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CLOSING PLUG FOR SEMI-FIXED AMMUNITION

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Fig. 1.

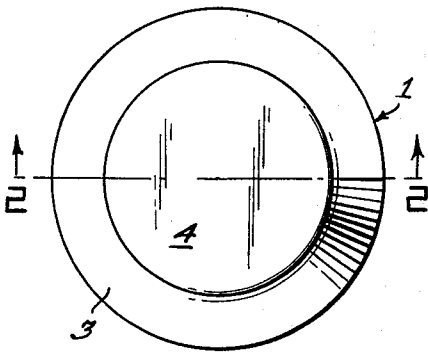


Fig. 5.

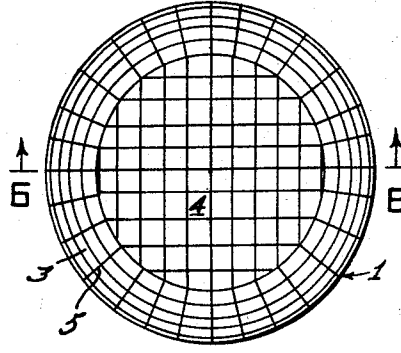


Fig. 2.

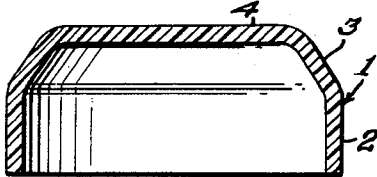


Fig. 6.

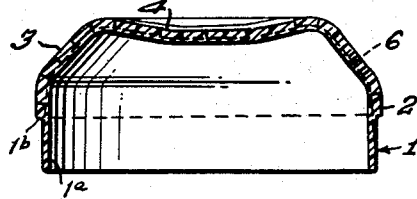


Fig. 3.

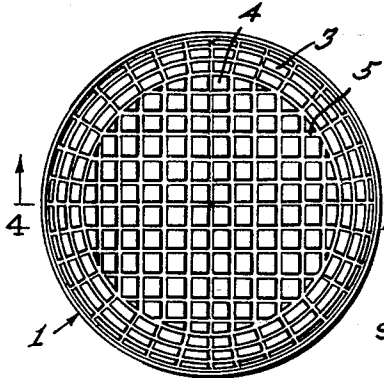


Fig. 7.

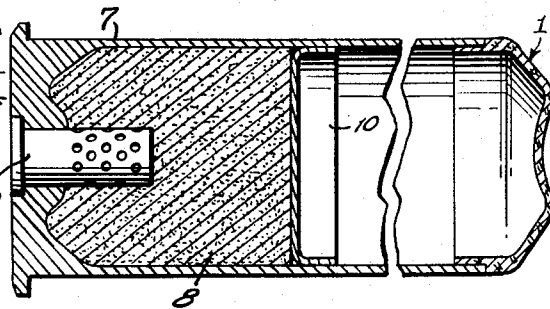
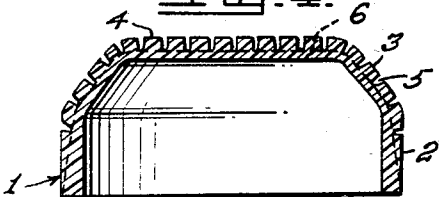


Fig. 4.



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1

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CLOSING PLUG FOR SEMI-FIXED AMMUNITION

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2 Claims. (Cl. 102—43)

(Granted under Title 35, U.S. Code (1952), sec. 266)

This invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon.

This invention relates to a closing plug for semi-fixed ammunition and more particularly to a closing plug of a composition material shaped and positioned to act as a powder retainer for ammunition of the semi-fixed type.

In ammunition of this type, the projectile and cartridge case are issued, assembled and are loaded into the gun as a unit, the cartridge case is not permanently attached to a projectile, but may be removed when dictated by conditions of use, for the purpose of varying the amount of propelling charge. In such situations, where the volume of propellant used is less than the corresponding volume of the cartridge case, a closure plug is employed to maintain the propellant in a compact body in the rearward portion of the case and in detonating relation with the primer.

Closure plugs for cartridges have heretofore been fabricated from paper, cork and the like, which lacked the necessary strength, and resistance to moisture, fire or solvents.

The present invention has for its purpose to provide a closure plug essentially composed of an intimate mixture of about 60% phenolic resin, of the type of resin made from phenol and aldehydes, such for example, a phenol-formaldehyde or resins of the type commercially known as "Bakelite," and the remainder of northern kraft pulp.

After moulding into shape and drying, the preform is subjected to a hot wire screen which burns a waffle-like grid to a prescribed depth on its outer surface to provide controlled fragmentation of the plug upon firing the cartridge. The gridded plug is then subjected to pressure of from 1500 to 2000 p.s.i. in a steel die, preheated to 300° F., to set the resin and to bond the fibrous pulp into a hard, strong, homogeneous piece.

It is a principal object of the invention to provide a plug, impervious to moisture, solvents and possessing fire resistant qualities.

A still further object of the invention is to provide a plug as aforesaid, having a grid of waffle-like scores or weakened lines whereby the fragmentation pattern of the plug on firing of the cartridge, is predetermined or controlled.

Another object is to provide a plug forming a hard, strong, homogeneous piece of material having a good impact resistance for high speed ramming.

Other objects and features of novelty will be apparent to those skilled in the art from the following description and drawing, it being expressly understood, however, that the invention is in no way limited by such description and drawing or otherwise than by the appended claims.

Referring to the drawing in which similar reference numerals refer to like parts:

2

Figure 1 is a top plan view of a closure plug constructed in accordance with the invention;

Figure 2 is a cross sectional view along line 2—2 of Figure 1;

Figure 3 is a top plan view of the plug of Figure 1 after the grid has been burnt therein but before treatment under heat and pressure;

Figure 4 is a cross sectional view taken along line 4—4 of Figure 3;

Figure 5 is a top plan view of the plug after treatment under heat and pressure;

Figure 6 is a cross section taken along line 6—6 of Figure 5, and

Figure 7 is a longitudinal cross section taken through a semi-fixed round illustrating the plug of the invention as applied therein.

The plug forming the subject matter of the invention and generally indicated by 1 in the drawing, may assume various shapes consistent with the design of the cartridge. The general shape shown in the drawing illustrates one satisfactory embodiment thereof. The plug 1 is substantially in the form of a one-piece cup or hollow piston having a side wall 2, a beveled wall 3 and a closed end 4. 5 indicates a grid formed in the surfaces 3 and 4 and is formed to a depth indicated at 6 as best seen in Figure 4. As seen in Figure 7 the plug 1 is mounted in a semi-fixed round of ammunition comprising a shell 7 having a charge 8 and primer 9.

In fabricating the plug, a pulp comprising an intimate mixture of approximately 60% phenolic resin and 40% kraft pulp is preformed as by pressing into the general shape of the plug as indicated upon Figures 1 and 2. The dried preform is then subjected to the burning action of a red hot Nichrome wire grid, not shown, until the grooves or channels thus formed have a depth approximately three-quarters of the thickness of the formed blank, whereby the outer surface of the blank has a waffle-like pattern of intersecting grooves or channels. The grooved blank is then hot-pressed or moulded under a pressure of approximately 1500 to 2000 p.s.i. in a steel die heated to 300° F. This operation densifies the plug material and closes up the grid pattern (as best seen in Figure 6) during the setting of the resin, which bonds the kraft pulp and resin into a dense hard, homogeneous structure, wherein the grid pattern is undisturbed.

As shown upon Figure 6, the plug is formed with a skirt portion 1a of reduced thickness defining an annular shoulder 1b. The skirt portion has an outside diameter about the same as the inside diameter of the mouth of the shell 7.

In assembly of a round, the desired amount of propellant is placed within the shell 7, a wad is inserted to retain the propellant in position, suitable cement is applied to the exterior surface of the skirt portion 1a, and the plug is inserted into the shell until shoulder 1b abuts the end of the shell.

The resulting plug is satisfactorily resistant to frontal impact, abrasion and the like, but will shatter into a fragmentation pattern determined by the grid lines, upon detonation of propelling charge 8.

From the foregoing, it is apparent that the stated objects are realized and that I have provided a closure plug for a cartridge which is tough, strong, effective in confining the propellant charge in the base of the cartridge casing and which readily shatters into a large number of fragments when the charge is detonated.

While a preferred embodiment of the invention has been described and illustrated, it will be apparent to those skilled in the art, other modifications may be made without in any way departing from the spirit of the in-

vention, for the limits of which reference must be had to the appended claims.

What is claimed is:

1. The method of forming a closure plug for a semi-fixed round of ammunition including a casing comprising, molding an intimate mixture of 60% phenolic resin and 40% kraft pulp into a cup-shaped preform having a side wall, a beveled wall and an end wall, said side wall having an upper portion and a lower portion, burning a grid of channels into said end wall, beveled wall and the upper portion of said side wall, to a depth of $\frac{3}{4}$ the thickness of said preform, and thereafter subjecting said preform to heat and pressure to permanently reduce the thickness of said preform and, bond said mixture into a dense, hard, homogeneous structure, and close up said channels in said grid pattern while leaving said pattern undisturbed, said side wall to define after said pressure a smooth skirt along its lower portion of less thickness than the upper portion thereof, said skirt portion having an outside diameter substantially equal to the inside diameter of said casing of said semi-fixed round of ammunition.

2. A closure plug for a casing of a semi-fixed round of ammunition including a shell comprising a unitary cap-shaped member having a side wall, a beveled wall and an end wall, said side wall having an upper portion and a lower portion, said side wall defining a smooth skirt along its lower portion of less thickness than the

upper portion thereof, said skirt portion having an outside diameter substantially equal to the inside diameter of said shell of said semi fixed ammunition, said member being weakened on the outer surface only of said end wall, said beveled wall and the upper portion of said side wall along two sets of mutually normal intersecting closed-wall channels, said sets of channels being parallelly spaced, whereby said member will shatter in a predetermined pattern on detonation of a propelling charge confined therein.

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