is also preferably substantially greater than the inner diameter of tubular body 16. Because of the described relationships, and aided by the conical guide surface 18, the wad 11 automatically dishes upon insertion into the body 16 as shown in FIGURE 6, and remains in slightly dished, press-fit relationship in the body as shown in FIGURE 2.

As an example, given by way of illustration only, the interior diameter of body 16 may be in the range of 0.312 inch to 0.315 inch, whereas the minimum diameter of lip or bead 17 (at the apex) may be in the range of 0.304 inch to 0.307 inch. The outer diameter of wad 11 may be 0.318 inch. The wad should be sufficiently thick that there is no danger of cracking and consequent spilling of the powder during storage and shipment, or during insertion into the gun. It has been found that the wad may be relatively thick and still achieve the advantages of the invention, so that a secure seal is maintained preventing any leakage of the powder 27. For example, the wad may be $\frac{3}{16}$ inch thick.

The powder 27 is preferably flash powder, since this burns very rapidly and does not result in ejection of grains of powder a substantial distance from the gun. When the present blank cartridge, filled with flash powder, is employed in an ordinary blank-cartridge gun, the user may place his hand within two feet of the gun without suffering any injury, and feeling only a slight stinging effect. With a conventional blank cartridge, the above would result in severe injury to the hand.

Referring next to FIGURES 7-10, inclusive, a blank-cartridge gun 41 is illustrated. The gun is conventional in construction except that safety means are provided in the barrel 42 thereof to insure separation of all of substantially all of the beads or cells 12 from the remaining beads, so that the sizes of the particles ejected from the barrel are minimized. FIGURE 7 illustrates the gun 41 a very short period of time after firing, the individual beads 12 being shown a few inches from the end of the gun barrel. FIGURE 8 illustrates the beads 12 a lesser period of time after firing, when the beads are between the safety means and the chamber, whereas FIGURE 9 shows the beads at a time period intermediate that illustrated in FIGURES 7 and 8, when the beads are passing through the safety means.

The illustrated safety means comprises a plurality of cross pins 43-45 inserted through the barrel 42 at spaced points therealong and relatively adjacent the open end. For example, the pins may be spaced approximately one-half inch apart, the pin closest to the barrel end being approximately one inch therefrom. The pins insure breaking up of all wad portions into beads or cells, but permit escape of gases resulting from firing of the cartridge.

As best shown in FIGURE 10, the pins are disposed at angularly-related positions relative to each other, the illustrated relationship being such that the pin sections disposed outwardly from the axis of the barrel are sixty degrees apart. The pins may be press fit, brazed or welded into the barrel after drilling of suitable openings therethrough. The pins may be formed, for example, of a hard steel.

It is emphasized that the blank cartridges of the present invention are suitable for use in any gun capable of firing blank cartridges. This is because the wad 11 breaks up into the individual beads 12 as described in detail above, in response to the explosion of the flash powder 27 within the cartridge. The safety means 43-45, which provide partial obstruction in the barrel, operate to increase the factor of safety and (as stated above) to insure that any beads 12 which still adhere to other beads will be separated as desired.

One example of a plastic which may be employed to form cartridge case 14 is high-density or linear polyethylene.

It is to be understood that the outer surface of the cartridge may be suitably contoured, in conventional manner, to permit a single cartridge to be employed in different types of guns. Thus, a single cartridge may be used in a 45-70, a 44, and a 45 long Colt.

The use of the term "bead" or "lip," in the present specification and claims and relative to the element 17, also denotes constructions in which the bead or lip is not continuous. Thus, the bead may be formed of a plurality of internal projections.

The foregoing detailed description is to be clearly understood as given by way of illustration and example only, the spirit and scope of this invention being limited solely by the appended claims.

I claim:

1. A blank cartridge adapted to be fired at a person at short range without causing substantial pain or injury to such person, said blank cartridge comprising:
 - a generally tubular cartridge body having an open end and a closed end,
 - a charge of rapidly-burning flash powder disposed within said body adjacent said closed end thereof,
 - percussion-responsive means provided in said closed end of said body to ignite said powder, and
 - wadding provided in said body between said powder and said open end to prevent said powder from shifting out said open end during storage, shipment and loading of the blank cartridge,
 - said wadding being the only barrier between said powder and said open end whereby said wadding will be expelled immediately through said open end in response to ignition of said powder, without creating substantial compression in said cartridge,
 - said wadding consisting essentially of a mass of lightweight, expanded synthetic resin adapted to prevent shifting of said powder through said open end during storage, shipment and loading of the cartridge, and further adapted to separate into a large number of small, lightweight, harmless pieces in response to ignition of said powder.
2. The invention as claimed in claim 1, in which said wadding is composed of heat-expanded beads of a synthetic resin having a raising agent in homogeneous dispersion therein.
3. The invention as claimed in claim 2, in which said synthetic resin is polystyrene.
4. The invention as claimed in claim 1, in which said wadding is a disc die cut from a multi-cellular sheet

composed of heat-expanded beads of synthetic resin, the beads in said sheet being adherent to each other.

5. The invention as claimed in claim 4, in which said synthetic resin is polystyrene.

6. The invention as claimed in claim 1, in which said wadding is formed of heat expanded beads of synthetic resin containing a volatile substance in homogeneous dispersion therein.

7. The invention as claimed in claim 6, in which said synthetic resin is polystyrene.

8. The invention as claimed in claim 1, in which said cartridge body is injection-molded plastic.

9. The invention as claimed in claim 8, in which said cartridge body is provided at said open end with radially-inwardly extending retaining means for retaining said wadding within said body prior to ignition of said powder.

10. A blank-cartridge gun, which comprises:

a gun having a barrel portion, and safety means disposed across said barrel portion to aid in breaking up the wad ejected in response to firing of a blank cartridge in said gun,

said safety means comprising obstruction members extending transversely of said barrel and serving to provide obstructions for said wad while permitting escape of gas from said gun,

said obstruction members comprising a plurality of pins disposed diametrically across said barrel at spaced points therealong and oriented at substantially different angular positions relative to a plane containing the axis of said barrel,

said gun being combined with a blank cartridge having a wad adapted to separate into a substantial number of components in response to firing of the cartridge,

said wad being formed of multi-cellular expanded plastic.

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