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PRIMER ASSEMBLY

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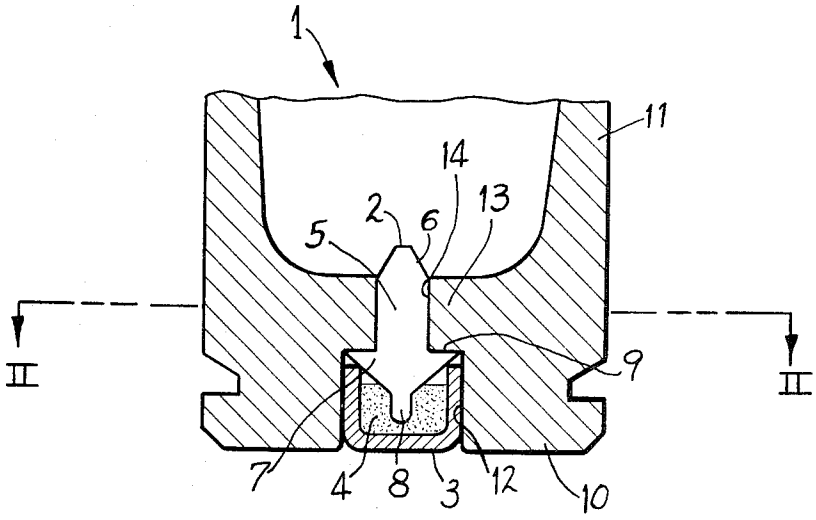


FIG - 1

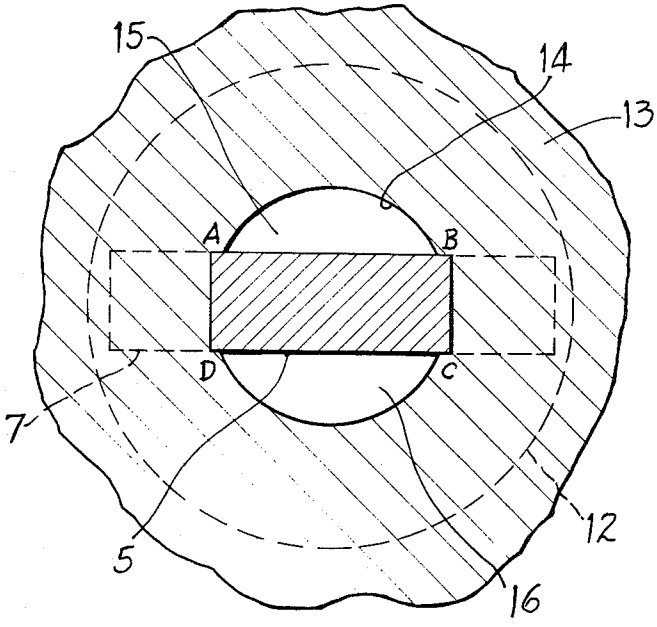


FIG - 2

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PRIMER ASSEMBLY

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This invention relates to ammunition primers for percussively igniting primed cartridge cases and to an improved method of so priming cartridge cases.

In center fire ammunition, which is characterized by a head structure of metal, among the important requirements are that the included parts, especially the anvil, be maintained in proper association to achieve ignition reliably and effectively and that the structure at the primer must be able to resist the pressure developed when the primer burns.

Accordingly, an object of this invention is to provide a stronger head structure at the primer in cartridge cases of all calibers, including even the smallest, where the problem of both elastic and plastic expansion of the case faster than the expansion of the primer cup is accentuated particularly when higher propellant pressures are employed in a cartridge case of small diameter, irrespective of the bullet caliber.

Another object is providing a simplified primer of small size but adequate volume for effective priming.

Another object, therefore, is the provision of a new method of priming cartridges which will provide a simple and reliable primer assembled with ease and economy.

Still another object is the provision of a new primer structure having exceptional uniformity of dimensions and sensitivity and which will reliably ignite the priming composition with exact uniformity while effectively retaining the primer's metallic components and the gases resulting from the ignition.

These and other objects are attained by a novel construction constituting a significant improvement over the type of primer shown in U.S. Patent Nos. 92,795 and 94,210, characterized by an anvil having a leg extending through the flash hole or vent in the base of the case.

Where these prior art primers have an anvil with a stem fitting relatively loosely in the flash hole to adapt the cartridge for repriming and reloading, the improvement of this invention involves staking a new and improved anvil configuration in a novel way in the head of a case to obtain both longitudinal and lateral support for the anvil while maintaining the necessary communication at the flash hole between the priming composition and the charge of propellant in the charger case.

How this is done will become apparent from a description of a preferred embodiment with reference to the attached drawing in which:

FIG. 1 is a longitudinal sectional view of a base portion of a cartridge case at the head;

FIG. 2 is a fragmentary and enlarged view taken on line II—II of FIGURE 1.

Cartridge **1** has at its head a metal base **10**, and joined thereto is the conventional cylindrical wall **11** which is integrally formed with the base for containing the usual propellant charge. The solid base is formed with a central primerpocket **12** and has a perforated web portion **13** between the pocket and the cartridge powder cavity. The perforation through the web portion is a central flash passage **14**, forming a hole of smaller diameter than that of the pocket.

Emplaced within the head is the anvil **2** and the primer cup **3**, the latter being held by frictional or other means, and being loaded with a percussion sensitive mix **4**.

The anvil is disposed to extend into both the pocket and flash hole; it has a shank **5** having substantially parallel sides extending over the full length of the passage **14**. Shank **5** is adapted to be firmly staked in the flash hole **14** by cutting into the metal of the web portion **13**; for this purpose the shank is slightly tapered in width. One extremity is beveled at **6** to form a short guide means for aiding pressing of the anvil into the cartridge case. At the opposite end the anvil has a projecting point **8** for extension into the primer cup and coaction with a suitable primer mix **4**. Between these ends, the anvil has an enlargement **7** providing a shoulder **9** for accurately bottoming and positioning the anvil. Opposite the shoulder the enlargement **7** is cut away on a bevel or a curve so as to minimize the portion of the volume of the cup occupied by the anvil thus providing a generous volume for receiving an adequate amount of the primer mix, despite the fact that this construction is generally adaptable for cartridges of small diameter at the head having a primer pocket and cup of reduced diameter.

In contrast to the conventional type of primer as shown in U.S. Patent Nos. 208,589, Gardner; 962,888, Buell; and 1,571,510, Dickerman and where the anvil occupies around 40% of the primer cup volume in this type of ammunition, the primer construction of this invention utilizes only around 10% of the cup for reception of the anvil projection.

Where with such a relatively wide conventional primer it is necessary to have a coned anvil involving blanking, bending, drawing, or swaging to make the anvil point supported by two or more legs between a like number of flash notches of the anvil, which must be press fitted into the cup in a precision assembly involving two small diameters held to very close tolerances, in contrast the relatively slender anvil **2** is merely blanked to final finished shape and size and pressed into the flash hole **14** into final position rather than into the usual preassembly with the cup which must then be pressed in turn into the pocket. Thus, the problem of tolerances is largely eliminated and the primer is completed with remarkable uniformity by merely press fitting in the reduced diameter cup **3** carrying mix **4** in a condition suitable for safe assembly. Dimensional variation from metal spring back and flexing is avoided.

As a result, the diameter of the cup **3** and pocket **12** can be reduced by about a third to give more strength at the base **10**. Even at higher propellent powder pressures, dropped primers and leaky primers were eliminated. The added metal grip on the anvil at web **13** makes for consistent sensitivity and firing.

Where in the conventional primer the flame must flow in a circuitous path around the wide spread configuration of the anvil before it reaches the flash hole, the primer of this invention in contradistinction offers less obstruction to the passage of the flame straight from the cup to the flash openings **15** and **16**. Since this reduces the heat and energy lost, the primer efficiency is improved.

The anvil shank **5** of this primer is of rectangular cross section, i.e. it is of a width in excess of the thickness, and its dimension of width is substantially equal to the diameter of the flash hole **14**, so that diagonally from A to C, or B to D, it is slightly in excess of the hole diameter and will cut into the web **13** and stake itself rigidly upon being pressed into the flash hole to divide it into the two adequate openings **15** and **16** left since the thickness from A to D, or from B to C extends over only part of the diameter, preferably not more than 40% of it, but not less than 30% of the diameter. For example, in a flash hole having a diameter of about 0.060 of an inch, a thickness of a typical anvil from 0.018 to about 0.020 of an inch was found satisfactory together with an anvil width of about 0.060 of an inch.

An anvil width about three (3) times its thickness

is contemplated for providing both desired anvil rigidity and desired freedom of flash passage. The shank length shown is about twice the width.

By employing staking over substantially all the shank and flash hole length together with bottoming at the shoulders **9**, anvil **2** is positively anchored in the case head not only against slippage lengthwise but also against tipping. Unlike prior art anvils with a "stem" extending rather loosely in the flash hole, the present primer anvil is not adapted to facilitate extraction of the exploded primer by pressing on the stem. Moreover, it avoids the obstruction frequently offered by this type of prior art anvil, which at that time suggested the need for a tiny central flash passage in the already minute stem of these anvils. Unlike the prior art, anvil **2** cannot tip to shut hole **14** and is anchored straight in the case and anvil anchoring, independently of the anchorage of the cup **3**, has the advantage of avoiding difficulties of preassembly, for example, either by crimping the cup in under the anvil head, or by precision fitting of the anvil inside the cup. By staking, all desired accuracy, nevertheless, is achieved, together with consistent sensitivity.

For the best cutting or indenting to stake the anvil, the substantially parallel sides of shank **5** preferably are slightly tapered on a side at a rate of about 1 in 40 giving an over all divergence of about 1 in 20 from a width substantially equal to the flash hole diameter adjacent beveled end **6** to the greatest excess adjacent shoulder **9**.

For example, for a flash hole having a nominal diameter of about 0.060 of an inch, the shank width varies from about 0.060–0.061 of an inch adjacent end **6** to about 0.064–0.065 of an inch next to shoulder **9**.

At the enlargement **7** there is no problem of clearance or fit in the pocket **12**, because the width of the enlargement is made sufficiently smaller than the pocket diameter. In a pocket having a diameter of 0.120 of an inch, for example, the width of enlargement **7** is about 0.100 of an inch.

The anvil has a thickness less than any part of its width except that of the percussion projection **8**. In any event, the cruciform anvil shown is preferred.

What is claimed is:

1. A primer assembly comprising

(a) a cartridge case having a propellant cavity and a head recessed and perforated to define, respectively, (1) a primer pocket extending inwardly and peripherally to a thickness of web in said head and (2) a flash hole reduced laterally with reference to said pocket and having sides extending longitudinally over a length of communication through said web between said cavity and pocket, said hole defining with said web at said pocket a transversely extending shoulder,

(b) a primer cup disposed in said pocket in opposed relation to said flash hole, said cup having an outer end wall and a peripherally extending side wall engaged in pocket sealing and retained relationship with the head of said case,

(c) an elongated anvil in engagement with said case in spaced relation with respect to said end wall, said anvil having a percussion projection on one end extending into said cup adjacent said end wall, a reduced extension forming a substantially parallel-sided blade on the opposite end staked within said flash hole to provide said anvil engagement by indentation of said case by said extension at peripherally spaced intervals over substantially all of said length, said extension filling only part of said hole to provide flash openings peripherally spaced in alternation with said spaced indentation, said anvil having an enlargement intermediate said ends for seating of said anvil on said web over only part of said shoulder,

(d) and a charge of primer mix contained in said cup and substantially filling the cup volume between said cup walls and said anvil.

2. The primer assembly of claim **1** wherein the anvil has a cruciform shape and thickness less than any part of its width, exclusive of the percussion projection.

3. The primer assembly of claim **1** wherein the anvil extension forms a blade slightly tapered over the length of engagement with the web on a pair of opposite sides and sharply tapered at the tip to facilitate staking the anvil in the flash hole.

4. The primer assembly of claim **3** wherein the blade is longer than the flash hole length and wherein the tip extends into the propellant cavity.

5. The primer assembly of claim **1** wherein the primer anvil occupies not more than about 10% of the cup volume and wherein the charge of primer mix between the cup walls and said anvil occupies up to 90% of said volume.

6. A primer assembly comprising

(a) a cartridge case having a propellant cavity and a head centrally recessed and perforated to define, respectively, (1) a round primer pocket extending inwardly and peripherally to a thickness of web in said head and (2) a round flash hole reduced laterally with reference to said pocket and having straight sides extending longitudinally over a length of communication through said web between said cavity and pocket, said hole defining with said web at said pocket a transversely extending shoulder,

(b) a primer cup disposed in said pocket in opposed relation to said flash hole, said cup having an outer end wall and a circumferentially extending side wall engaged in pocket sealing and retained relationship with the head of said case and in spaced relation from said shoulder,

(c) an elongated cruciform anvil of sheet metal in engagement with said case in spaced opposed relation with respect to said end wall, said anvil having a percussion projection on one end extending centrally into said cup adjacent said end wall, a reduced extension forming a blade on the opposite end of rectangular cross section centrally staked within said flash hole to provide said anvil engagement by indentation of said case by said extension at peripherally spaced intervals over all of said length, said extension filling only part of said hole centrally to provide flash openings peripherally spaced in alternation with said spaced indentation, said anvil having an enlargement intermediate said ends for seating of said anvil on said web over only part of said shoulder,

(d) and a charge of primer mix contained in said cup and substantially filling the cup volume between said cup walls and said anvil.

7. The primer assembly of claim **6** wherein said blade extension has a thickness of at least 30% but not more than 40% of the flash hole diameter and a width at least that of said diameter for indentation on a pair of opposite sides of said extension.

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